
The voice and the vehicle: integrating live broadcast radio into automated live electronic works

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Introduction

"Radiophony is a heterogeneous domain, on the levels of its apparatus, its practice, its forms, and its utopias."¹

Broadcast radio has carved out a unique identity in the media world, having its place cemented through a mixture of sonic, social and cultural qualities intrinsic to its operation. In this article I will explore three automated live electronic works composed to evaluate the integration of over-air live broadcast radio with fixed audio and video materials. Through this exploration I plan to expose a number of the qualities live broadcast radio can bring to works of this kind, and what problems may be faced in trying to achieve a union between such materials².

Background

The subject of this article originates through a research project I have undertaken into the creation of distributable open outcome music³ – music whose sonic outcomes are not fixed and whose medium allows for mass-production and distribution. During the development of the project I approached broadcast radio as material, due to its inherent indeterminacy and ubiquity, and subsequently decided to create a suite of pieces that featured broadcast radio in some capacity.

The details of the technological attributes required for such integration were left open, with one objective kept in mind: any real-time control should be automated so the end result could operate with the minimum of human intervention, very much like a CD or MP3 player. The pieces' aesthetic outcomes were prioritised, with the thought that a second generation of pieces could be created to focus on distributability improvements.

The 'Qualities of Radio'

Early on in the conception and creation of these works I became aware that a number of conceptually interesting attributes became available through the use of a live radio stream, and came to the conclusion that these attributes must stem from what makes radio unique as an everyday medium.

The listener's relationship with radio is complex and occurs on many levels, and these

¹ Weiss, Allen, 'Radio Icons, Short Circuits, Deep Schisms', *TDR*, 40/3 (1996) 9.

² This article focusses specifically on analogue broadcast radio reception – digital radio and Internet radio, though able to carry similar content, work within different boundaries so will be seen as distinct media and thus not covered in this article.

³ The project is documented at <http://research.adamjansch.co.uk/> (accessed 16/9/10).

attributes – which I have termed 'qualities of radio' and will identify through the analyses of the three works that thus far make up this radio suite – are fundamentally related to this complexity. These works join a group of others using radio as dissemination medium or material source, including key pieces by John Cage⁴, Karlheinz Stockhausen⁵, Max Neuhaus⁶, Scanner⁷ and those involved in *Radio Rethink*⁸. Through these analyses I will also attempt to elaborate on a concept which I feel applies to how one might codify the use of live broadcast radio as material: radio as voice and radio as vehicle.

The Voice: *Synth Radio*⁹

The first piece under discussion is *Synth Radio*, for eight-speakers, recorded synthesizer and speech-based radio. *Synth Radio* features two distinct material sets between which a dichotomy is established, forcing a clearer view of the attributes of both material sets.

Technologically, the heart of *Synth Radio* is a Max/MSP patch acting as a sequencer controlling the sounding and spatialisation of the materials. The sequence held in the patch is fixed and does not change between playings. This is also true of the synthesizer material, which is played back from pre-recorded sound files. So into this domain of fixity the live radio material is introduced, and this dichotomy between materials of different fixity is established.

The very first aspect I would like to focus on pertains to the perceived grammatical tense of such materials. The recording of sound can be seen to simultaneously produce an artefact, containing the recorded sound data, and a temporal reference which places that recording historically. This reference is experienced during each subsequent airing of that recording, thereby providing to the listener a past timeframe into which they can place said recording.

Experienced at broadcast-time radio does not produce this artefact, only the reference. It is very 'now', arriving at our ears as current event, regardless of whether its base material was originally recorded. Radio "can serve to ground someone in the present"¹⁰, and, "even when its

⁴ Cage's *Imaginary Landscape No. 4* could be seen as the most elegant radio piece, not only using radio as material but also referring to its physicality through the piece's performance. He also used radio as material in a number of other pieces, including *Credo is Us*, *Speech* and *Radio Music*.

