

AN EXPLORATION OF AUDIO-SCORE TECHNIQUES AND PRACTICES

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ABSTRACT

This paper discusses the emergence of the Audio Score as a distinct compositional practice in which auditory communication, rather than visual notation, is the primary medium through which compositional information is conveyed to performers. Drawing on recent theoretical writing by Bhagwati, Sdraulig and Lortie, Schimana, and d’Heudières, the study situates Audio Scores within the evolution of technological, aesthetic, and ideological developments.

The discussion proposes a framework distinguishing three core roles of auditory material in Audio Scores—orientation, emulation, and instruction—and seeks to clarify the boundaries between Audio Scores and adjacent practices. The analysis foregrounds performer experience as a critical site of evidence through detailed case studies of works by d’Heudières, Schimana, and the author, all performed by the Australian ensemble *GreyWing*.

1. INTRODUCTION

This paper examines the emergence of the Audio Score, an overarching term capturing a range of practices, techniques and aesthetics that have only recently been identified and codified in the work of Bell [1], Bhagwati [2], Sdraulig and Lortie [3], Schimana [4] and d’Heudières [5]. The paper examines functional roles and criteria for Audio Score classification, the relationship between technological advances and the emergence of the Audio Score and examines four works performed by the Ensemble *GreyWing* as recent case studies. Where possible I have connected my thoughts to practical experiences of performing Audio Scores (and what might be termed proto-Audio Scores).

The core definition of the term Audio Score discussed by these authors, focuses on the shift towards the primacy of “auditory communication to convey (...) composer-defined aspects (of a creative work) to the performers”, [2] rather than visual communication through notation: Common Practice (CPN), graphic, text or other means. This shift represented a significant reconfiguration of where authority resides in the communication of musical ideas.

It should be noted that it is implied that this communication takes place through technologically-based

auditory communication – that technological mediation is not incidental but constitutive to the medium. The approach was made possible as the result of the development of pertinent audio technologies and is distinct from transmission of music ideas orally or “by ear” (presumably the oldest and still most common form of communication of musical information). The defining criterion of an Audio Score is not simply the presence of audio per se, but the primacy of auditory communication in determining performative action.

Bhagwati [2] and Sdraulig and Lortie [3] have both created categorisations of the types of recorded information and affordances found in Audio-Scores. In relation to their core role as auditory communication, these categories can be summarised as employing verbal or sonic information with only three types of function, each with different implications in regard to the balance of composer/performer authority: sound objects (the performer is delegated interpretive authority to imitate, interact with and/or exemplify sounds), orientation (cues orienting the performer in time implying a minimal shift in authority) and instructions (the composer exerts procedural authority byverbally directing actions to be taken by the performer) (see Table 1).

Verbal	Sonic
Orientation: ie “One”, “Two measures before A”, “Part Two”.	Orientation: ie metronome click, bell.
Instructions: ie “begin playing”, “imitate”, “describe”.	Sound Objects: ie sonic exemplars to be imitated, interacted with or used as exemplars.

Table 1. A summary of the functions of Verbal and Sonic cues or prompts in Audio-Scores

In terms of the works discussed in the five foundational papers mentioned above, it is important to stress that although Audio Scores may include orientative information, it is generally only the presence of either verbal instructions, sound objects or both that exemplifies the primacy of auditory communication at the core of the definition. Works that principally employ audio to provide temporal orientation for another medium, for example a film score click track, lie outside of the genre definition, because in most cases they preserve notational authority rather than assigning primary authority to sound itself.

Like many examples of emerging terminology, the term “Audio Score” is still somewhat in flux, with both examples of its use to describe different practices, and examples of different terminology being used for the same or similar practices. The first appearance of the term “Audio Score” in the literature that is clearly related to the

	verbal		sonic		delivery		performance		additional score			sounding		structure	
	orientation	instruction	orientation	emulation	audible	inaudible	rehearsed	extempore	CPN	graphic	text	audio	environment	fixed	indeterminate
Robert Erickson - <i>Pacific Sirens</i> (1968)				x	x		x		x	x		x		x	
Gavin Bryars - <i>1, 2, 1-2-3-4</i> (1971)				x		x	x								x
Alvin Lucier - <i>Carbon Copies</i> (1989)				x	x	x	x	x						x	x
Lindsay Vickery - <i>Night Fragments</i> (2011)	x		x	x		x	x		x			x		x	
Lionel Marchetti - <i>Inland Lake</i> (2019)				x	x		x					x		x	
Cat Hope - <i>Tough it Out</i> (2014)		x				x		x		x					x
Louis d'Heudieres - <i>Laughter Studies 3</i> (2016)		x		x		x	x	x						x	
Lindsay Vickery - <i>Un Paso al Abismo</i> (2018)				x		x	x							x	
Elisabeth Schimana - <i>Landscapes</i> (2021)				x		x	x							x	
Lindsay Vickery - <i>little grey wing</i> (2022)				x		x	x			x				x	

Table 2. Audio Score classification criteria for the works to be discussed in this paper.

post-2018 definition, seems to occur in an interview with performance artist and technologist Laurie Anderson about Robert Wilson's production *Alceste* (1986). [6]

Anderson uses the term to describe an audio recording created from actors' speech, and "sound effects, such as birds and wind" that was used to provide cues to assist in coordinating live performers in the stage production. Its existence draws attention to the parallel lineage of audio-based performer direction in performance art and theatre, that will be briefly discussed below.

In music, a similar early example (but not labelled or conceptualised as an Audio Score) was Stockhausen - *Kontakte* (1958–60) [7], in which the performers use both "synchronized clocks and their ears to synchronize with the tape". [8] Anderson's use of the term was isolated, and underlines the problem that the coordination of live performers with fixed media that first emerged in the motion picture industry in the 1930s, was addressed by numerous solutions that sought to solve a technological issue rather than an aesthetic one. This may have resulted in a lack of documentation of their development and the circumstance that only some of these solutions clearly lead toward the development of the Audio Score as defined by Bhagwati et al.

In addition to the Verbal and Sonic possibilities outlined above, there are a number of complimentary criteria that, while not defining the Audio Score, shape how its authority is experienced by performers and audiences.

- **Audible - Inaudible delivery/transmission to the audience.** For many examples of the Audio Score, transmission is "individual" via headphones, mirroring the conventional practice of the textual score in performance. As with notated scores, individual transmission creates the situation in which the audience are unaware of the internal details and scaffolding of the work, whereas a shared audio score can also function as a component of the musical fabric of the sounding work. In some cases, separate audio is also presented to the audience in addition to the performer's inaudible Audio Score.
- **Rehearsed/Extempore Performance.** One of the key advantages of communicating musical ideas through sound itself is the ability to efficiently model or create complex timbres, temporal information and continuous parametrical changes for performers to emulate. However, the situations resulting from performers responding to unfamiliar audio or

rehearsed audio presented in unfamiliar sequences are also exploited in some works.

