Routledge
Taylor & Francis Group

Contemporary Music Review

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/gcmr20

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To cite this article: Lauren Redhead (27 Nov 2023): ‘Developing Live-interactive Approaches to New Music for Organ and Electronics Through Collaboration’, Contemporary Music Review, DOI: 10.1080/07494467.2023.2277545

To link to this article: https://doi.org/10.1080/07494467.2023.2277545

CONTEMPORARY MUSIC REVIEW
https://doi.org/10.1080/07494467.2023.2277545

'Developing Live-interactive Approaches to New Music for Organ and Electronics Through Collaboration'

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ABSTRACT

In this article, I argue for a shift of focus from mechanical/technological and sonic approaches to music for organ and electronics towards the role of the organist as a performing musician in the collaborative development of new work. To do so, I address the roles and limitations of technologies in performance, taking an embodied approach to understanding and critiquing the work of the organist in the context of my collaboration with Alistair Zaldua (live electronics). I consider the practical solutions we have devised to allow performance in diverse spaces with diverse instruments as a hybrid instrumental practice, considering this an affordance rather than a problem to be solved. I offer three case studies: the preparation of an historical work for organ and electronics (Mesias Maiguashca, *Nemos Orgel,* 1971–1990); the realisation of the same concert in 5 contrasting spaces (*orgel, orgel, orgel, orgel, orgel*, 2021); and a collaboration focused on our performance practice (Annette Schmucki, *54 stops*, 2020). By examining the development of live-interactive approaches through collaboration I seek to show what this hybrid practice offers for the realisation of this music, and what it means for the consideration of the performing experience of the organist.

KEYWORDS

organ; electronics; interaction; collaboration; contemporary music

Contemporary Music for the Organ in Context

Music for organ and electronics could be considered a genre of contemporary music that is in some ways separated from the traditions of music for other instruments and electronics, or from other forms of electronic music. The reasons for this are the same as those reasons that historical organ music is often considered separately from the classical music canon: the spaces in which organs are housed, and the situations in which organ music can be heard, are often separate from those for chamber, orchestral, or other types of performances. When electronic music components are added to organ performance, these require the consideration of technical and logistical issues that do not occur in the concert hall, meaning that music in the tradition for organ and electronics may reflect separately developed and often idiosyncratic solutions to what otherwise could be common problems for all performers who work in music with mixed media. Therefore,

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the contemporary organist who works with electronics is someone who needs to look to the musical past, to present performance solutions, and to invent new solutions to create new methods of performing that represent the organ's contemporary possibilities.[1]

It is, however, not the case that the organ and electronic sounds and/or electronic means of production represent opposing sonic worlds or musical practices. Jean-Claude Risset (1938–2016) conceived of the organ as a machine with which the performer interacts, that also pre-supposes aspects of synthesis and computation in music, writing: 'the organ may be considered the first information machine: the performer, touching the keyboard, specifies information that is decoupled from the energy (provided by the pump) that actually produces the sound' (1994, 257). What Risset describes here is the basis of understanding a plausible relationship between organ and electronics—in that the *practical* source of the sound (the movement of air) and the *musical* source of the sound (the work of the composer or performer) are separated from each other in both cases. This is perhaps even a familiar analogy used to compare the organ and electronic sound since the basis of both can be said to be in sound synthesis. It is a sonic and a mechanical comparison, but also one that focuses on what takes place inside the organ. As such, possibilities of extended synthesis and relationships between the organ and electronics *as instruments* are proposed, but practical problems of the combination of organ and electronics for their performers are not addressed.

Risset is not alone in his consideration of the organ in terms of its internal mechanics over the practical aspects of the realisation of music for the instrument. Such a consideration leads to two possible trends within recent composition for the organ, or for organ and electronics, both of which can also create performance situations that I personally seek to avoid. The first of these comprises compositions that require one (or more) assistant(s) in their realisation. An example of such pieces is *Sieben Sterne* (1970) by Brian Ferneyhough; a piece that stipulates the requirement for two assistants, but in which composition Ferneyhough claims that 'the subjective input of the performer was elevated to a central issue of compositional regard' (1974). The organist's 'subjective input' in this case relates to passages of notation that are less dense than the material that surrounds them, which the organist is encouraged to embellish. The improvisational element of this instruction is one that clearly fits within the tradition of music for the organ, but also one that—in combination with the role of the assistants—is limiting as it casts the organist as the operator of the manuals and not as an instrumentalist who controls all aspects of the sound, including its registration. This means that a significant aspect of performance at the instrument is deferred to a performer who is not identified as the organist, and whose work is situated outside of the 'performance'. Therefore, for the performer at the manuals, 'improvisation' that is not planned in advance with the assistants is not completely possible: while the understanding of the link between register and timbre may be embodied for the organist, this cannot be expressed in these passages, which are assumed to be pitch-based only.

