
Phil Legard
Tonality Systems
Wakefield ArtsMill
Bridge Street
Wakefield
WF1 5JR
United Kingdom
tonality-systems@netmatters.co.uk

Re-conceptualizing Performance with 'Active' Notation

Nigel Morgan
Interdisciplinary Centre for Computer Music Research
University of Plymouth
Drake Circus, 206 Smeaton Building
Plymouth,
Devon
PL4 8AA
United Kingdom
n.morgan@netmatters.co.uk

Abstract

Common Music Notation (CMN) remains a necessary symbolic language for composers to communicate their intentions to performers. Improvisation, the addition and interaction of digital media, and the use of open-form non-linear structuring, challenge soloists and ensembles to find solutions to the organization of notated material and the ubiquitous 'page-turn'. Digital score processing and high-resolution display formats appear to bring ever closer the possibility of dispensing altogether with paper-based scores in performance situations.

This paper describes a re-conceptualization of the conditions surrounding performance with composed and notated scores. A composition for soloist is discussed in which an 'active' CMN score is digitally rendered in a time-based visual and audio format. The composition exploits a number of active components: generative algorithms to initiate open-form structural organization of notated material with embedded electroacoustic sounds; the initiation of

live recording, processing and playback of the soloist; the playful animation and transformation of graphic elements contained within a CMN score. Such components offer novel visual and audio stimuli to a performance practice lying between interpretation and improvisation and the construction of a more fluid and dynamic continuum between what the composer writes and what the performer plays.

Continuum with Blues (homage á György Ligeti) for electric guitar with 'active' notation system has been written for the American guitarist Alan Thomas. This is a prelude and companion piece to a large-scale 'recital' and DVD composition for soloist and ensemble with 'active' digital media based on the open-form graphic novel *Facts of Life* by Pippo Lionni with a specially commissioned text by Margaret Morgan.

Background

One of the least aesthetically pleasing aspects of attending a concert performance of new music is watching a musician wrestle with turning pages.

Those instruments that need never pause for breath and occupy both hands are particularly prone to this difficulty. And if it's not page turning that's the problem there's the oft-preferred alternative, that long row of music stands the performer attempts to move between . . .

I was in the early stages of composing a work for solo guitar when I heard a radio announcer introduce a performance of Ligeti's *Violin Concerto*. He told his audience that the soloist was using a computer display instead of a music stand, turning the pages with a foot-switch. What an elegant solution to such a perennial difficulty. This sparked off in my imagination another step in a personal journey to make the musical score more dynamic and richer in interpretative potential for the performer.

I began to wonder if the score on a computer-display might include 'active' elements. Displays, that whilst being based on notated material, might have the wherewithal to do other things: reorganize the musical structure of phrases and sections; offer different visual interpretations of musical parameters; even animate elements of graphic notations.

Even further possibilities were imagined, particularly as novel solutions to the difficulties musicians often face in performing with interactive systems that rely on score-following devices. The computer screen display of a score could also show markers for executing the playback of sonic objects, initiate on-board synthesis, record and play-back moments of performance, or provide selective real-time processing of the performer's instrument or voice. It appeared to turn ways of achieving such

things on their respective heads . . . and so the concept of Active Notation was born.

Of course many of the possibilities described here were already tried and tested. The hardware technology exists in the E-Stand, a laptop on a stand whose display acts as scanner, page-display and note-pad: the result of a research project initiated by Apple and University of Vancouver (Graefe, Wahila, Maguire, Dasna 1996). Andrew Brown of Queensland University Australia has experimented with networked computer-displays fed from a server driving 'client' parts for a small ensemble using his Java-based music display language JMusic (Brown 2005). On-going at the Sonic Arts Research Centre (SARC) at Queen's University Belfast Michael Alcorn's *Escore* responds to a performer's improvised performance to deliver live algorithmically-generated score material as the basis for his string quartet *Leave No Trace* (Alcorn, McClland 2005) That said, none of these solutions seemed to offer the full range of possibilities I felt such a system needed for soloist and ensemble performance alike. The E-Stand is seriously expensive, Brown's system whilst very efficient is geared to a single composition, SARC's *Escore* looks very promising but is currently confined to a Lutoslawskian view of music notation.

