The various challenges of conceiving and performing electronic music in ensembles of various sizes has been a focus of the authors’ practice-based research for some years. This area presents a number of questions for exploration and theorising that, as yet, have not been systematically addressed in the research literature. In this chapter, we reflect on three shared projects from 2007-2009 and consider how a framework for examining these projects as collective exercises might be developed. The practical projects we examine were all embarked upon, in part, to develop strategies and tactics for collaborative play in live electronic music, and each engaged with enabling technologies for musicking in different ways.

For instance, pre-prepared scores and idiosyncratic notations were salient features of exploring Christian Wolff’s *For 1, 2 or 3 People* (1964) in a live electronic setting. By contrast, whilst re-realising Morton Subotnick’s *Sidewinder* (2008) for live performance, we had to devise our own approach to scoring and notation from a recording. Finally, in the case of Sean Williams’ *Electronic Skank* (2009), the structuring element was provided by the particular disposition of electronic equipment and players.

In addition to directly responding to immanent practical concerns about approaches to group play in live electronics, these projects also address the question of the role of practice in musical research more generally, and explore the particular methodological affordances of the practice in revealing aspects of music making that could complement more traditional methods. We take this question to be urgent—insofar as the place of practice-based research remains precarious in academic institutional settings and so warrants advocacy—and also to be directly related to those pragmatic issues that motivated these projects in the first place, given that our practice involves the *lived intersection* of disparate concerns that might otherwise be theorised in isolation. In particular, it is our contention that through practice we may be able to engage concretely with slippery questions about how imbrications of social, technological and material...
circumstances may be implicated and involved in particular *musical* outcomes. So, whilst our immediate concern is with finding a way to theorise a particular issue in collective electronic music, it is our hope that this exercise may contribute more generally to finding valences between practice-based research and other methods in music.

**Sonic space and live electronic collaboration**

A motivation common to each of the projects we discuss in this chapter was to find practical ways of confronting the difficulties of negotiating musical space that often arise in collective live electronic performances. It is unfortunately common that group performances of electronics can end up being less than the sum of their parts in some respect. What is needed, in our view, is a way to address this issue practically, but also theorise it effectively such that it is folded into the field’s evolving understanding of live electronic music. We can roughly map out the kinds of challenges faced on two fronts: one, broadly speaking, technological and, the other, discursive.

On the technological front, first, there is a longstanding absence of repertoire. Whilst there are pieces for groups of electronic musicians, these are often composed specifically for particular instrumental systems, such as Stockhausen’s *Mikrophonie I* (1964). However, as the material base of electronic musicking has become more widely accessible, bespoke and idiosyncratic practices have proliferated and there is a significant cohort of electronic musicians who have their own developed craft centred around a particular instrument or assemblage. Meanwhile, there are pieces that aim to be instrumentally ambivalent (such as Wolff’s *For 1, 2 or 3 People*, discussed below), though it remains to be seen how well these fit the special challenges of group electronics.

A further technological factor concerns what we do with these instruments: how this informs the kinds of individual voice we develop and how these voices aggregate. For instance, one conspicuous affordance of electronic instruments is that they disrupt the temporally strict gestural coupling whereby energy input produces sound output more or less

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1 For these purposes, where repertoire can be said to consist of *works*, we are regarding *works* as a kind of intangible music technology, insofar as they exist to enable the making of music.

2 For a longer discussion of the fluidity of the idea of “instrument” revealed by electronic musicking, see Green (2011).
immediately. Moreover, because many electronic instruments can sustain sound effectively indefinitely until instructed otherwise, one can end up in the slightly perverse situation where it requires greater effort to stop sounding than to carry on. Related to this is the extraordinary spectral reach and presence of some electronic instruments. These properties can, in group situations, make it easy to slip into a preponderance of “continuous stream” playing (Smith and Dean 1997)—unperturbed by breaths, rests, or fermata—with dense, laminar (Bailey 1992) sound worlds. This can be frustrating for players and audience alike (although it may not be!).