A contrasting trend is the composition of essentially site-specific works that require a particular instrument such that the stop/manual combinations required to perform the piece are not available in a majority of locations or to a majority of organists. Such pieces are sometimes written to take advantage of specific sound possibilities (such as the bending of notes that can be possible for instruments with mechanical actions); sometimes to express work on sound combinations that a composer has undertaken with or for a specific instrument; and sometimes simply as the result of a

misunderstanding that variation between instruments can be as great as is the case—meaning that some specific descriptions of sound or effect might render a piece unplayable outside of a handful of locations. Many of the organ works by Olivier Messiaen might even be included in this category, linked as they are with the instrument at *La Sainte Trinité* in Paris where he worked. In particular, the upper-work available in that organ clearly influenced the composer's compositions for the organ, and makes the pieces difficult to perform outside of venues not only with a similar organ build but without the specific mixtures used by Messiaen.[2] The composer addresses this himself in interviews with Claude Samuel, stating: 'I used the organ mixtures with their false fifths, false thirds, false octaves, but without the fundamental notes, which created a […] family consisting only of harmonics, of artificial resonances' (1986, 56). He goes on to describe this as a twentieth century tendency that was, 'perhaps under the influence of *musique ealizat* and electronic music, to use new timbres, and, especially, timbres whose resonance adds a certain mystery'. According to Messiaen, 'these instruments offer us power, poetry and an unreal quality … ' which includes a 'halo of harmonics', 'false fundamentals', and 'other very complex sound phenomena', that come close to the 'enormous and strange noises in nature' (57). This aligns such work with important innovations in the consideration of sound within composition in the twentieth Century, but outside of the embodied instrumental knowledge of the organist; rather it is situated within the understanding of the organ and material and architectural.

I have included the examples of Ferneyhough and Messiaen to demonstrate how works that fall into these trends do so because they are also situated within traditions of writing for the instrument that do the same. In addition, these are traditions that seek to augment the organ or compare its capabilities to those of electronic music, and so are clearly relevant to the consideration of music for organ and electronics. However, in contrast to these solutions which, as Risset also does, address the organ in its mechanical aspects, I wish to consider the potential role of the organist as a performing musician in the collaborative development of new work for organ and live, interactive electronics. In particular, the 'liveness' and 'interactivity' of the electronics are points of focus as they introduce particular performative problems to be addressed. In considering these, I address the role of technologies in enhancing the possibilities for such performance but also acknowledge that there are practical and musical limitations to their use, and seek to address the organ and electronics as an *assemblage* (DeLanda 2016).

The Assemblage and Embodiment

Manuel DeLanda's concept of the assemblage, after Deleuze and Parnet is one in which, 'the parts that are fitted together are not uniform either in nature or origin', and where, 'the assemblage actively links these parts together by actively establishing relations between them'. The kinds of assemblages dealt with here are therefore DeLanda's *extrinsic* assemblages, since he claims that: 'if a relationship constitutes the very identity of what it relates, it cannot respect the heterogeneity of the components but tends to fuse them together into a homogenous whole' (DeLanda 2016, 2). The constantly changing and contingent qualities of the assemblage of the organ, electronics, and performers in the

examples I give below define them as therefore extrinsically related. Similarly, Marcus and Saka write that the assemblage,

> is a topological concept that designates the actualizations of the virtual causes or causal processes that are immanent in an open system of intensities that is under the influence of a force that is external (or heterogeneous) in relation to it.

This allows analyses that proceed from this concept to 'express something of the modernist condition of particular subjects and objects of study along the dimensions of the temporal, the material, the relational and the perceptual' (Marcus and Saka 2006, 103).

