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A New Model of Interpretation and Communication for Ensemble Music-Making.

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Declaration

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

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Examiners: Dr Julian Hellaby and Dr Alice Eldridge

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For Richard

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My family have been a continual support throughout my many years of studying. I would like to thank my parents for their encouragement, care and financial support; without which this study would have been impossible. I owe so much to my all my friends who have helped and enabled me to complete this thesis. I would particularly like to mention Pete and Duran, and of course my dearest Tim and Moo.

Abstract

AIMS

The time constraints that musicians often experience, particularly in ensemble settings, leave little space for reflection on how we interact with a score or for philosophical review or investigation of the rehearsal process itself. A theoretical framework is needed. Research shows that we interact with scores and follow rehearsal conventions largely without thinking about them, these customs being learnt and practiced through rehearsals. Research is therefore required into how instrumentalists, conductors and composers work together, and the results of that work, to enable more effective use of rehearsal time and to allow for a wider creative output. The aim of this thesis is to investigate the interplay between interpretation and communication in ensemble music making, to further research in performance studies and, as a result, offer innovative models that help musicians review how they work collectively. Use of the models should aid musicians to work together more effectively with a deeper consideration of their philosophical approaches and roles when making music.

Earlier musical communication models (Philip Tagg, David Hargreaves et al.) were largely developed around transmitter/receiver models focused on the musical sound, rather than the complex multimodal nature and the multiplicity of communicative channels required by ensemble musicians, with focus having been centred on solo performance to an audience. Investigations into interpretation have largely been philosophical explorations or empirical research on recorded performances (Hellaby, J 2009). Research into ensembles, and the rehearsal process (Clayton, M 2013., Moran, M 2013 , Bayley A 2009), are relatively new and are focused toward a single aspect of music making, either investigation of the communication or analysis of what is being produced but not combining these approaches. Here the approaches are combined providing a rich data set that underpins the novel models.

METHODS

This thesis is focused on realisation of scores in the classical music practices today, detailing two case studies of how an interpretation is negotiated and developed by an ensemble; allowing for

comparisons to be made between the studies. The first case study, in which I perform the role of conductor, explores the role of an orchestra accompanying an opera group through the rehearsal process as well as performances. The second case study, a conservatoire consort, builds on the methodology of the first, providing a more detailed analysis of interpretation and communication of two consecutive rehearsals of the same piece. Analysis is underpinned by my own expertise of working in a group setting as a professional conductor, singer and violist, genre conventions and the context of the roles therein. A novel methodology has been created to combine multiple analytical tools to enable a more holistic view through intensive analysis of the data captured. Ethnographic research techniques, including video and individual microphones are used to capture a series of rehearsals and performances. Grounded Theory is then employed to code video footage and scripts, in order to identify appropriate areas of investigation of communication; the code established in the first case study is then further developed in the second study. Changes in interpretation are analysed using Sonic Visualiser[1], primarily focusing on tempo and entrainment as accurate measurements of the developing realisation as well as analysis through listening to ascertain changes in dynamics, articulation, phrase ending and other musical features.

RESULTS

Findings show that interpretations develop organically, and refine through repetition - they are never finalised, as they are collectively negotiated in real time. Each repetition of the music is unique, as is each musicians' perception, depending on their physical location and their response to changes. Verbal communication primarily provides structure and focus to the rehearsal while ensembles use repetition, reinforced with non-verbal communication to negotiate an interpretation and to problem solve. My research shows that repetition is a more effective tool for arriving at an interpretation than extended discussion about intentions. There is evidence that even in ensembles that are operating within the conventions of obeying the score, musicians do not always achieve this, sometimes intentionally but also unintentionally.

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[1] Sonic Visualiser is an open-source application, developed by Queen Mary University of London, for studying recorded music closely.

Using this data, the thesis presents a musical communication model which is contextually driven and reflects the individual music making experience. This later combined with an interpretation framework which considers philosophical approach, performance conventions, ethical responsibilities, as well as the environmental and technical limitations that the performers operate within. Musicians will be able to use models to reevaluate their place in ensembles and to guide and challenge their work.

ORIGINALITY AND VALUE

The thesis provides new models for musicians and reveals a more detailed understanding of the process of interpretation when realising a score. The new models will encourage musicians to interrogate their philosophical frameworks and enable them to consider ways in which to work together more effectively. Explorations into how musicians operate will help to further inform composers about the process that the score they produce will go through. This is a strong starting point of research to help musicians interrogate what they are doing, encouraging the viewing of ensemble music making through a holistic lens by combining multiple methods of analysis, rather than with a narrow focus as has been the norm previously. My case studies focus on singers and instruments. Marking singers' onsets is a particular challenge when undertaking detailed tempo analysis as the beat does not always match the start of the sound. A method for centring singers onsets on vowel placement has been developed as part of this study to enable tempo analysis and entrainment in a choral setting.

List of Contributions to the Field:

- Communication Model (Context centred and individuated experiences)

This model puts the piece of music at the centre of the communication model where context (physical and genre) encapsulate the individuated human experience. It displays the traditional roles of musician, composer and listener, but argues that these are not mutually exclusive and that performers have to be listeners. It is centred around the rehearsal process and is developed from empirical evidence and developed using Grounded Theory.

- Interpretation Framework (Limitations and philosophical)

This framework builds on the case study evidence that musical interpretation of scores narrows through repetition in the rehearsal process. It outlines the reasons for this narrowing not only due to artistic development, but by considering the limitations, both environmental and technical, and philosophical approach.

- Vocalist Onset Marking Method for Entrainment Analysis ensuring vowel is the onset to allow for beat analysis.

A method for denoting where the beat occurs in singers' onsets has been developed. This is primarily driven by the tradition of placing the vowel on the beat with preceding consonants occurring before the beat.

- Investigation of changes in interpretation in the rehearsal process, and successive performances, of the same group through analysis of audio.

Audio analysis is through both repeated listening to recordings and through the use of the Sonic Visualiser.

- Novel methodology combining approaches bringing together ethnographic research methods of video coding and discourse analysis with musical analysis for holistic investigation into ensemble music making.

- Videos with performer permission granted for analysis and sharing for future research

- Uploaded Data - Zenodo - Videos and analysis files shared for future use in other research projects.

Table of Contents

Introduction

Since the beginning of civilisation, humans have gathered together to share the rhythmic, melodic and harmonic utterances that we call music (Wallin, NJ., et.al. 2000). This social function, which touches every aspect of life, has developed and refined to become a highly complex exchange. This thesis is concerned with the music making of ensembles and the communication that occurs when collectively negotiating a musical sound, particularly in relation to a score.