Active Notation

The Active Notation System is designed to allow musicians to make use of their own laptop computers as the basis for digital music stands. Imagine a computer screen split horizontally into two windows, top and bottom. Here fragments of musical score will appear for the duration of the piece (see Fig. 1, below).



Fig 1. Default display.



Fig 2. Illustration of lower sub-section fading in

In the middle of the screen is the title of the current movement and a timer bar. Each window is capable displaying a small collection of bars of music notation. Such a display is called a sub-section (usually a collection of phrases). At the start of a score the first musical sub-section will always appear in the top window. The timer image-bar will then decrease in size according to the duration of the sub-section. This is defined by the tempo and beat length of the sub-section. While this occurs the next sub-section fades in on the lower screen window. Once this sub-section has fully appeared and the timer expired, a new fragment will begin fading in on the window at the top of the screen. This process will repeat until the end of the movement (see fig 2, above).

This relatively simple notion has been extended to explore ideas of open-form composition and performance. Through an algorithmic process or a pre-defined play-list, the computer can control the sequence of sub-section displays. This means that a movement or section of a composition can be viewed more as a field of content from which new orders and relationships can be made, rather than a linear journey through the score. In addition to this feature, the parametric

content of each individual sub-section display may be reinterpreted in new and different combinations.

To imagine this unique feature of the 'active system' the composer is assumed to have composed a score in common music notation using standard pitch and metrical symbols, if only as initial reference and practice material for the performer. This notation is translated by the active system into a format that allows for the individual data coding of the parameters of pitch, rhythm, beaming, articulation, and note-size (to display dynamics proportionally). What this means in practice is as follows.

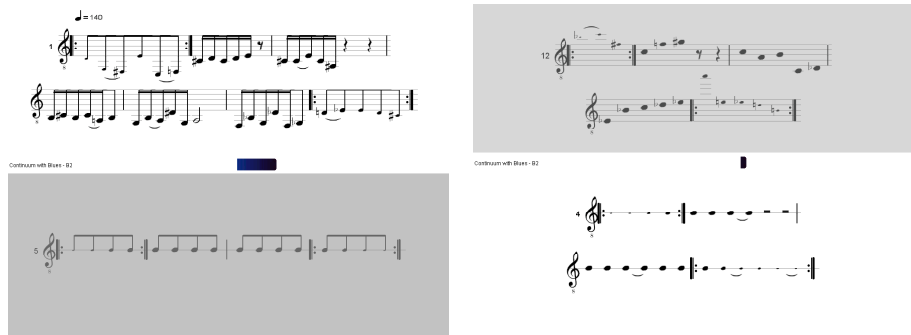
The display of a sub-section may be set up to appear solely as rhythmic units, solely as pitches, or as a un-tuned percussion-style stave displaying note heads in proportional notation to emphasize dynamics and accents. Any combination of these parametric abstractions is also possible. For example pitch and dynamics may be shown without rhythm. Such displays invite the performer to extend his or her relationship with the music in a truly dynamic way, through aspects of improvisation and the devising of new material (see fig 3, below). Currently

displays can also be accompanied by sound samples. There is an intention in the near future to enable Open Sound Control (OSC) commands to initiate real-time digital synthesis or processing from synthesis engines such as

SuperCollider or PD. These sonic interventions can also act as triggers or flags for particular sub-section combinations as well as accompaniment or textural material to underscore a musician's performance.



