Turntable and Computer Composition

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Abstract

This paper sets out to explore the area of turntables and composition. New attention, directed towards the turntable by software developers and academic institutions, has provided more original and creative environments for composition and improvisation using turntables. The hybrid of computer musician and turntablist could give rise to a new generation of computer based turntablists, who have their roots firmly in the techniques of the pioneers of turntable based composition and its respective sub-genres. It is my belief that the sonorities and innovative techniques of these computer-based turntablists will provide the next stage in the history for the turntable.

I will discuss the use of the turntable in today's technological environment, while attempting to decouple the connection between DJ and the turntablist. This will help me to better discuss the next possible stage in the history of the turntable and the type of artist that will usher it in. Where applicable, I will discuss some broader concepts, like the notion of gesture in relation to the area of turntables and computer music. I will conclude by analysing a recent interactive installation of mine, which focused on the fusion of turntables and computer music tools.

Introduction

Over the past sixty years, the turntable has enjoyed a symbiotic relationship with musical/cultural revolutionary movements. Consider Musique Concrète, the Hip-Hop revolution (with its offshoots into turntablism), Disco and the Acid House/Techno generation of the early nineties: the catalyst and creative common denominator was the turntable. From the headquarters of the Radiodiffusion-Télévision Française in 1948, the Block Parties in 1970's America, the explosively colourful, energetic clubs of the disco era to the heaving and throbbing warehouses of the Acid House generation, the technology of the turntable has remained more or less the same (with the exception of Qbert's QFO design), but the different contexts in which it was used have given rise to some of the boldest and most creative musical and cultural statements in history.

Aside from being a tool of the innovative pioneers, one must not forget that the turntable, as a 'record player', was a domestic product for decades. The turntable was ultimately replaced by the new and more convenient technology of the audio compact disc, causing the use of the turntable to diminish significantly. In correlation to this, the recent influx of software available for DJs has created an equally convenient situation, where DJs are now opting to use more laptop orientated means of performing, as it allows the artist to operate and arrange sets in a quicker and, some say, a more creative manner. One can appreciate the benefits this type of technology brings, the most obvious being that it alleviates the stress associated with transporting an immense amount of vinyl. However, this convenience destroys the physical relationship between the DJ and the vinyl. There are programs to cater for those DJs desiring an interactive element, using time-coded vinyl, such as Ms Pinky (whose motto is, 'It may not be the real thing, but at least you're playing with vinyl') (Ms Pinky website) and Serato Final Scratch. However, the majority of DJs tend to opt for the non-vinyl, laptop approach.

> 'Tape and computer music, turntablism, techno, do-it-yourself record manufacture and distribution – all these seizures of the means of (re-) production add up to a cataclysmic system-hack made all the more devastating by its invisibility.' (Shapiro 2000, unpaginated)

If one was to hypothesise, in the light of this recent influx of software, on the future of the turntable and its use in composition, how would it look? Peter Shapiro suggests a relationship between prominent musical movements and their 'invisibility' within the culture around them. Although the use of the turntable by commercial DJs has waned, I do believe that there is new attention being directed towards the turntable by inconspicuous sources.

Computer Based Turntablists

The popularity of the turntable, as a record player, diminished with the introduction of CDs but the instrument maintained popularity within the Hip-Hop community, acting as an intrinsic element of live performances. Turntablism has been the exception in the present day shift away from vinyl; it is concerned with the use of turntables as musical instruments.

> 'Lead by pioneers like Christian Marclay and Grandmaster Flash, who started to *play* the turntable in the late 1970's, turntable performance has become a distinctive form of musical expression. The primary interest of the turntablist is to generate sounds from the turntable and the DJ mixer, rather than playing and mixing pre-recorded music as a typical DJ does.' (Mizuta Lippit 2004, p. 211)

In the light of 'playing' and generating sounds with turntables, I feel it appropriate to include noise artists such as Otomo Yoshihide and Emil Beaulieau, whose primary instrument, or sound source, is the turntable. There is a significant difference between the

ideologies and practices of the more conventional turntablist and these experimental strands of turntablism, however I think that it is important to include every form of turntable art, to improve our understanding of the various ways one could possibly incorporate turntables into computer orientated composition.

Computer technology in the 1970s was not as advanced nor as easily accessible as it is today, making it an unattractive medium of experimentation. This leads me to believe that this new attention directed towards the turntable will result in a cross-pollination of turntablists and aficionados of computer music. Artists like Daito Manabe and DJ Sniff are prime examples of such cross-pollination, both working with turntables and Max/MSP in creative compositional environments.