On the discursive front, live electronic scholarship is confronted by a slender body of research relative to the expanse of practices that have emerged in recent decades. As it stands, our discourse remains framed by the perspectives of the European and US post-war avant-garde and, although this is slowly changing, the field lacks discursive frameworks that can cope with the wide range of electronic practices outwith these traditions. A key problem is that whilst we have ways of talking about sound and sounding technologies, and we have ways of talking about social and historical context, we are not so well equipped with ways of bringing these two perspectives together; attention to one may happen at the expense of the other.3

**Performance ecosystems, relational musicology**

We are by no means the first to note these problems. Here, we turn to two perspectives developed, respectively, by Simon Waters (2007) and Georgina Born (2010), and present them as being complementary. In particular, we believe that the combination of Waters’ and Born’s work provides a useful and powerful framework through which to develop understanding—arising from music practice—of the interrelation of social/material context and musical results.

Waters’ (2007) discussion, like ours, focuses on the disciplinary problematics of electronic music scholarship. He situates his discussion by noting an unfortunate tendency for discourse around electronic music to end up taking refuge in the relative certainties of talking about technology

3 These tensions are not limited to electronic music scholarship, of course: there is a rich history of antagonism between discourses that treat music as a historically situated, social phenomenon and those that prefer to view it in autonomous terms.
at the expense of more difficult (but more pressing) issues of social, historical and cultural circumstances and, as such, impoverishing our understanding of the music being made. What arises from this is a proposal that we instead adopt the perspective of a performance ecosystem that does not take for granted neat and stable delineations between players, instruments and their environment(s) but, rather, pays attention to the ways in which the distinctions between these entities may be dynamic and contingent in practice.⁴

The notion of a performance ecosystem provides a fertile perspective not only for beginning to contend with those factors that appear to be peculiar to electronic musicking (such as the conspicuous mutability of instruments), but also for scrutinizing the view that perhaps electronic music is not as exceptional as we might assume and that it can be useful and productive to look also for commonalities with acoustic music making. One particular area in which there is scope for developing the performance ecosystem idea further is in providing a more shaded understanding of the ingredients of “environment” in such an ecosystemic perspective. It is clear that the concept is doing hard work, insofar as it has to account for a complex set of interrelations between people, material circumstances, and historical-cultural situation. Here, Born’s (2010) recent work that proposes a “relational musicology” is useful in starting to chart this more shaded view.

Born proposes four broad topics that make up musical scholarship—sociality, temporality, ontology and technology—and goes on to examine the make-up of these topics in some detail, part of her argument being that they can only be tractable if approached by a variety of methodologies and perspectives. Whilst Born’s work is not addressed to practitioner researchers, focusing more on how to make more fruitful the relationship between musicology and music sociology, her proposed topics provide a useful framework for finding our way through the complexities of our performing environments and for beginning to appreciate on what fronts practitioner researchers may be well positioned to make contributions to music scholarship more widely. It is worthwhile to briefly examine these topics before turning our attention to three particular collaborations as case studies.

Born’s discussion of technology centres predominantly around issues of music reception, and especially the phenomenon of recording as having

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⁴ An issue of Organised Sound (volume 16/2; 2011) has been dedicated to elaborations of and responses to this idea, including Green (2011).
consequences for our understandings of music. As well as enlarging the scope of this discussion to include the role of technology in production, practitioners are well placed to contribute to our understanding of how these mediating technologies function as systems (of, e.g., microphones, recording devices, signal processors, loudspeakers) and how these, in turn, might interact with other systems of musical technology (for instance, concert halls or scores).

Around ontology Born opens up a highly useful pluralism when she argues that “from now on we would do well to be alert to the diversity of music ontologies in the world” (2010: 241). From the point of view of electronic music this is particularly apt in conjunction with technology, in that we can start to see how it is that particular formations of music-technological assemblage might participate in the enaction of particular music ontologies. Furthermore, to the extent that a musical ontology is enacted rather than given, and to the extent that musicians are often nomadic between musical communities (Frith 1996) we might regard individual practitioners as being involved in the bringing forth of multiple ontologies at different points and, so, well-positioned to reflect upon how these perspectives relate to the character of the musicking at hand.

