

Adventures in spatial audio across three acousmatic works: discoveries and new directions

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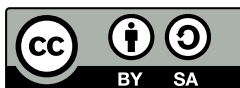
Abstract

This paper explores compositional approaches to space and spatialisation in three acousmatic works. It begins with 'Pellere' (Seddon, 2012), an eight-channel piece focusing on stereo sound deployment alongside the development of multichannel spatial sound identities. The discussion then shifts to 'Traces of Play' (Seddon, 2017), a four-channel work composed with a modified 5.1 system, examining how adopting reduced fixed-format speaker configurations impacts on spatial creativity. Finally, 'Reflecting Cau Cau and Parque Urbano El Bosque' (Seddon, 2021a) uses ambisonic techniques, highlighting unique spatial manipulations and workflow changes. The paper concludes by reflecting on spatial settings, formats and technologies, and considers hybridised compositional approaches.

Keywords: acousmatic; ambisonics; multichannel; composition; spatial setting

1 Introduction

This paper traces an evolving compositional practice regarding space and spatialisation across three multichannel acousmatic works: *Pellere* (2011-12), *Traces of Play* (2016-17), and *Reflecting Cau Cau and Parque Urbano El Bosque* (2021). Each adopts a different spatial audio format — eight-channel, four-channel, and ambisonic — enabling a comparative exploration of how spatial audio technologies shape compositional thinking and practice. The connective strand linking all three works, the spatial setting, is presented in relation to the then available spatial audio approaches and their creative potentials and challenges, demonstrating how technological affordances and constraints feed into an evolving compositional practice. The paper positions the spatial setting as a format-independent compositional concept and considers the potentials of hybrid compositional approaches.



2 Spatial Settings

The notion of the spatial setting (Seddon, 2021b) provides a useful lens through which to view the fundamental spatial-structural thinking across these works. Whilst a setting might be defined as "the manner, position, or direction in which something is set... the time, place, and circumstances in which something occurs or develops" (Merriam-Webster, 2026), it also brings overtones of permanence — an environment engaged with through listening, its features explored as the experience unfolds. The spatial setting is defined by the configuration of constituent sounds, the space(s) they bring, and the sense of a location evoked, whether strongly source bonded (Smalley, 1997) or more remote from reality. Spatial settings evoke temporal permanence and a spatial 'feel'; they might appear already established or might gradually evolve during listening, appearing fleetingly or for longer durations. Crucially, they remain not far from consciousness even when absent. Spatial settings are not audio-format dependent — stereo works such as *Grandeur Nature* (Bayle, 1980) or *Derrière la porte le plus éloignée...* (Gobeil, 1998) effectively navigate between different kinds of setting within spatially-oriented structures. That said, spatial audio enhances compositional potentials for music with an aesthetic focus on space and spatiality, and the means through which spatial structures are articulated.

3 Pellere (2011-12)

The first work under discussion is *Pellere*,¹ an eight-channel work composed using select open source software alongside a digital audio workstation. Three main spatial audio approaches are discussed.

3.1 Panning: individuals and composite groupings

The most broadly familiar technique used involves panning stereo sounds in the eight-channel lateral plane. In the opening passage (0:00–1:20), spectral descents occur around the listening point, conveying different locations in the distal, prospective, panoramic, and circumspatial zones (Smalley, 2007), establishing the scale and boundaries of the environment. Combined with high-frequency attenuation to simulate varying distance, this enables relatively specific placement of sounds at and between speaker locations. The source material is stereo: left and right channels are positioned at distinct locations around the listener while preserving their relative spacing, creating a 2-channel 'sub-space' within the 8-channel plane. Whilst this does not recreate a true stereo impression in the technical sense (Rumsey, 2001), it avoids the point-source localisation inherent with mono signals, which can draw attention to the loudspeaker and compromise the spatial illusion. This technique helps establish the spatial setting through a *composite grouping* while retaining detailed control over individual elements. This composite group appears alongside low-amplitude, pitch-based sustains and noise-based granular textures, which all together define the opening spatial setting.

