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Peter Zinovieff

Nuzuh

IAM LISTENING to a very old recording of a Turkish folk-song, made in the field by Béla Bartók in 1938 on an Edison wire recorder. He worked in conjunction with Zoltán Kodály and this result is part of the lineage of recording Hungarian folk music initiated by Béla Vikar in 1895 using a cylinder phonograph. This set the base for the work of László Lajtha, Zoltán Kodály, and Béla Bartók.

You can easily imagine what this recording sounds like—thin, hissy and as if from very far away. Such recordings are always mere glimpses of the original, nevertheless you can still, in a romantic way, place yourself at some ridiculous scene of the great Hungarian composer with his technical assistants asking some remote villagers to sing and dance or play their now almost extinct medieval instruments. You can also easily visualise Bartók and Kodály annotating their findings, transcribing the music into stave notation, describing the particular scales and the peculiar fingerings used.

There is a rather marvellous melancholy in the ancient recording, like looking at faded and torn old black and white photographs.

What I want to do is translate parts of these recordings into another medium that can be used by me in an electronic composition. That is to translate them into malleable computer music objects that can be crafted into whatever shape I decide.

What I do not want is to interpret the recordings, nor to make them less noisy, more recognisable, more pleasing, nor to transpose them to another key, nor to notate them so that other instruments or similar instruments can play them from a score. In these senses the work of Bartók and Kodály is irrelevant to me. So I am using the word interpret for all of the above manipulations while what I am going to attempt is

a translation. I will not discuss here how musical stave notation is one of the most brilliant codes ever invented, nor how no two interpretations are identical, nor their difference to ‘The Special Case of Intuitive Computer Music Scores’, which I wrote about in *The London Magazine’s* 100th issue in 1969.

First of all a little background to the project that has led me to this task.

Last year I would not have called myself a composer. This year I am most definitely one.

In the 1960s and ’70s I used to be greatly involved in all aspects of early computer and electronic music but since then—until last year—I have done other things. In those early days I had the most advanced computer studio in existence and also manufactured analogue synthesisers under the name Synthi (such as the VCS3 and AKS): these activities were umbrellaed by my company Electronic Music Studios (EMS).

After this time, and this is very relevant to the present discussion, I wrote the libretto for ‘The Mask of Orpheus’ by Harrison Birtwistle. Relevant, because, for the 3rd Act I invented a complete small-scale language. But I’ll come to that again in a bit.

A year ago I was unexpectedly commissioned to write a 40-minute electronic composition for ‘The Morning Line’, an incredibly elaborate sound sculpture at present in transit from Seville to Istanbul, where it opens in May as part of Istanbul’s contribution to being one of the European Cities of Culture for 2010. ‘The Morning Line’ is huge so that you can walk through it. It houses an array of 54 powerful loudspeakers that are able to project sound into a several three-dimensional spaces. These are computer-controlled on site and these computers are in turn programmed live from the Music Research Centre at the Music Faculty at York University.

So, at the end of many a long month, I have a 40-minute composition which I have titled ‘Bridges from Somewhere and Another to



'The Morning Line'. Image © Matthew Ritchie with ArandaLasch and Arup AGU
Commissioned by Thyssen-Bornemisza Art Contemporary. Seville, Spain, 2008.
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Somewhere Else'. I have sub-divided the piece into 8 sections of about 5 minutes each; the 'Bridges from Somewhere' make up tenuous connections to western classical music fragments which are the sparks for various sections, they also refer to memories of old compositions that I was involved in some 40 years ago using tape and early computer methods. The 'Bridge to Somewhere Else' is an allusion to the sculpture going to Istanbul and is the basis for the first section. This I originally called 'Hüzün' which is a marvellous Turkish word for a sort of deep but not maudlin melancholy that is maybe invoked, for instance, by the old city of Istanbul. I like the word but I have exchanged the first and last letters as well dropping the accents to finally call it 'Nuzuh', hoping to retain a tang of Turkish word without being sentimental about it.

The 'Nuzuh' section is 'orchestrated' into about 24 strands, some of which use the Bartók translations, and each of which is an evolving entity in its own right.

