Tragic Experiments Numbers 1 to N: Ecologies, Technologies, and Improvisational Forms of Life in the Plague Years

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Abstract

This paper describes a series of improvisational musical actions that the authors have initiated under the conditions of the COVID-19 pandemic and the enforced isolation we have experienced. We name our actions "Tragic Experiments'. Using a variety of networking technologies we have improvised together from our homes in Belfast and North Tyneside, UK. Rather than attempt to simulate co-present improvisation, we have sought out musical, technical, performative and documentary practices which are specific to the circumstances we find ourselves in. Here, we describe how we formulated"Tragic Experiment" as an orienting concept, the various actions we have performed and how two festival performances developed out of our practice. We close with some speculative remarks concerning our extended ecology of improvisation in the plague years and how we are developing some philosophical orientations which may provide useful provocations for others.

Keywords: feedback, localism, materiality, performance ecology, networked improvisation, COVID-19, diffractive methodologies

Biography

John Bowers is an artist-researcher with an academic background in the social and computing sciences, design, music and critical theory. As an improvising musician, he works with modular synthesisers, home-brew electronics, reconstructions of antique image and sound-making devices, self-made software, field recordings, esoteric sensor systems, experimental film, and spoken text. He often combines performance with walking and the investigation of selected sites to research an imagined discipline he calls 'mythogeosonics'. He has performed at festivals including the collateral programme of the Venice Biennale, Experimental Intermedia New York, Transmediale/CTM Vorspiel Berlin, Piksel Bergen, Electropixel Nantes, BEAM London, Aldeburgh Festival, and Spill Ipswich, and toured with the Rambert Dance Company performing David Tudor's music to Merce Cunningham's Rainforest. He contributed to the design of The Prayer Companion - a piece exhibited twice at the Museum Of Modern Art (MoMA), New York, and acquired for their permanent collection. Amongst many musical collaborations, he works with Sten-Olof Hellström, Tim Shaw, Kerry Hagan, with Paul Stapleton and Adam Pultz Melbye in the telematic improvising trio 3BP, and with Terry Burrows and Steve Elsey in the noise drone band Tonesucker. He helps coordinate the label Onoma Research, is a director of Allenheads Contemporary Arts, a trustee of Monkfish Productions, and a Visiting Scholar at SARC, Queen's University Belfast. website

Paul Stapleton is an improviser and sound artist originally from Southern California. He is currently Professor of Music at SARC, Queen's University Belfast, and director of Sonorities Festival Belfast. Paul designs and performs with a variety of modular metallic sound sculptures, custom made electronics and found objects in settings ranging from Echtzeitmusik venues in Berlin to the annual NIME conference, and has received critical acclaim for his sound design and composition work as part of the immersive audio-theatre piece Reassembled, Slightly Askew. Paul co-directed the AHRC (UK) funded network Humanising Algorithmic Listening, and has also co-led previous AHRC and European Commission funded research projects on diverse topics including the relationship between music improvisation and law, and the development of new methods for studying social interaction and entrainment in music performance. His interdisciplinary research is published in outlets ranging from Computer Music Journal and Organised Sound to Frontiers in Neuroscience and Psychological Research. website

Introduction

Let us begin autobiographically. At the beginning of 2020, the authors of this paper wrote a proposal for the first author (John) to become a Visiting Scholar at SARC (formerly the Sonic Arts Research Centre), Queen's University Belfast. This committed him to a series of improvisation workshop and seminars, and to help research students over the course of a year of monthly visits. In February 2020, John undertook the first visit and, amongst other activities, took place in two improvisation sessions with the second author (Paul). We were interested in exploring our joint interests in improvisation particularly where performers are working with what can be called "assemblages" of musical devices which exist within a "performance ecology" [Bowers 2003; Waters 2007]. That is, rather than take a purely instrumental approach to our improvised exchanges, where each performer worked with a single instrument, we played with multiple and very varied devices which exist across different technological idioms. Some of our devices have an acoustic instrumental character, for example, Paul's self-made instruments such as the Volatile Assemblage (aka VOLA) [Stapleton 2019], which contains a bowed string instrument with a metal resonator. Others have an algorithmic character, for example, John's Pure Data program MASH which offers 16 different techniques for processing live sound. Some of our devices emphasise live sound synthesis, for example, John worked extensively with a Makenoise Music 0-Coast, a small analogue synthesizer he had patched to create meandering lines inspired by the so-called "Krell Music" to be found in Bebe and Louis Barron's electronic soundtrack to the movie Forbidden Planet. For this work, VOLA includes two BugBrand Weevils, small battery powered circuit board-mounted synthesisers which have an unpredictable response to touch in a manner which builds upon the tradition of the STEIM Crackle Box. To contrast with the "liveness" of synthesis, we both brought prepared material that we could process and mix. Paul worked with VOLA's small portable vinyl record player and 7 inch singles modified with etchings, drawing on the turntablism practices of Christian Marclay, Philip Jeck and Grandmaster Flash. VOLA also contains an upcycled HDD turntable for live sampling and manipulating its various input and output sources.

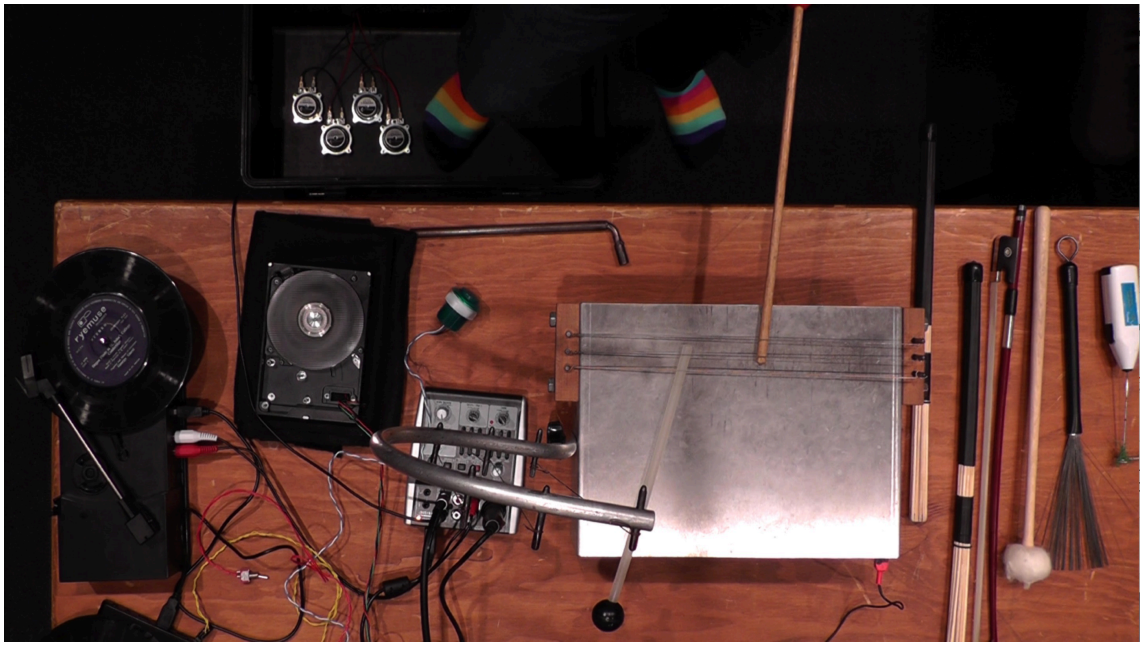


Figure 1: Volatile Assemblage, aka VOLA (Stapleton 2019).