⁵ Stockhausen's most notable 'radio as material' piece is *Hymnen*, which uses events from short wave radios, along with samples from records, to constitute "found objects" (Stockhausen, Karlheinz, liner notes to *Hymnen Elektronische Und Konkrete Musik Mit Solisten* (CD). Stockhausen-Verlag 10 (Kürten, 1995) 123). Radio also featured in *Kurzwellen*, *Spiral*, *Pole* and *Expo*.

⁶ Neuhaus was more interested in the infrastructure of radio broadcast. His most notable pieces in this area were the *Public Supply* series and *Radio Net*, which all involved listeners calling in to a radio station to provide material: *Radio Net* commandeered the whole US National Public Radio network, turning it into a feedback loop (Neuhaus, Max, 'The Broadcast Works and Audium', *Max Neuhaus Audio and Video Recordings* (n.d.). http://www.max-neuhaus.info/audio-video/Broadcast_Works_and_Audium.pdf (accessed 22 May 2010)).

⁷ a.k.a. Robin Rimbaud – as Scanner he taps various radio signals, from those of mobile phones to police radio, for use as material in his live shows and recordings.

⁸ *Radio Rethink* was a radio art event featuring pieces, installations and symposia held at the Walter Phillips Gallery in 1992, centred around the town of Banff, Canada (Augaitis, Daina and Lander, Dan, eds., *Radio Rethink: Art, Sound and Transmission* (Banff, 1994)).

⁹ Further details can be found at <http://research.adamjansch.co.uk/works/synth-radio/>.

¹⁰ Tacchi, Jo, 'Radio Texture: Between Self and Others', in *The Anthropology of Media: A Reader*, eds. Kelly Askew and Richard R. Wilk (Oxford, 2002) 242.

programmes are pre-recorded, seems to be a 'present-tense' medium, offering experiences whose outcome lies in an unknown future"¹¹. Radio, then, re-presents any sonic material into the present tense. This temporal disjunction between the material sets is one that *Synth Radio* seeks to emphasize.

Crisell's statement above also serves to highlight the special kind of indeterminacy inherent in radio. The commercial underpinnings of broadcast radio enlighten us to why this is: radio content producers use 'programme formats' to ensure that particular radio stations and specific radio programmes adhere to their intended target audiences' expectations¹². These formats are informed by market research and largely dictate the content a radio station will play and its probable time of airing. Combined with the genre filtering already instigated by radio stations, artists using broadcast radio as material have a method of determining the type of material they can access in an indeterminate manner. In other words radio provides a form of bounded, or predictable, indeterminacy.

Synth Radio uses this filtering mechanism to instantiate a specific effect in relation to the fixed synthesizer recordings. Tuned to a speech-based stream, the radio material becomes the 'voice' of the piece, carrying with it informational content which is balanced off against the semantically meaningless synthesizer. Having radio provide this semantically rich stream through its present-tense voice is artistically convenient – at a stroke the artist has access to a type-bounded indeterminate content stream, and the need for them to provide specific meaning through that content is delegated to the stream.

Furthermore, this voice stream provides suitable material for modulation between listening modes¹³, with the 'semantic' mode taking a central role: as an example, when the radio stream is featured in a solo capacity at the beginning of the piece the audience can't help but listen to the stream semantically. After one minute the synthesizer material replaces that of the radio with a hard cut edit, a jarring change for the listening apparatus, which is profoundly shocking when experienced. That the radio stream is never the same between performances is crucial for this use of semantic listening, as it gives a listener little chance to become familiar with the exact speech content and approach its listening using a different mode.

Being based around radiophonic speech *Synth Radio* also highlights radio's geographical localisation, and a convenient element of automation it provides. Seeing as the radio stream is chosen from a pool of local radio stations the language received should nearly always be comprehensible by the local audience, thus, in the case of *Synth Radio*, making portable the listening mode effects within the piece¹⁴.

The Vehicle: *The Chaos Engine*¹⁵

The piece that comes closest to being distributable is *The Chaos Engine*, a prototype hardware

¹¹ Crisell, Andrew, *Understanding Radio*, 2nd ed. (London, 1994) 9.