I mentioned my libretto for the 'Mask of Orpheus' and the invented language in Act 3. This language had its own alphabet and characters and a simple yet complete syntax. The vocabulary was limited to perhaps 250 words. With this tool, I could translate from English into strange graphic symbols with their own pronunciation. More importantly, the singers had to learn a new way of annunciation and an artificiality that was a main purpose of the structure. Having made the translation, I was then able to use this language to juxtapose sounds into a new poetry so that the final sung material was a set of poems written in Orphic but adapted via modern English. Oddly the Orphic poems look very much like Anglo-Saxon poems when re-translated back into English. Maybe this is because of the vocabulary and simplicity of the grammar. However much I manipulate the limited translation something is retained of the original English text:

ȷ Q FQ AD ȷ Q SŠ RÈI DRA-A DȷSIF, FRQ À-SZF Ū F-S. DSȷ DȷFDEI -A ȷR, IUS SE È U-U RȷDȷU Dȷ FUS-ȷS. Dȷ FȷRU Dȷ UD DÈ S-REȷA ID FȷS-E AD RȷS SE ID Q ÀS. ÈU Dȷ Rȷ FT.	The King stands Highest.	ȷD FȷS-E AD RȷS ID FȷS-E AD RȷS Rȷ Fȷ ÀS-Rȷ Dȷ Rȷ Fȷ ÀS-Rȷ Dȷ
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This is exactly the sort of thing that I wanted to do with my translation of the Bartók recordings albeit not from text nor into another text to be vocalised. This is a far more ambitious project.¹

Imagine a set of coloured plasticine strips you can twist, mix and re-shape. It is only with great difficulty that no remnants of the original colours remain. What I want to extract from the recordings is just as with a real piece of plasticine: re-workable strips that, whatever I do to them, will retain some of the musical entity from which they are derived. These sound objects will make up my orchestra and maybe are akin to the letters or maybe sometimes the words or even the complete Orphic poems. In some ways this is similar to, and ultimately inherited from, Pierre Schaeffer's music sound classification system 'Solfège De L'objet Sonore', first proposed at the Groupe de Recherche Musicale(s) in Paris in 1967.

In those days there was a sort of split between Musique Concrete and Electronic Music, the latter obtaining the raw material from electronic sound-making electronic devices while concrete sounds were derived from recordings of real sounds. Both sets of sounds were then altered, copied, speeded up, slowed down and extended, repeated by tape-recording techniques and tape splicing. The electronic generation then progressed from analogue sound generators such as in the early synthesisers (for example Moog and EMS) to sequencers (such as my own electro-mechanical sequencer based on telephone uni-selectors in 1963) to computer programmes such as MUSIC 5 (John Chowning at Stanford University), GROOVE then MUSIC (Max Mathews at Bell Labs) and MUSYS (Peter Grogono at EMS). My own preference has always been for naturally derived (concrete) sounds and my collaborations with Harrison Birtwistle ('Chronometer', 'Four Interludes' etc.) and Hans Werner Henze ('Tristan', 'Glass Music' etc.) have all used

1 I am extending the techniques at the moment in a violin concerto 'OUR' which the young brilliant Kazakh violinist Aisha Orazbayeva and I are composing together. However in this we are selecting the original building blocks from her specific sounds rather than the serendipic chance of finding the Bartók recording.

recorded sounds as a source. Indeed I might say, as a secret aside, that on the whole I dislike purely electronic music.

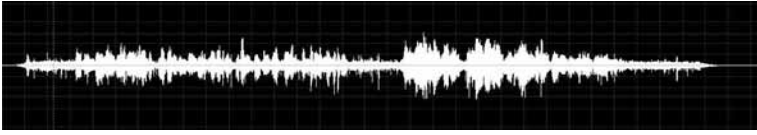
Ultimately, via Pierre Boulez's establishment at IRCAM in Paris, a highly modular, music programmers dream-language (albeit a complex one), called Max/Msp (named after Max Mathews of Bell Labs and Miller Puckett from IRCAM) was developed by Cycling '74, and is now used extensively worldwide.

It is Max/Msp that is used by York University to control the 'Morning Line' and which has also provided me with specialist programmes that I shall describe.