Temporality and sociality are developed by Born in greater depth, and both notions are discussed in terms of various sub-divisions. Temporally, four modes are offered: intra-musical time; the mode of “memory and anticipation” that map corpora of musical works to each other as distributed across time; the time scales over which musical genres form and interact; and the epochal time over which large scale notions (“modernism”, “classicism” etc.) take form. Socially, we see a similar division into different orders ranging across the immediately microsocial, through imagined communities of listeners and producers, to the ways that music is bound up with social relations such as race, class and gender, and finally to the ways that music is involved in large scale economic and political tides.

What each set of delineations has in common is that they are not to be taken as simple analytical aggregates—we cannot understand large scale social currents just by aggregating microsocial interactions—but, rather, are co-dependent and in constant interaction. From the point of view of practice, it should be obvious that the more socially and temporally immediate orders are those that we are most directly involved in, and perhaps have most to say about. However, being alert to the ways in which these longer/broader orders may be present as effects is helpful in untangling the complex of factors involved in trying to reflect on why an episode of musicking might have turned out as it did. To test the possible
usefulness of this perspective for developing reflections on musical practice we turn now to our three case studies.

Three case studies

Unrecording Subotnick’s Sidewinder (2008)

The simple aim of this project was to perform a live version of Morton Subotnick’s Sidewinder (1970, on Subotnick 1971), for an ensemble of six players. This piece was originally created for long-playing vinyl, consisting of two parts, around fifteen minutes each—one for each side of the record. In the absence of a published score, we embarked on the project with nothing more than a brief email from Subotnick giving his blessing. So, in order to make a score we had to transcribe the record.

We approached transcription by listening, and sketching out in sequencer (Apple Logic Pro) dummy regions representing individual sound elements. Using a sequencer allowed easy replay and notation of exact timings, and the ability to colour-code different blocks; and some extra cues were given by the visual waveform display. The biggest initial challenge was finding a way of naming sounds in order to communicate them efficiently to other group members. Our first approach was to try and describe the intrinsic sonic structure of each sound—e.g. a “high pitched frequency modulation with very fast amplitude envelope, iterative at 4 Hz”. This proved both unwieldy and ineffective, as not all the ensemble members were equally at home with such technical descriptions. The second option upon which we quickly settled had a parallel in Stockhausen’s experience with notating Mikrophonie I (Stockhausen 1989) in that it used referential terms such as “crickets”, “marimbas”, “low drone”. These labels were much more easily communicated and built on a far greater shared cultural vocabulary. This approach also allowed for more interpretation at the individual level, and therefore more individual agency in the performance practice.

The resulting performance score is really an overview, with each sound element represented as a block, sometimes with dynamic indication (IMAGE?). If you like, we can include an image in the chapter… With

5 The group consisted of the authors, Jules Rawlinson, Lauren Hayes, Dave Meckin and Lin Zhang. We had a visual collaborator in Henrik Ekeus (see below), and the eventual performance was diffused by Rachel Kellett.
more time we could have split the score into individual parts and
developed each of these to show more detailed amplitude, frequency and
timbral information. In order to recreate the sounds, each sound, once
agreed upon and identified, was given to at least two people to re-
synthesize using analogue synthesizers.

Subotnick created his music on a Buchla synthesiser (Subotnick 1971),
which we did not have access to; so we instead made do with a range of
other synthesizers. Some of Subotnick’s sounds are now the subject of
extensive online discussion, particularly the so-called “Buchla Bongos”\(^6\),
but at the time there was little information available about Subotnick’s
techniques. As such there was a certain amount of trial and error in
getting individual sounds “right”, or at least to be convincing. In certain
cases we could rely on some historical knowledge of the Buchla synth. For
instance, we knew that the Buchla featured vactrol\(^7\) filters, and once we
acquired a filter based on Buchla’s design, some sounds were much easier
to re-synthesize with considerable accuracy, particularly what we termed
“plink plonk” and “marimba” sounds. The idiosyncratic decay properties
of this filter provided the material foundation upon which to build such
sounds. The single most effective instrument was a Roland RE-201 Space
Echo which transformed every sound fed through it to a really convincing
period sound. The unit’s spring reverberation and characteristically lo-fi
tape delay conjured a sense of a particular era (the 1970s) rather than a
sense of space, but this gave the sound a kind of temporal authenticity that
the group recognised and appreciated.