Buchannan criticises this sociological re-reading or development of the ideas of Deleuze because of its progression from 'the concrete to the abstract', writing that '*only the actual elements can be causal*' (2015, 389; emphasis original). While this reflects the approach of someone who wishes to deepen their understanding of Deleuze's concept proceeding from a variety of examples, in my analysis I look at the heterogeneity of the system, and the fluid relationships between the human and other actors within that system. It may therefore be that my analysis is closer to Actor Network Theory than constructivist philosophy, but as my aim is to understand real-world performance relationships in which I must participate, rather than only to apply poststructuralist concepts to them, I find this appropriate. Beyond a practical approach to the realisation of music for organ and electronics, I take an embodied approach to understanding, developing and critiquing the role of the organist in this context, which is a progression from the concrete (or corporeal) to the abstract. In this way, my approach to the assemblage in this discussion also reveals the limitations of focusing only on technology.

This is also not an approach that finds the work of the performer to be inscrutable. For example, Merleau-Ponty's conception of the organist is an embodied one but one that is ignorant of the actual circumstances of work for the player. He writes that,

> Between the musical essence of the piece as it is shown in the score and the notes which actually sound round the organ, so direct a relation is established that the organist's body and his instrument are merely the medium of this relationship. (Meleau-Ponty 2005, 168)

While composer-performer collaboration might be one way in which a very direct and embodied relationship between the performer and the music can be established, such a statement also overlooks the physical work and unique solutions that are required in order to realise music for organ and live electronics, and the process of making and re-making that is required to realise such music in the different spaces in which organs are housed, and for different organ builds. Above, I outlined two examples that deny the performative agency of the performer's body across the heterogeneity of performance situations in which the organist finds herself, and in the following analysis I seek to centre that agency; I do this through the identification of the contingencies and boundaries in the systems that surround each of the pieces I describe.

Below, I address the conception of the performance of music for organ and live, interactive electronics in my collaboration with Alistair Zaldua, that considers—as an assemblage—a single hybrid 'instrument' that we perform together. I address the practical solutions we have devised to allow us to perform in diverse spaces and with diverse instruments as a hybrid instrumental practice: this is considered as an affordance of our performance practice rather than a problem to be solved. In order to explore this,

I offer three case studies: that of the preparation of an historical work for organ and electronics (Mesias Maiguashca, *Nemos Orgel,* 1971–1990); that of the realisation of the same concert of new works for this duet, but not created in collaboration, in 5 contrasting spaces (*orgel, orgel, orgel, orgel, orgel*, 2021); and that of the realisation of a work written collaboratively for our performance practice as opposed only to the sonic and mechanical combination of organ and electronics (Annette Schmucki, *54 stops*, 2020). Through examining the development of live-interactive approaches to this music through collaboration I seek to show what this hybrid practice offers for the realisation of music for organ and electronics, and what it means for the consideration of the performing experience of the organist.

Case Studies

Mesias Maiguashca, Nemos Orgel*, 1971–1990*

Nemos Orgel is a foundational piece that establishes the sonic relationship between the organ and synthesised sound. The piece began as a tape work, *Übungen* (1971), to which an organ part was added in an attempt to come close to Maiguashca's imagined sound of the organ described in the novel, *20,000 Leagues Under the Sea* (Jules Verne 1872). Maiguashca writes of this pairing,

> [d]ie Mischung von *Übungen* mit Klängen von einer "echten" Orgel würde eine "Mixtur" schaffen, eine Mixtur die eigenartig, ja bizarr klingen würde, eine Mixtur, die den Klang des Nautilus suggerieren könnte. (1990)[3]

He also describes how this is compositionally achieved, through close relationships between the musical materials, as well as the sounds, of the organ and tape parts, that create an aural 'labyrinth':

> Die Wege der Orgelstimme und des Tonbandes treffen sich, kreuzen sich, begleiten sich und schaffen somit ein Labyrinth, ein Labyrinth, das wohl die psychischen Meander der kuriosen Gestalt des J. Verne darstellen könnte. (1990)[4]

