

Perception of sound can move between hearing a sonic object as a whole or as the sum of many parts. The brain can choose to interpret sound on different scales of magnification, and this opens a space of ambiguity, where music can be composed to take advantage of the tension between these readings. The pieces presented on this recording all take this ambiguity as a starting point, a compositional material.

My interest in this stems originally from looking at the works of the Spectral School of composition, exemplified by Gérard Grisey's *Les Espaces Acoustiques* (1974-85), a seminal exploration of the inner structure of musical sound that playfully discards notional separation of pitch and timbre, of time and memory, of music and sound. I learned from this that a musical note, or any sound, is a structure of partials (harmonics), a spectrum. A sound's timbre is dependent on different weightings in the structure of its partials, and the perception of pitch on the ordering of its structure. These structures can be harmonic or inharmonic to varying degrees. Harmonic spectra have partials ordered in a linear progression of doubling frequency values, and are common in musical tones. Here, the brain generally hears the structure as a whole, a single percept with the pitch being identified as the lowest partial, the "fundamental". At the other end of the scale is sound which lacks order or that has random ordering, this is the domain of (mostly) unpitched noise. Between noise and order lie inharmonic sounds, strangely ordered structures that have patterns or near-patterns of partials, un-linear and complex. This is the domain of bells and metallic sounds, the hollow iron leg of a table, the stainless steel rack of a grill pan, sounds that shimmer and beat with complex interactions of misordered partials outside the rational tuning of western musical harmony, a strange and distorted beauty.

Inharmonic spectra offer a world of ambiguity. The brain parses the quasi-ordering of their partials and tries to grasp the sound as a whole, but cannot settle on a fundamental. The structure of spectra offers several possible resolutions. A struck bell appears to have one specific pitch until you listen closely, upon which the sound fractures into several competing pitches, hanging in the air, unwilling to accept a single unifying identity, an aural hall of mirrors (1). A musical instrument can be like this: it is a multiple, not a plural. Many possible instruments overlap and emerge from the same tube of air or box of vibrating strings. Among these multiples are places outside the normative musical tone, where the material of the instrument allows competing tones to co-exist, spectral vortices, metastable knots of sound which refuse to collapse into linear harmony or singular identity.

This was my starting point. The series of wind pieces titled *there are neither wholes nor parts* is built entirely on the technique of multiphonics, a combination of finger positions and mouth shapes that allow more than one simultaneous vibrating column of air to be stable in the instrument. The sound is complex and often inharmonic; though even when it is harmonic, the tuning is usually not equally-tempered. In the case of a single note, a single vibrating air column produces a musical tone with its ordered partials. In a multiphonic, there are multiple superposed columns interacting nonlinearly to produce a strange hybrid that is more than a chord. The clashing spectra contort, altering their vibrational patterns to find a "best fit", a stable configuration where the competing

reinforcements and cancellations balance each other, like a spinning top that defies gravity, an elegant improbability.

There are neither wholes nor parts Ia developed out of several years of working with the saxophonist Iain Harrison and his research into the physics of extended techniques on the instrument: the composition of the piece was afforded by a joint commission from hcmf// and November Music (Netherlands). The initial idea was to address the problem of wind multiphonic fingerings producing different sounding results on different instruments. Rather than specify fingerings, the score leaves the choice of multiphonics up to the player as a puzzle to solve; a puzzle with many possible solutions. To represent this using standard notation would be meaningless and counterproductive, the notation must account for the lack of fixity yet still give the player both something to work with, and a visual analogue of the sounding ambiguity. The score is series of gestures that describe sound morphologies on a three-line stave connecting high, medium, and low registers of the instrument. The graphic notation allows the player to choose whichever multiphonics best produce the given morphology, but with the important constraint that events which appear to be horizontally commensurate should have the same pitch, or as near as possible (ambiguous visual here equates with ambiguous sound). The score also forces changes of fingerings at points so the player must find different fingerings with similar pitches. The result is a series of sounds connected by pitches that move between definite states — such as solid tones and multiphonic complexes — and more ambiguous half-states where tones are consumed by their own inharmonic shadows.

In developing this idea for a new player, Jonathan Sage — and a new piece, *there are neither wholes nor parts II* — the organising principle of maintaining a connecting pitch through a changing environment of fingerings and morphologies was refined and re-notated. The three-line stave was removed, now the score indicates only temporal/dynamic morphologies, and levels of ambiguity between sound types that are defined as greater or lesser ambiguity of pitch. We decided to explore the possibility of applying the same score to two different instruments, the standard clarinet, and the basset horn; an older member of the clarinet family with a darker sound and lower range. The use of two instruments highlights the importance of materiality for these pieces. The two versions are not simply different arrangements or different colourings; the basset horn version is not the clarinet version transposed downwards. The variation in size of instrument utterly changes the resonance of the instrument and affords an entirely different set of multiphonics. While there are familial similarities between the versions, such as similar types of multiphonic and spectra, the two versions carve very different paths through the possible pitch space as differences in construction alters the resonance which alters in turn the weighting and sensitivity of different pitches. As a result, the material agency of the instrument extends itself into the composition, co-authoring the performance with the player. This is the ultimate goal of these pieces, and my research in general.