¹² Hendy, David, *Radio in the Global Age* (Cambridge, 2000) 70.

¹³ In reference to Pierre Schaeffer's listening modes. A brief overview of the modes Schaeffer described can be found in Hugill, Andrew, *The Digital Musician: Creating Music With Digital Technology* (New York, 2007) 19-20.

¹⁴ This can work against a listener: at the piece's premiere in Stockholm in November 2009 the station chosen was Sveriges Radio P1, and understanding no Swedish I was unable to comprehend the speech stream, thereby affecting my experience of the piece.

¹⁵ For more on *The Chaos Engine* go to <http://research.adamjansch.co.uk/works/the-chaos-engine/>.

pop song which is listener-operated and capable of audition over headphones. Being about the size of a medium-sized paperback novel and requiring power through an external supply *The Chaos Engine* as a template for a mass-producible music dissemination format is crude and impractical, and so should be viewed as a proof of concept: that live radio hardware could be integrated with recorded sound sources in an aesthetically acceptable and technologically viable way.

The Chaos Engine takes a similar approach to *Synth Radio* in its use of materials – a predetermined sequence controlling a fixed recording and the parameters of a live radio feed. In this case however we are looking instead at the traversal of the ether that makes up analogue radio's boundaries, exploring this ever-present yet invisible space in the process; using radio as a vehicle for the exploration of an omnipresent sonic world, full of but never static¹⁶. How this is done is best explained through a brief dissection of the hardware.

The prototype consists of a VMusic2 MP3 player¹⁷ and an AR1010 radio receiver¹⁸, both of which are controlled by an Arduino over separate serial data connections. The Arduino is the brains of the piece, holding the sequence which governs how the sound sources operate. Ancillary electronics include audio mixing, amplifiers for both the radio and the headphone output, and simple user interface components.

This implementation thus allows for the playback of the main song sound file and, more importantly, the control of radio frequency and volume: it is with this latter mechanism that *The Chaos Engine* allows travel through the ether world of radio. Throughout the song a constantly pulsing bass drum part acts as a synchronisation point. On every other bass drum a command is sent to the radio to randomly jump between the stronger stations it can find, with a randomly-decided detune value applied. The volume control applies a simple envelope over the radio, following the dynamics of the song. The result is a survey of stations and their environs which inhabit this ether world.

This exploration, for me, puts forward the idea that by altering the parameters of radio reception the listener, and not the surrounding world, is in motion; that, as listeners, we are part of a vehicle in transit through this ether world. John Cage's *Imaginary Landscape No. 4* is another example of such a vehicle, highlighting, along with *The Chaos Engine*, different means of vehicular transit: having access to smooth control of both tuning and volume parameters Cage's vehicle is able to successfully drive between stations, taking in the immediate 'scenery'; the technological implementation employed in *The Chaos Engine*, using quantized parameters, only allows flight directly to the stations, or close by¹⁹.

¹⁶ In his article 'More Facts on the Polywave' G. X. Jupiter-Larsen retells a story of a technical malady interrupting one of his weekly radio shows which highlights how both location and time affect the reception of radio static (Jupiter-Larsen, G X, 'More Facts on the Polywave', *TDR*, 40/3 (1996) 163).

¹⁷ The Vinculum VMusic2 MP3 playback module allows access to MP3 and WMA tracks, stored on a connected USB memory stick, via commands sent over a UART or SPI serial interface. More details on the VMusic2 can be found at <http://www.ftdichip.com/Products/Modules/ApplicationModules.htm#vmusic2> (accessed 16/9/10).

¹⁸ The AR1010 FM Receiver Breakout Board provides control of certain radio parameters over a serial interface, and is available at SparkFun Electronics, http://www.sparkfun.com/commerce/product_info.php?products_id=8972 (accessed 16/9/10).