Gesture in Turntablism

'The brushstroke a painter makes onto a screen can be understood as a visible mark of his or her gesture; likewise, in music, sound materiality and its movement in time can be understood as an audible mark of a gesture onto an instrument.' (Zanpronha 2003)

Any genre of music that incorporates turntable technology in performance or composition places an emphasis on the concept of gesture. As the use of turntables is decreasing somewhat, the element of gesture is also a notable casualty. Physical gesture was an intrinsic element in the production of Musique Concrète, the first turntable 'inspired' genre: Holmes noted one such gesture, 'he used volume control to create fade-in and fade-out effects', (Holmes 2001, p. 92). This relationship between technology and composition was a prominent factor in the revolutionary face of the genre, as Holmes explains.

'The act of composing music was accomplished by technological means; the way in which the organization of sounds

was created was as important to the outcome of as the sounds themselves.' (Holmes 2001, p.93)

The whole studio became a musical instrument for Pierre Schaeffer; here the interaction with technology was just as important as the concept of the piece. In comparison, turntablism relies on physical interaction. The genre incorporates a plethora of physical and sonic gestures, primarily emanating from the manipulation of the mixer and records under the styli.

In terms of laptop improvisation and performance, physical gesture is a characteristic which can often be omitted. As there is a shift away from hardware environments and older technology such as the turntable, there has been a greater need for controllers to develop some level of interaction with the computer interfaces. Few of these are helpful to the turntablist: 'because the turntablist use both hands when he/she plays, these devices are impossible to use at the same time.' (Mizuta Lippit 2004, p. 211). Similarly, not using controllers like this can create a distance between the performer and the audience, because the listener/audience does not know what aspect of the sound the performer is controlling, as Emmerson notes,

'performer-triggered real-time computations give no guarantee that the listener will *perceive* that a human being has initiated or influenced a musical event.' (Emmerson 2007, p. 93)

Integrating turntablism into the world of computer music means the turntable becomes accessible as an interactive middle ground, maintaining the physical element, which certainly, in a performance aspect, confirms the real-time cause and effect of the sonic result for the audience or listener. Sonically, turntablism's most notable gestures emanate from the manipulation of the vinyl under the stylus, contributing to the genre's (and the instrument's), unmistakable sonic fingerprint. With the introduction of computer processing, the

conventional sonic gestures will be the most notable change. As I will mention later, when analysing an installation, the sonic gestures associated with this fusion of technologies, become completely original and unrelated to the instruments associated with the audio.

Up to this point I have discussed the use of the turntable in a variety of contexts; the genres, the artistes who have adopted it and the more discrete topics at play when using turntables. The performance and sonic possibilities when integrating turntables into computer music are vast and I will now analyse one such event, an installation of mine which took place in The Lab, Dublin, as part of the EAR-Plugged Festival 2009.

Installation: A Turntable and Computer based Interactive System

The inspiration for this installation evolved from a Max/MSP patch which was my primary environment for composing and improvising, when using turntables. It became apparent that the patch could be operated by anyone, making it feasible to present it within the context of an installation. It would allow me to break the divide between the artist and the audience and allow participants to interact freely with the software using turntables as an interactive middle ground and it would expose them to the notion of computer based turntablism. My main objective for this project, (prior to presenting it as an installation) was to employ the synthesis language Csound in conjunction with Max/MSP, with turntables as inputs and, to a certain extent, controllers.

System Technology

In discussing the system make-up, I will operate within the confines of questions posed by Leigh Landy in his book *What's the Matter with Today's Experimental Music? Organized Sound Too Rarely Heard* (Landy 1991, p. 32)

1. What can be the justification for using technology as a compositional tool?

In justifying the system technology used for the installation, we can draw similarities between the symbiotic relationship which exists between the computer musician and his/her compositional tool. In this specific style of composition or improvisation, where turntables are integrated into computer music, each possesses properties which compliment each other. In terms of the installation, the turntable made the installation approachable and engaging, primarily because turntables are recognised by a varied demographic and also because a person could interact with a tangible object, ultimately, making the participant the artist.

2. Which aspects of technology are applicable to the making of the music and in what way?

The answer to this question will allow me to delve into the more technical aspect of the installation and to de-construct a computer-turntable based environment. The Max/MSP patch can be broken down into two main sections:

- Real-time Sampler/Sequencing Section.
- Processing Section (Csound).

The real-time sampling section consists of four buffers which take a snapshot of the input every second. Coinciding with these buffers, there are five step sequencers. They read from these buffers and output the contents corresponding to where the various toggles are placed in the sequencers.