The slabs of musical objects that I want to create, then, are of the concrete variety in that they are squeezed from the original Bartók recordings, although the manufacture of the plasticine is entirely computer made.

What I choose to make into such metaphorical pieces of plasticine is up to me, as is what I do with them. For example I might choose a fragment of melody or the arbitrary peaks in a recording to derive a percussive rhythm or I might even think that the very hiss and other imperfections are part of the whole 'Nuzuh' and thus something useful as well. From the complete recording to the tiniest fragment are hidden nuggets to be found and modelled however I decide. It is the process of making the slabs of plasticine rather than the composition possibilities that I will illustrate. Of course, these sound or musical objects are a combination of a huge array of digital numbers, and mathematical processes imposed onto these numbers. In other words there is nothing directly tangible in what I am doing, and the sounds that we hear are always re-generated by computer.

So what actually happens? I will now describe some of the steps I made in creating these malleable computer sound objects from part of Béla Bartók's 'Halay' song. This is what the original recording looks like:



Next we have a marvellous haunting melody that I have used in the final composition, a trumpet, rather beautifully played, using the exact timings of the original and still preserving some of its fragility and dynamics. This would never be possible from a score or normal re-rendering or other interpretation. This is not the sound of the original trumpet. It is a sort of conjuring trick. Or in other words it is a translation.



Both of these graphical representations show nothing more than the amplitude peaks and shape and are useless for guessing what they actually sound like, although one can see the correlation between the two examples.

In order to get here, like any translator, I have used various ‘dictionaries’ as well as allowing myself the luxury of being very fluent in the computer language into which I am translating.

As in the case of a normal inter-language translator, I can translate these recordings using wildly different methods so that my end result might be an amalgam of the various dictionaries. Many of these are purely instinctive and make up part of my process of composing. So instead of writing a part for trumpet, I might say that I want to use the timbres of that recorded voice, the rhythm of that oboe-like instrument and give this imaginary, not-yet-existing sequence a nomenclature and classification so that I can almost (but not quite) touch it, and I can certainly hear it.

There are myriads of software programmes available to a computer musician, but in making 'Nuzuh', I have used the following:

- Adobe Audition (Preliminary Editor)
- Paul's Extreme Sound Stretcher (Stretch waveform without altering pitch)
- Spectral Interpolator—Max/Msp patch (written for me by Oliver Larkin)
- Frequency Glissando—Max/Msp patch (written for me by Tony Myatt)
- TS Audio to MIDI (Convert audio to MIDI)
- Sibelius 6 (Score writing and midi interpretation)
- Adobe Audition (Effects Generator)
- n-track Studio (Digital Analogue Workstation)

None of these procedures would have been remotely possible with tape technology and they all require a powerful modern computer.

My own computer system is rather strong. I use a fast quad chip Intel processor, 8GB RAM, twin 24" screens, a huge storage of 10 terabytes of disc space, small very high quality Genelec speakers and a host of useful 'extras'. I might add that my original computer in 1965 had 8k of memory and, at the end of the era, a 32k disc drive. One has to multiply this by many millions of times to get to what I have in front of me as I write this.

Let me say a little about each of these programmes.

Adobe Audition (as a preliminary editor) is an extremely sophisticated, reliable and accurate waveform editor. In the first instance I use it as one might use a small scale text editor. With it I can cut out bits of sound, add silence, and combine sounds together. I can then remove any portion that is noise or that I consider as noise, keeping the reject or not. I can add an envelope to the dynamics and save various stages as different sound files. I use Audition as the nearest to old fashioned tape cutting that there is.

Audition also allows very sophisticated noise reduction processes and I use these in conjunction with Izotope RX.