- **Audio Score Alone/Additional Score or Audio Materials.** Although auditory communication is core to the Audio score, perhaps the most contentious boundary case is whether the addition of other kinds of scored materials place a work beyond the definition of the term by undermining the primacy of audio.

As is often the case, actual examples of creative works occupy every continuum of these practices. This paper will discuss my own observations in regard to a number of Audio Score works that I have had first-hand experience performing, composing or both. These works are classified in Table 2. according to the criteria for Audio Score classification outlined above.

2. PRECURSOR TECHNOLOGIES, AESTHETICS AND WORKS

I have elsewhere argued that the appropriate technological and ideological conditions were necessary for the emergence of works exploring the combination of acoustic instruments with field recordings. [9] Similarly, the emergence of the Audio Score and its various sub-genres was dependent on the establishment of specific technological capabilities and ideological shifts and these evolved well before the Audio Score concept was named or codified in detail. Once these conditions were established, a range of broadly similar approaches and practices emerged independently among unrelated projects in art music, performance art, dance and theatre. The following discussion plots three principal threads.

2.1. Orientation

Bell [1] and Bhagwati [2] have pointed to the click track, invented to synchronise orchestral scores with motion pictures, as an important precursor technology for the orientative function of the Audio Score. Foundational technologies necessary for the development of the click-track included the electronic transmission of audio signals begun with the telegraph and the telephone; recording; and headphones (For detailed discussion of their development see [10, 11, 12, 13, 14]). The desire to coordinate live performance with fixed media in art music, thus retaining centralized compositional authority, became evident with

the emergence of the early works for instruments and fixed media (tape) such as Bruno Maderna - *Musica su due dimensioni* (1952), [15] Edgard Varèse - *Déserts* (1954), [16] and Luigi Nono - *La Fabbrica Illuminata* (1964). [17] The exact date of adoption of click track into art music is difficult to trace, as early examples may have emerged to solve performative technological coordination problems (rather than compositional and aesthetic ones), and as such were not often discussed in the literature or recorded by composers as an integrated component of their works. An exception is Ghent's creation of an analogue system using "a magnetic tape recording on which signals to the individual performers (had) been pre-recorded at different pitch levels' allowing them to perform with "complete independence as to tempo, meter, and positioning of the beat, and yet be precisely coordinated in time" and "as a means of synchronising electronic tape music with live performers". [18] This electronic apparatus was ambitiously used to coordinate musicians performing a polytemporal score, dancers, fixed media and lighting in his work *Phosphones* (1967).

It is often claimed (including by myself) [19] that Xenakis coordinated the six percussionists in *Persephassa* (1969) via click track, but this appears not to have been the case, for the premiere performance at least (which used stopwatches). [20] The confusion may be the result of subsequent performances that used a click track as a coordination aid. The same is possibly true of Elliot Carter - *Second String Quartet* (1959), [21] for the reasons suggested above.

What is clear is that, at latest, the technique of click track coordination in art music began to be established shortly after the foundation of IRCAM (1977-) for example the instruments and fixed media work *Arcus* (1978) by York Höller. [22]

These technologies, while foundational to the development of the Audio Score solved a temporal coordination problem, (also useful to the Audio Score), but not yet a communicative and interpretive problem.

2.2. Emulation

Audio recording and reproduction technologies were also gingerly, if more conspicuously, adopted into art music, beginning with gramophone Respighi's *Pini Di Roma* (1925) [23, 24], Vertov's *Collages* [25, 26], Toch and Hindemith's *Gramophonmusik* (1930) [27], Cage's turntable, radio and electronics works [28, 29], Schaeffer and Henry's *Music Concrète* works [30] and other directions [31, 32, 33, 34] and laid the groundwork both technologically and ideologically for the emergence of a medium in which the textual score was diminished in importance, and the "sound itself" was to become the predominant medium for communicating the score.

The shift towards emulating the complexities of sound itself can be considered a proto-Audio Score strategy. It partially redistributes authority in that the performer's perception, and instrumental limitations mediate the result, as evident in Karlheinz Stockhausen - *Spiral* (1968) in which the performer is instructed to listen "quietly to broadcasts on the short-wave receiver (while searching one can join in quietly with instrument/voice), until one

has found something one wants to start with" and then to "join in as much and as precisely as they can". [35] Similarly in *Pacific Sirens* (1968), Robert Erickson directs "improvising" performer's to "listen into" "the spectral complexes of the environmental noise". [36, 37] Both works included a scored component: for *Spiral* this is a "plus-minus" meta-composition score - instructing how the performer is to transform the found sound that they are emulating, for *Pacific Sirens* the performers are given a quasi-spectrographic guide score showing pitch, duration and morphology of prominent frequencies and are instructed to "blend" with and "protrude" [36] from the recording. (Erickson does not discuss the technique used to create the "quasi-spectrographic" score in his *Sound Structure in Music* [38], only the band-filter processing of the ocean recording, but it is possible he created the score using the filter output or the "Kay Sona-Graph" a device with similar graphic output that was commonly used for speech and animal call analysis in the late 1960s).

In both *Spiral* and *Pacific Sirens*, the audience hears the electronic audio component in addition to the live performers, however three years later, in what is clearly an early example of core Audio Score practice, Gavin Bryars - *1, 2, 1-2-3-4* (1971) asks the performers to interact privately with an individually recorded copy of "the same piece or type" of "familiar music". "Instrumentalists/vocalists, each wearing headphones connected to a portable cassette machine. Each performer hears only the music in his headphones, music which contains "parts" for his instrument or voice, and he plays, along with the cassette, his own instrumental part. [39] (In the influential 1975 Obscure Records release they used "identical material" [40])

The process for realising the work is documented in a Text Score (it is framed as a text score in a collection called "Verbal Anthology" [39] and not merely "instructions"), but in concert, the performers interact exclusively with individual recorded audio. The process invariably results in a deconstruction of the source audio in which the players are inconsistently de-synchronised from one another due to the indeterminate start position and playback speed of the music on each cassette machine, and the fact that the players synchronise with their personal audio and not with one another. Here the listener isolation, so intrinsic to headphone listening, is exploited as structural material.