Music is, by its nature, a practical discipline which is developed and honed through doing. As musicians, our philosophical approaches and processes are largely developed and explored through making music, first of all with teachers and later with other musicians and in-front of audiences. The time pressures that exist in rehearsals, and the overriding focus towards performance, means that our musical choices often remain unchallenged; with conventions and habit taking the fore.

Music Performance as a research field emerged in the middle of the last century and has its roots in neighbouring disciplines such as sociology, psychology, language, computer science as well as, of course, musicology and ethnomusicology. Key theorists in this field include: John Rink (1995)(2002, Amanda Bailey (2013), Martin Clayton (2013), Nicki Moran (2013) and David Hargreaves, Karen Littleton, Raymond MacDonald and Neil Mercer (2005)(2012).

Music performance is a developing field which requires more research that can be used to increase our understanding of how musicians operate, in both solo and ensemble settings, to produce output, in the form of debate and models, that can be utilised by musicians to improve how they work and to help enable a wider artistic freedom.

Musicians should investigate how they are working together and the results that this has. This will enable more artistic freedom and help to make the most of rehearsal time; which is often pressured. It is therefore the aim of this thesis to investigate the communication that occurs in ensemble music-making and to measure, through analytical methods, how the music produced

changes. My focus is the classical score-based tradition. Realisation of notation is a central pillar of the western music art object. Many processes and conventions surround this process which take sustained commitment to master. There are many writings about notation and the process of realising scores, as well as philosophical explorations on what constitutes the musical object and its interpretation. What is needed are empirical studies which explore score realisation using ethnographic methods to deliver a more detailed approach that reflects realistically upon our own experiences as musicians.

Musicians in the classical tradition tend to realise and interpret scores. Current research into this process is growing, particularly in the field of Artificial Intelligence and through ethnomusicological studies. However, these studies are either based on codification of musical meaning or on isolating a particular mode or aspect of communication between musicians. This project developed research methods to look at how musicians interpreting music together use communication to realise a notated work. This will then permit the development of a new communication model and an interpretative framework that can be utilised by musicians to help them develop a deeper understanding of their practice as well as challenge existing approaches to realising scores.

The aim of the thesis is to further understanding of the role of ensemble musicians with the intention to underpin both my own professional work as a conductor and to challenge and inform other musicians that use the new model. It also aims to further research in the field of performance studies combining methods to enable holistic ethnographic study. It will develop an innovative model of communication and interpretation that moves beyond previous models representing the complex processes that occur in ensemble music-making ensuring that all elements are based in ethnographic research. The new model should help to enable musicians that realise scores to challenge their practice by considering the creative role of the musician leading to wider artistic freedom.

This chapter will provide a review of the current approaches to music research on musical communication and critically consider current models of musical communication. The following chapter will explore the parameters of a work of music and the philosophical considerations

implicit in working with scores by exploring the debate on interpretation. The third chapter will outline the methodological approaches to be employed in this project's empirical research, from which two case studies will be undertaken. The first case study will examine the role of an orchestra accompanying an opera group by analysing rehearsals and successive performances. The second case study will provide a more detailed analysis of the consecutive rehearsals of one piece by a conservatoire consort. The findings from these case studies and the discussions from the literature in the earlier chapters will then be brought together in the final chapter where a new model of musical communication will be presented alongside a philosophical framework.

Verbal communication

Simultaneously communicating in many different ways is an essential skill of an ensemble performer. Arriving at a collective sound is a complex activity, requiring negotiation. Musicians working in groups have to engage in discourse, read physical gestures and have awareness of stylistic nuances, entrainment and group dynamics. Listening is vital in a successful ensemble. It will consider, in detail, the varying approaches towards studying musical communication. It will consider current studies of verbal communication, non-verbal communication and entrainment to enable a critical engagement with the research in the field of performance studies.

In performance studies consideration of verbal communication is relatively sparse. This is due to an overriding focus on cognition, instrument technique, performer to audience relationships and undoubtedly the fact that verbal communication is non-existent, or at least limited, in performing contexts. Naturally, musical investigations into verbal communication have centred around the rehearsal process.

Discourse analysis is directed towards identifying rules that transcend the simple structures. In music studies it is has been used to study improvisation in band rehearsals (Littleton, K and Mercer, N 2012) and to support research into an ensemble's relationship with a composer (Bayley, A 2011). Many studies use discourse analysis as a secondary tool in researching meaning of gesture and embodiment (Clayton 2013., Godoy 2010). There is a body of interdisciplinary research which is concerned with investigating the social structures of ensembles, using

discourse analysis to examine and theorise system dynamics and leadership merging with the sociological research into group dynamics (Rink, J 2002., Hargreaves et al. 2005). There is an absence of research addressing the musical intentions of performers in rehearsals through discourse analysis. The analysis of discourse is yet to be used alongside musicological analytical techniques which means that we have had a less holistic picture of music-making that we could have had. This is a gap in the field of performance studies which this project aims to address.

Discourse analysis began with research into verbal communication. The most recent developments have been in the fields of sociology, linguistics, education, cognition and speech therapy. A number of varying approaches toward analysing verbal communication have arisen including sociocultural analysis and narrative analysis. *'To linguists discourse names a part of language that has an intimate correlation to syntax'* (Gee, J.P. 2014a: 17). A change in syntax does not usually change the meaning of a sentence. Instead it is used to change emphasis and direct the listener toward a particular understanding or opinion. Gee gives the following example: *'1. The destruction of my home in the fire took only an hour, 2. My home was destroyed in the fire. It only took an hour'* (Gee, J.P 2014a: 18). The change in syntax here means that the second sentence directs the listener or reader toward the focus of losing a house. Sentence one is less clear in its meaning, even though mostly the same words are used. Gee asserts that this analysis of sentence structure and the change in meaning is what linguists term discourse analysis first and foremost. This is not the discourse analysis that it will be focusing on here.

Gee's second definition of discourse '*language in use (language used in specific contexts)*' (Gee, J.P. 2014a: 19) is what will be useful for the analysis of communication of musicians '*because the analyst is investigating the use of language in context by a speaker… he is more concerned with the relationship between the speaker and the utterance, on the particular occasion of use, than with the potential relationship of one sentence to another*' (Brown, G., Yule, G 1983: 27). The analysis used here will not be focused on the relationship of sentences but their meaning as determined within the context of a rehearsal and with consideration of physical cues and the wider musical conversation.