After working with woodwinds for a couple of years on the series *there are neither wholes nor parts*, an opportunity arose to write for the exceptional Quatuor Bozzini. This was a chance too wonderful to pass up, but was difficult to begin as it presented me with a compositional problem, to not simply fall back into old compositional habits, but instead to push forward into new territory and apply the same thinking from the wind pieces into the string domain. The issue

that thwarted my initial thinking was the linearity of the string spectrum, which seems quite simple and predictable when compared with the complex interactions of woodwind multiphonics: it is of course possible to play multiphonics on strings, but these are only the simultaneous sounding of several partials from the same harmonic series. Where the wind pieces revolved around the many subtle variations in tuning and timbre possible with multiphonics, string timbre seemed inflexible and the natural spectrum of the strings was too recognisable, too overdone; it seemed to have been fully explored by the spectral composers of the 1970s.

The breakthrough came after some experimentation with drones. By playing sustained tones on open strings and subtly varying the bow pressure and position, it seemed that the string spectrum would sometimes collapse into a single partial. Rather than the dozens of partials active in a normal bowed string spectrum, the energy of the vibration would pool in just a few partials, sometimes concentrating in a single clear tone, sometimes hovering between two or three. The passage from full spectrum to isolated partials offered a beautiful sound and a delicious perceptual ambiguity, especially when the collapse happened slowly, seeming in frozen moments not to change yet not stay the same. With testing, I also found that while it was impossible to predict exactly which partial would emerge and when, each string had a small set of preferred partials, two or three that would be most likely to emerge. This allowed for a structural/compositional possibility, treating each string as a weighted but open-ended set of pitches. This led to a notation system that abandoned completely the idea of predetermined pitches, replacing the normal staff with an “effort staff”. Effort here does not simply equate to force, it is an analogue of “seeking” or “revealing” — in the Heideggerian sense. The effort staff is a scale bounded on the lower end by the most immediate partial, one of several which will emerge with simple bowing over time, while the upper end of the scale is the larger set of more resistant partials which can be activated through persistent effort and careful attenuation of bowing parameters. This presents effort as “work”, “persistence”, the increasing amount of difficult terrain between attempt and goal. Similarly, this staff should not be read as lower-partial-equals-more-immediate and vice versa, because lower partials can often require great subtlety of bowing to reveal. The space of partials on a string is non-linear with respect to “effort”.

This notation results in an indeterminacy of pitch across the four instruments of the piece. Compositionally, this is mitigated by a formal device where the players use a scordatura that must be worked out for each specific performance: a string’s preferred partials can be affected by environmental factors such as acoustics, humidity, or temperature, meaning that the specific pitches of the piece will change with every performance. The scordatura is defined by the most immediate pitch of the cello’s lowest string, then tuning all other strings of the quartet (where possible) to also have this pitch (or octave equivalents) as a preferred pitch. This creates statistical likelihood of a pitch centricity but without specifying in advance, allowing the pitch structure to emerge.

With this as a basic performance technique, I spent a week working with the quartet in Montréal, trying structures, notations, and relationships. The resulting piece was written with St Paul’s Hall in Huddersfield — the venue of the upcoming premiere — in mind, using its architecture to solve a practical problem. The performance technique generates a continuous and ambiguous sound.

The quartet sit in close proximity to each other, and such a spectrally diffuse and unpredictable sound makes it difficult to tell who is playing what, or to differentiate your own sound from that of your colleagues. To lessen this problem, the quartet begin the piece at different positions in the space: the cello centre-stage, viola behind on the organ riser, violins at the back of the hall on opposing sides of the audience's tiered seating. This spatialised beginning allows the players to explore their instrument's response while isolated from each other, and as the piece progresses the three standing instruments alternate walking with playing to eventually come together on the stage for the final canonic section. In recording it was decided that the attempting to recreate this spatialisation would be artificial, and so this recording has fixed positions for the players throughout.

Working on the string quartet and solving this problem opened up the possibility for me of writing for vibrating strings, and led to a piece for solo low string instrument called *intra-actions*, not included here. I also wrote a short piece for LS2, the student ensemble at the University of Leeds, which included a part for electric guitar feedback. As with my initial work on the string quartet this was an attempt to translate an idea from one instrumental medium to another without sacrificing the principle. The experiments with the LS2 guitarist coincided with my thinking about writing a piece to be performed in the atrium of the Creative Arts Building at the University of Huddersfield; a beautiful acoustic with a very specific layout, a high-ceilinged open space with multi-level walkways on either side. *Surfaces of emergence* was the result of this, an open score piece for ensemble of electric guitars playing only feedback, preferably positioned around or among the audience in a large reverberant venue. The forces and duration are specific to the context: the studio recording presented here is fifteen minutes long and requires three players, the premiere performance at Huddersfield Contemporary Music Festival 2013 involved six players and was thirty minutes long.

