Interactive strategies for analysing musical structure

Amanda Bayley
Department of Music, University of Wolverhampton, UK
a.bayley@wlv.ac.uk

Michael Clarke
Department of Music, University of Huddersfield, UK
j.m.clarke@hud.ac.uk - http://www.hud.ac.uk/mh/music_technology/research/john-michael-clarke.php

Proceedings of the fourth Conference on Interdisciplinary Musicology (CIM08)
Thessaloniki, Greece, 3-6 July 2008, http://web.auth.gr/cim08/

Background in music analysis. Music analysts traditionally take the score as their subject matter but have more recently begun studying music 'as performance', as outlined in Nicholas Cook's 2001 article, 'Between Process and Product: Music and/as Performance'. This development poses new challenges for analysts exploring alternative texts to the notated score. An ethnographic approach exemplifies and develops Cook's recommendation to bring more voices into play than has been the case for traditional music-analytical approaches (E. Clarke *et al*. 2005: 46-47). Involving the composer and performer in analysis brings fresh insight into Ian Bent's observation that the 'analyst's ultimate concern is with the place of a musical structure within the totality of musical structures' (Bent, 1987: 2).

Background in music technology. Music Technologists work with software to manipulate sound. Increasingly, with the growing interest in multi-media work, visual elements are also transformed using such software. Programming languages such as Cycling 74's Max/MSP (developed from a programme designed at IRCAM by Miller Puckette) provide a versatile and powerful means of constructing software that can present and manipulate sound recordings, video, text and still images in a structured environment. Not only can such software be constructed for creative performance situations but also to create interactive multimedia pedagogical software. One of the authors (Clarke) has also used such techniques to develop an 'interactive aural' approach to the analysis of electroacoustic music (where a sound recording rather than a score is often the only or main trace left by the composer).

Aims. Composer-performer interactions that took place during the rehearsal of Michael Finnissy's Second String Quartet (written especially for the Kreutzer Quartet in 2007), help to establish a network of relationships between different layers of the musical structure. By adapting the techniques and methodologies that Clarke has developed for analyzing electroacoustic music the aim is to provide an informative, educational tool for navigating through the different musical parameters of the piece.

Main contribution The fact that Finnissy has only provided individual parts for his Second Quartet, and not a full score, invites the structure of the piece to be considered from a new perspective. From a variety of primary source material documenting the creative and interpretative processes, this paper explores the interface between performative, analytical and aural approaches to musical structure. The software that Clarke has developed for electroacoustic music enables the 'reader' to interact with the work as *sound*. This 'interactive aural' approach will be expanded for Finnissy's piece to accommodate the variety of written, aural and visual media that the piece has generated. The approach applied to these materials will enable the reader to engage with them in an integrated and creative manner in exploring the structure of this music.

Implications for musical practice. The available technology has not yet fulfilled its potential for supplementing more traditional methodologies. The software developed for this project will help to promote multimedia techniques for music analysis more broadly and will enable the work of other composers and performers to be disseminated in ways that will further enhance our understanding of creative processes by actively involving the reader in the analytical process.

Implications for musicological interdisciplinarity. In recent years music analysis has broadened to take into account music as it sounds, as it is performed. By bringing together expertise developed in the areas of musicology and music technology techniques and approaches can be developed to enable the aural aspect of analysis to be brought into the analysis and presentation of music.

Analytical work is traditionally text-based, the notated score being its main focus, sometimes supplemented by other forms of written texts. The analysis itself is usually written and follows a fixed linear trajectory. The nature of the piece being considered for analysis here and the analytical method taken by Bayley demand a broader, creative approach: the work itself does not have a complete score; rather it is in the form of a set of parts. The analytical approach embraces materials in non-written form: recordings of the rehearsal of the piece, interviews with the composer, recordings of

three public performances, and reflection on all these processes by composer and performers. The presentation of the analysis therefore requires that written text, the instrumental parts, and audio and video recordings (music and speech) be presented in an integrated manner. Clarke has used software to present analyses of electroacoustic music in which somewhat similar issues arise. This paper presents the co-authors' investigations of the possibility of adapting Clarke's Interactive Aural Analysis approach to the context of Bayley's analysis of Finnissy's Second String Quartet. Not only is the intention to present materials in different media in a coherent and integrated manner, but also to enable readers to navigate flexibly through these materials rather than on a fixed linear path but nonetheless in a structured and meaningful way.