To practically achieve this relationship through notation, the soundwave was visualised, printed, and presented in the score as a further 'stave' above the organ part so that the stave notation mirrors the electronic sound using the instruction crotchet = 60. This, therefore, also leads to Maiguashca's instruction to use a click track. I initially chose not to use the click track out of preference, but in fact this instruction turns out to be one that cannot be realised accurately. Through attempts in rehearsal to accurately time specific events between the two parts, it became clear that the length of tape may have been distorted in the process of creating the score—either as a result of distortion of the original tape through digitisation or of the soundwave as a result of the software used to print it. Knowledge of specific timings and a more flexible approach to tempo are required to sound specific events together as indicated by Maiguashca; this link between the temporal and the material cannot be known until the organ and electronics are sounded together. As a result, this relationship also becomes an embodied one, that is reliant on the performer's tacit expectations of the sound in the space, the speaking of the instrument, and the relationship between the two parts. Although a likely unintended

aspect of the preparation of the piece, this further reflects the labyrinthine relationship depicted in the music.

The piece also reflects a 'site specific' or 'organ specific' tendency, as described above. The notation is for a four manual organ, with specific events and registers mapped to specific manuals that likely reflect the organ performed by Zsigmond Szathmáry at the piece's premiere at the Metzer Festspiele in 1990. This is an impractical notation since few organs fulfil the criteria for both the number of manuals *and* the mapping of ranks to manuals in such a way as will also produce audible sound in performance. However, a majority of the events in the score are possible on a smaller instrument, managed by changes to registration. Where this is not possible some aspects of prioritisation are required and this is done using the electronic sound as a guide; the result is sometimes that notes sound in another octave or timbre than described in the score. It is also often necessary to 'support' some of the organ part through octave doublings to achieve audibility.

These are practical solutions, but also relate to the heterogeneity of the piece which is a complex negotiation between the instrument and the space. In a most extreme case, the piece was performed at the University of Dundee, which organ had only a single solo pedal rank: a 16' reed. The performance of the electronic part therefore needs to extend beyond the presentation of a 'tape' or 'fixed media' (which was intended by Maiguashca in the original composition) to the presentation of the sound in space and in combination with the individual instrument, which also requires extending the sonic possibilities of the electronic part. This is done through a Max/MSP patch that allows the organist to trigger the tape part from the instrument (by using the MIRA object and a connection to a closed network), and through a series of filters which allow the performer of the electronics to respond in real time to the sound in the space and its combination with the organ, and to do so in a unique way in each performance.

As such, in performance, control over time resides with the organist who controls the synchronicity of events through the piece's timeline. However, this temporal element cannot therefore be influenced by the performer of the electronics who must respond to the events as they arrive and cannot extend or delay them. The timbral relationship between the two parts is then influenced by the instrument itself and controlled and manipulated in the space by filtering the electronic sound. This part is controlled by the performer electronics and cannot be influenced (or sometimes even heard) by the organist. Therefore, aspects of the music are distributed in their embodiment by each of the musicians, who also need to perform somewhat in isolation from each other. This is by no means a perfect interactive relationship since it is limited by its contingencies and boundaries: although the organist, electronics performer, organ, and space each have a part to play in actively shaping the sound and the piece, this is also dependent on trust and devolution of responsibility that cannot be shaped or renegotiated during the performance. Nevertheless, this fluid relationship between the performers and other 'actors'—the instrument and the sound in space—could therefore also be considered part of the perceptual 'labyrinth' of the piece.

orgel, orgel, orgel, orgel, orgel, *2021*

In contrast, the tour *orgel, orgel, orgel, orgel, orgel*, was a project that took the heterogeneity of organs as its starting point:[5] the composer Uday Krishnakumar undertook

research to identify organs in Berlin that had significant differences from each other in terms of build and sonic capabilities, and that also had unusual aspects of interest in their own right, in spaces in which five concerts of the same music could be presented. The compositional development of the music in this project took a more 'traditional' approach where the performer of the organ provided some initial feedback on some draft scores but received the pieces on which to work already complete. The pieces themselves represent a variety of approaches to electronics and writing for the organ that included: computer-aided acoustic composition (Fredrik Wallberg, *Map* (2021)); music for organ with fixed-media playback (Lin Yang, *1.50am, dreaming*, (2021); Irene Glalindo Quero, *la noche se ha calmado de pronto* (2021)) or diffusion (Lula Romero, *Umbra* (2021); Alistair Zaldua, *… rain of stars* (2014)); use of the organ sound as a 'controller' for electronic sound (Luc Döbereiner, *OSC* (2021)); and live interaction through the use of an open score (Lauren Redhead, *post praeludium* (2021)).