Littleton and Mercer argue for a sociocultural approach toward discourse analysis. '*Sociocultural discourse analysis differs from linguistic discourse analysis in being less concerned with the organisational structure of spoken language, and more with its content, function and the ways shared understanding is developed, in social context, over time*' (Hargreaves et al. 2012: 235). Their paper *Communication, Collaboration, and Creativity: How musicians negotiate a collective sound* outlines a methodology that centres around sociocultural discourse analysis, using it as the focus for investigating communication, including non-verbal, in rehearsal sessions. '*[Their] analysis revealed that the band members studying rehearsing were highly engaged, repeatedly playing, replaying, and reworking songs, both new and old, in an attempt to reach collectively agreed versions and interpretations - which constitute a form of shared musical common knowledge*' (Hargreaves et al 2012: 236). The discourse analysis that takes place in this study unfolds from a process of transcription immediately followed by analysis. This face value analysis allows Littleton and Mercer to take rehearsal discourse step by step and consider meaning. However, with the absence of coding, participants' contributions, including some subtle forms of power play within the ensemble, may go unnoticed. This musical communication study is unusual, because it approaches the musicians' role as creative, and begins to reveal the processes involved in rehearsals.

Another valuable study centres around verbal communication in the field of Music Education. Sam Duffy and Patrick Healey's paper *The conversational organisation of musical contributions* investigates the one to one teaching of clarinet. Duffy and Healey approach the lesson as a conversation. '*In particular, the short fragments of music that occur when a section is being worked on in detail are closely integrated with verbal and non-verbal contributions. The musical contributions can themselves function as turns and their duration and organisation are managed using conversational turn-taking mechanisms*' (Duffy, S., Healey, P 2014: 890). Duffy and Healey argue that the pattern of communication throughout the clarinet lessons that they are investigating mimic that of normal conversation. They recognise that the physical formation for the conversation, student facing teaching, is changed as the score becomes the focus. They also argue that when mistakes are made by the student *'the tutor does not interrupt the student's*

playing as soon as a problem is identified. Instead they allow the student to correct self-diagnosed errors themselves, usually by promptly restarting from the point where trouble occurred. The tutor then waits until the end of the phrase to initiate discussion and provide feedback, taking the floor before the student can start the next phrase' (Duffy, S., Healey, P 2014: 891). The approach towards viewing teaching sessions as large conversations, with music playing being part of the conversation, can easily be extended into how rehearsals work for musicians. In professional (and amateur) rehearsals ensembles rarely stop at the point of a mistake or when they wish to express an artistic idea about a section. Instead, musicians continue to play either until little sense can be made of the music being played or until a structurally appropriate moment. Issues that are remembered by the player(s) are then addressed. It is at the these points that discussion occur and that repetition of certain sections that require work or refinement begin. The function of repeating material in rehearsals is vital to the rehearsal process and allows for the exploring of the available sounds and for the musician(s) to define their interpretation.

Amanda Bayley employs discourse analysis in her study of the Kreutzer Quartet (Bayley, A 2011). Her focus here is the relationship between the composer, Michael Finnissy and the Kreutzer Quartet, in a project that explores the limitations of notation. Building on the techniques employed by Davidson and Good's investigations into a student string quartet (2002), Bayley categorises the rehearsal discourse into: Chit-chat, Context, Notation, Technique, Sound Quality and Co-ordination. These categories present an extension of Davidson and Good's division of discourse into Social Conversation and Musical Conversation. Both of the String Quartet studies include playing of musical passages, or musicking, in the categories that are presented which reflects the nature of rehearsals centring around repetition of musical material. The approach here is to rely on quantitative analysis of discourse through the development of codes[2]. The analysis highlights the role of metaphor in expressing a desired sound quality.

These are examples from a range of studies into rehearsal discourse over the past decade. This research seems to show that verbal communication is situated within the larger 'conversation' of the rehearsal itself in which repetition of musical material is central. Discourse analysis has been

[2] Bayley develops this coding further in later research into quartet discourse with the use of NVivo. (Bayley, A 2009)

further developed by researchers (Martin Clayton, Simon Waters) who have investigated rehearsal processes by incorporating gesture and embodiment, as well as the use of instruments, as part of musical conversations in rehearsals.

Non-verbal communication

Research into non-verbal communication has received more attention than verbal communication in performance studies, perhaps because during performances verbal communication is restricted by convention.

The most commonly used definition of gesture is *'visible action as utterance'* (Godoy, R., Leman, M 2010: 14). Godoy goes on to explain five categories of gesture, previously coined by Ekman and Friesen: *'(1) Iconics represents a particular feature of an object, and can be described in terms of the shape and spatial extent of the gesture… (2) Metaphorics are similar to iconics but represent an abstract feature of an object… (3) Beats occur together with spoken words to highlight discontinuities and stress specific words… (4) Deictics indicates a point in space… (5) Emblems are stereotypical patterns with agreed meaning, such as the "goodbye" or "OK" sign'* (Godoy, R., Leman, M 2010: 14). In musical communication I argue that these five categories appear alongside verbal communication. When an ensemble is playing, musicians' gestures accompanying verbal utterances may be obstructed by their instruments. However, the presence of an instrument can also strengthen the communication through gesture. With the instrument in hand the player is able to gesture throughout their playing. This is due to visual signals being received by other players, and audience members, which contain information either for the purpose of co-ordination or expression.

For example, a pianist leaning into a piano to add weight to their playing creates a gesture that the viewer will understand will add volume. This form of attack on the instrument may be stopped suddenly before impact meaning the gesture and the resulting music do not match. This play on expectations and cues is satirised in comedy sketches such as Rowan Atkinson's *The Piano Player* (Helga K 2011) where the audience matches the attack to the sound even when the

instrument is not present. More subtly, string players, wind players and singers alike rely heavily on the gesture of breathing in for a beat with an extended lift on an instrument or the head to indicate the start of a piece, or to start a new section. This gesture embodies and communicates attack, dynamics and intended tempo and has been investigated by Laura Bishop and Werner Goebl (Bishop, L., Goebl, W 2018). There is a close relationship between physicality, gesture and embodiment. This physicality, whether with an instrument or without, means that visual cues are essential to the creation of ensemble musical sound. With the removal of verbal communication during most music-making, gesture can be used to communicate with fellow musicians and to audience members. These gestures may come from conventions, such as traditional conducting patterns and hand signals to go to the head in improvised jazz pieces. Conversely, they may be an extension of the physical movement required to produce a particular sound, such as an over acted bow lift or an exaggerated intake of breath preceding an onset. Embodiment in this case, is physical reaction to the music which may result in swaying or foot tapping to the beat or the synchronisation of breathing and heart beats to musical tempo.