An ethnographic approach to analysis

Cook has explained how 'creativity … has always been present in the performance culture of Western "art" music, but has long been repressed by the text-dominated discourses of musicology' (2003:210). This paper places 'creativity' in the foreground of music analysis. The different activities of composition, performance and analysis that are often considered separately are now brought together to inform each other and to contribute to the analysis of musical structure. The precedent for an ethnographic approach to contemporary music is the collaborative research undertaken by Eric Clarke, Nicholas Cook, the composer Bryn Harrison and pianist Philip Thomas: their investigation considers the processes of interpretation and performance from several points of view – creative, practical, analytical and psychological – presenting 'experience as a conversation within which learning is located' while at the same time allowing participants to articulate their own stories.

In the context of an ensemble, Bayley's ethnographic project on Finnissy's Quartet examines all aspects of the creative process, from the original conception of the piece to an evaluation of multiple performances and subsequent reflection of interpretative processes by composer and performers. A multimedia interactive approach to the analysis of musical structure allows different musical parameters to be traced through various stages of development. Aural analysis supplements visual analysis; it reaches beyond the notation as primary text and encourages interaction between multiple texts:

Creative processes	**Form of documentation**	**Date**
Compositional sketches	written	2006-2007
Interviews with the composer:		
pre-compositional	audio	10 July 2006
pre-rehearsal	audio	4 Feb 2007
post-performances	audio	26 July 2007
Rehearsal with the composer	audio	4 Feb 2007
Performances		
First public performance	video	13 Feb 2007
Second public performance	audio	8 Mar 2007
Third public performance	video	23 Mar 2007
Reflection		
Interactive discussion between composer and performers	video	23 Mar 2007
Questionnaire responses from performers	written	March 2007

Focusing on specific parameters shows how a passage can evolve over time (both within the short space of time of a rehearsal and in relation to different performances). Issues

that emerge during rehearsal and performance can be considered within different and evolving contexts of musical structure.

Background to the software

Clarke's Interactive Aural Software is built within the Sybil environment itself constructed using Max/MSP. Sybil (Synthesis by Interactive Learning) was originally developed at the University of Huddersfield as a pedagogic tool for the teaching of sound synthesis and processing techniques (M. Clarke *et al.* 2003). It provides a method of integrating textual material with interactive demonstrations of synthesis techniques in which sounds are manipulated in real time by the computer and can be transformed by the user. The Sybil environment provides a means of structuring such materials into pages and sections within a module and a navigation tool is built into the software to enable users to work there way around a module. Sybil was later expanded by Clarke to incorporate the possibility of playing back and manipulating CD tracks for the purpose of analysing (electroacoustic) music. Its first use was in the analysis of *Mortos Plango Vivos Voco* by Jonathan Harvey. As in many fixed media ('tape') electroacoustic works there is no score and the primary trace left by the composer is the sound. The software enables readers to engage with this audio record directly alongside written text and to reference precise passages and perhaps compare passages in different parts of the work. An aural paradigmatic analytical chart provides both a means of tracing the evolution of particular aspects of the material and of orienting oneself to the structure of the music. Being constructed within Max/MSP, a widely used program for sound synthesis and processing, the software also enables the analyst to reconstruct the processes created in the work and provide the user with the opportunity to become familiar with the alternatives facing the composer, so depending their understanding of the significance of the actual choices made.