The result of this variety of compositional approaches was a potential variety of performative solutions that were both necessitated and afforded by the different organs and locations. This also drew attention to the aspects of performance that are embodied as in Merleau-Ponty's understanding of the organist (the ability to present the music despite the changing physical and mechanical circumstances) and those that are embodied in terms of the assemblage of the organ, performers, and electronics (the presentation of the music through this relationship, that emphasised the changing sonic capabilities of the sound in space). For example, the Pfarrkirche Weißensee houses two organs—one at the front and one at the back of the space, enabling the use of space in the organ parts as well as the electronics by performing in different locations and, in the case of *OSC*, by presenting elements of the piece from the different organ locations. In the pieces *Map* and *1.50am, dreaming* I utilised the uniqueness of each instrument to realise their different colour-characters in the spaces; this is work that draws on the available ranks of each instrument to produce a different timbral colour in each space, but also requires the organist to be flexible in the use of manuals and stop changes to realise this, since these also need to be re-learned for each performance, reflecting non-propositional knowledge of both the music and the instrument. At the Kaiser-Wilhem-Gedächtniskirche, the hybrid digital-acoustic instrument allowed for the widest combination of sound possibilities, and therefore the most extreme differences in this respect.[6]

In *Umbra*, *… rain of stars*, and *OSC* the possibilities of the sound in space were prioritised—for example by making use of different opportunities for speaker placements at different heights (in the Alte Pfarrkirche, Pankow and the Taborkirche, Kreuzberg) or a unique architectural shape (in the Paul-Gerhard-Kirche, Schöneberg). In the piece *post-praeludium*, the electronic part was realised by Alistair Zaldua by combining a recording of the organist reading an alphabetised re-ordering of the English text of the programme note with an ensemble of recorded instruments—including violin, e-violin, recorder, accordion and trombone—that were situated in the speakers behind the audience, and field recordings. In addition to placing the organ sound and electronic instrument sounds in distinct opposition to each other in the space owing to their sonic origin, this approach also caused the electronics to behave more like an organ, with different 'registers' to deploy.

The compressed nature of this project (taking place in a single week) was effective in highlighting differences between the instruments, and challenging project for the

organist in dealing with the differences and variety. At the same time, this situation invited a focus on the materiality of the organs as instruments, and diminished the evolving relationship between the organ and electronics out of practical necessity. Therefore, whilst potentially spotlighting the relationships between performers, instruments, and space by the focus on heterogeneity of the organ as an instrument, the space to experiment with these relationships also became contingent on the time in each venue and in potential tension with overcoming practical and technical difficulties in each space. This highlighted the relationship between the performers, instrument(s), electronics and space(s) as an assemblage, since event where aspects of this assemblage were changing (the instrument(s), the space(s)) the performers were able to work flexibly together not only to establish pragmatic solutions but to actively engage aspects of the network to animate the music within each space. In so doing, we '[link] these parts together by actively establishing relations between them' (DeLanda 2016, 2) and '[actualize …] virtual causes or causal processes that are immanent' (Marcus and Saka 2006, 103).

The project *orgel, orgel, orgel, orgel, orgel* also highlighted the practical difficulty of communicating the possibilities of composing *for* the organ's heterogeneity. The composers in the project had all visited one or more of the instruments in the project ahead of the concerts themselves. This resulted in a number of moments that appeared to 'work' better in a single location—by drawing on a specific sound, stop, or possibility—that therefore necessitated what seemed to be compromises more often than experiments in the other locations. This highlights that conceptualisation of the duet of myself and Alistair Zaldua and electronics as an assemblage is not only a performative solution but one that suggests a conceptual analogue in composition to be used to best effect. That is, so conceived, that such an assemblage offers its best possibilities when considered as a hybrid instrumental situation for which one might compose, rather than as an instance of a generic compositional idiom.