3.2 Quasi-diffusion

A second approach, 'quasi-diffusion', deploys stereo sound across an eight-channel ring of speakers in what Wilson and Harrison (2010) refer to as the 'French' orientation. Drawing on the practice of live sound diffusion, a stereo signal is distributed across a loudspeaker array by routing the left channel to each 'left'

¹ Stereo reduction can be found at <https://electrocd.com/en/album/6094-ambrose-seddon-espaces-ephemeres>. Multichannel versions of audio examples are available from the author.

speaker of each lateral pair and the right channel to the other, with each loudspeaker amplitude controlled by its own mixing console fader. Here, however, that distribution is composed rather than performed in real time; the spatial shaping is fixed in the multichannel mix, hence 'quasi'-diffusion. By projecting the stereo signal across adjacent loudspeaker pairs at varying levels, sound can be dynamically shaped through the listening space: emerging in the frontal pair, extending into panoramic space by engaging the side pairs, and crossfading into the rear circumspatial zone. Subtle left-right balance adjustments further shape the image in response to its inherent spatial details; for example, the accelerating noise-based iterative gestures at 0:51 and 0:58, or the high-register graduated continuant texture emerging at 1:11.

3.3 Composed eight-channel entities

A third approach involves inherently multichannel spatial entities, defined broadly as spectral-spatial and granular-spatial techniques. In spectral-spatial approaches, spectral components — bands or individual partials — are deployed through the circumspatial field. During the long-timescale ascent at 10:20, partials are positioned around the listening zone using a spectral panner operating at the individual FFT-bin level². Although perceptual fusion means that the entity is still heard as a unified whole (Kendall and Cabrera, 2011), de-correlation of bin phases creates the impression of a diffuse spatiality (Kendall, 1995), generating a sense of immersion within the spectral texture. As pitch and spectral focus change, energy is redistributed across discretely panned bins, tying spatial distribution directly to spectral change.

Granular-spatial approaches operate differently: sound grains are deployed through various spatial zones to create dynamic spatial textures. At 4:26–4:40, noise-based granular material emerges in the frontal zone (prospective space), rapidly extends through circumspace to encircle the listener, then recedes to its distal origins. Deployment at the grain level enables the composition of spatial trajectories and textural evolutions extending beyond conventional panning paradigms.

These techniques allow for nuanced spatial articulations, ranging from individual point sources and composites of identifiable elements through to granular spatial textures in which individual grains are no longer perceptually distinct. They reflect some approaches presented by Barrett (2022); whilst Barrett's focus is on ambisonic deployment, the ideas of sound composites and composed spatial motions are common.

3.4 Spatial settings in *Pellere*

In *Pellere*, spatial settings are form-bearing features. Both individual sound identities and spatial settings as constructed environments reveal musical structuring at local to global levels, their spatial identities and behaviours intimately linked. Compare the rapid iterations at 0:50 with the voluminous textures at 6:00 and the relative stasis of 9:25: such contrasts encourage a global conception of spatial structure in which larger-scale spatial changes underpin form. Settings appear and recur throughout with varying degrees of modification, evoking connections to earlier passages. The work encourages visceral engagement — beyond observing settings from a conventional listener's perspective via an expanded stereo image in frontal and panoramic space, one can also be immersed within settings both physically and poetically. Shifting between such perspectives is a core feature.

²See Khosravi (2011) for a description of this method - <https://tinyurl.com/yjsuymm4>

4 Traces of Play (2016–17)

*Traces of Play*³ adopts many of the same compositional approaches, with one key pragmatic difference: a downsizing to a modified 5.1 setup, omitting the LFE channel to retain accurate full-range audio in the multichannel space, and the centre channel to avoid point-source mono localisation. Compositional approaches were scaled accordingly — quasi-diffusion in two stereo pairs (front 1/2, rear 3/4); panning in the four-channel plane; and composed four-channel granular-spatial and spectral-spatial entities.

There were noticeable impacts. In the studio, sounds moving through the listening space created a reasonable impression of continuous motion, though with a perceptible front–back flip, paralleling Rumsey’s “front–rear distinction” (Rumsey, 2001, p. 87). This additionally encouraged an ‘extended stereo’ conceptualisation — at times using rear speakers to add spatial depth to essentially stereo images. Reduced spatial coherence in the 4-channel plane conditioned compositional decisions, particularly for quasi-diffusion. The nodal-spectral, medium-register granular gestures at 4:58, weaving through distal and circumspace, illustrate how the non-contiguous four-channel spatiality impacted the graduated spatial motions.

These limitations became more apparent in large concert spaces. Despite comprehensive multi-loudspeaker setups, the lack of differentiated side information caused the sound field to tend more towards discrete front and rear halves. Subsequent performances required careful diffusion management — attenuation and boosting of side-loudspeaker levels at pertinent moments — to achieve a more cohesive spatial image.

