

Institution: University of Surrey		
Unit of Assessment: 33 Music, Drama, Dance, Performing Arts, Film and Screen Studies		
Title of case study: Driving New Directions in Spatial Audio Art		
Period when the underpinning research was undertaken: 2012-2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Anthony Myatt	Role(s) (e.g. job title): Professor of Sound	Period(s) employed by submitting HEI: September 2012 – present
Period when the claimed impact occurred: 2014 - 2020		
Is this case study continued from a case study submitted in 2014? N		
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p>Myatt's ground-breaking research on state-of-the-art 3D sound projection methods and production techniques has resulted in a large body of unique and award-winning works of sound art. Works have been exhibited in some of the world's most prestigious art galleries and at major international cultural events. Myatt's work has achieved global cultural impact and impacted artistic and curatorial practices. Furthermore, immersive spatial audio projections of wildlife and natural phenomena have promoted international awareness of the conservation of species, of threatened habitats, and the awareness of sound pollution in the oceans.</p>		
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>Myatt's practice-based research in spatial audio production integrates both technical and aesthetic research questions. It moves beyond the notion of spatial sound reproduction as a primarily technical research problem to consider the content, recording methods, the technical and artistic composition of works and their means of reproduction as an integrated whole; to establish production methods which can appeal to human spatial audio perception (HSAP).</p> <p>Myatt's research introduces spatial considerations at all stages of the artistic production process: from the conception of a work, its pre-production, field recording and studio production, to post-production, sound reproduction and loudspeaker installation in art galleries and exhibition/performance venues [S1, S2, S3].</p> <p>The research underpinning this case was preceded by a period of theoretical research relating to the psychoacoustics of human spatial-audio apprehension (Myatt/Lennox, 1999-2011). This previous body of work established the practice-research questions whose solutions are articulated in the body of sound installations and performances described [R1-R5, S1-S6], and in the resulting spatial audio production methods.</p> <p><i>"Prof. Myatt's research stands out in merging science, engineering and art and contributes significantly to the understanding, creation and presentation of highest-level spatial audio works."</i> [S5]</p> <p>Novel air-based recording methods to preserve spatial audio information</p> <p>Research insights relating to the nature and preservation of spatial audio information have spurred collaborative field recording projects, such as capturing the audio soundfields and infrasound generated by elephants in Amboseli National Park, Kenya 2016 [R6, S3]; and the use of Myatt's native-B-format Ambisonic hydrophone array [A and <i>Hy Brasil</i> (2014)] for underwater spatial audio capture, to provide access to otherwise unperceivable underwater sound environments (e.g., those of Humpback Whales, dolphins, coral reef fish—variously recorded in the seas off the Dominican Republic, Cocos Islands, Miami and Belize). [R1, R2, R4, R5]</p>		

The derivation of bespoke audio signal processing software

A number of multiparametric spatial audio attributes have been implemented in the works described, including methods to support the delivery of perceptually significant audio attributes, e.g., to achieve “audio looming” [R1, R2]. The artists’ former use of mono or stereo recordings, amplitude-panned to discrete loudspeakers, has been replaced by complex, spatially encoded methods which combine, scaled and layered soundfields to generate spatially-rich environments to promote a “powerful sense of place” [R1], e.g., to reorient listener (mic) positions and the perceived perspective of soundfields within Ambisonic recordings [R4 and *Rising tides*]. The production of such works has also been supported by bespoke audio software created by Myatt for use in their personal production studios [S1, S2].

The design, implementation and integration of appropriate loudspeaker reproduction technologies.

Research insights have established methodologies to create multifaceted spatial environments, consisting of carefully selected proximate, foreground, midground and background elements to support HSAP, including methods to time-align and compensate loudspeaker reproduction systems for venue acoustics, architectures and outdoor sites [e.g., R2, R5].

In 2019 Myatt realised a world-first live-performance system that integrated full-spectrum fifth-order High-order Ambisonic (HOA) sound reproduction of 64 independent audio channels, with a 496-audio-channel Wavefield Synthesis (WFS) system and infrasound generation at EMPAC, US [R1, S1, S5]. The system implemented a high-precision surrounding and multi-faceted sphere of sound as a mid/far-field component, used WFS to project proximate audio materials to within ~5cm of the audiences’ ears, and infrasound to provide access to animal communication behaviours of whales and elephants using purpose-built infrasound reproduction units [S3]. Spatial audio materials and control systems were produced for each of these reproduction elements, to support the presentation of a holistic, spatially-rich audio environment.

