PAPER TEMPLATE FOR THE 2016 SOUND AND MUSIC COMPUTING CONFERENCE

First author
Affiliation1
author1@smcnetwork.org

Second author
Affiliation2
author2@smcnetwork.org

Third author
Affiliation3
author3@smcnetwork.org

ABSTRACT

Place your abstract at the top left column on the first page. Please write about 150–200 words that specifically highlight the purpose of your work, its context, and provide a brief synopsis of your results. Avoid equations in this part.

1. INTRODUCTION

Sound is by nature both temporal and spatial but, in the history of music, the temporal aspects have played a predominant role while spatial dimensions have occupied a subordinate, albeit sonically defining, place. The recent roots of spatialization originate in sound for cinema during the 1940s. Later, beginning in the 1950s, electroacoustic music also emerged as an important parallel factor in the development of multichannel sound diffusion techniques and practice. Notably, concurrent with the development of electroacoustic music, space was established as a new parameter of musical material, joining frequency, duration, dynamics and timbre.

Multi-speaker systems allow for the creation of virtual spaces for sound diffusion, and research in loudspeaker design, acoustics, psychoacoustics, and cognition during the last decades has greatly advanced the understanding of the resultant complex experience of such systems. Today, through these fields of inquiry and improved technologies, it is possible to more rigorously investigate the relations between sound, space, location and direction. That said, the use of both natural and architectural spaces from caves to cathedrals, concert halls and anechoic chambers have, of course, been purposefully exploited and designed for their acoustic and spatial characteristics over the centuries (see Dyrssen 2014, Hellstrm 2011). And, historically, musical works with spatialized groups of musicians have also been composed including pieces by prominent composers ranging from Gabrieli, Mahler and Ives to Stockhausen, Varese, Xenakis and Cage (Harley 1994). What distinguishes spatialized instrumental and vocal music (ensembles in different locations in one room) from spatialization for the cinema and electroacoustic music is the technological delivery and the distinction between the composed and performance spaces. (Smalley 1997, Emmerson 1998, Smalley 2007)

Cinematic sound has been a driving force from the early Disney classic Fantasia (1940) and This is Cinerama (1952) to Star Wars (1977), which introduced the Dolby Stereo and led to other surround formats including 5.1, 7.1, and onwards to the cutting edge development of todays immersive 3D- audio systems, Dolby Atmos and Auro 3D. The motivation for multichannel reproduction is based in part on the need for a commensurate sonic space to match the visual dominance of the increasing size of projection screen formats. Moreover, the development of strict formats for cinema has been mandated by the need for standardized equipment for both image and sound in movie theaters throughout the world as well as for distribution of digital media such as DVD and Blu-Ray discs.

Within the musical sphere, monaural, stereo and quadraphonic formats remain, but eight channels and its multiples are now more prevalent in electroacoustic production and performance contexts. Larger configurations are, by no means, standardized and include periphonic (dome) and cylindrical systems and the venerable Acousmonium, a loudspeaker orchestra concept used by GRM in Paris. Composers and performers have learned to adapt to differing loudspeaker configurations just as they have accommodated varying conditions at acoustic concert spaces.

Over the last six decades, a number of large systems designed for spatialization have emerged at universities, cultural institutions and elsewhere.1 IRCAM (Institut de Recherche et Coordination Acoustique/Musique) in Paris was built in 1977 and came to epitomize the new concert hall paradigm with variable acoustics, and high-tech audio facilities, including, of course, surround sound audio. ZKM (Center for Art and Media) in Karlsruhe, Germany has constructed the Klangdom, a flexible arrangement of up to 42 loudspeakers, which are digitally controlled by software. SARC (Sonic Arts Research Center) at Queens University in Belfast opened in 2004 with a special concert featuring the electroacoustic music of Karlheinz Stockhausen. SARC is unique in that sound is projected from all directions from 48 loudspeakers including below the audience. The MUMUTH at the University of Music and Performing Arts, Graz was inaugurated in 2009 and provides a remarkable design for music and intermedia that bears resemblance to KMH's new facilities. Others systems are (relatively) mobile in character, including BEAST at the University of Birmingham and HISS at the University of Huddersfield. The capacity to combine permanent and mobile elements is also possible and often used.

All of the aforementioned are technical constructions but

their ultimate applications are intended to articulate artistic expression in space. Among the goals of spatialization are a) to localize sounds in a listening space, b) to articulate sound as an object convincingly from a 3D perspective and c) to create a spacious and immersive musical experience. Indeed, the overarching goal of increased aural realism is also coupled to the imaginative potential for hyper- or surrealistic effects.

While spatial properties of sound has not been at the fore in music historically speaking, in sound art it space is commonly one of the main attributes of sound. Sound artist Maryanne Amacher points at how in regular music you don't have any models to learn about spatial aspects. Music does not have distance, direction, nothingness or closeness she argues. Her contribution to the field of perception of sound in space is significant and the current project may be seen as an attempt to bridge the gap between the high temporal resolution of musical events in electroacoustic music with the sophisticated conceptual spatial resolution of sonic art. Parallel to developments in sound diffusion, recording techniques beyond stereo emerged to capture sound in greater spatial detail. The Soundfield microphone, for instance, is based on the pioneering work of Michael Gerzon and at the root of ambisonic techniques. Current work has moved on from quadraphonic channel capture and reproduction to high-order ambisonics (HOA) for greater resolution and supported number of loudspeakers. (Barrett 2010)

2. INTRODUCTION

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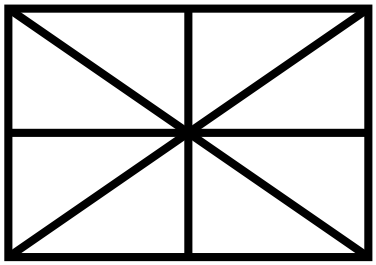

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should be on the right side, in parentheses.

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Acknowledgments

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