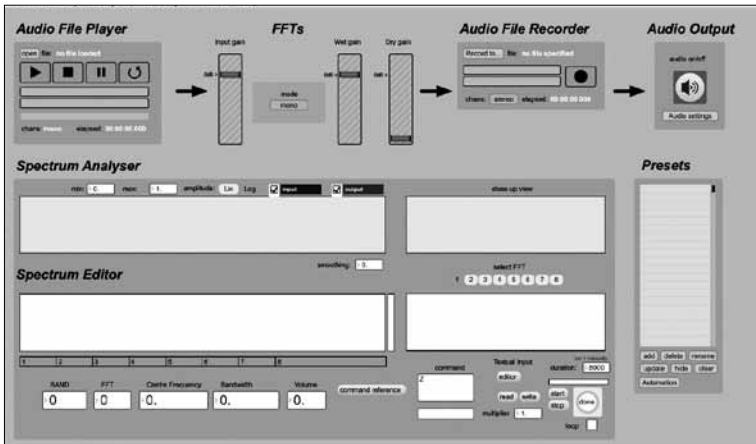
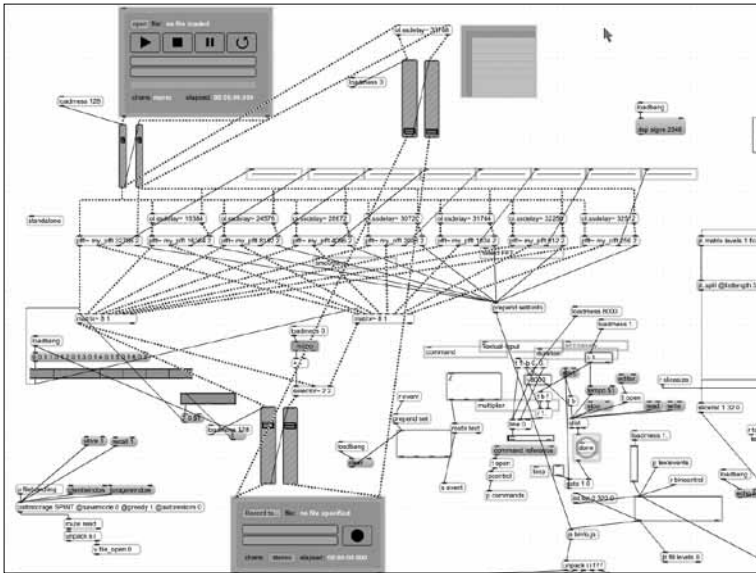
Paul's Extreme Sound Stretcher. This is a wonderful programme that allows a sound to be stretched in time without necessarily altering its pitch. For instance a 10 second sound can be made to play for 10 or 100 minutes thereby exposing all the tiny nuances that are inevitably missed in listening to the original. Moreover sounds may be squeezed, change in pitch up or down by many octaves and so on.

Spectral Interpolator 4 (Max/Msp). SPINT was developed for me by the Research Department at York University last year (by Oliver Larkin). In some ways this was partly an answer to a plea I made at the end of a film 'What the Future Sounded Like' by Mathew Bates:

It is only now with modern computers that it would be possible to start again with exactly the same aims as EMS had and that is to be able to analyse a sound, put it into a sensible usable musical form on a computer and work with it and be able to re-create it in a musical way. I wish I could find somebody to work with!

So SPINT is a partial software answer to an extremely complex and expensive hardware project that EMS undertook in 1973, when computers were unable to provide such a solution. SPINT allows a sound to be filtered into a huge number of frequency bands so that only tiny fragments of the spectrum can be selected and manipulated. This is written as a patch in Max/Msp and the first picture, opposite, shows what extremely complex design lies behind the clean graphic user interface in the second picture, and why these are called Max/Msp patches.

Frequency Shift (Max/Msp). This Max/Msp patch was also designed for me at York by Tony Myatt. It was in response for my plea to be able to make gradual pitch changes over the duration of a sound. With this patch I can make a gradual semitone change over 30 seconds or maybe a huge swoop of 7 octaves over ten seconds!



TS Audio to MIDI. One method of translation, an unlikely one for any reader who knows about this subject, is to convert the original recorded waveform into a set of MIDI instructions which can be diverted to a sampled computer musical instrument of one's choice. Converting a complex waveform into a polyphonic instrument is full of pitfalls and here the art of translation comes to the fore. I have set various thresholds to try to capture the frequency changes in a sort of trumpet sound in the original recording. This I will then send to Sibelius for alteration.