This piece develops the idea behind *a metastable harmony* — that a sustained vibrating string can allow individual partials to emerge as the strong percept, and that the specific partial that emerges is indeterminate but is constrained by the materiality of the string, its formants, resonances, etc. In *surfaces...*, the sustaining mechanism of bow-strokes is replaced by feedback. The players use only open strings (the left hand is used to mute strings when required) and change feedback pitch by altering the guitar's position relative to the amplifier. The feedback pitch is always a partial of the vibrating string. Altering position changes the phase relationships in the system between the spectrum of sound produced by the amplifier and the vibration of the string itself. This causes instability in the feedback system that selectively damps and reinforces different partials as the guitar passes through standing waves, until one partial is strong enough to overpower the currently sounding partial.

Another development that builds on the string quartet implementation of this idea was to include harmonic motion in the piece by altering the instrument's environment as the piece progresses. There are staggered rest-points for each player where they detune their strings by small and non-specific amounts. The piece begins with only the low E-strings of each guitar sounding, giving a stable harmony for the first half of the piece. After this, the players un-mute the other strings and begin the process of staggered detunings, moving the piece into an unstable and inharmonic territory where pitch relationships are emergent.

Notationally, this piece moves away from the string quartet's interpretable and performatively "read" score to a text score that outlines a set of performative rules for the players to internalise. The score has two elements: a text score that explains for all players the method of sound production and the rules for performance (as in "game" rules); and a part that is specific to each player and used in performance, listing when and how they alter the environment of their instrument. The main rule in *surfaces...* is that players attempt to oscillate between two feedback pitches. If, while attempting to return to the previous pitch a new pitch emerges, then that becomes the pitch to oscillate around, for example:

A B A B A B A C A C D C D C D C D E D E

The performative aspect is intensified as the players are also instructed to change their position as slowly as possible, to catch and elongate the point of ambiguity where the old and new feedback tones are poised, equidistant, hovering between forces, until one emerges.

At least two things is the second piece I've written for the wonderful Trio Scordatura (3); an unusual ensemble consisting of voice/violin, viola/voice, and keyboard. This piece makes a different statement about ambiguity than the other pieces on this disc. Rather than focussing on the materiality of the instruments, it is built on the ambiguity of shifting relationships between the players as part of an inharmonic whole. In *At least two things* I wanted to find a way to blend the three parts, voice, string, and keyboard such that they move between points of clear timbral separation and unification. I also wished to find a new way of writing for the keyboard; a long-standing problematic instrument for me. Specifically I wanted to find something where the player did more than simply play notes, something that involved the player in continuous sound rather than "events", but without sacrificing performance on the keys, or replacing this with other controllers such as tone-wheels or faders. As the electronic synthesiser lacks any materiality (4), I needed to find a way to connect the physicality of playing to the sound in a generative and meaningful way. Here, the keyboard samples the voices and strings at specific points, and smears it microtonally across the keyboard. The sample is sustained and played as chords, with each key mapping the sustained sample in five cent intervals higher and lower than a central "trigger" pitch: e.g. if the trigger is A5 then key B5 will be the same sample ten cents sharper. Rather than play this melodically, the part requires chords of multiple mistuned samples, constantly shifting in position and voicing within a small ambitus. The result is a complex beating timbre that simultaneously blends-with, and alienates, the voice and string sounds from which it emerges. The acoustic parts alternate blocks of repeated gestures, either sustained sounds or iterated process. Subtle shifts of tuning across these blocks models the same unstable beating texture generated in the electronic part.

To summarise, these pieces represent a snapshot of my thinking at the start of what I hope to be a long and fruitful exploration of relationships between materiality and performativity in sound. As 2014 begins, I look forward to re-treading these paths many times, working with new spaces and new people.

SCOTT MC LAUGHLIN
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1. Listen to the melody of a church bell peal, then listen past the melody to the strange—almost parodic—harmony that floats above it, then forget the melody and hear only the alien world that remains.
2. The doubling of both the forces and duration between the two versions is purely coincidental.
3. The first was *Marx*, which can be heard on *Dubb* (2010), the first release on the Ergodos Records imprint.
4. I considered using the non-linearities of feedback circuits and the like but could not implement the idea.

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there are neither wholes nor parts (ERI2) is released on Ergodos Records and is available from ergodos.ie/shop/there-are-neither-wholes-nor-parts