Annette Schmucki, 54 Stops, Grésillement, Alphabet des Rauschens, *2020*

My third example, in contrast to the two above, is the realisation of a work that was written collaboratively for the established performance practice of my duet with Alistair Zaldua, as opposed only to the sonic and mechanical combination of organ and electronics. *54 stops, grésillement, alphabet des rauschens* is 'for' the organ, 'about' the organ, 'about' the process of creating the piece, and 'about' contemporary music. It achieves these multiple levels by drawing on Annette Schmucki's established compositional techniques for working with text and speech. Discussions of how to approach the project of creating the piece became 'scripts' that were then recorded by both performers, and that became a fixed media portion of the piece. The 'script' also forms part of the score, along with tone rows and instructions for performing practices that are poetically described, and assigned to different sentences within the script/score. The temporal elements of the piece are in some way fixed by a link between the text and actions from the organist and electronics performer: the audio provides a series of cues to both performers from their own voices, triggering different playing instructions, tone rows, filtering and transformation of the sound, and fixing the performative rhythm in most places. However, the performers are also instructed to intervene in this structure by pausing the fixed media sound-score and interjecting with different kinds of pauses,

fermatas and loops. This process makes the voice on the tape both material and relational in the performance.

The issues of performance described in the previous two examples still pertain here: the efficacy of filtering is still highly dependent on the space, and the differences between organs raise questions about how to realise the registration instructions that —while poetically described by the composer—also combine with instructions for tessitura that present some limitations. In addition, the need to make many quick changes means that without pistons it can be difficult to create stark sonic changes between each of these instructions. In some ways the piece is deliberately designed to take this in account. Schmucki states:

> I have opted for an approach where a piece becomes developed over time. With our piece I did not know much about the organ previously, and you both told me a large number of things about the instrument and how each organ differs from others. I came to the realisation that because of the differences from organ to organ I would have to leave the score open. This intention behind creating an open score was to invite or present you both with a challenge in order to work precisely; it was to compose a score that you would be able to realise in either simple or in complex ways, depending on your response. (Schmucki and Zaldua 2020, 382)

This heterogeneity is reflected in the title, and Schmucki explains this as a conscious choice:

> '[i]n German, we have the word *Rauschen* and in English, you have "noise", and there are differences of concept between the two. The word *grésillement* means something very enlivened, like butter that sizzles as it heats up in a cooking pan. So, it is something that is very animated and lively. This word has been added to yield a trilingual title (English, French, German)'. (Schmucki and Zaldua 2020, 383)

The 'noises' in the title might connote different ideas to listeners depending on their linguistic backgrounds and musical preferences, and their familiarities with the organ and with experimental musics, but invites the consideration of a range of sound possibilities with and around the organ. This, for my purposes, helpfully also directs attention away from the organ's mechanism as its method of 'sounding'.

The mechanical aspects of the organ might, in fact, have been the answer to one of Schmucki's original questions for the piece. She reports, '[i]n order to address the question of writing a piece for organ and live electronics firstly I had to consider the question: what is an organ?' (Schmucki and Zaldua 2020, 379) Since, of my examples, this is the piece with the most obvious flexibilities, it clearly also feels the most adaptable. But in other ways this is not so: the work is quite complicated and requires significant advanced preparation that results in the development of an almost fixed score from which the performers work in the concert (Schmucki's 'challenge to work precisely'). The score that I created became a 49-page A3 collage of the vocal prompts, mapping of registrations to pistons, aspects of the poetic instructions, stave notations of the tone-rows, some notations of choices within the tone-row parameters, *ossia* cues relating to the electronic part and Alistair's and my shared decisions, and colour-coded playing instructions. This acts as a record of my performative engagement with the process, score, and instructions and an externalisation of my embodiment of the piece; while it represents the work that it is necessary to be able to realise the piece—in particular in its 2-hour installation version—

it is likely unintelligible to anyone without that embodied knowledge of the music and should rather be considered a constantly evolving aspect of the music. Likewise, the electronic part is represented by Alistair in a Max/MSP patch that contains modules in order to realise the poetic performing instructions of the electronics part, along with a library of samples that were created as part of the piece and the process, and separately from the spoken script-score. These, equally, contribute to the rhythm and pacing of the piece, in ways that reflect the performers' tacit knowledge of them.

On a practical level, the performance is not possible without monitoring the unprocessed audio score for the organist; a logistical requirement that we otherwise seek to avoid as a potentially limiting factor in performance. In addition, the piece also has a specificity, but one that is related to its particular performers rather than a particular organ. While technically possible for another duet to prepare the scores and realise the piece from the audio and instructions, the link between the performers' voices on tape and bodies in the space would not be present. It might be possible for other performers to re-record the script and for the tape to be re-made; in that case the link between aspects of the spoken content and the individuals performing would also not be present. Rather, Schmucki answers the question 'what is an organ?' by proposing a new instrument: one that is already assumed to function as an assemblage of human and non-human actors.