Research into the physical movement of musicians performing together has increased over the past decade (Bishop, L., Goebl, W 2018., Timmers, R., et.al. 2014) with the object of understanding how musicians synchronise. These researchers have developed techniques, including the use of motion capture equipment and specialised analysis of video footage.[3] Studies into physical movement of musicians centre around three points of investigation: movement for synchronisation, movement for expressiveness and movement to articulate leadership. These will now be discussed.

Synchronisation

One of the most important aspects of successfully making music as a group is the ability to synchronise both in terms of tactus and rhythm. The challenge that musicians face here is that,

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[3] The Interpersonal Entrainment In Music Performance project (IEMP) based at the Durham University combines analytical methods of motion capture and video analysis along side onset analysis using Sonic Visualiser software. The research group provides analysis of music from many different genres from Indian Raga groups (Martin Clayton) to improvised jazz duos (Jakubowski).

more often than not, performance conventions require that there is no verbal communication to assist with either starting a piece of music as a group or for changes in tempo. Musicians therefore have to rely on visual cues and gestures. These may be from conductor to ensemble, between certain musicians, or collectively negotiated as a group.

Laura Bishop and Werner Goebl present an interesting study into how gesture kinematics conventionality affect synchronisation success in piano duos (Bishop, L., Goebl, W., 2017). The *'study investigated how head movement kinematics communicate beats, and tested four kinematic properties of head gestures that we predicted could help observers detect communicated beats more successfully'* (Bishop, L., Goebl, W., 2017: 1178). Synchronisation in the duos was improved by visual cues and considerations were made to the leadership roles involved; the observation here being that the leader/follower division is not necessarily binary but interdependent. The study found that *'the communicative quality of cueing gestures depended on their smoothness, magnitude, and prototypicality (how exemplary the gesture is); both ensemble performance and conducting experience improved the quality of cueing gestures given'* (Bishop, L., Goebl, W., 2017: 1192). As well as arguing that ensemble and gestural experience improved synchronisation, attention in this study is paid not only to the relation of movement to display tactus but also the way in which performers mimic each other's movement, showing how musicians continually react to the ensemble setting.

Physical Expression

There is undoubtedly an expressive quality in the physical movements of musicians in live performance that can be perceived both by audiences and by fellow musicians. Euler et al (2015) performed an investigation into expressive gestures of clarinetists performing solo works of Brahms and Mozart. Here the study *'present[s] a procedure to extract clarinet players' physical gestures during performances of pieces from the classical repertoire, based on movement segmentation and analysis of recurrence patterns, analysing their musical location and gestural features'* (Euler, C.F et al, 2015: 98). The focus of this study is on the ancillary gestures that the musicians present. These are the motions that are beyond the physical movement required to

manipulate the instrument to make the required sounds in performance. The methodology employed centres around repeated analysis of ancillary gestures of each of the clarinetists in the study to develop an understand of the movements. These movements were then considered in terms of their presence at particular musical moments in the structure of the piece. The study demonstrated that ancillary gestures often accompany points of musical interest and structure. This demonstrates a performative aspect to the physical movement that musicians employ. Due to the solo setting of the study, it seems likely that gestures benefit the audience primarily, because they reinforce structurally important moments in the music.

The expressive quality of the visual aspect of performance was isolated and investigated in Jane Davidson's experiment into the movement of solo musicians (Davidson, J 1993). This study, using final year undergraduate students performing on violin and piano, utilised Point-Light Technique to isolate movement that could then be revealed to observers. Each musician in the experiment was asked to perform excerpts in different expressive ways: deadpan, projected and exaggerated. Observers, who were also undergraduate students, were asked to rate the expressiveness of the excerpts sometimes with just the audio, just the visual and both. *'The results suggest that vision can be more informative than sound in the perceiver's understanding of the performer's expressive intentions'* (Davidson, J 1993: 112) and affirm that musicians movement increase the understanding of expressive intentions in performance. More recent studies (Leman, M 2007) (Leman M 2016) have continued this research and begun to develop computer programs for analysing musicians gestures in more detail.

Movement and Leadership

All channels of communication in ensemble music making are contained within the social structures of the group. This is true for how musicians move when they are in positions of leadership to other musicians. Donald Glowinski et. al. presents a study of the changes in expressive movements that are made by violinists when assuming leadership positions in a quartet setting and when playing solo (Glowinski, D et. al. 2013). The study employed motion capture technology and analysed head movements of players. Glowinski hypothesises in his

conclusion that *‘regular movement provides a kinaesthetically defined framework within which musicians can locate auditory events’* (Glowinski, D et al 2013: 4). The study found that *‘at least some such patterns [of head movement] do change between solo and ensemble performance’* (Glowinski, D et al 2013: 5). This study highlights the changing physical role of the performer when transitions from a solo setting to an ensemble one. Head movements change when operating within an ensemble and begin to give an insight into the leadership structures that are present. Musicians exhibit physical movements within the social structure of the ensemble performing micro movements that entail expressive or coordination signals.

Another research project by Andrew Chang et al, presents a further study that supports the Glowinski’s findings when investigating body sway in a quartet setting. This study focuses on the social dynamics of the ensemble and artificially manipulates which musician is leader by the researcher assigning the role. Interestingly, the project here also isolated the physical communication of the ensemble at times by removing the player’s ability to see each other; providing comparative data when visual connection is restored. *‘The results showed that anterior– posterior body sway couplings among string quartet performers reflected nonverbal interpersonal coordination, leadership roles, and performers’ subjective evaluations of their coordinative performance. Assigned leaders influenced followers more than followers influenced leaders or than one follower influenced another, and this effect was larger when performers could see each other than when they could not*’ (Chang, A et al 2013: 4138). Again, this study highlights the roles that musicians undertake in an ensemble setting and the change in physical communication that is evident when roles change[4].