Technical issues aside, spatial settings remain form-bearing components. The opening passage features proximate, spatially mobile, inharmonic granular textures that transition, via a noise burst at 1:32, to a more expansive environmental setting at 1:50 comprising pitched drones, noise-based grains, and iterative thuds. These contrasts differentiate settings that recur in modified forms throughout the work. They are perhaps less nuanced in terms of channel-based deployment than those in *Pellere*, conditioned by the 4-channel constraints, ultimately motivating the pursuit of ambisonic techniques.

5 Reflecting Cau Cau and Parque Urbano El Bosque (2021)

Composed as part of the Soundlapse project⁴, this soundscape work is built around ambisonic field recordings from wetlands in Valdivia, Chile, and was created entirely in the ambisonic domain⁵. Spatial processes focused on soundfield manipulations of zoom, focus, and spatial masking⁶, enabling the emphasis of sonic features that were subsequently subject to further transformation — filtering, transposition, and select spectral processing.

Granular and spectral processing was limited by the availability, at the time, of tools that would not disrupt the spatial detail of the ambisonic source audio. The compositional palette instead prioritised transformations maintaining spatial integrity, for example, low-pass filtering from 0:00, and transpositions of frog calls from 6:21. However, select spectral processing was applied to enhance pitch characteristics in noise-based material, producing the emerging drones at 2:10 and 8:00. These characterise the develop-

³Stereo reduction can be found at <https://electrocd.com/en/album/6094-ambrose-seddon-espaces-ephemeres>

⁴For more details see <https://soundlapse.net/?lang=en>

⁵Listen to the Binaural reduction at <https://tinyurl.com/2s48krdk>

⁶Achieved using Blue Ripple Sound’s Core and Manipulators bundles, <https://www.blueripplesound.com>, alongside IEM Ambisonic plugins, <https://plugins.iem.at>

ment of spatial settings featuring distinct harmonic identities. Aiming for minimal spatial impact, this was achieved through conversion of ambisonic source material to an A-format signal representing 20 microphone sources, subjected to the spectral processing, and then re-encoded to 3rd-order ambisonics⁷.

The scalability of the ambisonic approach across playback systems offered greater confidence between studio composing and concert performance. However, limited software access meant that spatial settings here revolve around quasi-environmental images inherent in the source material — bird calls, wind noise, amphibian sounds and their subtle abstractions — enhanced through filtering and transposition rather than synthesised granular or spectral detail. Additionally, the Soundlapse project's soundscape focus shaped my musical thinking and aesthetic position. The audio was treated using techniques that would largely preserve the recognisability of the sound sources, and be composed in ways that would lead the ear through those musical developments, reflecting Truax's soundscape composition principles (Truax, 1996).

6 Conclusions

Across these three works, spatial settings function as fundamental formal components — totalities defined by their constituent activities, dimensions, and behaviours — consistently so regardless of format. This underlines that the spatial setting is a compositional rather than technological idea.

Yet the relationship between compositional intent and available technology is neither neutral nor incidental. Spatial audio formats do not simply enable compositional intentions; they further shape what can be conceived and realised. The transition from the eight-channel field of *Pellere*, through the constrained four-channel domain of *Traces of Play*, and into the ambisonic domain of *Reflecting Cau Cau...* demonstrates this clearly. Each format affords distinct compositional possibilities while simultaneously imposing limitations: granular and quasi-diffusion techniques that flourish in eight channels resist straightforward translation to four, while ambisonics offers significant advantages in spatial coherence and scalability across performance venues.

The core spatial techniques identified — source panning, composite groupings, quasi-diffusion, and composed spatial entities — prove durable compositional ideas that persist across formats, even where the means of realisation differs. What changes between formats is not the underlying spatial thinking, but the fidelity and flexibility with which that thinking can be expressed.

This points toward a productive reframing. Rather than treating spatial audio format selection as a single decision determining all subsequent compositional choices, these works suggest the value of a hybrid approach in which channel-based, ambisonic, and stereo materials are deployed according to the specific demands of individual sound types within a single work. Granular and spectral textures may be most effectively authored in channel-based formats; immersive soundfield recordings and their spatial transformations in ambisonics; frontal stereo source material retained in its native format to preserve its inherent spatial character. Forthcoming work is currently exploring the possibilities and practicalities of such a hybrid approach, treating spatial format not as a monolithic constraint but as a compositional consideration in its own right, whose expressive potential is most fully realised when matched to the nature of the sound material itself.

⁷Processed using Michael Norris's Soundmagic Spectral plugins (<https://www.michaelnorris.info/software/soundmagic-spectral>), in combination with Blue Ripple Sound's B>A20 and A20>B convertor plugins.

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