“The resulting experience [of R1] was for everyone – audience, artists, the EMPAC production team and myself – aesthetically and technologically stunning.” [S5]

3. References to the research (indicative maximum of six references)

- [R1] *Okeanos/Sanctuary* (2019), spatial audio performances, *The Powers of Nature*, 20-22 March 2019, EMPAC Concert Hall, RPI, Troy, NYS. US. In collaboration with Chris Watson.
- [R2] *Transmission* (2017), site specific sound installation for GES-2 turbine hall, Moscow. Commissioned by VAC Foundation, Moscow for launch of GES-2 Gallery, Moscow, Ru. In collaboration with Jana Winderen.
- [R3] *Hrafn* (2015, 2019), outdoor, site-specific forest audio installation, 2015 Kielder Forest and 2019 Hastings Caves, Tasmania, Au. In collaboration with Chris Watson and The Wired Lab.
- [R4] *The art of listening: Underwater*, (2019) site specific sound installation, Collis Park Rotunda, Art Basel Miami. Commissioned by Audemars Piguet, in collaboration with Jana Winderen.
- [R5] *Dive* (2014), site specific installation Park Avenue Road Tunnel, NY. Commissioned New York Department of Transportation. In collaboration with Jana Winderen.
- [R6] *Sanctuary/Cemetery*, live film incorporating live spatial audio performance, Tank 2, January 2017, Tate Modern, London. Commissioned by Tate Modern, Soda Film, Wellcome Foundation. In collaboration with Chris Watson and Carlos Casas.

Indicators of research quality include:

- the large number of commissions for these works by world-leading international curators and exhibition venues [9]: e.g. inc. ZKM, Germany (2015); Museum of Modern Art (2013), NY, US; Summer Streets Festival, Park Ave Rd Tunnel (2014), NYDT, NY, US; Tate Modern (2019), UK; Dark MoFo (MONA) Australia (2019); GES-2, Moscow (2017), VAC Foundation, Ru; Le Fresnoy (2018), France; Oceans'21 (2019), Berlin [6], commission for "Seaphony" a new work to launch the UN Decade of Ocean Science 2021; Art Basel, Miami (2019) US, commissioned by Audemars Piguet.
- A 3-part documentary about the fieldwork expedition for Seaphony [S6] with Chris Watson 2020, Guardian newspaper podcast series (14 million subscribers worldwide).
- MIT Press invited book chapter Sound Pavilions, for Sound Art (MIT Press 2019, ISBN-9780262029667), to document spatial audio production practices resulting from this research, and to discuss both the history and potential future of spatial audio installation;
- Recordings of spatial audio performances of Okeanos and Sanctuary used to demonstrate the state-of-the-art spatial audio capabilities at EMPAC, RPI, US, the world's leading experimental performing art development centre [S5].
- Two works acquired by nation-state national art collections: Rising tides (2019), acquired by the Norwegian National Art Collection [S2, S4]. The Morning Line, part of the permanent collection of the German-state centre for media art, ZKM, Karlsruhe (2014).
- Sanctuary/Cemetery awarded Prix de la Fondation Culturelle Meta, Prix Marseille Espérance and Mention Spéciale du Jury Lycéens at the Marseille International Film Festival 2019.
- The art of listening: Underwater, listed and described as one of the 'Eight Highlights of Art Basel Miami' by the New York Times, US 2019 (of >2000 exhibits) [S7].

4. Details of the impact (indicative maximum 750 words)

Myatt's practice-based research has encouraged curators to see spatial audio artworks as feasible, impactful in their emotive and experiential reception by audiences, and as a significant new form of artwork that allows artists to present wildlife and natural sound recordings in contexts that are believable, and not obviously mediated by loudspeakers.

1. Cultural Impact

Myatt's research has facilitated a large body of immersive and architectural spatial audio artworks, exhibited throughout the world [S8]. The cultural significance of these works has been recognised by their inclusion in two nation-state national art collections (see above) [S4]. The international demand from art curators to exhibit and commission new spatial audio sound art, and for key cultural events, is also indicative of the cultural impact of this work [R2, R3, R4, R5, S8].

"[Myatt's] research and the outcome of his research are extremely relevant in the contemporary art discourse today, as the interest in sound is growing in art practices, in art theory and for major art institutions. The physicality of the sound experience ... resonates vividly with the notion of embodied spectatorship in the phenomenological approach in art theory." [S7]

"Prof. Myatt's research stands out in merging science, engineering and art and contributes significantly to the understanding, creation and presentation of highest-level spatial audio works." [S5]

Spatial audio works have been disseminated to millions of people worldwide: ZKM visitor numbers, 1.3m since 2014 (at 2019); Summer Streets, Dive, Park Ave Road Tunnel exhibited on three mornings August 2013, 17,300 people (data: Summer Streets Festival), along with exhibits at very high visitor-attraction venues such as Tate Modern (2018) and Museum of Modern Art (2013), New York (20,000/day) [S8].