Synchronisation, or in this case precise desynchronisation is an important Audio Score affordance exploited by Bryars. It becomes a key element of many later Audio Score works including the Nancarrow-like structures of Joshua Fried - *Headset Sextet* (1995) [41] and Benedict Mason - *felt|ebb|thus|brink|here|array|telling* (2004). [1] In his notes, Bryars also foreshadows another important parameter: whether the performers have rehearsed their part or are responding in realtime. The rehearsed/extemporary condition and experience of the performer is also crucial in later theatrical works such as Ant Hampton's solo show *Blake* (1999) in which the audience watch an actor who receives instructions on stage in real time, so that the audience understand that he is "discovering everything at the same time as they are" [42] or Cat Hope - *Tough it Out* (2014) in which the audience

observes the spectacle of real-time instructions disrupting musicians as they attempt to read as score.

Another early example of the Audio Score is Alvin Lucier - *Carbon Copies* (1989), [43] which expands the emulation of acoustic environment found in his (*Hartford*) *Memory Space* (1970) [44], but in this case using a recording of an “indoor or outdoor environment” rather than relying on the performer’s memory. As in *Memory Space* the performers are instructed to imitate the sounds (this time on a self-made field recording) “as exactly as possible, without embellishment”. *Carbon Copies* also anticipates a crucial parameter of Audio Score practice by designing a process in which every configuration of the environmental sound is examined: in *Section I* both the audience and performers listen to the audio through loudspeakers; in *Section II* the audience continues to listen through loudspeakers while the performers listen through headphones and begin to emulate the recording; *Section III* the audience only hear the performers emulate the recording in their headphones; and *Section IV* the performers too, remove their headphones and continue “playing, either from memory or by freely imagining the sounds continuing”.

These early “emulative” works lay the groundwork for Lionel Marchetti’s *Partition Concrète* works for Decibel New Music Ensemble and others – in which an audible audio component created, from “sounds themselves” using the techniques of *Musique Concrète*, also functions as an “auditory score” for instrumentalists. [45]

2.3 Experiential Evidence

I participated in performances of *Pacific Sirens* in 2018 with *GreyWing* Ensemble and *1, 2, 1-2-3-4* in 1986 with *Tonight’s Ensemble* and *Carbon Copies* in 2010 with *Decibel*, and can comment that there are a clear experiential differences distinguishing them. In *Pacific Sirens*, there is an interplay between the audio component, the score and the performers always informing your choices of pitch, duration, timbre and dynamic – the performers are also listening to the complete work, creating a hybrid distribution of authority between the score, environment and performer agency. *1, 2, 1-2-3-4* on the other hand invites the performer to focus on maintaining synchronisation with the audio in their headphone and not to be influenced by the slightly varied temporal orientation of the other performers, restraining the performer’s authority via individual synchronisation. *Carbon Copies* brings a heightened awareness of the audience experience even when listening and performing from personal headphones, and shifts authority toward the memory and imagination of the performer. The Bryars and Lucier works both reward detailed practice: Bryars to assist maintaining focus and Lucier because of the potential complexity of finding appropriate techniques to emulate the environmental recording, while Erickson’s work permits a more exploratory and improvisational approach, perhaps due to the dominance of the ambient recorded component, but also because of the presence of a guide score.

2.3. Instructions

The rapid evolution of audio technology from 1970 - the advent of low cost, portable stereo and multi-track tape recorders in the late 1970s, such as the Sony Walkman [46] and TEAC 144 Portastudio, [47] the advent of microcomputing and sequencing in the 1980s, [48, 49] Digital Audio editing [50, 51, 52] and object oriented interactive software [53] in the 1990s and a general shift toward “private listening”, [54, 55, 56] introduced further possibilities for synchronisation and complexity and created the conditions for a second wave of Audio Scores. The point at which either orientative or instructive verbal cues were added to the metronome style click track is also not recorded, although my own first experience was in a 1986 performance of Steve Reich’s *Tehillim* (1981) by Nova Ensemble, at this time only possible because an ensemble member directed a multitrack recording studio. This performance in Perth, Australia suggests that these techniques were established quite rapidly following the developments at IRCAM or already existed and/or were transferred from the film industry.

As an unambiguous example, my own song cycle *Night Fragments* (2011) performed by Caitlin Cassidy with Decibel New Music Ensemble included verbal and electronic temporal cues, poly-temporal sections and pitch cues for the singer to assist her maintaining pitch within a chromatic cluster. I would argue that even what might be termed an “elaborate click track” such as this, despite being integral to performance of the work, does not constitute an Audio Score.

Bell gives the closer example of Aaron Cassidy - *I, purples, spat blood, laugh of beautiful lips* (2012), [1] which despite its complex score is dependent on a pitch received via headphones and varied in each performance. The potential for alteration of this work through its reliance on indeterminately generated pitch brings it closer, however I would still argue that auditory communication is not the primary source of its identity.

To Bell and Bhagwati’s discussion of the click track we should add the affordances of “Interruptible Foldback” (IFB) [57] systems that evolved as part of mid-20th-century broadcast studio engineering practices. These are audio cueing networks that provide mix-minus program feeds and director interruptions to on-air talent, [58] that generate the opportunity to create dynamic, interruptive authoritarian hierarchies.

The possibility of providing realtime delivery of verbal instructions with performers has also been explored in Cat Hope - *Tough it Out* (2014). It was composed for a concert of music celebrating Australia’s first female prime minister Julia Gillard, who faced a sadly predictable chorus of “noise and interference” in the course of her tenure. In *Tough it Out*, Hope uses this frustrating situation as a structural device. Performers are asked to read “any Cat Hope score, or (...) the score provided” [59] – a graphical score comprising prime ministerial popularity graphs – but are continually interrupted by verbal instructions received individually over headphones. The theatrical and conceptual potential of the situation is presided over by a dedicated electronics operator who chooses when and which of 17 messages to send to each

player throughout the work. Some of the instructions are more typically “musical” – “play like a whisper - super soft, almost not there”, while others can lead to more dramatic situations “copy one person next to you, whatever they are doing, as exactly as possible. Don’t hide it”, [59] a juvenile bullying tactic employed by Gillard’s political opposition. In addition to it commentary on the challenging tenure of Australia’s first female Prime Minister, the work serves as critique of authority, hierarchy, and control that is embedded in audio cueing systems and exemplifies the interdependence of technological and ideological developments.

3. CASE STUDIES

This section examines four Audio Score works relatively recently performed and/or recorded by the Western Australian New Music ensemble *GreyWing* (flute - Kirsten Smith, clarinet - Lindsay Vickery, Electric Guitar - Jameson Feakes and Harp - Catherine Ashley). The discussion analyses the techniques employed in each work and the structural ideas that are created in light of the experiential aspect of performing the works. The works are Louis d’Heudières - *Laughter Studies 3* (2016) [60] and Lindsay Vickery - *Un Paso al Abismo* (2018) [61] both part of a series of work exploring the use of text in music, Elisabeth Schimana – *Landscapes* (2021) [62] performed as part of a series of environmental and “instrument a field recording works” *Banksias under Snow* and *Little (Grey) Wing* (2021) [63] a hybrid Audio Score plus Scrolling score performed as part of the *Outcome Unknown* series. These works, while not exploring every corner of Audio Score practice exemplify some important nuanced differences in practice, including: the explicit use of instructions and addition of a reference score; the challenges of vocal in comparison to instrumental emulation; and a range of distinctive structural features that are exemplified in these works.