John had a variety of field recordings. Both Paul and John were interested in exploring how they could exchange sound, in particular via resonant objects, as one of us would send sound to a driver mounted on an object while the other attached a contact microphone. Both of us have longstanding engagements with the strategies associated with David Tudor's series of *Rainforest* performances/installations/performative installations (1969-95). In addition to creating paths and feedback loops through resonant objects, we made our amplifiers and loudspeakers also part of the ecology of our improvisation sessions. Both of us had devices which would make sound locally to us (either acoustically or with small built-in amplification), alongside others that could be sent to either John's or Paul's dual loudspeaker systems, alongside resonant materials which could be excited to serve as a Tudorian "speaker object." We might also be moved from time to time to sing. We deliberately worked at low to moderate volume levels so that the different forms of sound production and reproduction could be heard against each other and arranged our resources around the room so that our work would have a "naturally" spatialised character. Finally, in addition to pursuing shared interests in experimenting with improvisational forms, all this was packable into a few cases and rucksacks – including a particularly striking yellow Peli flight case that John had bought specifically to support the collaboration. For his part, Paul internally mounted 4 transducers wired in series/parallel in a more subtly coloured black Explorer flight case. In this way, the case, as well as containing miscellaneous gear, could be a resonant space with sounding surfaces. We intended to gig.

Figure 2: John (pictured) and Paul initial in-person session (February 2020).

Within a few weeks of our initial sessions together, our universities had gone over to remote and video-mediated teaching and were closed to all but essential access. Shortly after this, on 16 March 2020, a national lockdown was declared by the UK Government. It was no longer possible for John to visit SARC monthly as planned. Our commitment to regular improvisation sessions, developing these into workshops, and the intent to take our ideas and practices onto the road were all put on hold. We needed to rethink our work.

Over the course of our two sessions, we had thought about their character and how some of our enduring preoccupations were finding a new application in them. In particular, we had agreed upon three themes: *feedback*, *localism*, and *materiality*. These should already be hinted in our presentation so far but let us give a bit more detail and connect with some existing research literatures.

Feedback

There are many senses and applications of feedback in musical, technological and philosophical contexts which interest us. John has written a number of papers describing various ways for working with feedback. For example, Bowers and Haas [2014] describe a series of explorations drawing on the work of David Tudor already mentioned as well as Nicolas Collins' *Pea Soup* (1974) where the amplitude of the signal incident at an omni-directional room microphone is used to modulate a phase delay before amplification back into the room. Bowers and Green [2018], in part inspired by

Background Noise Study by Agostino Di Scipio [2011], describe a performative installation/lecture called *All The Noises* in a 21 loudspeaker environment where a binaural listening head provides signals to a battery of machine listening and resynthesis algorithms whose generated material is diffused across the loudspeakers in a complex feedback environment.

Similarly inspired by the work of Tudor, Collins, Di Scipio and others including Toshimaru Nakamura, Paul has been building self-resonating instruments which are often driven by feedback through and across acoustic, mechanical, electronic and digital means (e.g. BoSS 2010, MiSS 2007, and in the earlier work of *theybreakinpieces* 2004-8). Stapleton and Davis (2011-13) developed the distributed musical instrument *Ambiguous Devices* which explored feedback in audio and control data channels sent between two geographically separate locations [Stapleton and Davis 2021].

In addition, in the second of the February 2020 improvisation sessions, cellist Miguel Ortiz and double bassist Adam Pultz Melbye joined us. Pultz Melbye [2021] has developed a feedback system, FAAB for feedback actuated augmented bass, where a number of sound analysis and synthesis algorithms are placed in a feedback loop between 4 separate string pickups and a speaker embedded in the body of the bass.

Localism

Sound spatialisation is a much discussed topic in the sonic arts and allied technical research areas (for an overview, see Baalman 2010). It is a very common aim for researchers to find ways of creating a virtual soundspace with a necessarily finite number of loudspeakers in support. From the early Disney patents specifying the mix coefficients across loudspeakers to create a "solid" (in Ancient Greek *stereo*) sound stage [Garity and Hawkins 1941] to extensions to arbitrary speaker arrays such as VBAP [Pulkki 1997]. Artists in acousmatic and allied traditions have often composed for an "orchestra of loudspeakers" (for a recent contribution and review of the challenges and possibilities, see Lyon 2014). And contemporary research in Virtual Reality has deepened interest in virtual soundspaces, notably those which might be responsive to individual listener's head position and orientation (for a critical analysis of the emergence of immersive VR's "one person listening spaces," see Roquet 2021).

The prominence of these research endeavours opens out a design space for different species of localism to be explored, where sounds are located by or in objects and where those objects themselves have determinate loci. For example, Stapleton et al developed the interactive installation *Sound on a String* (2012) which augmented networks of tin can telephones allowing visitors to manipulate and move their voices around the three-dimensional space of the Sonic Lab at SARC. The installation made use of ambisonics, bespoke sensing systems, and embedded speakers within each tin can.

Relatedly, Bowers et al. [2016] discuss strategies for organising a multi-loudspeaker system to support a promenade concert with multiple performers arranged around a performance space where sounds could be located in a speaker proximal to performers or delocalised to a multi-speaker diffusion system. In this manner, it was intended that transitions from one group of performers to another could be signalled by the current

group delocalising their sounds as the next group started. Accordingly, we regarded our intended program of improvisations as a means of exploring multiple strategies for associating and disassociating instruments and other systems, materials and devices, loudspeakers and other speaker objects, and their loci. By these means, our intent was, again following in the traditions of Tudor and others, to create a varied ecology of listening and action which our improvisations engendered and were embedded within.