2. Impact on artistic and curatorial practice

Myatt has conducted and applied his research findings in more than 22 collaborations with artists Chris Watson (UK) and Jana Winderen (Norway).

“Tony’s research findings have enabled me to pursue a new strand of sound installation practice, quite distinct from other approaches...It has also given me the confidence to take on very large-scale projects and installations. This has made not only the issues at stake—the awareness of underwater sound environments and its importance to the biodiversity—but also the quality of the listening experience, in itself in the installations and concerts, of a noticeable quality internationally. ...Installations of this type are now a major component of my artistic output and future commissions for galleries and exhibitions around the world.” [S2]

“As a means of expression, I am particularly interested in spatial audio sound installations to put the listener into the environment of the original recording. Tony’s work in creating multiple loudspeaker arrays and designing the software to deliver these works is crucial to the powerful sense of place conveyed to the audience.” [S1]

The practices of the above artists have been enhanced and expanded by Myatt’s research outcomes [S1, S2] to now include complex, spatially-encoded methods which combine scaled and layered soundfields to support spatially-rich sound environments, projected via large, spatially-encoded loudspeaker arrays [S10].

Widespread programming by leading international curators acknowledges the potency of the sound works resulting from this research [S8]. Myatt’s research has also facilitated works of a consistently high-quality of sound reproduction and technical reliability that has provided curators with the confidence to present works of spatial sound art in extended and major exhibitions [R2, R3, R5, S8].

3. Conservation awareness and reach

The exhibition of each work [S8] has spurred critical discourse relating to the aesthetics of sound art and to conservation in the press and media [S7, S8]. The spatial dimension of works underpinned by Myatt’s research allow audiences to be enveloped in rich, high-quality sound environments and to very quickly engage with the subject matter of the work. International curators have been quick to acknowledge the potency of spatially-rich and immersive sound installations which fully occupy architectural space.

“[The Art of Listening: Underwater (Miami)] makes the sea’s natural wonders and man-made stresses surprisingly visceral for locals and visitors alike.” Schneider, Artnet Magazine, US, (2019).

As Pernet described above, the awareness of conservation themes and listener engagement is enabled by Myatt’s spatial audio production methods [S7]:

“The Art of listening: Underwater provides visitors with a unique opportunity to listen closely to the ocean’s inhabitants and to reflect upon the ways in which human activity interferes with underwater life...to bring awareness to the ocean’s increasingly fragile ecosystem and to how environmental concerns are localised within this seaside community.” [S9]

“[Winderen and Myatt] highlight soundscapes that are otherwise hidden from us and makes them accessible. With this, they promote a new form of awareness around the soundscapes, but also what effect man-made noise pollution can have for them.” [S10]

The efficacy of the works’ phenomenological experience is evident in subsequent discourse in the international press around the themes of the installations, e.g., The Wall Street Journal, The New York Times, Miami Herald, Artnet, The Guardian, and numerous online publications such as signemagazine, Subjekt (No) and Artnet.

“Sound is for me a visceral medium and I judge the success of Tony’s work by the enthusiasm of an audience to fully engage in a journey wherever my microphones and Tony’s spatialisation takes them.” [S1]

“This is vital work, especially as pandemic economies continue to grow more dependent on e-commerce and water-borne shipping traffic amplifies noise pollution. In a quarantined world,

spatial sound is crucial to reconsidering our actions on land, to think outside ourselves, where a one-click order on Amazon could have grave consequences.” [S11]

5. Sources to corroborate the impact (indicative maximum of 10 references)

- [S1]** Factual Statement by Chris Watson, sound recordist and artist.
- [S2]** Factual Statement by Jana Winderen, sound artist.
- [S3]** Factual statement by Carlos Casas, filmmaker and artist
- [S4]** Factual statement by Anne Hilde Neset, Curator & Director, Kunsternes Hüs, Norway.
- [S5]** Factual Statement by Johannes Goebel, Director, Curtis R. Priem Experimental Media and Performing Arts Center (EMPAC), Rensselaer Polytechnic institute, Troy, NY, US.
- [S6]** Factual Statement by Diana Schneidermeier, Managing Director, Oceans'21 GmbH, Berlin, Germany.
- [S7]** Factual Statement by Denis Pernet, Art Curator, Audemars Piguet, Switzerland.
- [S8]** Table of spatial audio works, spatial installations and spatial performances 2014- 2020.
- [S9]** Article, Signe Magazine, Miami, US <https://signemagazine.com/artanddesign/audemars-piguet-to-present-the-art-of-listening-under-water-at-art-basel-in-miami-beach-2019/>
- [S10]** Review and description, *Rising tides*, Bjørg Marie Tønnessen, Subjekt, Norway (2019)
- [S11]** Factual Statement by Dave Tompkins, journalist and writer, contributor to New Yorker, Slate and Oxford American.