3.1. Louis d’Heudières’ - *Laughter Studies 3* (2016)

Louis d’Heudières *Laughter Studies 3* (2016) for three performers, uses synchronised individual verbal

instructions and sound objects to be emulated entirely vocally by the performers either by describing or imitating the sounds they hear. For the most part, this performative situation aligns with what Sdraulig and Lortie describe as “Reactive Emphasis”, in which “instructive/ performative prompts” elicit a “real-time improvisatory response to sound [that] performers cannot hear or infer ahead”. [2] However, d’Heudières does suggest that some sections be rehearsed as they benefit “from interpretation beyond merely reacting to the sounds”. [60]

Two of d’Heudières’ detailed instructions in particular, rely heavily on real-time improvisation. The instruction “describe” requires the performer to speak continuously for the duration of the sound - “like a stream of consciousness” - while “describe with one word only” demands that performers “go with the first word that pops into your head” [60], deliberately creating situations of temporal uncertainty and cognitive pressure. In the former case, performers must sustain improvisatory verbal description without knowing when the sound will end; in the latter, the task resembles a psychological word-association test, heightening performative stress. This pressure becomes materially significant in the final section (see Figure 4. below), when all three performers receive identical verbal and sonic prompts and their responses can be compared by the audience.

The setup exemplifies what Saunders terms a “self-evident process”—a work whose “processes [are] made self-evident [to the audience] through actions” [64]. The performers’ attentive listening through headphones and their audible reactions are sufficiently transparent that audiences can plausibly infer shared stimuli and compare divergent responses, often with comic effect. It creates the strongest example of the four works of a distributed and indeterminate authority in which the performers cognition becomes a compositional variable and the balance of composer/performer authority becomes clearly observable by the audience.

Across the seven *Laughter Studies* (2015–19), d’Heudières categorises sonic materials into four groups: “everyday sounds, ambient environments, music, and emotive sounds” [65]. *Laughter Studies 3* focuses

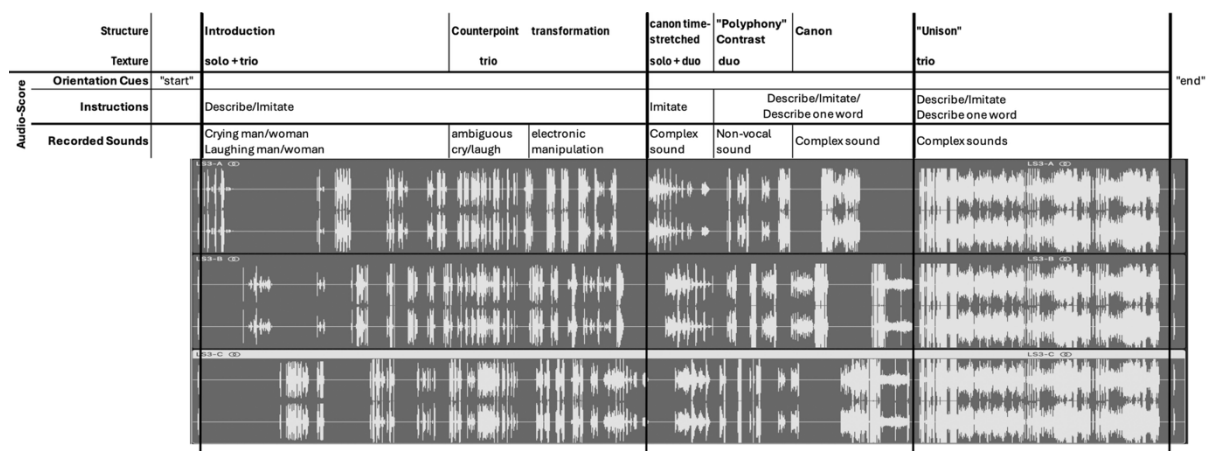


Figure 1. Louis d’Heudières - *Laughter Studies 3* (2016), Structural Analysis of the Audio-Scores for Performers 1, 2 and 3.



Figure 2. Louis d'Heudieres - *Laughter Studies 3* (2016), Counterpoint section: showing the interplay of the samples (numbered) and the instructions (“Imitate” and “Describe”).

exclusively on everyday and emotive sounds. The emotive materials include recordings of crying and laughing at varying intensities, alongside a third, ambiguous state d'Heudieres terms “*Cry-Singing*” [60]: positioned between laughter and crying, this material complicates real-time description and imitation. The everyday sounds - ranging in duration from 2 to 37 seconds - are sometimes subjected to processing such as pitch-shifting and time-stretching, and include sources that resist straightforward vocal imitation or verbal description (for example often processed, footsteps on twigs, drumbeats, a double bass, clattering cutlery or the sound of a cork being removed). A structural analysis of the work (see Figure 1.) can be made based on: the structural role of each section; the number of simultaneous voices (Texture); and the type of information conveyed in the Audio-Score, plotted against a soundwave visualisation of the Audio-Score “parts” for each performer.

The work opens with something of a typical “introduction of forces” – each performer is heard in turn demonstrating the two principal instructions “describe” and “imitate”. In the “counterpoint section, the recorded sounds become more ambiguous and difficult to describe, often resulting in the performers creating “non-lexical interjections (‘uh’, ‘er’, ‘um’), awkward pauses in the middle of sentences and frequent involuntary hand gestures in the performers’ interpretations”. [65] A total of eight samples are used in a variety of combinations and in simultaneous or staggered orientations between the performers. The final part of this section settles into simultaneous imitations of contrasting samples (see Figure 2. above).

Laughter Studies 3 also features a more explicitly polyphonic section, in which a source sample (sometimes stretched or deconstructed) is heard in successive voices d'Heudieres states that “the acts of vocalised mimicry in *Laughter Studies* are specific, personal, and nonlinguistic.