Fig 3. Some possible parametric differences in notation display



Video example 1 – excerpt from section B2 showing the active computer display in action

Continuum with Blues

The Active System described up to this point is the one featured in *Continuum with Blues* for electric guitar and active notation system (Tonality Systems Press 2006). This is a single movement work lasting about 12 minutes. It has been

composed using the Lisp language within the *Symbolic Composer* environment, an application that compiles text-files directly into the MIDI file protocol (Morgan, Podrazik, Tolonen 2007). This Midi-file output can be used to audition the score, even modelling a performance with algorithmically-generated

articulation and expression. Sound example 1 plays an excerpt from the

Symbolic Composer-generated simulation of *Continuum with Blues*:

◀ *Sound example 1- from section B of Continuum*

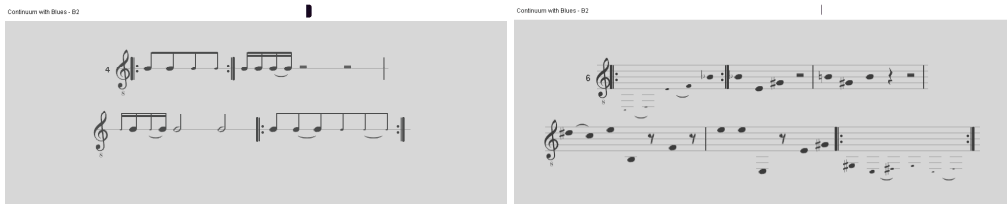
The text-file that when compiled produced this simulated example can be setup to write to a midi-file with a flat articulation i.e., duration-perfect note-lengths. This allows instant and highly-accurate translation into common music notation via a commercial score-writer.

There is a real advantage in engaging the computer to aid the composition of a work featuring open-form thinking. Radical algorithmic ‘play’ of structure and parametric content can be re-auditioned in a matter of seconds and repeated until an appropriate ‘rightness’ for the composer – or indeed the performer- has been achieved (Dixon and Morgan 1996).

Continuum with Blues joins two earlier works as a further experiment in developing new conditions for the

expression of virtuosity in music for solo performance. In *Compass* (Tonality Systems Press 2000) a pianist enters into a dialogue with the composer’s own MAX-based interactive computer system triggering accompanying sounds and textures kept under control by the use of a special foot-pedal. In *Interactions* (Tonality Systems Press 1999) Robert Rowe’s *Cypher* (Rowe 1993) is used to listen and respond to the keyboard actions of the soloist (Morgan, Osuga 2000).

Continuum with Blues dispenses with the need for any complex machine listening, parsing and analysing. Here the notation of the work becomes ‘active’ by a unique form of presentation on a laptop computer’s visual display, and with no external devices needed by the performer to control the system.



Video example 2 – excerpt from section B2 showing the active computer display along side a simulation of the guitar performance

Active Notation in a Networked Ensemble

The next stage in developing the Active System has been to make it useable by more than one performer. This has meant developing a network implementation of its design where an ensemble using ‘client’ laptop displays may be led by a ‘server’ conductor. Rather than compose a new work specifically for this trial it was decided to use *Self-Portrait* (2002), a work for variable ensemble of seven (or more) players written for musicians from the BBC National Orchestra of Wales. *Self-Portrait* is composed in a series of 4 ‘panels’ after the fashion of Franco Donatoni.

Donatoni used open-form structuring of material in the preparation of much of his work, but made final decisions about order and repetition only when the moment came to write the full-score. He would, for example compose a work (such as his String Quartet) beginning at the central moment of the score and write material outwards from that point, often rearranging the sequence of sections of the outward material as he went along.

In this spirit a new version for networked ensemble of *Self-Portrait* was made. It enables a conductor (or one of the performers) to control (live or via a playlist) not only the sequence of ‘panels’, but the addition of repeats within each panel, and all page-turns. This is complemented by a web-based application (Legard 2005) that enables performers to structure and audition a simulated performance. With this in place it will only be a small step to bring the Active System alongside the network

protocols required for ensemble performance. This will be the objective in the composition *Facts of Life*.