Research into physical communication has benefited from technological advances and methodologies employed in other disciplines. Further research is needed in this field to begin to incorporate larger ensembles as most current studies centre around soloists, duos and quartets. Although this thesis will not employ the data-heavy and highly quantitative approaches of the

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[4] A study with pianists further supports these conclusions through the analysis of head and hand movement in duet playing. This study isolated the auditory feedback and concluded that ‘visual cues became more important when auditory information was absent’ ((Goebi, W, et al. 2009)

studies outlined above, it will consider the role that physical communication has in the ensemble setting, which will be on a larger scale than the field has previously explored, through analysis of movement in recorded videos.

It is clear that physical movement, from which we can identify communicative features more quickly and reliably than sound, is a specialised aspect of ensemble music making. Further research in this area will give insight to the sociological aspects of group activities but will also help us train the next generation of musicians; these skills are learned by doing, but could be reinforced with clearer theories and established practices.

So far we have discussed how vital verbal and non-verbal communication is to ensemble musicians. Verbal communication studies have revealed the roles that exist within ensembles and provide a number of approaches to analysing discourse in rehearsals. Non-verbal communication studies have developed understanding through isolating and investigating aspects of physical movement to understand how these aid synchronisation, particularly at the start of a piece. They have also developed understanding of the how physical cues communicate expressive intentions. Moving beyond visual cues, we will next turn to entrainment which is an essential feature of ensemble music-making allowing for continued synchronisation.

Entrainment

Entrainment is the term developed in music research to account for how musicians play rhythms together. It is also used to describe how other rhythmic phenomena, such as walking together, speech and clock pendulums come in and out of sync (Jones, M.R., Boltz, M 1989) (Large, E., Boltz, M 1999) (Strogatz, S 2004). It has been defined as '*the process by which independent rhythmical systems interact with each other'* (Clayton, M 2012 p. 49). Clearly this is a vital aspect of ensemble performance; creating and sustaining togetherness. It is important here to point out that the independent rhythmical systems are systems that are capable of maintaining their own tactus. Which in the case of ensemble performance is each player, meaning a quartet would have four independent rhythmical systems interacting with each other.

Greeves et al. argue that there are *'four different types of entrainment: (1) self-entrainment –*

responding to self-generated rhythmic output; (2) social entrainment – responding to rhythmic

output generated by another person; (3) mutual social entrainment – two people responding via a

bidirectional information processing loop such that the rhythmic output of person 1 is taken as

input by person 2 whose rhythmic output is then taken as input by person 1; (4) collective social

entrainment – mutual social entrainment occurring across more than two parties, such that there is

a network of input/output connections created between more than two individuals in a

group' (Greeves, A et al. 2014). Self-entrainment refers to solo performance where the performer

is required to determine a rhythmic frame work (tactus) to enable their own and other's following

of the music[5]. Social, mutual and collective entrainment are all features of ensemble performance.

The determining factor for which form of entrainment is happening depends on the system

dynamics and power play within an ensemble. This will usually be dictated by performance

conventions such as the first violinist being the leader of a quartet, or by each performer's place

within the hierarchy of a work at a particular time; those playing the melody for example. It is

necessary for musicians to be able to project a tactus. These may be stable or changing (in the

case of tempo markings such as rubato or rallentando). Musicians and listeners, continually edit

their projected tactus in line with the rhythmic stimuli that they are presented with. It is this

protected expectation and re-evaluation of the tactus that allows musicians to play together.

Clayton defines only three categories for entrainment: Intra-individual, Inter-individual/Intra-group

and Inter-group (Clayton, M 2012: 51). These terms are less problematic than Greeves et. al. as

they clearly define into the grouping structures that musicians are trained to operate within when

performing. Here intra-individual is the entrainment of the soloist, inter-individual or intra-group is

the entrainment of a small ensemble (where operating in sub groups does not exist) and Inter-

group is entrainment in a larger ensemble setting. A good example of Inter-group entrainment

would be a performance of a large work such as Bach's *St Matthew Passion*. In this work, a bass

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[5] This is particularly important for most western music, however, there are examples in free jazz
and experimental music where the synchronising of rhythm and maintaining a tactus by players is
no longer essential. There are also examples of African drumming that shift in and out of entrained
rhythms in complex hyper-metric systems (Clayton et al. 2013).

in choir one would have to secure intra-group entrainment with the other members of his section and inter-group entrainment with the rest of the choir and orchestra. It is clear that larger ensembles with more complex groupings require musicians to process many more stimuli in order to successfully entrain. This is why larger ensembles require a conductor (who could also be a player) and a stricter hierarchy amongst players to enable the stimuli for entrainment to be more focused.

Symmetry in power relationships in entrainment is an important consideration. '*Entrainment can be symmetrical in an ensemble made up of peers, asymmetrical when people play or dance along with pre-recorded music they cannot influence. It can also be relatively symmetrical: in most musical ensembles any individual can influence any other, but in practice some people are more likely to have influence than others (e.g. conductors, section leaders, soloists, senior musicians)*' (Clayton, M 2012: 52). Once again Clayton's analysis of entrainment highlights the importance of the social relationships and hierarchy within an ensemble. Elements of trust, perceived correctness and confidence will feed into a determination of who to follow and when to lead.

'*Hierarchical relationships can not only be observed behaviourally, as in the case of parts which move at different speeds but are mutually coordinated. They also account for metrical percepts: computer models which aim to illustrate this process in a simplified form, show how hierarchical percepts can emerge spontaneously in response to relatively simple stimuli*' (Clayton, M 2012: 51). We can therefore use measures of entrainment to reveal the social hierarchy and leadership within an ensemble. This allows us to analyse rehearsals in conjunction with discourse and behavioural analysis and continue to measure this kind of communication in performance where verbal communication does not take place and actions may be more subtle.

The communication that has to be employed by ensemble musicians is multimodal and from multiple sources. The complex social order in which an ensemble operates demands discipline and sensitivity from musicians, especially as the social order may be in a state of flux in conjunction with aspects of musical structure. Case studies (Godoy, Leman, Davidson etc.) in

communication in music have largely focused around one narrow focus, be it head or body movement, verbal communication or entrainment. This study intends to combine the more accessible approaches to analysing ensembles and to centre this on the changing interpretation that ensembles present.

Entrainment is an essential feature of ensemble music-making. It requires consideration of the complex and social hierarchy that ensembles exhibit to understand how systems operate within the whole interdependently. It also requires understanding of the fluidity of the musician's hierarchy in terms of moving from solo to accompanying roles or from leader to follower.