¹⁹ A method of 'driving' between the stations was the original aim for *The Chaos Engine*, and a mechanical implementation was devised. However, the current configuration was finally adopted due to perceived benefits in

Through *The Chaos Engine* a further quality of radio becomes apparent (although it is necessarily present in the other two pieces as well). In contrast to television, the typical mode of radio consumption revolves around listeners staying tuned to the same station and switching on and off around their daily routine²⁰. This is called 'tap listening', and the content of radio is created to account for it, with programmes being open-ended and divided into smaller chunks whose content can be easily repeated over a longer show duration. The benefit of tap listening from an artistic perspective is that it provides a convenient interface for radio's integration into larger artistic works.

Voice and Vehicle: *Travelling*²¹

The final work of this suite is *Travelling*, a video piece for 5.1 speaker setup. It strives to go further than both *Synth Radio* and *The Chaos Engine* in uncovering some of the qualities of radio by using a fixed video element and live radio part.

Travelling continues the fixed/indeterminate materials paradigm utilised previously – this time the fixed material is comprised of the video element with its originally captured diegetic sound. The video shows a short in-vehicle road journey from the viewpoint of the rear seats looking out toward the direction of travel, and consists of a single shot, framing both the driver and the vehicle's stereo sound system. The intention was to inject a live radio stream into this shot in a diegetic manner, this being manifested in two ways: firstly the stream would be spatially located within the vehicle through audio processing; secondly the radio's physical presence in the vehicle is referred to through a number of physical gestures recorded into the video – in this case the driver pressing buttons on the sound system – which are then used to manipulate radio stream parameters at run-time.

The video and its sound track are played back directly from a Nuendo project which contains a track with messages to control a custom-built radio that responds to MIDI²². The radio is synchronised to the in-video gestures through this track – during the journey the driver's gestures are mapped to alter radio volume and station, with the radio output being run back into Nuendo for placement processing. By doing this *Travelling* seeks a link between the 'voice' of radio, and the radio as 'vehicle'. In trying to attain this link a number of radio's qualities are encountered.

Two significant qualities not yet discussed concern how the radio medium can both bring people together in a virtual community and, at the same time, create an intimate channel between a listener and a programme presenter. Both of these stem from the contraction of space and time that has been attributed to electronic media, highlighted by Marshall McLuhan with his idea of the 'Global Village'²³. Being disseminated via broadcast a radio station provides a perpetual event as locus for the establishment of a community, linking its members through

building the piece and maintaining reliability during its life. Also the chosen configuration better reflects that of a theoretical mass-production version of the piece.

²⁰ Crisell, *op. cit.*, 215; Hendy, *op. cit.*, 130.

²¹ More details on *Travelling* may be found at <http://research.adamjansch.co.uk/works/travelling/>.

²² The electronic implementation for *Travelling* consists of an AR1010 radio receiver module connected over a serial link to an Arduino-based microcontroller, which handles the translation of MIDI input messages to commands sent to the radio.

²³ McLuhan, Marshall, *Understanding Media: The Extensions of Man* (London, 2001).

"gossamer connections"²⁴; at the same time radio presenters are able to gain direct access to the fundamentally private spaces of our lives – in particular our homes and work places – and forge intimate, though one-way, relationships with audiences. Radio is used by some to counteract loneliness and fill domestic and social voids, allowing a limited but less risky link to a society in which they are unable or unwilling to partake fully²⁵. *Travelling* takes a simpler approach to present these qualities, focussing on the isolation of a lone motorist on the road and radio's role as companion in this scenario.

Another function for live radio in *Travelling* was as the basis for an experiment in retemporalisation: I was interested to see if radio's reference to the present, as discussed above, could overwrite the more ambiguous temporal reference inherent in the video. In other words, would integrating live radio with the fixed video change a viewer's perception of the video's grammatical tense? The answer, with the piece having had just one public airing, is as of yet unknown.

Tap listening also plays its part in connection with radio's perceived status as a secondary medium, a term used to describe a medium's ability to function in the background and be experienced alongside other activities. Crisell²⁶ and Tacchi²⁷ both describe how a listener naturally foregrounds or backgrounds radio, zoning in and out depending on the relevancy of the content. In *Travelling*, radio's status as a secondary medium is depicted both visually through the film and technically through its implementation within the piece.