Materiality

We have already remarked how, as improvisers, we work with very varied sonic resources: some with an instrumental character, some things made of software, some things made to be heard acoustically, some with amplification, some commercially available instruments and controllers, some things self-made, some recorded sound, as well as lumps of wood, metal, ceramic or glass, bowed or beaten. This variation draws attention to the materiality of our performances and involves a number of differences which it would be too crude to schematise as digital versus analogue or in any other fixed typology or solfège. We tend to work with an open ended set of heterogenous materials and aim to find out what they can do in performance in juxtaposition to one another. In our sessions, we were keen to connect, or otherwise play off against each other, new combinations of devices, materials, instruments, algorithms, and so forth, our material resources. Of course, this idea of a "materials-led exploration" is not exactly new in art and design worlds more generally, though, here, we are radically open in what we are taking as "a material" [Stapleton, Bowers, Melbye 2021] and set ourselves the task of exploring materiality as a first class topic as an improvisation unfolds.

Rethinking

Our threesome of feedback, localism and materiality was initially intended as a set of orientations for our future improvisation sessions. However, as we had begun to think in this way, we found that it actually eased the passage for us into a locked-down world. Our preoccupations were flexible enough in their articulation to give us new topics for exploration. Rather than linger on how the dislocation of the locked-down world had disrupted our artistic activity and made, for example, the improv gigs we are used to impossible to host or participate in, we could wonder about new forms where *precisely those dislocations* could be a topic for investigation. Similarly, we could extend the material resources that we bring to improvisation to include engaging with networks, sound and image streaming technologies, conferencing and messaging applications, and so forth. We could *open out our performance ecologies* to include those sorts of things too and regard them, as we have formulated it, as *material resources for improvisation, rather than as tools for simulating co-presence or compensating for its lack.* Several years ago, Tanaka [2007] remarked on the omni-presence of delays in networked performance as a creative opportunity rather than a difficulty to be overcome [Freeth, Bowers, Hogg 2014]. We saw an opportunity to take delays and other networking phenomena (e.g. the effects of differences in bandwidth, packet loss, etc.) to an extreme of creative exploration. The accumulation of such phenomena through feedback suggested itself as an obvious possibility. What would happen to, for example, the background noise suppression algorithms in Skype or Zoom if we fed our signals, kept hot, to and fro, and on and on?

John had already done some experiments with Owen Green circulating an initial spoken text via Skype until it was ground down into a curious cloud of digital full scale glitches [Bowers and Green 2018]. And by March 2020, Tim Shaw had reminded John of this and suggested *I Am Sitting In A Zoom* as a project in awkward tribute to Alvin Lucier [Shaw and Bowers 2020]. Our concern for *feedback* had a new timeliness. As systems for technically connecting the remote nodes of the atomised world of lockdown began to proliferate, we too could proliferate them and feed them through and into each other as part of our improvised music making. Whilst it is beyond the scope of this article to provide a genealogy of networked or telematic performance, it is worth pointing to the fact that our work exists alongside the broader reemergence of these and related themes of research. This is evidenced by recent events such as Stefan Östersjö and Federico Visi's "Physically Distant #3: the network, the pandemic, and telematic performance," which opened with the provocation: "Musicking online: your technical problem is actually a social problem. A performative conversation" [Waters and Stapleton 2020].

Tragic Experiments: The Very Idea

Paul suggested that we name our explorations "Tragic Experiments." Part of this was a self-deprecating irony which we found attractive. Part of it was also in recognition of the real tragedy that was beginning to emerge with lives and livelihoods lost while rumour, conspiracy and, from time to time, violence becoming increasingly palpable. We were also attracted to the classical sense of tragedy that can be found in Aristotle's *Poetics.* On Aristotle's analysis the principal participants to tragedy suffer *hamartia,* a flaw of character that, given perhaps extraordinary circumstances, coincidences or revelations, ultimately leads to their downfall. Agamemnon's hubris leads him to hope that the gods are not looking when, on his return from Troy, and on his wife Clytemnestra's goading, he walks triumphantly upon a carpet of purple robes. If hubris is not flaw enough, Agamemnon's ancestry is marked by murder, incest and treachery. Against this background, Agamemnon's murder at the hand of his wife's lover Aegisthus is a tragic inevitability which, for Aristotle, would cause us to reflect on virtue, family and destiny. That Agamemnon is flawed, rather than evil on the one hand or good on the other, makes him recognisable to us, Aristotle would claim, and what happens to him is neither his just desserts nor an incomprehensible outrage.

It amused us, perhaps because our hubris is as great as Agamemnon's, to think of our experiments as tragic in this sense: as actions which were the fatally flawed doings of puny humans struggling against larger forces, but perhaps instructive precisely through being so. Perhaps also our self-characterisation anticipating tragedy warned us of the loss of sensation and affect, and growing despair, as purposelessness takes hold ("Tragedy! When the feeling's gone and you can't go on, you're going nowhere."). Humour like this helped us.

So much for tragedy. Our actions are experimental in the familiar sense of being experiential and uncertain, but also as occasions for "trying" (*expiri*, Latin, to try), that is, for not giving up. The historians of science Shapin and Schaffer, in their classic study of the disputes between Thomas Hobbes and Robert Boyle *Leviathan and the Air-Pump* [1985], give an analysis of the constituents of the new experimentalism practiced by Boyle

and others in the newly founded Royal Society. Experimentalism involves a coming together of three "technologies": *a material technology* (e.g. the construction of, in Boyle's case, an effective air-pump), *a literary technology* (e.g. particular ways of writing about what occurred, highlighting observation, measurement and care), and *a social technology* (e.g. the inculcation of shared standards of reporting and conduct appropriate to a community of experimentalists). The joint operation of these technologies assist a reader of a report of an experiment become what Shapin and Schaffer call *a virtual witness*. We will discuss more later in this paper how our work has been influenced by a collision with sociological, historical and philosophical studies of experimental practice in the sciences. Suffice it for now that Shapin and Schaffer suggest there is much more to experimental practice than any form of "mechanical" conduct. Indeed, whatever mechanisms, devices, systems, apparatuses there are have to be crafted and are themselves a matter of some artfulness and contingency in their design and deployment. Equally, forms of writing and documentation are a constituent feature of experimental practice. The experiments are not just witnessed by those who were there. But again, these forms of writing emerged historically in a particular way. Finally, there are forms of specific sociality around experimental practice. It is clear that the "technologies" Shapin and Schaffer identify as emerging in mid-17th century England are present in many of the formats of contemporary academic writing, and not just the sciences. This paper too wants to help you be a virtual witness to our actions. But we follow Shapin and Schaffer in a different way too, in how they analyse out the constituents of the emerging experimentalism. We draw on *Leviathan and the Air Pump* in conducting ourselves experimentally in a specific three-fold sense, as equally "material technologists," documenters, and participants in new social forms.