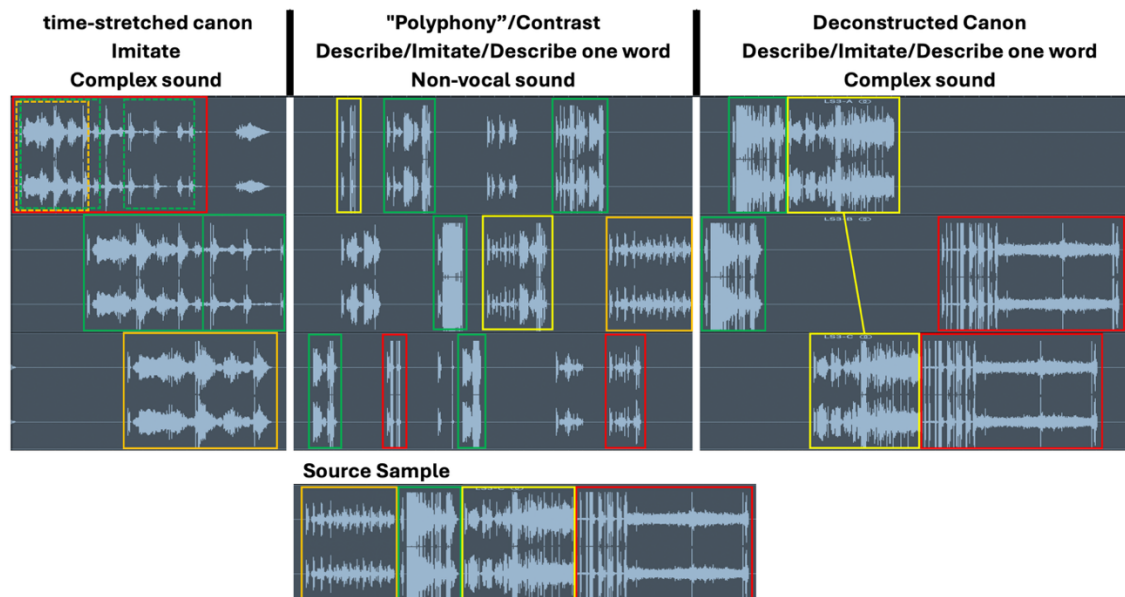


Figure 3. Louis d'Heudieres - *Laughter Studies 3* (2016), Musical Structures in the Central Section: “time-stretched canon; Polyphony Contrast; Deconstructed Canon. The source sample for the materials of Polyphony Contrast and Deconstructed Canon is shown at the bottom of the figure.

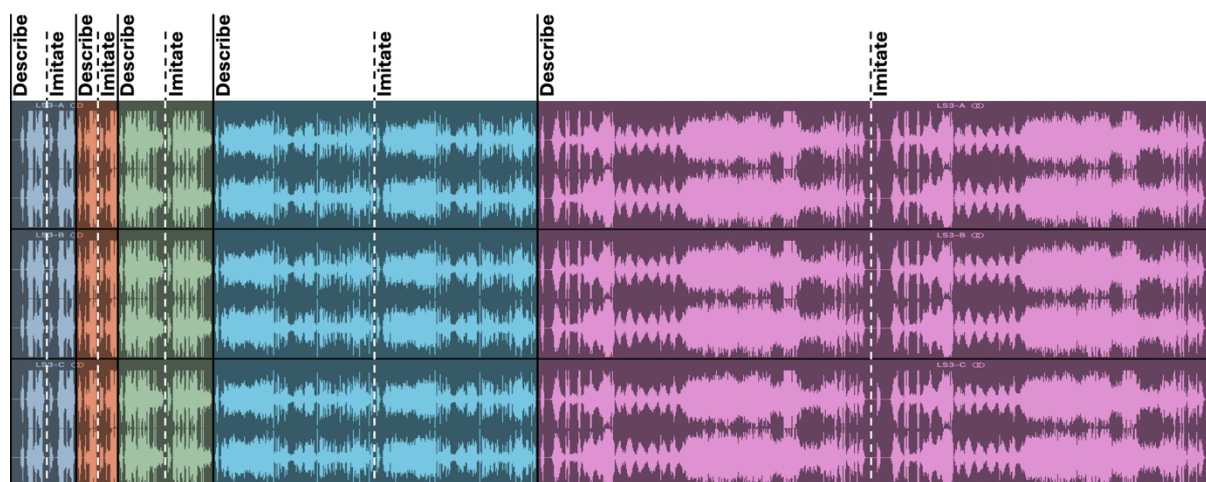


Figure 4. Louis d'Heudières - *Laughter Studies 3* [2016], final “Unison” Section showing the increasing length of the pairs of “describe/imitate” samples.

They are not signifiers in a socially mediated game of linguistic communication, but rather vocal attempts at replicating sonic phenomena” [65]. This abstraction is reinforced by the deliberately non-theatrical staging: performers face the audience, avert their gaze to the tops of audience members’ heads, and maintain poised, confident body language [60], even as they are tasked with vocal actions that progress from challenging to physically untenable (See Figure 3. below).

In the final section, d’Heudières presents a unison or “Tutti”. Each performer hears the same instructions and recorded sounds, but the audience hears something entirely different, the variation in the responses of the three performers to the same “stimuli” – the subject, focus and heart of the work (see Figure 4. above).

Despite its restricted materials - performers receive only three types of instruction and the sonic palette is limited entirely to the human voice - the work achieves considerable structural complexity. Complexity arises in part from d’Heudières’ systematic consideration of every possible “micro-textural” combinatorial relationship between performers and instructions [65], a strategy comparable to John Zorn’s approach in his early Game Pieces. [67]

3.2. Lindsay Vickery: *Un Paso al Abismo* (2018)

Un Paso al Abismo was inspired by the composer’s discovery of a production technique developed by the Mexican media company *Televisa* to accelerate recording schedules for telenovelas (such as *Un Paso al Abismo* (1958-59) (One Step from the Abyss)).

A Mexican engineer invented an electronic earpiece for instant communication with actors that became a standard and somewhat unique element of the *Televisa* production process. Performers could be fed their lines, either between takes or while taping was in process; as a result, the speed of recording was greatly enhanced [68].

The technique was adopted separately in the theatre world in the genre *Verbatim Theatre* that seems have emerged in England and Australia in the early 2000s. Descriptions by Blythe and Oades define an approach that

is remarkably similar to the Audio Score, “a paperless form of theatre that features the faithful reproduction of speech patterns” [69] featuring the use of “spoken instructions, timing cues, or text fragments via headphones during performance”. [70]

Similarly, in *Un Paso al Abismo*, eleven performers imitate, as precisely as possible, excerpts of recorded dialogue from the long-running U.S. soap opera *Days of Our Lives* (1965–), which has aired over 150,000 episodes. [71] The Audio-Score consists of dialogue collages assembled by the composer and selected to foreground what Blake terms the soap’s “latent hysteria”. [72] The material draws on a wide range of *Days of Our Lives* plotlines, principally around the elaborate machinations of the villain Stefano DiMera.