For the performance itself, rather than relying on a conductor we
distributed cues between players as appropriate to each section or sound.
The use of modular synthesizers afforded us the ability to create some of
the sounds by patching different systems together, allowing combinations
of players to simultaneously influence single sound elements. Subotnick
used what he termed “Ghost Tracks” where he would record a sine wave
of variable amplitude onto tape and then, on playback, use an envelope
follower to derive a control voltage from this signal, in turn controlling
various parameters such as oscillator frequency, envelope times or
modulation depth. Instead of using tape, we patched modules together so

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\(^6\) 373 threads are returned for “Buchla bongos” from the popular modular synth
forum Muffwiggler.com.

\(^7\) A vactrol is a brand name for a type of variable resistor that uses a combination
of a photocell and a light source, and which can be used as a control in place of
standard potentiometers, transistors and so forth, sometimes bringing a distinct
quality to the sound.
that some control signals were distributed between multiple players, thus allowing a degree of interaction on a machine level without having to rely on a fixed media source.

Dividing the labour up in this way led to interesting co-depencies: individual sounds could not be instantly produced so the process of preparing the next sound required a particular degree and kind of attention. Alloting sounds turned out to be logistically quite complicated: not only did we need to keep track of who was busy at a given moment, but certain people’s synths were better suited to some sounds than others. In rehearsal a good deal of time was spent trying to develop the agility needed to perform these rounds of play-setup-play. As well as the six soundful members of the group, we also collaborated with Henrik Ekeus to provide a backing video projection for the performance. In part, we hoped this would make clearer the relationship between our physical movements (all quite small) and the sounding results, which we exaggerated by trying to keep as still as possible except when engaged in sounding action. Ekeus devised a simple visualisation using Jitter video processing software Cycling '74 that highlighted the difference between successive frames. This meant that still elements would fade from view, but things that moved would be highlighted. The group wore white lab coats on stage, partly as a dramaturgical gimmick given the overt technicity of all the wires, knobs and dials that surrounded us, and partly as a pragmatic measure to give the video algorithm clear points of contrast.

Our performance took place as part of the University of Edinburgh’s biannual acousmatic\textsuperscript{8} music festival \textit{Soundings}...; the concert in which it featured was curated by Sean Williams and dedicated to works one would not normally hear in the context of an acousmatic concert. As is typical for acousmatic concerts, the sound reinforcement took the form of an array of a large number of loudspeakers (24), spaced around the hall, where a sound projectionist seated in the audience typically takes responsibility for “diffusing” the sound across the speakers. An almost ubiquitous feature of electronic performance of any kind is a certain degree of dislocation as one finds oneself in a different space, with different loudspeakers in different places. This dislocation was particularly acute in this instance as the sound was (literally) all around us, and consequently much harder to localise on stage compared to rehearsals (needless to say, another

\textsuperscript{8} A particular post-Schaefferian tradition of tape music. “Acousmatic” refers to the condition of not being able to see what one is listening to, a condition somewhat breached in this instance.
ubiquitous feature of performance, i.e. a lack of *in situ* rehearsal time, also applied here).


The aim of this project was to abstract techniques from dub producer King Tubby’s studio performance practices and incorporate them into our ensemble work, this time for a smaller ensemble of four.⁹ Could the studio practices of the 1970s be translated effectively to stage performance practices in the 2000s?

The bulk of Tubby’s dub mixing was based on radical remixes of four-track tape masters using a twelve-channel mixing desk, tape delay, spring reverb (Fisher Spaceexpander), faders, and a stepped high-pass filter.¹⁰ These items were available to other producers, but it was Tubby’s creativity in studio practice that enabled him to combine these tools to craft a unique sound. The four-track tapes would usually consist of a track per drums; bass (guitar); rhythm (electric guitars, organ, horns); and voice. In the case of instrumental versions: drums; bass; rhythm (electric guitar and organ); and horns (Williams 2012).