Musical Communication Models

Musical communication models are relatively new in the field of music research. They take their foundations and history from linguistics, semiotics and information systems. They attempt to model the communication that occurs when making music; with focus on meaning and codification. This section of the chapter will evaluate the current musical communication models by Phillip Tagg, David Hargreaves, Raymond MacDonald, Dorothy Miell and Charles Inskip and Andrew MacFarlane. It will argue that a successful model of communication requires a reciprocal feedback model to demonstrate the affect the audience has in performance as argued by Hargreaves, MacDonald and Meill (Hargreaves, D et al. 2005). It will also argue for a holistic approach for musical communication models and therefore research methods as argued by Small (Small, C 1998).

Phillip Tagg approached the task of designing a communication model within the context of his seminal paper on Semiotics: *Introductory notes to the semiotics of music*. (Tagg, P 1999).

Figure 1:
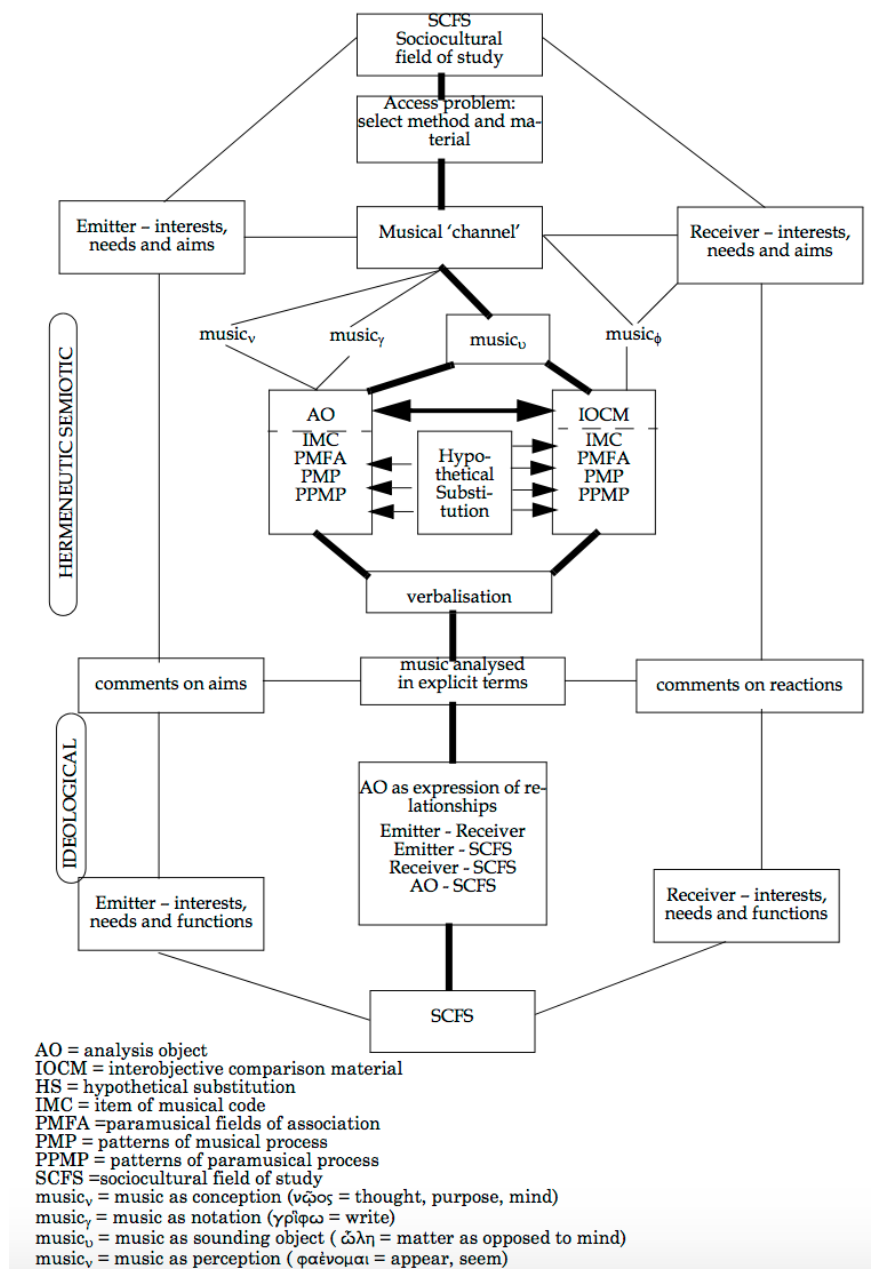
Phillip Tagg: Methodological paradigm for analysis of affect in popular music. (Tagg, P 1999: 43)

In this paper he covers the field of semiotics methodically and in great detail, with the aim of creating a successful model of musical communication. In this approach the meaning of the music has taken precedent over the channels and methods of communication. This has a negative impact on the design of his model as it simplifies the communication that happens between performers, instead relying on a basic sender receiver flow of communication model. It is

not a model that represents the flow of communication in performance but rather the encoding, decoding and transmitting of music. The model is designed as an extension of the Shannon and Weaver model of communication (Inskip., MacFarlan 2007).

Figure 2:

STORE of SYMBOLS

| Transmitter only | Common to both transmitter & receiver | Receiver only | *possible feedback* |

incompetence

not decoded

intended 'message' → **TRANS-MITTER** → **Channel** (coded 'message') → **RECEIVER** → 'adequate' response, reaction

'inadequate' experience, reaction

interference

| Transmitter only | Common to both transmitter & receiver | Receiver only | *possible feedback* |

SOCIOCULTURAL NORMS

© Philip Tagg

Source: Tagg (1999)

Tagg Communication Model (Inskip, C., MacFarlane, A 2007: 11)

Figure 3:
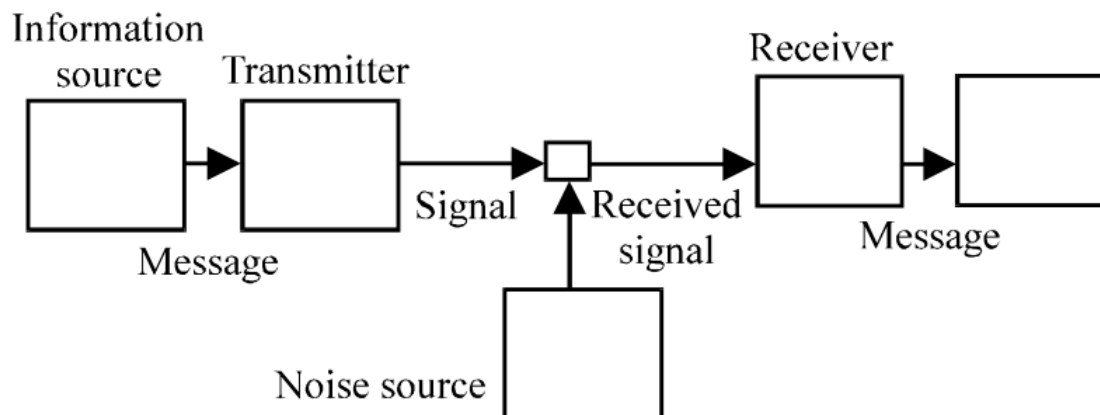
Shannon and Weaver Communication Model (Sabah, A 2012: 13)