Performers in *Un Paso al Abismo* are required to reproduce the theatrical delivery, timbre, pacing, and dialect of the soap opera actors with high fidelity. Sdraulig and Lortie categorise this use of Audio-Score as “Rehearsed Emphasis / High-fidelity reproduction”, [3] in which performers practise extensively rather than responding to the Audio-Score in real time). This approach enables performers to “execute a high degree of timbral detail in the imitations” [3], but positions them more as a performative conduit rather than an interpreter. The Audio-Score functions less as an improvisatory prompt than as a set of cues or an aide-memoire - closely paralleling the technological mediation of *Televisa*’s telenovela production process.

The Audio-Score parts were assembled directly within a Digital Audio Workstation using samples of dialogue from the soap opera. These samples were selected as archetypal examples of soap opera tropes, such as the following excerpt:

Stefano: “That was too close. (ah, breathes) Abe and Lexi could have ruined my entire plan (breathes) thank goodness nobody knows about this secret tunnel... except for the lady in white.” [61]

The ordering and layering of voices is explicitly collage-like, applying techniques commonly associated with collage practice to musical, verbal, and narrative parameters, including juxtaposition, overlap, interruption, and the fragmentation of sequential dialogue and narrative

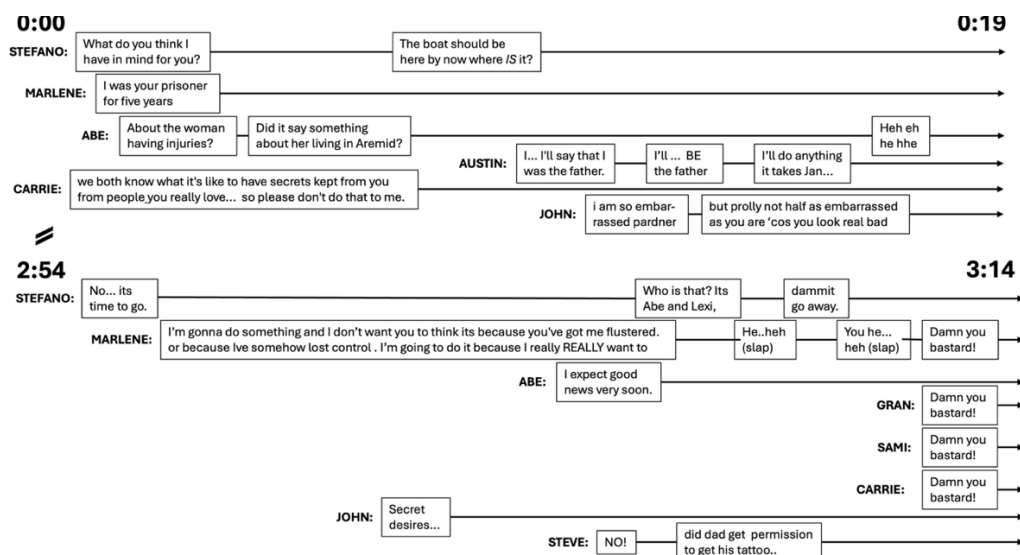


Figure 5. Lindsay Vickery – *Un Paso al Abismo* (2018) (excerpts), transcription of timestamps 0:00-0:19 and 2:54-3:14.

continuity. The opening demonstrates how multiple narrative threads are juxtaposed, relying on the audience’s recognition of dialogue “codes”—for example, those associated with the characters Stefano and Marlena (villain and victim), Carrie (manipulative), and Austin (pathetic pleading)—to infer distinct narrative contexts.

While the work is clearly akin to the *Verbatim Theatre* practices mentioned earlier and has an informal quality reminiscent of “play-back theatre”, like *Laughter Studies* it explores musical/sonic ideas such as the more overtly “musical” orchestration of voices, building toward a crescendo in which four female characters simultaneously cry out, “Damn you, bastard” in the section beginning at 2’54”.

The performance relies on the audience’s capacity to decode these dialogue conventions even within a dense sonic environment of overlapping speech, non sequiturs, and disrupted narrative flow. It also depends on the productive friction between cultural hierarchies: the perceived “low” melodrama of soap opera dialogue is recontextualised within the conventions of the “serious” new music concert, with the camp excess of the performance practice playing a central structural and affective role. Figure 5. presents a transcription of the opening and a later section of the work.

3.3. Elisabeth Schimana - Landscapes (2021) 7x3 Interventions

Landscapes (2021) is part of Schimana’s *Acoustic Memory* series, in which “the musicians are given sound samples as a source material, which they translate to their instruments”. [73] The work

consists of seven roughly three minute “modules”, each created from a simple mosaic of sound objects or “fragments” -either field recordings or electronic samples. It was created for the group *Airborne Extended* that features the unusual combination flute, recorder/ Paetzold, harp and harpsichord. The work was performed and later recorded by *GreyWing* Ensemble in 2022 Although *GreyWing* also has a similarly unusual line-up, the harp part was retained but the other instruments were substituted as follows recorder (flute), flute (clarinet), and harpsichord (electric guitar). The spectrogram examples in Figure 7. below are created from the studio recording.

The 33 “fragments” range from 15 to 75 seconds in duration and must be memorised by each performer. In performance the fragments in each module are recalled/performed in-synch with audio recordings in which they are arranged in a particular configuration of

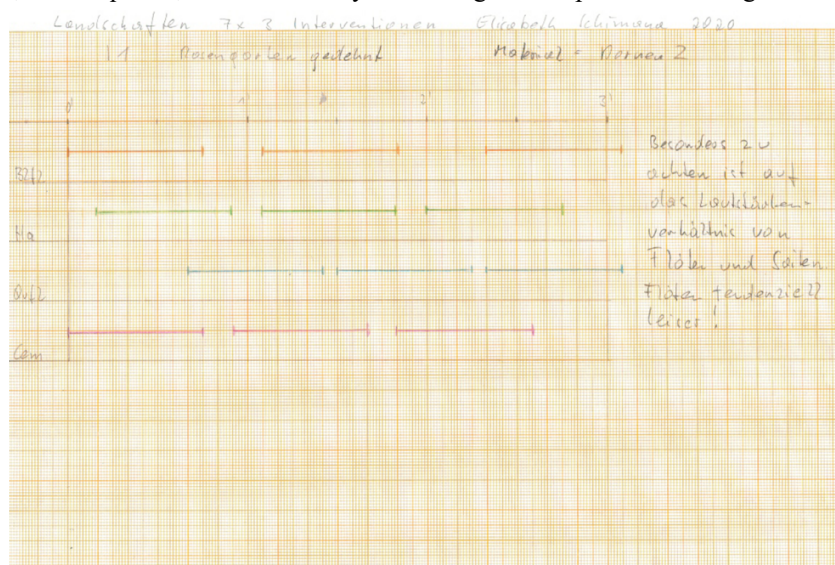


Figure 6. The time structure of Elisabeth Schimana – *Landscapes* (2021) 1L Stretched Rosegarden. The graph grid is in seconds and the durations of the fragments in each instrumental part are represented by different colours recorder/ flute (Orange), harp (Green), flute/clarinet (Blue) and harpsichord/electric guitar (Red).