Finally, an extension to the geographical automation referred to with *Synth Radio: Travelling*, by moving through the radio space, is able to represent the regional geographic layer as well as the national one, as there is every possibility of tuning in to county or town-level radio stations.

Issues

Despite the artistic potential of integrating live radio into live electronic works there are some problems to be faced, the most obvious of which I will detail below.

As alluded to whilst discussing *Travelling*, there is an issue with airing an open outcome piece just once: that an audience may not necessarily know that the piece is meant to sound different between playings²⁸. This is exacerbated when audience members are given no performative cues: the piece could easily be misconstrued as being just a recording. This issue constitutes a whole separate topic of research, one which I hope to take up in a future article.

Furthermore, an artist using such material is at the mercy of whatever content can be received at the time of playback. To filter the radio stream other than by time of day or/and selected

²⁴ Douglas, Susan J., *Listening in: Radio and the American Imagination* (Minneapolis, 2004) 22.

²⁵ Hendy, *op. cit.*, 128-129; Tacchi, *op. cit.*, 241-257.

²⁶ Crisell, *op. cit.*, 219-220.

²⁷ Tacchi, *op. cit.*, 250-251.

²⁸ Informing an audience of this feature in a programme note or pre-airing talk may or may not alleviate the issue. Stockhausen may offer a solution where, at the end of the performing directions in the score for *Klavierstück XI*, he writes "This Piano Piece should if possible be performed twice or more in the course of a programme" (Stockhausen, Karlheinz, *Klavierstück XI* (London, 1957)).

station would require a significant jump in the complexity required to monitor the stream, and even that may not cancel out material that could be interpreted as being morally questionable to re-present in an art work (coverage of natural disasters for example) – in other words, for an artist to use radio in this way they must be comfortable with accepting any possible sonic outcome.

The next two issues concern the deployment of works of this nature: their reliance on a distribution infrastructure and how they are viewed in regards to copyright. On the former issue it is clear that no suitable infrastructure exists for the mass-dissemination of such pieces, and the development of such a platform would involve the design and manufacture of proprietary playback hardware that would have to rival already established platforms. On the subject of copyright it can be safely assumed that should music utilising broadcast radio material become popular in the market there would be questions raised of said music's legality in the face of copyright law.

However, the significance of these issues pales in comparison to that which may herald the end of publicly accessible analogue radio. Despite the ubiquitous technological legacy of analogue radio and the tepid market response to digital radio, the so-called digital switchover in the UK has been targeted for 2015²⁹, meaning that such radio pieces are faced with becoming conceptually obsolete within the next five years³⁰. The boundaries of digital radio are fundamentally different to those of analogue radio: there is no 'ether world', no 'scenery', no static. All stations will become hermetically sealed within digital multiplexes, with the analogue receivers left outside to a deserted wasteland of static, and the possible rogue transmissions of pirates. The future of radio works, then, appears to lie in a digital world.

Conclusion

The works discussed above are tentative steps towards the integration of live radio as material into automated live electronic works. Obviously a great deal would have to be undertaken, in particular towards the implementation of suitable dissemination technology and within the infrastructure of music distribution, for such works to be viable on a mass scale.

However, considering the seemingly imminent destruction of the current analogue radio habitat any theoretical infrastructure should be predicated on more secure radiophonic media. I hope that the three works presented here, however short-lived they turn out to be, go some way to clarifying the features that live radio material can bring to an art work, with the further hope that this article, rather than being undermined by unavoidable circumstances, might provide information relevant to the extended artistic use of any new radiophonic media.

²⁹ n.a., 'Peers Warn of Backlash Fears Over Digital Radio', *BBC News* (29 Mar 2010). <http://news.bbc.co.uk/1/hi/entertainment/8591942.stm> (accessed 3 May 2010).

³⁰ The degree of obsolescence depends on the exact function of radio within a given piece, and whether a piece could be converted to operate with a replacement radio source – for example *Synth Radio* could be revamped to use digital or Internet radio.

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