Tagg's model operates within, and is designed through, his methodological paradigm for analysis of affect in popular music (see figure 1). This is a highly complex model which aims to demonstrate the way in which semiotics, grounded in a sociocultural field of study, become ordered in a channel of communication in order to demonstrate meaning. Tagg alerts us to the complexity of the process of music-making including social-cultural factors. However, the foundation of the model is rooted in theory and information retrieval systems not from empirical evidence.

David Hargreaves, Raymond MacDonald and Dorothy Miell created a reciprocal feedback model for musical communication. They argue that '*the central characteristic [of Tagg's model] is that the information moves in one direction - from sender to receiver, and not vice versa… a good deal of musical communication is much more interactive and re-creative than is suggested by the idea of information being passed from one person (e.g. the performer) to another (e.g. the listener)'* (Hargreaves, D et al 2005: 4). Again these assumptions are made without empirical evidence and are based on the author's experiences of music-making. In response to this they determine two preliminary models: a reciprocal feedback model of response and a reciprocal feedback model of musical performance (figures 4 and 5 respectively).

Figure 4:

Music

Reference Systems, genres, idioms, styles, pieces...
Collative variables: complexity, familiarity, orderliness....
Prototypicality
Performance contexts: live, recorded, non musical

situational appropriateness
of genres and styles

musical 'fit'

Situations and Context

Social and cultural contexts
Everyday situations: work, leisure, consumer, education, health, media, entertainment...
Presence/absence of others
Other ongoing activities

Response

Physiological: arousal level
• level of engagement
• active/passive control of listening
Cognitive
• attention, memory, perceptual coding, expectation
• discrimination, evaluation
Affective: emotional response, like/dislike, mood

constant evolution and change
in individual preferences and taste

individual use of music as a
resource in different situations:
goals in specific environments

Listener

Individual difference variables: gender, age, personality...

Musical knowledge, training, literacy, experience
Immediate and short-term preference patterns: medium/long term taste patterns
Self theories: musical identities

Musical Response Model (Hargreaves et al. 2005: 8)

Figure 5:

Music

Reference Systems, genres, idioms, styles, pieces...
Collative variables: complexity, familiarity, orderliness....
Silence, chance events

situational appropriateness
of genres and styles

Situations and Context

Social and cultural contexts: political, national...
Everyday situations: work, leisure, consumer, films, meds, entertainment, broadcast...
Presence/absence of others: live audience recording

Performance
Acoustic performance parameters
Performance medium: live, recorded, broadcast
Performance contexts: composed, improvised audience/medium interactive

interpretation, improvisation

cultural/artistic performance
conventions: audience interaction
and exceptions

Performer
Instrumental, vocal
Solo, group. orchestral
Informal: children, non-art

Individual difference variables: gender, age, personality...
Interpretative/improvisational skill
Expressive intentions
Internal state: arousal, anxiety, motivation

symbolic conventions, notation   improvisation, interpretation

Composer
Formal: art music
Informal: children, non-art

Individual difference variables: gender, age, nationality...
Expressive intentions: musical, aesthetic, social, political....
Internal state: motivation, life stress

Musical Performance Model (Hargreaves et al. 2005: 15)

29

The basis for the creation of these models lay in Bandura's approach to social cognitive theory. *'Central to Bandura's approach is his view of the nature of human agency - how people exercise influence over what they do - which leads to the principle of triadic reciprocal causation'* (Hargreaves et al 2005: 5). The triadic system at work here is formed of *'behaviour; internal personal factors (cognitive, affective, and biological events); and the external environment'* (Hargreaves et al 2005: 5). These elements interplay with each other. *'People themselves create social systems - but are themselves influenced by those systems in turn, so that human behaviour is a product of both social influences and internal psychological factors'* (Hargreaves et al 2005: 5). This triadic view from social theory can help us to understand the workings of an ensemble; the individual's behaviour, and therefore actions recorded in this study, are dependent on how the rest of the ensemble operates. Musicians will tailor their actions in performance and communication in rehearsals in response not only to conventions but also to behaviour that occurred in the rehearsal or previous sessions[6].

Hargreaves, Raymond and Meill also push for models of musical communication to incorporate recorded music and when the performer(s) and composer(s) may not be professionals. *'Musical communication takes place outside of the artistic contexts of the concert hall or recording studio, which could include recorded performances, such as those in broadcasting, the media, and cinema, or even listeners' reactions in everyday situations such as shops, leisure environments, or the workplace'* (Hargreaves et al 2005: 7). This approach makes a clear argument for a holistic model which can cope with the multiple mediums for dissemination of music. This has strong implications for the perception of music and its meaning. An audience member listening to Nimrod from Elgar's *Enigma Variations* may have very different reactions to the music listening to it being played in a concert hall setting, than at the opening ceremony of the London 2012 olympics or played through a church sound system at a funeral. The communication to the audience in any recorded performance changes in each context that it is played. Listeners will also make a distinction between studio recordings and reproductions of live recordings; the live recording or reproduction will be met with less expectation of perfection and perhaps a

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[6] The notion of learned behaviour in each musical setting is commented in in Bishop and Goebl's study into synchronisation in piano duos (Bishop, L., Goebl, W., 2017: 1192)

consideration of the original environment. The reciprocal model of response hopes to account for this communication outside of traditional live performance.

The reciprocal model of response and the reciprocal model of performance are then combined by Hargreaves et al. to create a reciprocal feedback model of musical communication. This model encompasses the two previous models, turning them from two dimensional models into one three dimensional model (figure 6).