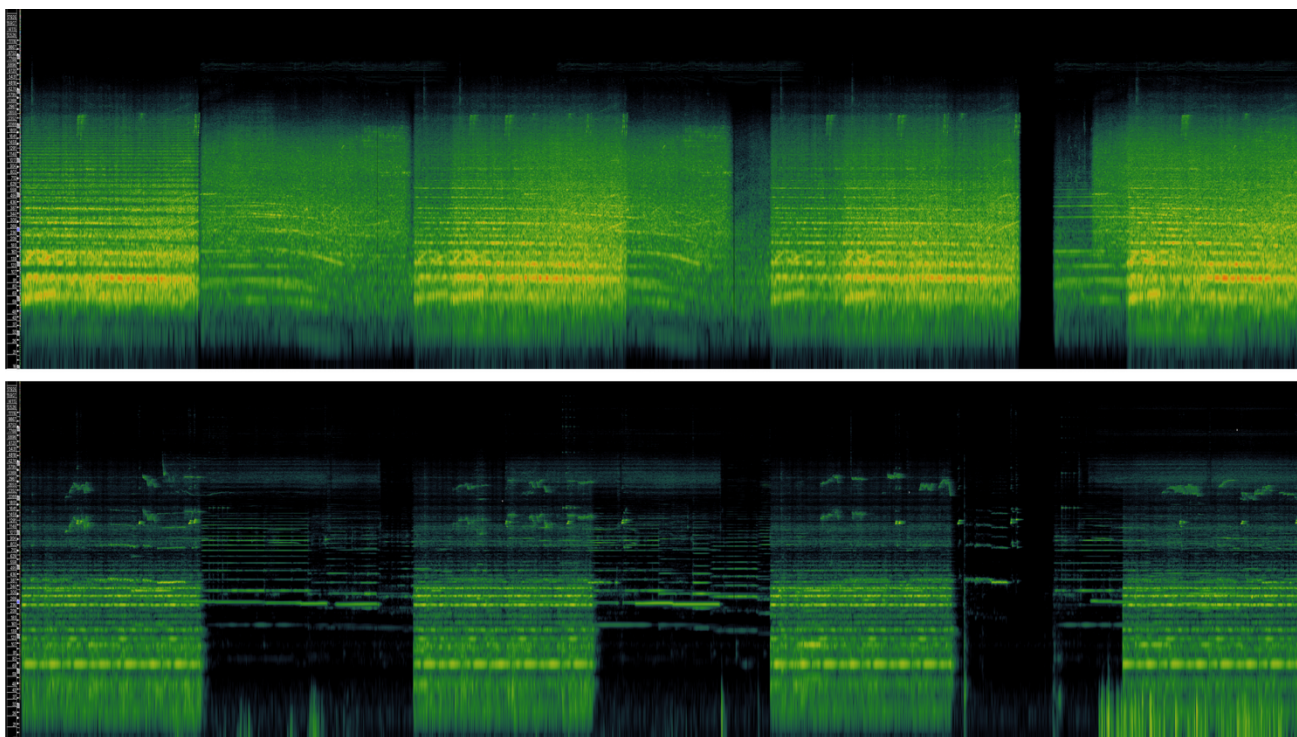


Figure 7. Spectrograms of the electronic audio score (above) and ensemble emulation (below) in *Schimana – Himmel*.

repetitions and silences. The composer provides a “time structure” (See Figure 6.) indicating the temporal relationships between the samples used in each of the four parts.

Landscapes also demands “Rehearsed Emphasis/High-fidelity reproduction”, [3] but the performers here face different challenges from those found in *Laughter Studies* or *Un Paso al Abismo*. Whereas those works all focussed on the challenges and possibilities of the human voice encountering generally different tasks, in *Landscapes* the same or similar tasks are confronted by performers with the idiomatic constraints and possibilities of different instruments.

Rosegarten (Rose garden), the third module of *Landscapes*, is constructed from fragments comprising short electronic sounds, generally spanning a range between ~400Hz to beyond ~20KHz. The majority of the formant energy falls between a spiky 10-20KHz (the composer labels the fragments “dornen” (thorns)). Although such high frequencies may generate artifacts at lower pitches due to aliasing, headphone response and other factors, the highest frequencies are usually inaudible to adults (especially older ones). The actuality of what they physically “sound like” perceptually to each performer is somewhat indeterminate (and slightly existential) and obviously central to a work involving the emulation of audio.

From the performer’s perspective, the capabilities of each instrument play a crucial role. For example, their ranges are quite varied: while the range of the electric guitar is approximately 80 Hz – 5 KHz and the harp 30 Hz -3 KHz, the flute and clarinet are closer to 260 Hz to 2 KHz and 147 Hz to 2 KHz respectively. Predictably the electric guitar, timbrally closest to the recorded sounds, was able to produce the most plausible emulations, the harp slightly

less so, while the flute and clarinet were restricted to a much more impressionistic “low-fidelity” reproduction. However, the variation in performer interpretation is presumably the point in this module, and as is often the case in Audio emulation works, it is the performer’s attempt to emulate the sound that produces the most interesting and unexpected outcomes.

The final module in the set, *Himmel* (Sky), uses a field recording of a helicopter. It is not the generic “sound of a helicopter”, found in sample packs, but rather a real field recording of a slightly distant helicopter - distant “in the landscape”. Emulating the recording, the performers are faced with a different, almost opposite set of problems to those found in *Rose Garden* - the field recording is “noisy”, layered or polyphonic (in the musical sense) and includes low ground hum around 60 Hz, again beyond the range of the flute or clarinet. The harp and the electric guitar with their polyphonic capabilities and wide frequency range cope the most naturally with these challenges. The guitar in particular, able to process its output with a distortion pedal, and perfectly adapted to producing ground hum, was able to create most of the broad frequency noise in the recording (the four periods where the guitar emulates the white noise are clearly visible in contrast to the other instruments’ attempts). The high frequency glissandi on the other hand are more prominent in the live recording than in the recording, partly because of the difficulty for acoustic instruments in creating a “distant” sound live. Figure 7. shows a spectrogram of the audio score (above) and the live performance below).