The current project adapts this software and the interactive aural approach to the context of the analysis of Finnissy's Second String Quartet. Here the integration of text with audio material is extended to incorporate video recordings of interviews, rehearsal and performances. The Max/MSP software has a video extension 'Jitter' and so the possibility of extending Sybil to include the use of video is a natural step. It is also possible to incorporate static images (e.g. pages from the score) and to change these automatically (for example, in time with the music). Sound synthesis and processing is not significant in this context in the way that it is for analysing electroacoustic music. Other important work in this area is being carried out by Nicolas Donin for example in the 'signed listening' project which also seeks to integrate analytical materials with aural experience (Donin 2004).

Examples

The project is in progress and the following are examples of the ways in which the software is being used to integrate different types of material:

1. Explanatory text coordinated with audio clips from rehearsal, audio and video from performances of the work, discussions and explanation as part of the reflective process, and pages from the score. The user has the opportunity to select his/her own path through the material.

2. The score consists of four parts: there is no overall score. This page allows the user to select one of the four parts and then follow that part (with automatic page turns) as the audio recording is being played. It is possible to swap between parts while following the performance.

3. Comparing performances. It is possible to select a page of one of the parts and then choose which of the three different recordings available will be heard. Different versions can be heard in quick succession so that comparisons can easily be made.

4. Audio recordings of interviews with the composer and extracts from the written responses of the performers are related to issues arising in rehearsal and performance. At particular moments options appear to cross-reference specific points to the music either in the form of a page

from one of the parts or other textual or graphic information or audio of a performance.

The Appendices to this paper contain screen shots from the software in its developmental stage.

Appendix 1 shows how the user can select a certain passage of the work and then choose to listen to a particular performance while viewing one of the parts (there is no full score for this piece). It is possible to make immediate comparisons between recordings of the same passage and swap between parts instantly.

The screen shot in Appendix 2 shows a number of windows from the software under development illustrating a variety of features. A tree diagram provides a means of navigating through the range of topics relating to the analysis. Each node of the tree diagram is a button which leads to pages in the software relating to that topic. These pages contain information in a variety of media (e.g. text, diagrams, score, audio and video extracts). The other pages in the screen shot show:

a) a diagram of the structure of the work by Bayley with buttons enabling the user to play specific extracts of the music whilst studying the structure;

b) a hand-drawn sketch made by the leader of the quartet in preparing for the first performance;

c) controls allowing playback of video extracts;

d) one of the videos with the composer discussing his work.

Summary

Bayley's approach to the analysis of Finnissy's Second String Quartet uses a number of texts in different media. Bringing this analytical research together with software techniques developed by Clarke in relation to music technology enables these texts to be presented in a coordinated and structured way. The analysis can be seen, heard and read. The software also enables the analysis to be presented flexibly, allowing readers to navigate through the materials along varied yet structured paths. With the increasing recognition of the importance of texts other than the score and of other media in addition to the written page, such alliances and sharing of skills between analysts and music technologists are likely to become increasingly significant in the future.

Acknowledgments. We are grateful to the British Academy larger research grant which has funded the project upon which this paper is based. We are also grateful to members of the Kreutzer Quartet, Peter Sheppard Skærved, Mihailo Trandafilovski, Morgan Goff and Neil Heyde, as well as Michael Finnissy, who have all been generous with their time in providing material for this research.

References

Bent, I., with Drabkin, W. (1987). *The New Grove Handbooks in Music Analysis*. London: Macmillan.

Clarke, E., Cook, N., Harrison, B., and Thomas, P. (2005). 'Interpretation and Performance in Bryn Harrison's *être-temps*', *Musicæ Scientæ* 19/1: 31-74.

Clarke, M. (2006). 'Jonathan Harvey's *Mortuos Plango, Vivos Voco*' in *Analytical Methods of Electroacoustic Music*, M. Simoni (ed.), New York: Routledge.

Clarke, M. (2005). 'An interactive aural approach to the analysis of computer music', *Proceedings of the International Computer Music Conference,* Barcelona.

Clarke, M., Watkins, A., Adkins, M. and Bokowiec, M. (2003). *Sybil* (software package). www.hud.ac.uk/mh/music/sybil

Cook, N. (2003). 'Music as Performance' in *The Cultural Study of Music. A Critical Introduction*, M. Clayton, T. Herbert, and R. Middleton (eds), New York: Routledge.