MIDI (short for Musical Instrument Digital Interface) is a music industry standard communications protocol, defined in 1982, that lets MIDI instruments and sequencers (or computers running sequencer software) communicate to each other to play and record music. Much of the music you hear every day is written with and played by MIDI sequencers.

MIDI does not transmit audio signals but sends a series of instructions regarding pitch and amplitude, vibrato, panning and so on. In fact this is a simplified version of what my first computers would do by issuing commands to all the sound producing equipment or tape recorders that I had in my studio. Our language Musys was extremely versatile in the cohesion of these commands.

Sibelius 6. Sibelius is used in this piece to extract melodies and complex rhythms from MIDI files derived from the original waveform. Here I can edit the actual notes, listen to the sound on virtual instruments, re-record these into new waveforms and begin the whole cycle again. Opposite is a rendering, extracted like magic, from the original Bartók recording of a completely different instrument and translated into a trumpet. This MIDI file derived through TS-Audio, interpreted by Sibelius, can display the timing intervals in as much detail as is required. The second translation would never have been able to be transcribed or notated by ear in such detail. Some of the time intervals are really tiny.

Adobe Audition (As an Effects Generator and mastering tool). As a final sound editor, Audition allows very complex stereo, reverberation and echo effects as well as allowing the use of a large range of vst's to

Simple Trumpet Translation

♩ = 120

Trumpet in B♭

Tpt

Tpt

Tpt

Tpt

This musical score is for a trumpet in B-flat, set in 4/4 time with a tempo of 120 beats per minute. It consists of five staves. The first staff is the main melody, starting with a quarter rest followed by a quarter note G4, a quarter note A4, and a quarter note B4. The second staff begins at measure 4 and features a triplet of eighth notes. The third staff begins at measure 7 and includes a triplet of eighth notes. The fourth staff begins at measure 9 and contains a triplet of eighth notes. The fifth staff begins at measure 12 and continues the melodic line.

Complex Trumpet Translation

Trumpet in B♭

Tpt

Tpt

Tpt

Tpt

This musical score is for a trumpet in B-flat, set in 4/4 time. It consists of five staves. The first staff is the main melody, starting with a quarter rest followed by a quarter note G4, a quarter note A4, and a quarter note B4. The second staff begins at measure 2 and features a triplet of eighth notes. The third staff begins at measure 3 and includes a triplet of eighth notes. The fourth staff begins at measure 4 and continues the melodic line. The fifth staff begins at measure 5 and contains a triplet of eighth notes.

be linked in. This is an interface that integrates a huge number of effects programmes or plug-ins. It was originally designed by Steinberg. I prefer, if possible to use such effects at this stage rather than in the final assemblage.

N-track 64. A final programme is needed by me to mix and to coordinate my assemblage of translations into a state ready for performance and ready for re-distributing into a three-dimensional sound object for the 'Morning Line' at York University; in other words to translate my composition into a single 8 minute sound-sequence on a number of separate audio channels. There are many such programmes (DAWs, Digital Analogue Workstations) available—for instance Cubase, Nuendo, Pro-Tools, Ableton—but I have chosen to use N-track, which is simple and versatile and suits me extremely well.

Now I can lay out the tracks, add a compressor to avoid distortion, and review and listen to the tracks in any combination. It is at this stage that loudness and mixes are adjusted. Then I use special mastering programmes such Izotope RX.

By very circuitous routes I have now finished my translations and I have ended up with an 8 minute segment, called 'Nuzuh', of my 'Bridges from Somewhere and Another to Somewhere Else'.

NOTE

Bartók's original recordings and the translations discussed above can be heard at cambridgeliteraryreview.org/zinovieff, alongside a recording of 'Bridges from Somewhere and Another to Somewhere Else'.

Author Info

Peter Zinovieff is a composer inventor with a D.Phil. in geology from Oxford. He founded the company EMS which made the first commercially available musical synthesisers, and has personally owned a computer longer than anyone else in the world. He has collaborated with many composers including Hans Werner Henze and especially with Harrison Birtwistle (for whom he also wrote the libretto of 'The Mask Of Orpheus'). His large scale electronic work 'Bridges from somewhere and Another to Somewhere Else' has just been premiered in Istanbul as part of its European Capital of Culture programme 2010.