Williams’ piece was supposed to have four players representing the four tracks of tape, and a sound projectionist representing the role of King Tubby himself, but in the two performances in London and Edinburgh this was reduced to three performers plus sound projectionist. Percussion, bass and voice were the rough roles, with an added fixed-media “player” in the shape of a tape of Peter Nelson’s experiments on Xenakis’ UPIC machine made at the Centre for Mathematics and Music (CeMaMu) in Paris in the 1980s.

Williams built a filter based on close listening and some measurement of King Tubby’s recorded output, coupled with a photograph of his mixing desk (Williams 2013). It was only after the performances of this piece that the exact filter type was identified and sourced (an Altec 9069b), but the

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⁹ Sean Williams and Owen Green, with Jules Rawlinson and Lauren Hayes.

¹⁰ A tape delay uses the physical distance between a recording and a playback head to delay playback of a recorded sound. A spring reverb creates reverberation-like effects by playing sound through a spring and picking it up again. A high-pass filter variably attenuates lower frequencies in a sound (and so can be used to bring out texture or thin a sound); to be stepped means that the cut-off frequencies are chosen from a discrete rather than continuous range, giving adjustments a characteristic feel.
home-made stepped filter was close enough in terms of angle of rotation, number of steps, clicks, and overall sound.

Although there is no evidence of Tubby having used a variable speed controller to change delay times, his records only feature one of two delay times consistent with running the tape machine at 15 or 7.5 inches per second; to extend the capabilities of the Studer tape machine used for tape delay in our performance in Edinburgh, Williams also built a varispeed unit mountable in the analogue modular synthesizer used as his main performance instrument. A Fisher Spacexpander spring reverb was also sourced and completed the array of historic and newly built devices.

The content of the music performed by the other players was entirely improvised although there was a general guidance that each player should have a role broadly correlating with drums/percussion (Hayes); bass (Rawlinson); and voice (Green). The form would follow a common dub form starting with “voice”, then “drums” and adding “bass” last. The sound projectionist (Williams) was then able to mute, fade, filter, reverberate and echo at will, thus building a super-instrument and—at its best moments—creating a unified sound with each ensemble member contributing to one overall sound. Parallels can be drawn between the distributed agency that this created and Stockhausen’s Mikrophonie I in which two groups of three players create two distinct sounds as teams (Williams 2013).

Whilst the material super-structure for the piece was modeled around dub practices, the “four-track” materials provided live by Hayes, Rawlinson and Green were quite dissimilar from the grooves that King Tubby and others customarily worked with. As such, the sound world that the overall ensemble produced had an audible hybridity about it. Whilst Williams’ interventions were clearly redolent of that particular sound, the other three players were exploring textures and timbres perhaps more characteristic of contemporary electronic improvisation.11

The process of performing the piece with clear but minimal constraints led to a very different set of skills being emphasised. Given the ability of the sound projectionist to completely cut off each player’s output, or to radically filter and spatialize it, there had to be an element of trust and also an acknowledgement of playfulness between the performers. This made room for a certain amount of humour in who was being cut and filtered, which also provided something extra for the audience to “hold on to”

11 A video of the London performance is available at: <https://vimeo.com/8742551>. All websites referenced in this article have been accessed in MONTH YEAR.
(Landy 1994). There was generally good sensitivity about what was happening and how to bring the piece to an end. Although the power structure was clearly asymmetrical, a sense of negotiation and playfulness was manifest throughout the performance.

From the perspective of the other performers, of course, the division of sonic roles duplicates some of the dislocation described above in the Sidewinder performance. However, here it becomes thematic and integrated into the actual business of performing the piece: there was as much dramatic effect to be had in clearly working hard but inaudibly, as there was in those moments of being heard un-mediated. Meanwhile, on a technical level the context of working live with this dub setup provided a rigorous context for Williams to experiment with configurations and routings, keeping performance in mind. Williams found that using only one fader to control both the delay’s level and feedback (by routing the delayed signal back to the tape machine post-fader) was wonderfully effective in live performance as it freed up one hand whilst allowing a great range of control.