Cook, N. (April 2001). 'Music and/as Performance: Between Process and Product' in *Music Theory Online* 7/2: 1-31.

Donin, N. (2004). 'Towards organised listening: some aspects of the "Signed Listening" project, IRCAM' in *Organised Sound* 9/1: 99-108.

Appendix 1

COMPARING PERFORMANCES

Choose which SECTION you wish to hear:

Vivace

Choose which PART you wish to view:

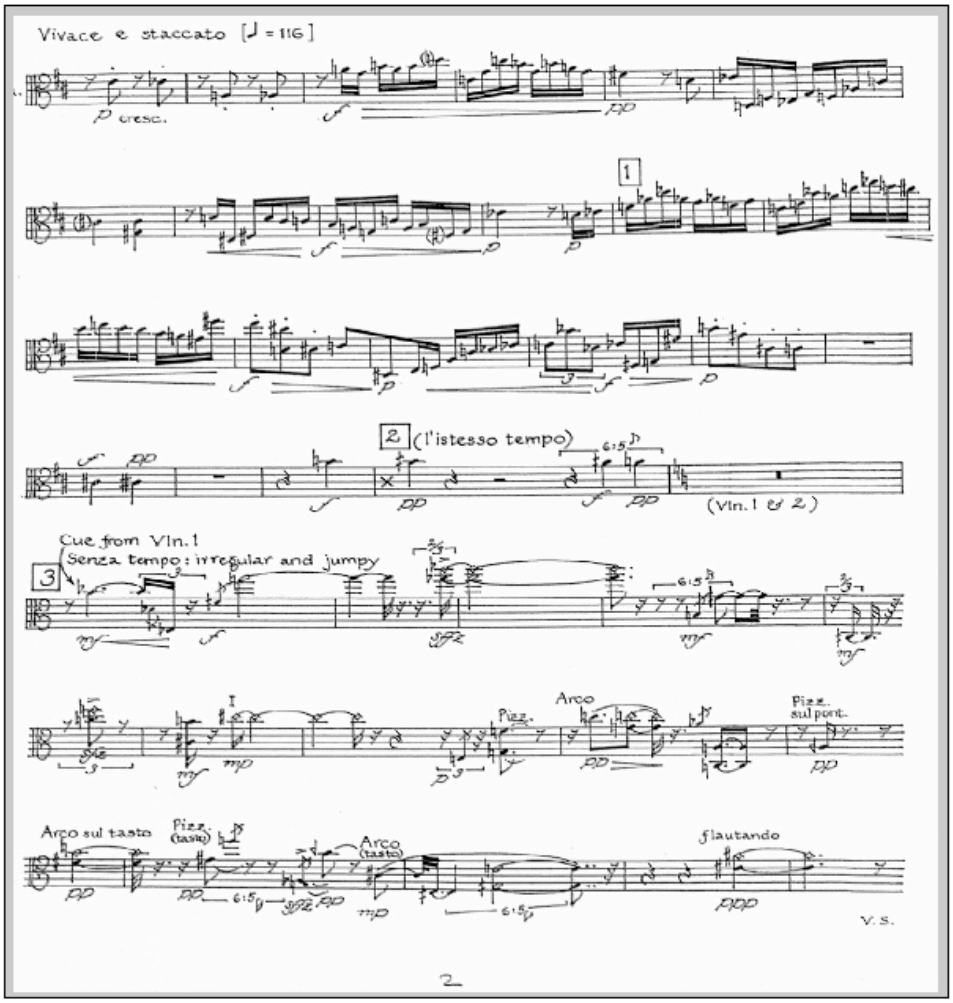
viola

Choose which RECORDING you wish to hear:

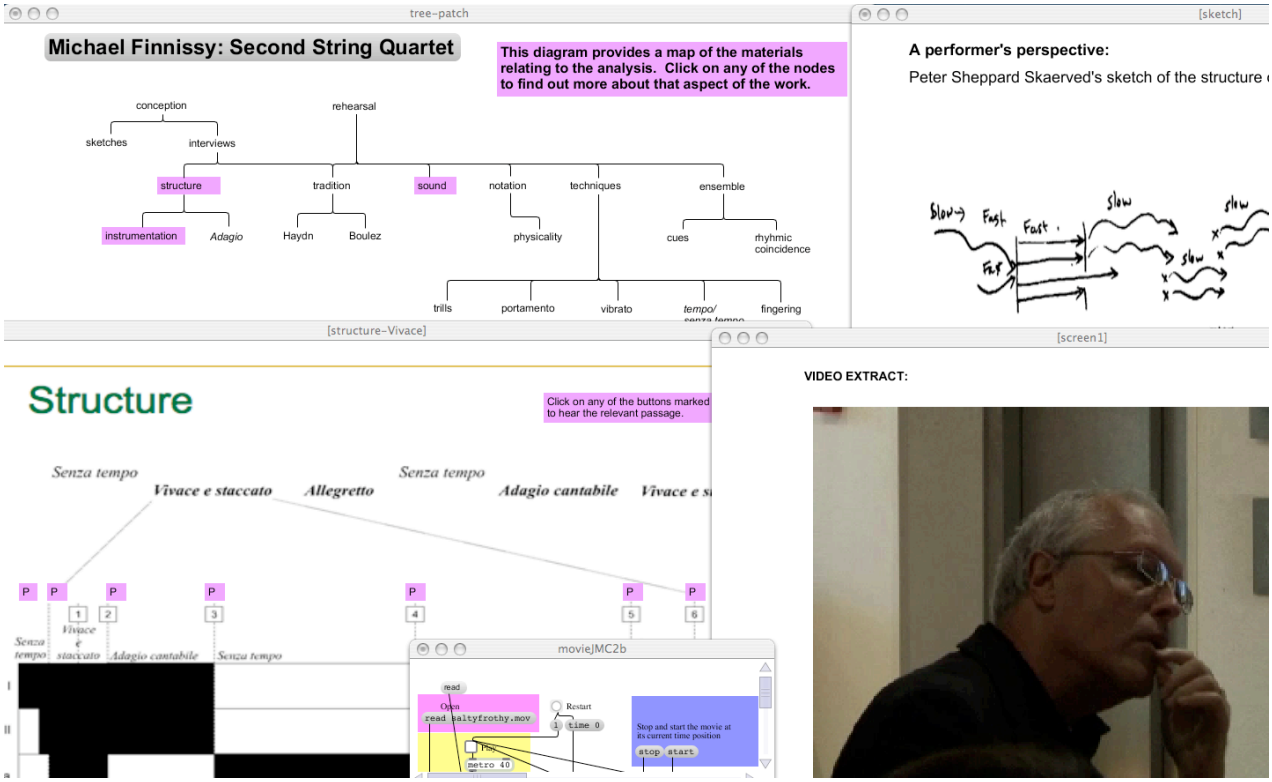
2nd recording

Play/Stop:

Volume:



Appendix 2


tree-patch
Michael Finnissy: Second String Quartet
This diagram provides a map of the materials relating to the analysis. Click on any of the nodes to find out more about that aspect of the work.
conception
rehearsal
sketches
interviews
structure
tradition
sound
notation
techniques
ensemble
instrumentation
Adagio
Haydn
Boulez
physicality
cues
rhyhmic coincidence
trills
portamento
vibrato
tempo/
fingering
[sketch]
A performer's perspective:
Peter Sheppard Skaerved's sketch of the structure
[structure-Vivace]
Structure
Click on any of the buttons marked to hear the relevant passage.
Senza tempo
Vivace e staccato
Allegretto
Senza tempo
Adagio cantabile
[screen1]
VIDEO EXTRACT:
movieJMC2b
read
Open
read haltyfrothy.mov
Restart
time 0
metro 40
Stop and start the movie at its current time position
stop
start