The first two sequencers will play the contents of buffer one, the rest will play their respective buffers. Depending on the speed of the playback and size of the recording buffers, a variety of effects can be achieved. Small buffers and fast playback speed will result in a staccato effect with the contents of the buffers being quite unrecognisable. Slower

speeds and larger buffers will mean a larger proportion of the buffer can be played and more of the input sound will be audible. The context in which this section of the patch could be used can vary dramatically. For instance, one could use this instrument with percussion, to generate very syncopated, rigid bass lines.

Aside from the sequencing buffers, I was also writing to a separate buffer, which can be broken down into two feeds. The 'dry' feed of the buffer was constantly recording a live feed from the turntables, but unlike the above concept of sequencer with toggles, this was constantly outputting its contents. Feeding into the playback speed of this buffer was a random number generator,

producing values between 0 and 123, which resulted in a glitchy, grainy sound when the values produced were quite high. The 'wet' feed of this buffer was fed to a resonator in Max/MSP, which was outputting the same grainy, glitchy sound as above, but, this time it was resonating at user-defined frequencies, making the glitchy sounds completely inaudible, resulting in harmonic, bell-like sounds.

The Csound section of the patch was really the foundation of the sonic result and catered for immediate sonic gesture produced once someone interacted with the installation. Both concepts in question catered for pitch shifting the input sound (records).
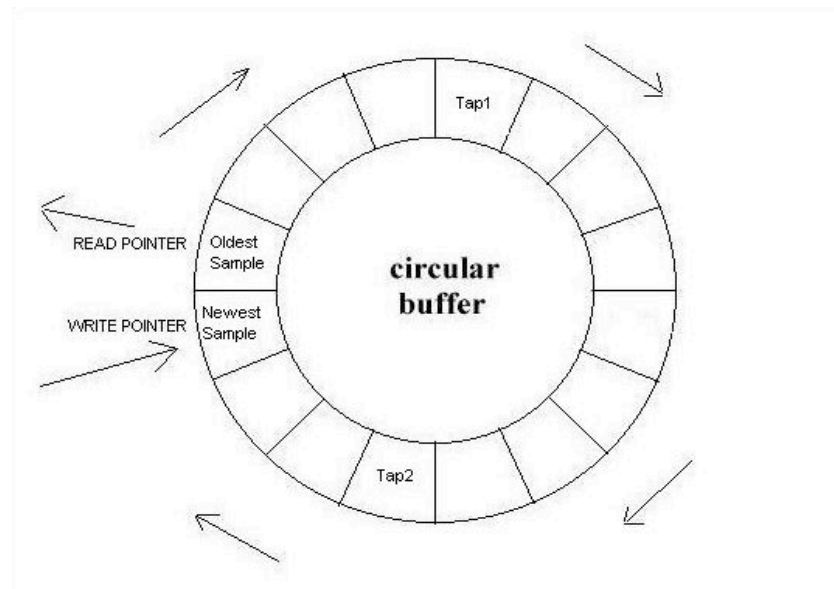

Figure 1

Figure 1 displays the main concept behind the first Csound instrument (the code of which is somewhat beyond the scope of this paper). The circular buffer is a computational method of implementing digital delay lines and a place to store delayed samples. Where the samples are released depends on the delay time used. Shorter delay times would mean that the buffer would be 'spitting out' a delayed version of the input sound relatively close to the original input sound. One can also tap the buffer at different intervals to hear

the inputted signal with different delay times. In this particular Csound instrument, we will need to implement a variable delay line, which as the name suggests allows us to vary the delay time during performance. In variable delay lines (and in order to achieve pitch-shifting) the read pointer (playback) is moving at a constantly varying speed than that of the writer pointer (record), which is moving consistently at the sample rate. Should the two pointers meet, an audible click would be present. To alleviate this

problem, we use two delay lines with the same varying delay times, however one delay line will be offset by half a buffers length and we fade between the two. The instrument implements a harmonising/arpeggiator-like effect on the inputted signal, with a number of user defined parameters such as the ratio of pitchshift, the max delay time and a feedback parameter, which caters for the recycling of the delayed signal between the read and write intervals.

The ratio parameter of the instrument allowed me to pitch the input sound down to a quarter of the original input. There was no 'dry' sound included in the resultant output so when this was used in conjunction with a very short delay time of 0.25 seconds and a high feedback value, there was an instant low frequency drone heard once interaction commenced. Because of such processing, to the point of making the original sound unrecognisable, in theory, one could use any record and still end up with this low, breathing-like drone.