Tragic Experiments 1 to N

So experiments with tragedy, with failure, supervening force, dulled affect, loss of telos, with selected and multiplicitous materials, documented and attentive to new social forms which may emerge around improvisation, particularly in our new plague years…

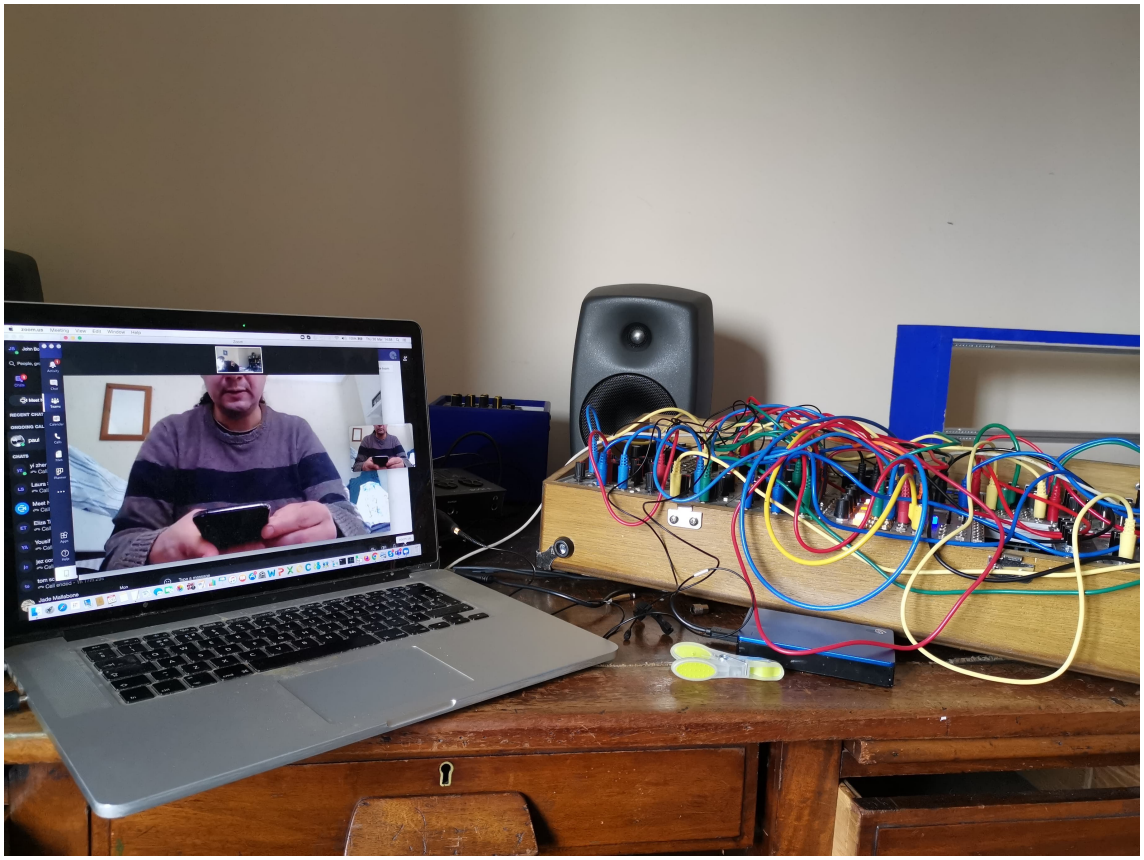
Rather than compensate for the difficulties of our condition, or cope, or put our faith in technologies, or carry on blindly as normal, we have interrogated our troubles, exaggerated them, created uncomfortable performance conditions, where we try (experimentally) to work out whatever sense we can of what is going on, and perhaps learn something useful for ourselves and others, practically and, perhaps, philosophically.

Many of our experiments have dramatised the difficulties of working with networked audio-video technologies. Rather than see them as a way to ameliorate separation and fabricate a reunified sense of presence, we search out disruptions, anomalies, infidelities, infelicities, disarticulations. They were not hard to find.

In *Tragic Experiment Number One*, for example, we connected to each other using as many applications as we could run simultaneously to saturate our already stressed and sometimes choked domestic-grade bandwidth. We used Skype, Facebook Messenger, FaceTime, Jitsi Meet and Zoom (the latter two of which were studied in Kubacz-Szumska and Szumski 2021). Each of these technologies has different audio and video compression algorithms, different levels of quality for audio and video, different ways for identifying

and cancelling echoes, different algorithms for suppressing what is taken to be background noise. We brought our heterogeneous musical resources to the scene (synthesizers, resonators, bowed and plucked strings, algorithmic transformations, and so on) very few of which sound like the human voice speaking against background noise that the systems are used to dealing with. For that matter if a foreground can be identified against a background, the identity of each fluctuates and so we can imagine the noise suppression algorithms, in feedback, producing a second order variation of what was heard, and several such from the different systems and the feedback cross-talk between them.

We both made no attempt to suppress feedback in our local home studio environments. John monitored using his studio speakers as, anyway, he had forgotten his headphones during his hasty exit from his university workplace when lockdown was declared. An open stereo microphone was placed in the room too. John used a single laptop to manage all the communications technologies (except Facebook Messenger, as discussed shortly) and to run some quite intensive Pure Data live sound processing patches he had authored. A four channel sound interface handled two channels of computer sound (Skype, Zoom and the rest) and two channels from Pure Data. All of these sources made their way to a 16 channel mixing desk, the main output of which was monitored in the room as well as sent to the laptop and on to Skype, Zoom, and the rest. The connection using Facebook Messenger was made using our mobile phones. These were also manipulated performatively to vary what their cameras and microphones picked up or their speakers reproduced (which could be played with in relation to the stereo room microphone).