Coda

Finding a digital solution to the page-turn plays a small, though necessary, part in enabling the composer to engage in a very particular approach to the handling of form and content. This approach has come to be known as ‘open-form’ through its presentation in one of the major treatises of modern aesthetics (Eco 1962). More than twenty years after its original appearance in Italian, *The Open Work* by Umberto Eco remains significant for its powerful concept of “openness” - the artist’s decision to leave arrangements of some constituents of a work to the public or to chance – and for its striking anticipation of two major themes of contemporary literary theory: the element of multiplicity and plurality in art, and the insistence on literary response as an interactive response between reader and text’ (Bondanella 2005). Eco discusses musical instances of open-form composition in some detail. His focus is on music of the sixties by Stockhausen, Boulez, Maderna and, most significantly for this study, Henri Pousseur. The recent Scambi AHRB-funded research project (Ayrey, Dack, Decroupet 2004) has done much to highlight the value that the role of the computer may now have in realizing and modeling open-form work. To have access to a system that gets around the prodigious difficulties composers once faced in applying open-form thinking to instrumental and vocal performance may encourage a livelier and more dynamic linkage between composer and performer. Pousseur observed that ‘the

poetics of the “open” work tends to encourage ‘acts of conscious freedom’ ... and places (the performer) at the focal point of a network of limitless inter-relations, among which he chooses to set up his own form without being influenced by an external *necessity* which definitely prescribes the organisation of the work in hand’ (Eco 1967 quoting Pousseur 1958).

References

- Alcorn, M. McClland, C. (2005) *Escore – Real-time Notation in Interactive and Live Electronic Performance Environments*. Proceedings of the Live Algorithms Group seminars December 2005.
- Ayrey, C. Dack, J., Decroupet, P. (2004) *The Scambi Project* AHRB- funded research project, Middlesex University (www.scambi.mdx.ac.uk)
- Bondanella, P. (2005) *Umberto Eco and the Open Text*. Harvard University Press.
- Brown, A. R. (2005) *Generative Music in Live Performance*. Australasian Computer Music Conference, Brisbane: ACMA, pp. 23-26.
- Dixon, J. Morgan, N. (1996) *Getting Your Hands on the Music*. Proceedings of Bretton Hall Conference Leaving the 20C (Available with music examples on www.nigel-morgan.co.uk)
- Eco, U. (1962). *Opera aperta* (English edition- 1989) Harvard University Press
- Graefe, C., Wahila, D., Maguire, J. Dasna, O. (1996) “*Designing the muse: A digital music stand for the symphonic musician*” paper presented to the CHI 96, Vancouver: ACM/SIGCHI.
- Pousseur, H. (1958) *La nuovo sensibilita musicale*, Incontri musicali 2 (May 1958): 25
- Legard, P. (2006) *The Active Notation Manual*. Wakefield. Tonality Systems Press.
- Legard, P. (2005) *Self-Portrait (2002) web application*. Wakefield: Tonality Systems Press.
- Morgan, N. (2000) *Compass* for keyboard and interactive system. Wakefield: Tonality Systems Press.
- Morgan, N. Osuga, N. (2000) *Towards a Constraint-based System for Interactive Performance and Recording*. The National Arts Education Archive Occasional Papers Volume 9.
- Morgan, N (1999) *Interactions* for piano (left-hand) and interactive system, Wakefield: Tonality Systems Press.
- Morgan, N. (2006) *Continuum with Blues* for guitar and active notation system. Wakefield: Tonality Systems Press.
- Morgan, N. (2006) *Self-Portrait (2002)* version for networked ensemble of 7 or more players. Wakefield: Tonality Systems Press.

Morgan, N., Podrazik, J., Tolonen, P.
(2007) *Symbolic Composer*,
Venice: Tonality Systems

Rowe, R. (1993) *Interactive Music
Systems*, Cambridge, MA: MIT
Press.