**Hermeneutic overload: Wolff’s For 1, 2 or 3 People (2008)**

Christian Wolff’s *For 1, 2 or 3 People* (1964) is one of a number of pieces the composer produced during the 1960s investigating alternative forms of notation, with improvising players in mind. The notational scheme in the piece is orientated towards describing the interaction of players, that is it tells you more about when to play in relation to when others play (or to other sounds in the environment), in contrast to the more conventional declarative notation that also specifies what to play, and has a less relational attitude towards time.

Green gathered together a small group, consisting of Williams and colleague Dave Murray-Rust, to work together on *For 1, 2 or 3 People* using electronic instruments with two distinct queries in mind. First was the idea that by getting to grips with, and practising this relational notation the players could hone their agility at performing fluid musical exchanges, and so provide a territory of contrast to the “continuous stream” mentioned earlier and so easily achieved with electronic instruments. Second was an interest in whether the notation could be made to work at all for electronic instruments (presumably not at the forefront of Wolff’s mind when composing the piece in the mid-60s), or whether there lingered basic assumptions about what affordances an instrument might have.
There are a great many distinct symbols in the notation for the piece. However, the most important ones denote types of synchronisation. For instance, a diagonal line leading into a dot is an instruction to synchronise the start of your playing with the immediate end of someone else’s, although there are modifiers to this like having to wait for a certain number of seconds or for a number of other events to pass before commencing. Other symbols denote starting/finishing in synchrony with another player, or waiting for some time after someone else has started, and so forth. Meanwhile, there are further instructions on qualities of tone (e.g. metallic), occasional choices of pitch, and transformations of pitch and/or timbre. The score consists of systems of these symbols, spread out over a page in no particular order. Players divide up the systems on a page between them, but with no explicit guidelines on how this should be done.

Unlike Sidewinder or Electronic Skank there was no fixed element of technical architecture here apart from the score itself. Whilst we each used the same basic resources throughout the series of sessions, the details of what we actually employed and how we played mutated in order to accommodate the demands of the notation. Murray-Rust and Green both had laptops running Ableton Live and assortments of external MIDI controllers and microphones, but each took quite distinct approaches to producing and controlling sound. Williams used a custom modular synthesizer, consisting of an array of oscillators, triggers, filters as well as a spring reverb.

The character of negotiations around sound took on a very different character in this case compared to either Sidewinder or Electronic Skank. Although we had a score, we did not have any particular guide as to how the piece should sound. There does not seem to be a canonical version of For 1, 2 or 3 People that one might rely on. There are a number of published recordings (e.g. Tudor 1968; Blum, Uitti, & Vigeland 1992; Goldstein & Kaul 2003) as well as a surprising number of renditions available on sites like YouTube,12 all of which are quite diverse (although one YouTube version made available in 2009 does actually feature Wolff as a performer).

As such, the specific qualities of the sounds we produced became driven more by the needs of coping with the interaction demanded by the score (and by Green’s certainty that there was always scope to go faster)

than by an overarching commitment to a particular sound world. In fact, possibly unsurprisingly, whereas much of the talking time in Sidewinder rehearsals had been geared towards trying to collectively come to consensus over what we were hearing and in finding ways of communicating about immanent characteristics of sounds, discussion in these sessions was much more focused on what we were reading as we tried to decode the various systems of instructions into scrutable sequences of action.

It was only through this process of examination that it became clear that, in fact, for many of the systems in the score there simply is no unambiguous interpretation available. What may have appeared at first to be omissions or inconsistencies in the notation (such as the near certainty of reaching a deadlock where no-one can play) began to look instead like deliberate playfulness on Wolff’s part, perhaps as a mechanism for compelling performers to make overt interpretative decisions. What was interesting socially was how differently the various players felt about this situation: for one—predisposed to wanting to get things right and to keeping at problems until a solution is found—it was immensely frustrating to be presented with something that would not reward that type of perseverance, whereas another—altogether less concerned with correctness—was happy enough just to settle on one of the available choices whilst playing and move on.