Conclusions

In this discussion I have reflected on practical solutions that make music for organ and electronics performable in multiple spaces; but these are in themselves not only pragmatic. The concept of the assemblage as outlined by and in response to DeLanda presents the possibility of understanding the feedback loop between human and non-human actors in the realisation of music for organ and electronics. This allows for the consideration of the 'material' in the music beyond the mechanical and technological realities of the instruments, and of the music's temporal aspect beyond practical questions of duet. The heterogeneity of the organ as an instrument can be superseded by the heterogeneity of the network of the performers, organ, technology, sound and space. This may not be unique to the duet of organ and electronics, since the practical and performative issues I have outlined could be replicated in other contexts. However, it is exemplified in this context as a result of the close relationship between the instrument and electronics as referred to by Risset at the opening of this article. While all instruments can be considered as 'technologies', the parallels between the organ and electronic studio technologies bring the assemblage of the organ, electronics and embodied experiences of the performers into greater focus in this case. This leads to an understanding of technology not as purely studio-based but, as for Ursula K Le Guin, 'the active human interface with the material world', and as 'what we can learn to do' (2004).

I have also shown that it is not the case that a philosophical reconceptualisation of the duet can solve on its own the practical problems that are present in real-world performance situations, and suggested by real musical compositions. When these aspects are considered, the relational and perceptual elements of music also come to prominence: in my examples, working in collaboration toward a shared—if disparate—set of goals, and the opportunity to design and create the performance materials in favour of this assemblage-

approach, resulted in the outcomes with the clearest aspects that point to the assemblage at work in the music. It is therefore easy to suggest a collaborative approach as a solution in all cases, but this may not be realistic: for example, where there is little time for a project, or where the composers are not able to enter into a collaborative partnership in the case of music that already exists.

These situations highlight the contingencies and boundaries of the networked elements of these performances that make up the assemblage, and also how the performing experience of the organist could be re-centred in the evaluation of them. For example, my three examples highlight that technical and mechanical challenges do not account for all of the questions of the realisation of the music; where a purely sonic-mechanical approach is taken to the organ as an instrument then all such questions could be answered in this way. Rather, I have presented a relational response to what I have shown to be a relational question, and therefore one that highlights the role of non-human actors in shaping the embodied experience of performance.

Notes

1. I acknowledge, here, the work of other musicians working with organ and electronics who also devise new instrumental means, such as that of FUJI||||||||||TA, and of organists who are using studio-based means to expand their performances, such as Wolfgang Mitterer. However, this article will focus on music that involves the organist as a performer of the 'traditional' or unmodified instrument, and music that requires the organ and electronics to be performed live within a space.
2. Mixtures are stops that activate ranks of clusters of notes that are both higher than the note played by the organist, and not harmonically linked to the fundamental. These clusters can be differently determined depending on the organ build.
3. 'Mixing ÜBUNGEN with sounds from a 'real' organ would create a 'mixture', a mixture that would sound peculiar, even bizarre; a mixture that could suggest the sound of the Nautilus' (my translation).
4. 'The paths of the organ and tape parts meet, cross, accompany each other, and therefore create a labyrinth; a labyrinth that could probably represent the psychic meanderings of the curious character created by J. Verne' (my translation)
5. A project description can be found at https://orgel-x-5.netlify.app/.
6. The specification of the organ can be found at https://www.gedaechtniskirche-berlin.de/page/2458/kirchenmusik-orgeldisposition.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Notes on Contributor

Lauren Redhead is a composer, performer, and musicologist. Many of her compositions are published by Material Press (Berlin), her organ music is published by Firehead Organ Works (UK), and her most recent albums have been released on the *pan y rosas discos* label (Chicago). As a performer of music for organ and electronics, Lauren works in a duet with Alistair Zaldua. Their performances have recently featured on BBC Radio 3, NRK2, and Deutschlandradio Kultur, as well as festivals such as Tectonics, NyMusikk/Only Connect, Ideas of Noise, and Electric Spring. In her writing about music, Lauren focuses on the aesthetics and socio-semiotics of twentieth and twenty-first century musics. Recently, she has published on the music of composers Michael

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