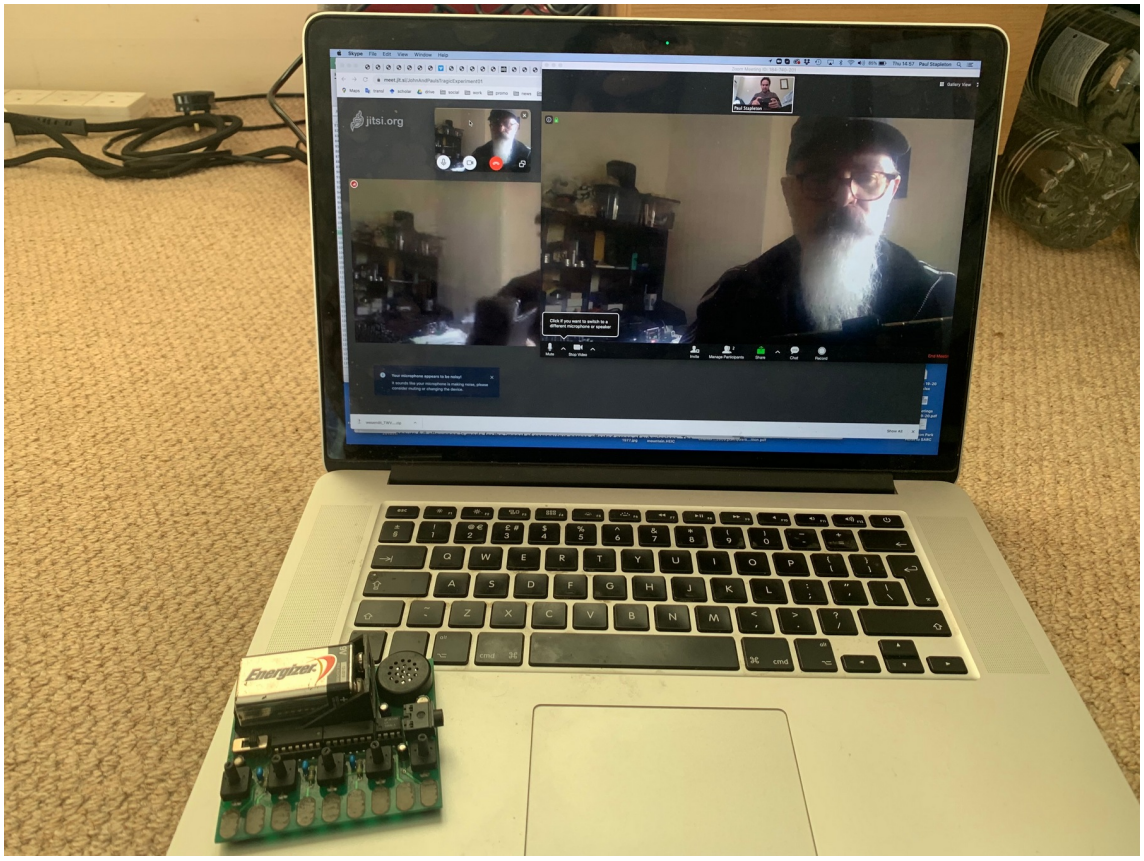


Figure 3: Stills from *Tragic Experiment Number One* (26 March 2020).

Having not yet rescued many of his musical instruments from his office at SARC, Paul played a single BugBrand Weevil using its built in speaker for amplification, while monitoring John's transmissions through his laptop speakers and mobile phone. Local audio was transmitted back to John via the built-in microphones on the same laptop and phone. The resulting general cacophony was modulated by changing the proximity of the Weevil, laptop, and phone.

The documentation of our experiments is an interesting and problematic matter. First, we could (and both did) take a desk audio recording at our local studio. Second, several of the communications applications we were using enabled the session to be captured, both audio and video. Third, we could add in other recordings locally, for example, the room sound could be recorded by John's stereo microphone and our phones could also be used for their cameras. In the feedback arrangements which are characteristic of our Tragic Experiments, communications devices can have a dual processing and documentary character, a kind of complementarity which we will discuss later. For now, let us note that many and varied recordings were made.

We improvised in the face of all this for some 20 minutes.

So, what next? As we had proliferated documentations of what we did, it seemed right to avoid unified accounts that might downplay the inherent and incipient tragedy of our work. Here is our reasoning. We might wish to take our two desk recordings and align

them to make a high fidelity documentation. But how are these to be aligned. Where is their common starting point? Ending point? What is to be the left channel and what the right in the mix? What is the correct mix level between John and Paul? The usual and familiar uncertainties of making documentary recordings of improvisation are amplified and multiplied in our case. Indeed, such fidelity would be most unfaithful to the precarity of our performance situation anyway, with things coming in at changing and bewildering delays, and creating a harsh confusion. Maybe, we should be faithful to that instead. But equally, which harsh confusion? The one picked up by our mobile phones? The one captured at the Zoom server (rather than in either of our local environments)?

We decided to take a different approach. We regarded the recordings for each of our Tragic Experiments *as assembling a corpus* including the perspectives of all the technologies, sites and actors at play, without prejudice. From this we made further pieces (edits, remixes, video collages, animations) which individually and together highlight the fragmented and divergent character of the experiment.

Tragic Experiment Number One took place on 26 March 2020. Over the next two weeks, we each made what we called, drawing on Shapin and Schaffer's idea of virtual witnessing, a "testimonial." These are movies which we have published together with short texts about the actions that gave rise to them. (Links to all movies, texts and other material about our Tragic Experiments can be found here[1])

> Paul's Testimonial: On the 26 March 2020 John Bowers and Paul Stapleton decided, while catching up on Skype, to also connect via Jitsi, Zoom and Messenger at the same time. This is Paul's tale of what followed. The truth of the matter is less certain, but rest assured, this was not a one-off incident.
>
> John's Testimonial: On the 26 March 2020, John Bowers in Newcastle and Paul Stapleton in Belfast contacted each other using as many online video conferencing methods as they could muster. Simultaneously. Inspired by the wails of feedback and digital splutter, the discrepancies and distortions, they turned on their synthesizers and each recorded what was going on. This is John Bowers' testimony – made up of fragments from the video frames that were recorded, then mashed and mosaicked, together with a layering of varied audio accounts of the event.

Paul's and John's accounts are widely divergent. Paul's is 3 minutes 8 seconds long. John's is all of 25 minutes 34 seconds. Paul quickly layered, compressed and further distorted the visual and sonic materials collected in the *Tragic Experiment Number One* corpus, aiming for a duration reminiscent of a pop music video. John has allowed himself much more extensive further processing and compositional work, notably time-stretching, to create a slower moving piece. Visually, the two movies are very different too, most notably in how they deal with the space-time of the screen. Paul's exploits how some of the video conferencing technologies were making attempts to infer who was speaking and change the camera view accordingly. His testimonial then shows how views of John and himself working in their studios are cut between. By contrast, John wrote a program in the Processing language to animate imagery drawn from the experiment. As his account indicates, he extracted stills made up of details from selected video frames. These then slowly filled a 20x18 mosaic, starting from black, with the screen full of fragments by the

midpoint of the movie, whereupon the screen slowly empties to return to black at the end. This is a contrasting and complementary way of depicting the multiplicity of documentation in a single testimony.

Let us read John and Paul describing *Tragic Experiment Number Two.*

> John's Testimonial: This is John Bowers' account of the second of the Tragic Experiments where he and Paul Stapleton try to improvise their music using video conferencing technologies.
>
> On 24 April 2020, they connected with Jitsi Meet. It was a warm day in both Newcastle and Belfast, so they put on beachwear. They each recorded their own local sound. Jitsi also captured the improvisation – live editing automatic cuts from one camera to another probably on the assumption that it was dealing with speech. Between the three of them – John, Paul and Jitsi – there were several recordings giving different versions of what happened.
>
> John decided to combine all these to cause trouble for any coherent sense of "being there," either recorded or reconstructed. All the recordings are chopped up and played back together but not in any fixed time order. Early, late and middle (where he sings) can appear at any time. The frames from Jitsi's video are synchronised with the audio but only approximately as the recordings are of different lengths and, besides, different times can appear simultaneously, whereupon frames are shuffled. Up to 48 different fragments can be heard at one time. John used the Pure Data and Processing programming languages and improvised using the Sensel Morph multitouch controller to make this (remix) performance in one take with no further edits.
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> Paul's Testimonial: Not content with the first tragedy, John and Paul reconnected via Jitsi on the 24 April 2020. Network acoustics and domestic spaces were intertwined through a series of tubes, actuators, actants and transducers.