A final interesting feature of these sessions was to observe the extent to which both laptop players progressively stripped back their systems in order to cope with the demands of the score. The kinds of symbolic interfaces offered by sophisticated computer applications offer an abundance of choice but possibly at the expense of the very quick reactions needed by the piece. Whilst there are instructions in the score, such as mimicking the sound just heard, something a computer instrument could do extremely well in principle, this would always seem to be at the expense of timely responsiveness. As such Green and Murray-Rust both progressively abandoned processing sophistication and boundless choice to end up with much more constrained instruments that afforded greater agility (by the end of the sessions, Green was, essentially, using a single microphone and a filter).

**Discussion**

In each of the cases discussed in this chapter, we can see different ways in which we as musicians were engaged with each other, with our materials
and with our wider environment. Following Waters’ *performance ecosystem* perspective we can, for instance, see how the distinctions between players, instruments and environments shifted.

In *Sidewinder* the instrument was a constantly shifting assemblage, based upon changing interconnections and coordinations between players necessary to produce the next sound, and recalling the observation by Schroeder and Rebelo that “instruments are never stationary but are always given within a constantly changing, indeterminate background or horizon” (2009: 136). Moreover, this meta-instrument undergoes a profound shift when the music is transferred to the performance space and the group find themselves marooned in a sea of loudspeakers.

Similarly, in *Electronic Skank*, from the perspective of those players not in control of the mixing desk, their instrument is a dynamic phenomenon, subject to unpredictable interventions and transformations. Likewise, the sound projectionist is no longer dealing with predictable, repeatable materials coming off tape but with unruly, poorly behaved, *performing* human beings. In both these instances we see how the “instrument” is a distributed phenomenon, traversing technical and social relations.

Our experience with *For 1, 2 or 3 People* may appear to be different, and more in keeping with a conventional orientation of distinct player-instruments guided by scores. However, the score here becomes part of the instrument, needing to be played (what system of symbols to tackle next? How to interpret them?) and, made overt by the nature of the notation, the score itself becomes socially distributed and environmentally affected as the contour of these decisions hinges on what each other are doing.

Using Born’s analysis we can probe further, and see that each of her four topics interacts in different ways in each case. All the pieces had quite different ontological starting points, insofar as where the music was taken to spring from. In *Sidewinder* we are gathered around a recording as being representative of a musical ground truth, and subscribing to the idea that if we can reproduce the same sequence of sounds (or near enough) then we will have reproduced the same piece of music. The presence of a score with *For 1, 2 or 3 People* may suggest that we were on similar ontological ground, with a reliable, authoritative reference, but this is not the case. Through actually engaging with the score, and only through doing so, does one become aware of the extent to which the piece is quite deliberate in making sure that the score is *not* where the music is taken to reside, making unstable the idea of a composer as broadcaster of musical intentions. Here, the role of recordings is more ambiguous, presented as
we are with a multitude of versions, and there are no special grounds on which to privilege one over another.

Meanwhile, in *Electronic Skank* the music is taken to be distributed between the improvised actions of performers and between an assemblage of practices and materials deriving from a particular sub-culture, again placing a deal of ontological substance in the recording, both as an artefact of reception and tool of production but also putting substance in dub as an on-going music-historical tradition. Here is a particularly overt set of interactions between ontologies, technologies and different social and temporal orders: the piece recalls in title, sound world and in technical choices a genre (dub) that has been conspicuous over the decades since the 1970s for the ways in which it is enrolled into and generative of other genres (hip-hop, jungle, contemporary bass styles, etc.), both invoking Born’s second and third temporal orders by proposing connections between this piece and others, and also seeking to place dub into a concert setting, evoking imagined communities as it does so.