3.4. Lindsay Vickery: *Little (Grey)Wing* (2022)

Little (Grey) Wing uses samples of materials that are potentially familiar to the audience, from the final two

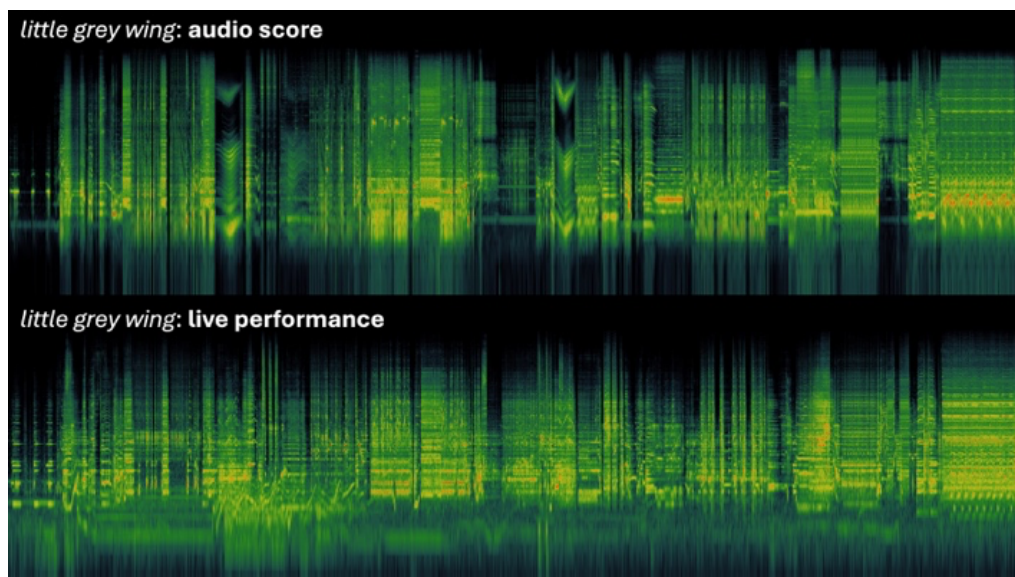


Figure 8, Comparison of Spectrogram of *Little (Grey) Wing* Audio Score (above) and live performance (below).

albums of the *Jimi Hendrix Experience*. The seven-and-a-half-minute Audio Score is a sonic collage of 187 mostly extremely short samples from 21 different tracks (See Table 3.). The samples often consist of fragments of so-called “studio banter”, false starts and doodling that occur between tracks. The title is obviously a nod to both Hendrix – *Little Wing* (1967) and the ensemble performing the work.

The samples are densely distributed, forming a three-part structure in which the first section is stable, the second exploratory and the final section returns again to a more stable but also energetic climax of off-kilter loops. Like *Landscapes*, the work is entirely focused on the instrumental emulation of recorded sound. But unlike the other works in this section, the same audio component is presented to all of the performers in conjunction with a synchronised scrolling score that “orchestrates” the components that they are to emulate. This, along with Rehearsed Emphasis/(slightly tongue-in-cheek) High-

Axis: Bold as Love (1967)

<i>EXP</i>	11
<i>Up From the Skies</i>	5
<i>Ain't No Telling</i>	4
<i>Little Wing</i>	2
<i>If Six Was Nine</i>	37
<i>You Got Me Floatin'</i>	1
<i>She's So Fine</i>	1
<i>One Rainy Wish</i>	1
<i>Bold as Love</i>	10

Electric Ladyland (1968)

<i>Have You Ever Been (To Electric Ladyland)</i>	1
<i>Crosstown Traffic</i>	20
<i>Voodoo Chile</i>	3
<i>Come On (Let the Good Times Roll)</i>	2
<i>Gypsy Eyes</i>	28
<i>Burning of the Midnight Lamp</i>	2
<i>Rainy Day, Dream Away</i>	2
<i>1983 (A Merman I Should Turn to Be)</i>	11
<i>Moon Turn the Tides</i>	2
<i>Still Raining (Still Dreaming)</i>	16
<i>House Burning Down</i>	3
<i>All Along the Watchtower</i>	5
<i>Voodoo Child (Slight Return)</i>	20

Table 3. List of sampled tracks in Lindsay Vickery - *Little (Grey) Wing* (2022) and the number of samples from each.

fidelity reproduction”, [3] potentially contributes to the ensemble’s ability to maintain a close synchronisation, especially rhythmically and timbrally, with the Audio Score collage. This is visible in the comparison between the spectrograph of the Audio Score and the live performance seen in Figure 8.

Although an electric guitar is part of both the original recordings and the live ensemble, the components performed by Hendrix in the recording are often distributed between several performers in the ensemble and highlight the complexity (impossibility) of faithfully emulating the sounds of a rock band with acoustic instruments.

The “orchestration” was strongly influenced by rhythmic and timbral features of the collage rather than the pitched ones. This results in the translation of closed hi hat sounds into key clicks, bass drum strikes into palm strikes on the harps and other extended techniques developed as part of the rehearsal process. This contributes to the performances retaining much of the energy of the original recordings, in a manner that is recognisable but perhaps has something of an “uncanny valley” quality for the audience.

The inclusion of such a detailed score places *Little (Grey) Wing* in the border territory of Audio Score practice, but in performing the work, the primacy of the Audio Score and the visual score’s mnemonic function is clear despite their interdependence.

4. CONCLUSION

This discussion aimed to reframe the Audio score as an approach that reconfigures compositional authority, in particular through its foregrounding of communication through the medium of sound itself and through minimizing the representation of sound via visual abstraction.

The case studies explored, exemplified a diverse range of types of authorial reconfiguration: delegated (*Laughter Studies*), centralised (*Un Paso*), constrained (*Landscapes*) and hybridised (*Little (Grey) Wing*).

It placed the Audio Score at the convergence of new and emerging technological affordances, aesthetic priorities, and listening practices and examined the proto-auditory score works and their contribution to the formulation of the conceptual foundations of the Audio Score.

Boundary works were discussed, demonstrating the necessity for an Audio Score to be defined by reliance on the primacy of auditory communication both in the “outside” case where auditory cueing is employed in the service of a primary score (even if it is indispensable to the performance); and the “inside” case where audio is the primary form of communication even when used in conjunction with other peripheral score materials.

A number of categorisation parameters were explored concerning works in relation to the emergence of supporting technologies. Where possible I have attempted to place these discussions in the framework of my own experience performing Audio Scores – the first of which was surprisingly forty years ago.

Audio Score practice is clearly relatively new, very rich and requires more detailed documentation. Numerous novel combinations of Audio Score capabilities remain to be explored.

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