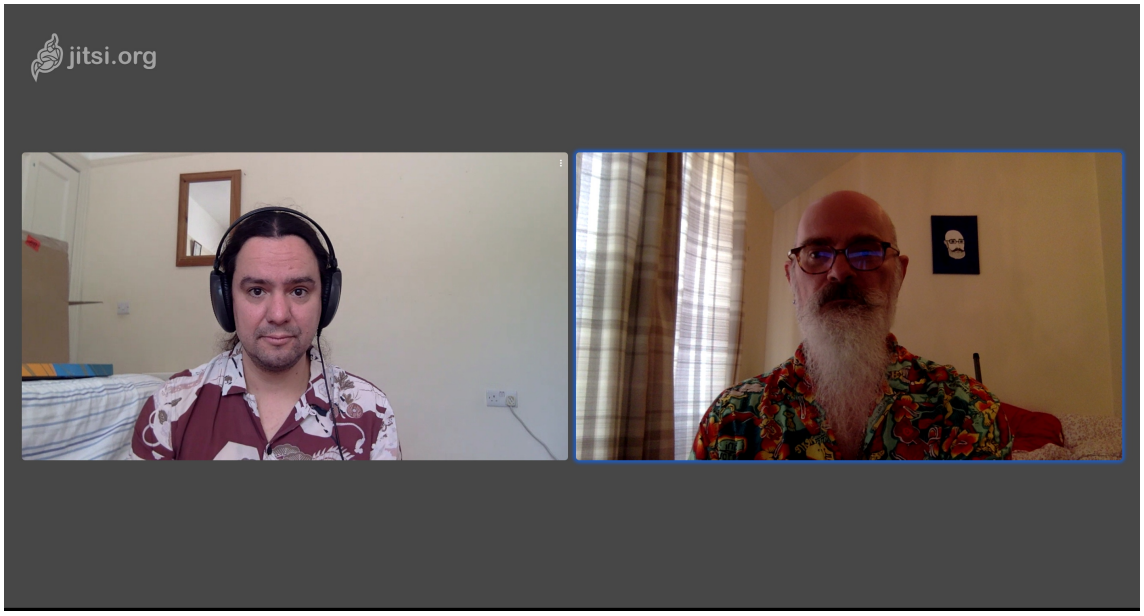

Figure 4: *Tragic Experiment Number Two* (24 April 2020).

For *Tragic Experiment Number Two*, Paul played the various surfaces of VOLA (recently rescued from SARC) with beaters, brushes, a bow, a guitar pic, a cappuccino whisk, ping pong balls and hands. Paul monitored John's transmissions along with his local audio signals through headphones and a movable transducer pressed against VOLA's metallic resonator and other household objects.

As in his treatment of *Tragic Experiment Number One*, John experiments with the playback of the captured Jitsi video. Here, the video is treated as a set of frames which are progressed through in response to finger touches on the Sensel Morph. Touches to the left will select frames from early in the improvisation while touches to the right will select later frames. In principle, a finger movement from left to right slowly completed over the course of 10 minutes would recreate the movie and give an approximation of the improvised music. The Sensel Morph can identify up to 16 touches and associated with each touch a looping fragment is taken from the three documentations (John, Paul and Jitsi) with all three played simultaneously. The length of the fragment is given by the size of the touch and its speed of playback (with associated pitch shift) being given by the top-bottom coordinate of the touch. In this way, a variety of scrubbing and scratching techniques can explored and with a considerable variation of sonic density from small fragments being replayed with a single light touch to a variety of loop sizes and playback rates heard from different parts of the improvisation if two hands are flattened on the surface. John's movie is 5 minutes 25 seconds long.

Paul's movie is a seamless 10 minutes edit of the raw 25 minutes 10 second Jitsi recording synced with a mix of audio recorded locally in both Paul and John's home studios. It appears to not temporally disrupt the order or the speed of the improvisation in the way that John's does. Nor does it transform the recorded sound to the extremes of John's looping/pitch shifts. Paul does insert a number of stills of John and Paul in unflattering poses around 3 minutes 30 seconds in, and again at 6 minutes 30 seconds. But it is Jitsi

view selection algorithms which most disrupt the conventional documentary style. The camera favours Paul and only rarely turns to John. We speculate that this might be due to John providing more of the improvisation's continuous textures while Paul's more frenetic staccato playing might seem to more resemble speech in its amplitude contours. Amongst other things, this suggested to us (yet to be executed) future experiments where the aim is to play in such as fashion as to either capture or avoid the system's identification as the "speaker." Such an experiment might interestingly work alongside some of the improvisation exercises in John Stevens' *Search and Reflect* (1985/2007) as well as "cartoon trades" in John Zorn's *Cobra* (1984), which put a strong value on swift minimal responsive exchanges between players (e.g. via click sounds).

Paul's testimony was submitted to and accepted for inclusion in the 2020 *Improvisation Festival (IF)* curated by the International Institute for Critical Studies in Improvisation (IICSI) at the University of Guelph, Canada. In the light of the COVID-19 pandemic, the Festival was delivered online through a continuous 24 hour presentation of submitted videos.

We began to think how our approach might transfer to other online festivals as they emerged in 2020. In particular, we were attracted to the Irish Sound, Science & Technology Association's festival *ISSTA 2020: Sonic Practice Now*, a festival not unlike *IF* which explicitly topicalised the specific contemporary situation that sound artists and audiences find themselves in. The festival also offered a technical infrastructure and support for live performance as an alternative to the fixed media approach of *IF*. Over the course of 2020, Zoom had improved its performance for high quality stereo audio and this enabled *Sonic Practice Now* to host performers as co-participants to a Zoom meeting alongside audience members. We entitled our *Sonic Practice Now* performance *How Our Suffering Is Multiplied* and wrote a polemical programme note which ended: "We intend *HOSIM* to be a hellish yet hilarious microcosm of contemporary sonic suffering."