Similarly, the other two cases are shaped by these longer temporal orders. In *Sidewinder* the very notion of seeking to make-live a seminal fixed-media work can be partly understood in terms of the slow, contested movement of (albeit marginal) genres and territories of electronic music, and the conceit of donning lab coats can partly be understood as playfully underscoring the whole venture’s enrollment into a particular modernism, with its techno-scientific aspirations. A different modernism is perhaps at work in *For 1, 2 or 3 People*, but one that remains concerned with and has faith in the possibility of a radical renewal by altering the technical base of music making. For all that the piece remains strictly indeterminate there is, nevertheless, a certain uniformity between interpretations, ours included; it seems doubtful that this can be accounted for by the notation alone, but could possibly be partially accounted for by performers investing the music with a flavour of what they feel it ought to sound like.

Having *lived* the musical case studies discussed in this chapter, it is quite straightforward to identify at least some of the ways in which microsocialities contributed to the character of the musicking. The grouping that produced *Sidewinder* had an implicit but clear hierarchy based, in part, around degrees of expertise with analogue synthesisers but also, less simply, around the ability to wield technical language, as the negotiations over who was to do what, when and how were, perhaps unavoidably, dominated by those most able to patch the sounds, and also to critique what was being produced in “correct” technical terms (i.e. the language of analogue synthesisers). The other two cases were decidedly less hierarchical (Williams’ directorial role in *Electronic Skank*...
notwithstanding). With *For 1, 2 or 3 People* a degree of micro-social overacting (much waggling of eyebrows and significant looking) became integral to the performance practice as a necessary way of getting to grips with the coordination, whilst the structure of rehearsals and run-throughs became inflected by the need to bring some order for the benefit of those frustrated by the uncertainty of it all. Moreover, it should not be neglected that our social and musical interactions transcended, and wrapped themselves around the particular instances detailed here, that we all had ongoing relationships with one another, as well as a host of other musical commitments. We feel that this is a strength of the interior perspective of practice-based research, that our immersion in the bits in-between the conventional focal points of musical scholarship (the production of works or performances, or even the observing of musical communities) can make us alert to the texture of how the forces accounted for by Born’s various topics interact in practice.

Nevertheless, it should be acknowledged that the perspective granted by being *inside* the practice means that one will almost certainly overlook many aspects of micro-social interaction, and how these are inflected by the currents of the broader social planes, especially where unconscious or unthinking actions are involved, and it is clear that from this perspective having a productive disciplinary relationship with trained observers from sociology, anthropology and ethnomusicology is invaluable. This is especially true if one wants to account for the ways these broader social planes—the interplay of race, class, gender, and the broad tides of political and economic movement—become manifest in our particular ways of musicking. We can acknowledge the narrow bandwidth of gender, class and race present in these projects, and we can acknowledge the privileged circumstances of institutional affiliation that made musicking in this way possible in the first place, but we would be hard pressed, without the contribution of a critical eye from outwith, to account in any concrete way for the effects it might have on the character of the music.

**Conclusion**

Our argument has been, quite simply, that sometimes collectively produced live electronic music isn’t as satisfying as it might be and that, as practice-based researchers, we have an interest in finding ways of tackling this as a concrete problem. We have suggested that part of the problem lies in untangling the complex of social, historical, material and other factors at work in musical practice and that, if we are better able to do such
untangling then we would have better understanding of, and tools to talk about, when and why electronic performances are more or less successful.

To investigate this we have suggested that Simon Waters’ idea of the performance ecosystem (2007) can be usefully augmented with the ideas developed by Georgina Born in pursuit of a relational musicology (2010). By presenting three case studies from the authors’ own history of collaborations we hope to have demonstrated that such an approach can be productive in tracing some of the relationships between people, technologies, histories and so forth, because practice takes place at the lived intersection of the various topics of musical scholarship. At the same time, we have tried to clearly acknowledge that any such personal accounts of practice remain partial: practice-based research necessarily sacrifices generality for particularity. Nevertheless, we hope that aggregations of detailed personal accounts of practice in these terms, besides being of direct use to the communities of practice at hand, can also signal a way in which practice-based research is able to make a distinct contribution to wider musical scholarship.

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