The other Csound instrument used in the patch was based around the pvsadsyn opcode. This opcode resynthesises an input sound (in this case real-time input from one of the turntables), with the option of scaling the frequencies (resulting in a pitch shift) which were analysed from the phase vocoder analysis using pvsanal. Using the csound~ object in Max/MSP, I could connect a control rate value of the Csound instrument to the pitch~ object in Max/MSP. This particular Max/MSP object is a pitch estimator which, once fed with an input, will output pitch information in numerical values. This meant that the users had a certain amount of control over the sonic result: the faster they manipulated the record, the higher the pitch values produced by pitch~ were and they controlled the amount by which to shift the frequencies of the input sound.

The final element of the patch was a VST plug-in by composer and developer Michael Norris. The plug-in was a spectral processor and it functioned to tie every sonic aspect of the patch together. An extremely useful parameter here was the threshold. Setting a higher threshold meant that the plug-in would only begin processing audio once the input sound had reached a particular level. When the threshold was not reached, there would be no output from the VST. This was an engaging aspect of the patch, as audio was not always being produced and upon its introduction to the resultant sound, an element of surprise was evident among the participants. The original intention was to have only one turntable involved in the installation. However, in order to achieve the maximum level of interaction, the patch was divided up between two turntables. The high frequencies and resonating sounds were assigned to one turntable, while the other catered for the low frequency drone and ethereal sound of the spectral plug-in.

Critique

This was my first foray into the world of installations and I was pleased with the reception mine received. It exposed a varied demographic of participants to the notion of turntable and computer based interaction/composition. From an objective standpoint, it was interesting to note how engaging the sonic result was to both aficionados of the genre and those participants unfamiliar with the technology. I think that this is a testament to the presentation of the installation, as it was presented in such a way that, to the participant, the computer and software were not the dominant components; instead they was merely catalysts for an immediate sonic result, based on the participant's interaction. Trevor Wishart restates the importance of this ethos, noting:

'The translation of performance-gesture into the gestural-structure of the sound object is most complete and convincing where the technology of instrument construction is does not present a barrier.' (Wishart 1998, p. 17)

The successful presentation and the resultant sonic gestures produced were components of the installation that became a huge interest to me and seemed to be an engaging factor for many participants. The placement of the installation meant that it was not immediately visible to visitors as they entered the gallery, although they could hear the low frequency drone as soon as they entered the foyer. It was a very prominent sound, unmistakable to my ears, but visitors would not have easily recognised the association between the sonic gesture and the instruments used.

An interesting anomaly, which became apparent to me and a few participants during the course of the installation, was the relationship between the sensitivity of the turntable styli, the wooden turntable stands and the wooden floor on which the installation rested. Upon approaching the installation, one's footsteps would make the wooden floor resonate, causing the turntable joists to move, in turn making the styli of the turntables move, creating sonic events as if someone was intentionally interacting with the piece. This seemed to work better in the case of the higher frequencies, which needed less manipulation to produce audio. It reminded me of a Leafcutter John installation I had seen, where microphones were placed under the floorboards of a gallery. The artist then entered the gallery, with a number of friends, and began manipulating objects like pipes and bouncing balls on the floorboards, resulting in sonic events from the algorithm that the microphones were feeding. I think that this idea would merit further investigation in relation to integrating a number of areas of performance, such as dance, visuals and sound into a live performance.

In terms of the technology, I initially wanted the turntables to 'control' the computer instrument more, but the range of fluctuations in such objects like pitch~ in Max were too small to apply to anything meaningful like a filter or oscillator. I could have automated the parameters of the patch and there would have been a greater variety of sonic events, as opposed to one collective sonic result. This could also retain the interest of returning participants. Another suggestion made to me was to consider the possibility of changing the sonic results as the records changed. In hindsight, this is feasible, with some spectral analysis of the records and it is definitely another area which would merit some further investigation.

Conclusion

Composition, incorporating turntables, is not a new concept and there have been experiments in this field, conducted prior to the inception of Musique Concrète in the late forties. The sonorities associated with each turntable-based genre transverse an extremely varied sonic terrain, each one as innovative as its predecessor. The advances in technology, in terms of computers and software have caused the use of turntables to diminish significantly among traditional users but new artists are emerging and they are exploiting these advances.

It is my belief that the future of turntable composition lies in the academic and research institutions which continually promote and develop means to improvise and experiment with the turntable. One must not forget the extremely innovative and creative sub-cultures which continually experiment with musical tools and instruments, operating as an invisible entity within the parent culture. With this in mind, it is my aspiration to develop my own style and sonic imprint, by fusing computer music software and turntables, combining the physical and computational algorithms.

As an aficionado of both turntablism and computer music, I believe that this amalgamation of technologies will usher a new era in the history of the turntable and a new context within which to view it, resulting in engaging performances and fresh sonorities.

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