For *HOSIM,* Paul worked with an overhead camera showing the range of musical resources which he had been exploring throughout the Tragic Experiment series. John placed his laptop behind and above his devices with its lid angled so as to obtain a view with considerable variation in perceived scale. His embodied action was also only partly revealed, often appearing as a set of fingers in the dimly lit distance. This was the view that was sent to the *Sonic Practice Now* Zoom. In addition, John introduced a second (USB) camera, set up to show a rear-side upper body view. This was connected to a separate machine and sent to Paul via Facebook Messenger. Paul received this to his mobile phone which was placed under his overhead camera inside a large trophy cup and hence was visible within his Zoom image. Thus, John and traces of his embodied activity were distributed across two very differently composed video images, located at seemingly different places, and in contrast to yet contained within Paul's overhead view.

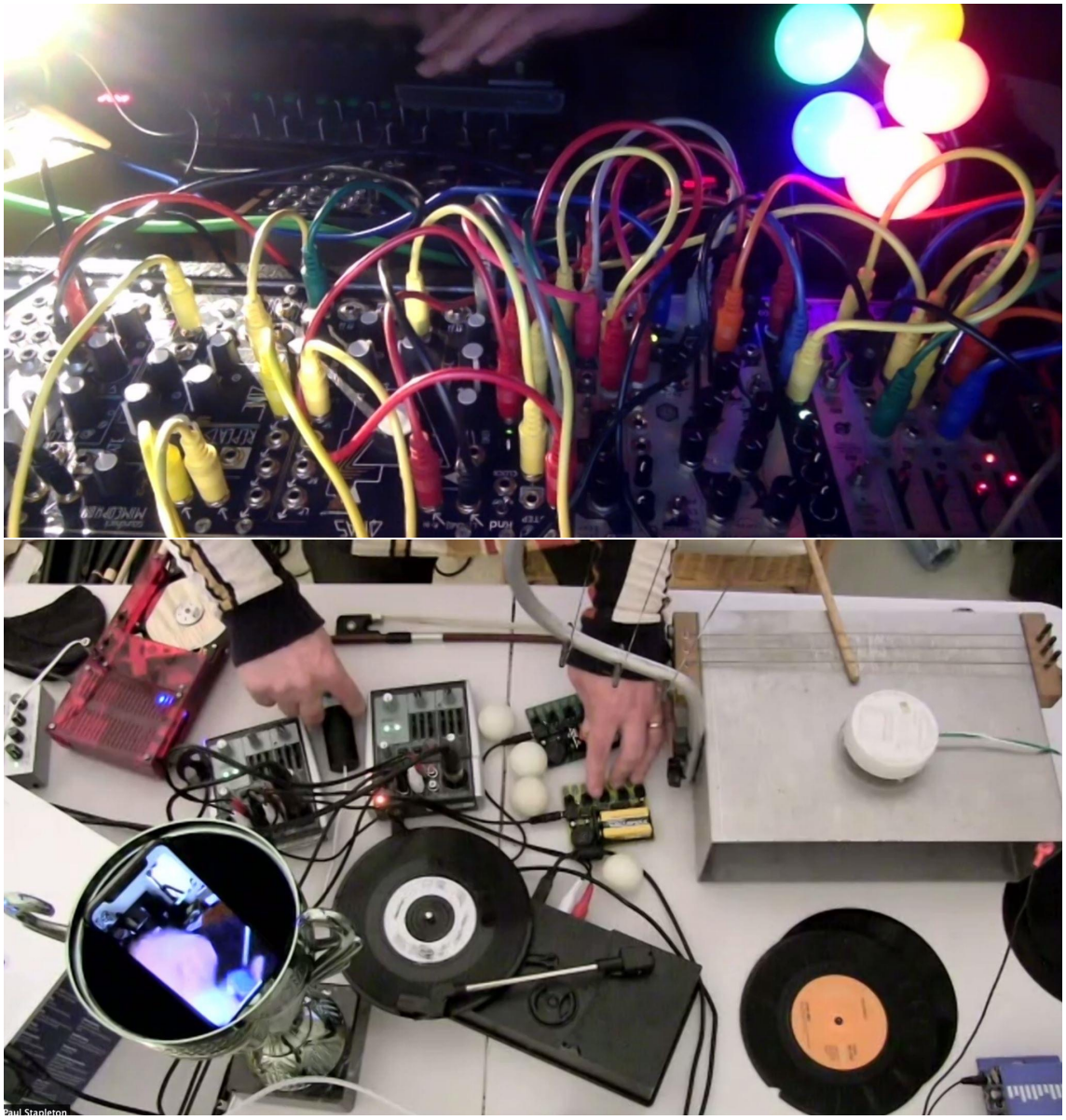

Figure 5: Stills from *How Our Suffering Is Multiplied* (15 August 2020).

Our performance was very well received and also gave us a lot of pleasure. Indeed, our experience was not tragic in the sense we had identified before, nor was our suffering that great. Inspection of the 12 minutes and 48 seconds of the Zoom capture of the performance reveals a number of episodes of recognisable improvisatory interplay where, for example, Paul and John experiment together with string bowing, plucking and scraping effects or, later, where John sings along with/against a vinyl record that Paul has been manipulating. About 5 minutes in, there is a coordinated passage of increasing intensity as Paul's insistent electronic pulses are counterposed with John's modular synthesizer, sampling of a live radio broadcast, and agonised pastiche romantic tenor. The performance also ends gracefully with John echoing a record that Paul has been scratching and playing slowed while Paul bows to create a sound that responds to a resonant feedback effect that John has created from superimposing various versions of

delayed studio sound picked up by a stereo microphone in the room.

Before this performance however we had a disastrous rehearsal. It was unclear whether our Zoom installations were indeed giving us the high quality stereo that we had set them up to deliver. John had some difficulties routing his signals through his audio interface and getting Zoom to pickup the intended channels. Amongst other difficulties. We took two test captures from Zoom and both were poor quality and one, where we tried to simulate how we might play together in performance, seemed especially amateurish. Sorting out how to Zoom and how to accommodate it within our local performance ecologies took all of our rehearsal time. We did not have time to extend the number of communications systems we were working with in rehearsal. Rather than perform untested, we decided, overnight, to simplify the number of systems we were bringing in and for John to submix Paul and himself into the overall sound with only John's Zoom being heard. In short, we made a recognisable and well received improvised performance at the cost of rejoicing in feedback complexity. While we retained our sense of heterogeneous materiality, our explorations of disjunctions of time and locality were tamed. We gained applause but we lost tragedy.

Accordingly, our rehearsal can be retrospectively numbered *Tragic Experiment Number Three* and, at the time of writing, it awaits the divergent witnessing that we have give Numbers One and Two. And our *Sonic Practice Now* performance, *How Our Suffering Is Multiplied,* is named *Tragic Experiment Number Four*, but cancelled, under-erasure. The series can, of course, be continued.

Reflection and Diffraction

> Reflexivity has been recommended as a critical practice, but my suspicion is that reflexivity, like reflection, only displaces the same elsewhere, setting up worries about copy and original and the search for the authentic and really real… What we need is to… diffract the rays of technoscience so that we get more promising interference patterns on the recording films of our lives and bodies. Diffraction is an optical metaphor for the effort to make a difference in the world… Diffraction patterns record the history of interaction, interference, reinforcement, difference. Diffraction is about heterogeneous history, not about originals. – Donna Harraway

We have described a series of improvisatory experiments we have conducted under conditions of lockdown during the (at the time of writing, ongoing) COVID-19 pandemic using various audio-video communications systems to connect our studios. In its initial intention, this work started out not to overcome or compensate for the separation we experienced, and the disruption to our standard improvisatory practice, through the use of communications technologies. We did not seek to (virtually) return to an "original" copresence. Rather, we were concerned to explore how we might fold those technologies into our ongoing concerns with feedback, locality and materiality. We characterised our work as a series of Tragic Experiments to capture a sense of us as flawed humans grappling with a technological complexity that we had deliberately exacerbated (hence tragic) and engaged in practices which create a kind of virtual witnessing of our attempts to keep on trying (*expiri,* hence experiment).

Our practice has turned out more variable than we expected. We have grappled with networked communications technologies and used our sufferings as a means for generating a corpus of material that can be practically explored, remixed, reordered, mashed and rehashed to look at a range of issues in the space-time of networked media. Some of what we have made along the way may well have a place in future work. For example, John's multitouch work for layering, remixing and reordering sound and image may well be developed further. In addition, we have begun to develop a certain know-how for making less-than-tragic networked improvised performances. Importantly, though, this has emerged as our exploration of the more overloaded, diffractive, ill-disciplined environments of our Tragic Experiments has unfolded, together with the thinking and creative responses that they have incited. We suggest this as a viable alternative to an artistic research strategy that would regard the loss of performer (and audience) co-presence as a matter to be overcome, rather than creatively explored.

We want to close by taking a step back and offering a discussion in three speculative zones: performance ecology, technologies, and improvisation as a form of life.

Performance ecology. In previous work, a number of authors, ourselves included, have commended that performance be analysed in terms of the "performance ecologies" that the work is situated in and, reflexively, engenders. That performance exists in relation to a variety of social-material relationships which act as resources for action and are renewed through action is a perspective of general utility and has a lot in common with, say, the philosophies of performativity such as Judith Butler's [2004]. It is one that opens out our concerns for what is relevant to performance and how performers organise their conduct. This perspective is particularly suited for thinking about the kinds of improvisational settings that we like to inhabit: ones which are radically materially varied with many loci for action.

Our Tragic Experiments have made salient a number of phenomena which prompt is to extend our previous thinkings on "performance ecologies" in improvisation. In the work we have reported, it can be argued that there are multiple ecologies in play, the studio in the North Tyneside, the studio in Belfast, our respective domestic environments, the ecology of the networks in our domestic environments and beyond. Indeed, how we might want to individuate one ecology from another might itself be something that is explored in performance. Our Tragic Experiments force us to take note of the multiple entangled times and scales within which our work is embedded and which our work produces. Viral infected to global networked. Glitched audio packets to indefinitely extensible divergent reworkings.

Technology. Far from being a means to repair or reconstruct an original copresence lost under lockdown, the technologies we use work within our performance ecologies as sources of resistance, provocation, noise, displacement, disjuncture, and no little comedy. This goes for our instruments, synthesizers, amplified objects, found sounds, resonant materials, and voices, as much as it does for the networked technologies we have used. Indeed, our Tragic Experiments have encouraged us to reconfigure the human/nonhuman, agent/environment, noise/signal, power/resistance and other relationships our improvisatory work has negotiated. In her reading of the writings of Neils Bohr, Karen Barad [2007] analyses experimental practice in quantum physics in

terms of the "agential cuts" which are made separating foreground from background, the object of experiment from the apparatus used to investigate, the observer from the observed. When we engage in mattering, making some things matter and some things not, cuts are made in our practice, cuts that produce different distributions of agency. Barad offers a valuable elucidation of what Shapin and Schaffer would call the "material technology" at play in experimental practice. But she intends her analysis quite broadly. For our part, all of the critical dualities we have just listed became salient to us in our Tragic Experiments and cause us to resituate technology in a field of mobile relationships of mattering. This perspective, we would like to suggest, offers a radical departure for thinking about musical technologies, the actions they perform, and the other agencies that form and reform around them.

Improvisation and forms of life. Over the past decade, improvisation has been theorised by a growing number of critical improvisation scholars and practitioners [Heble and Caines 2014; Lewis and Piekut 2016; Born et al. 2017]. In this context, improvisation is understood as both a social practice and a theory of skilled human behaviour which is of relevance to a broad range of disciplines, from Music and the Performing Arts to Law, Psychology, Anthropology and Architecture. Rather than "making it up as you go along," improvisation is better understood as a way of knowledge-making leading to coordinated action, a process of collaboration and co-creation that depends for its success on the willingness of parties to bend existing structures and identities.

While improvisation plays a role in much of everyday life, it plays a particular role in times of crisis. In *Playing for Keeps: Improvisation in the Aftermath* (2020), a collection of authors give diverse accounts of "Improvisatory musical practices, the humans who create and listen to them, and the stories and critical discourses that make them intelligible beyond the scenes of their performative iterations" [4]. In this edited collection these accounts are framed as "both the outcomes and the alternatives to" histories of human tragedy, which can provide strategies for performatively negotiating the seemingly hopeless constraints brought about by wider social inequalities. Judith Butler once famously characterised gender as "a practice of improvisation within a scene of constraint" [2004, 1]. Pressed to elaborate on what this meant during an interview with saxophonist Tracy McMullen, Butler states that improvisation "seems to me a model of agency or action that's not based on mastery" [Siddall and Waterman 2016, 31]. This is a view that resonates with Stapleton's formulation of improvisation as "mastery resistance" [2007].

In improvisation, and particularly in times of crisis such as the current pandemic, we are reminded of the limits of intentionality and control. However a lack of control or mastery does not necessarily mean a lack of agency and responsibility. In Simon Rose's research monograph *The lived experience of improvisation: in music, learning and life* [2017], George Lewis instructively describes his approach to improvisation: "Well, first I try to pay attention [pause] to my environment, you're creating an environment – you're also interacting with one, so you have to pay attention" [202].

It is through paying close attention to the co-constituted and evolving nature of ourselves and our environment that we hope to find a way to navigate the plague years. The forms of life that musical improvisation embodies, or philosophically engenders, need to work now in an expanded field of tragedy and comedy, infection and survival, despair and

carrying on.

More documentation of our Tragic Experiments can be found here.

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