Figure 6:
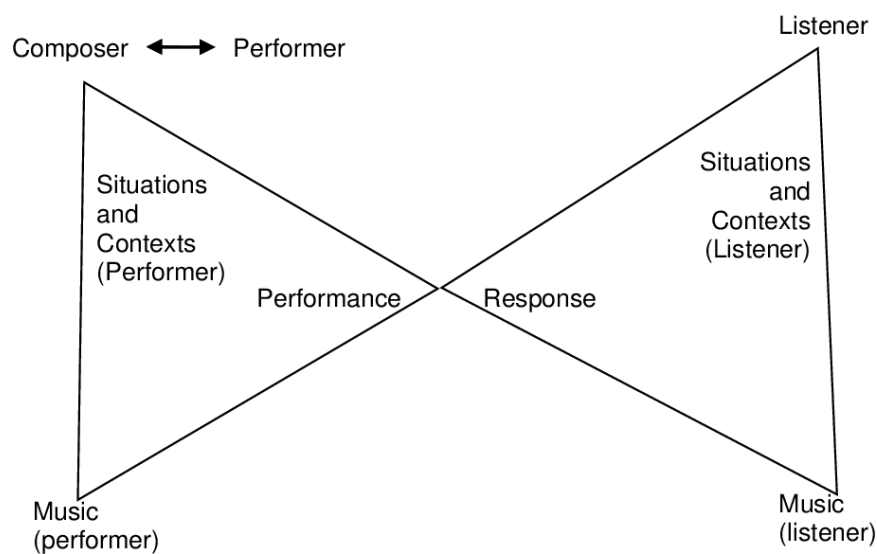
Combined Reciprocal feedback model of communication (Hargreaves et al 2005: 18)

'The resulting model is intended to represent a view of musical communication which goes beyond previous transmission models (a) by taking into account the many relevant personal, musical, and contextual variables, and (b) by virtue of its incorporation of the reciprocal causal influences of all its components' (Hargreaves et al 2005: 7). Although this model is successful on a macro scale, making sense of the multiple reciprocal feedback channels and recognising these channels to be two way, from performer to listener, it makes light of the communication within live ensemble performance. It therefore needs expanding in the central performer box to account for the communication that occurs between musicians and others who are in the space when the

performance happens. This new model incorporates feedback so it built on the qualities of the Tagg model and extended it to include feedback.

Inskip and MacFarlane present us with a reciprocal model which is closer in style and foundation to Tagg. Their evaluation of Tagg's model is the same as Hargreaves et. al., the model does not account for listener feedback which is a distinct weakness. Inskip an MacFarlane propose their own user-centred model (see figure 7).

Figure 7:
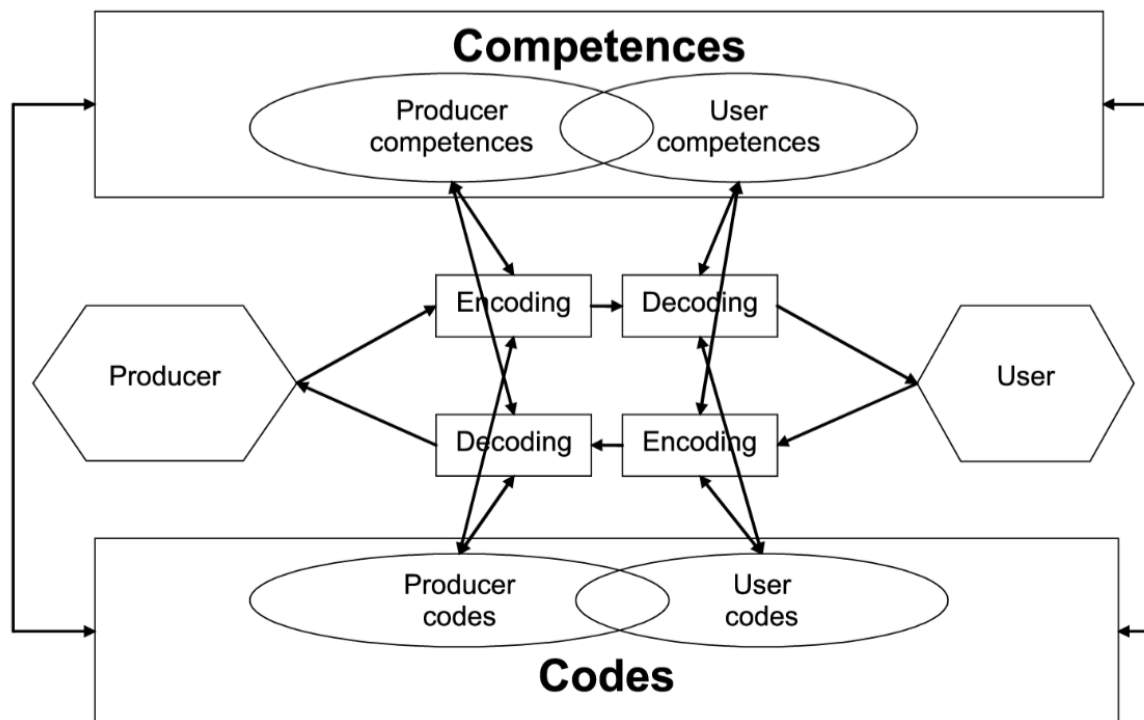
Inskip and Macfarlane user centred model (Inskip, C., MacFarlance, A 2007: 14).

In this model the user is the listener or audience member and the producer is the performer. Similarly to Hargreaves et al., Inskip and MacFarlane make reference to recorded music and the operating of their model outside of live performance spaces. Their model relies on the codification of music and the competency of the producer and user in understanding the codes that are in use. These codes are the music's meaning, whether it is a structural understanding of a piece's harmony or an understanding of the conventions in a particular genre. Inskip and MacFarlane

discuss Tagg's terms *codal incompetence* and *codal interference* and subsume this within their own model. '*Incompetence is caused by the transmitter and the receiver not sharing the same vocabulary of music symbols, and interference is caused when although they share ether vocabulary other values such as taste or cultural influences are brought into play*' (Inskip., MacFarlane 2007:13). It is this area of Tagg's theory that allows Inskip and MacFarlane to extend their model. They argue that Tagg's model '*suggests the communication is a one-way process, and that the receiver does not affect the message except by interpreting it through a store of symbols and sociocultural norms*' (Inskip., MacFarlane 2007: 13). Codal incompetence and interference allows for performers to attempt to educate listeners, whether it be in live performance or through successive performances live and recorded, so that they understand new codes. The idea that there is no feedback to the understanding of transmitted codes in Tagg's model is a substantial weakness. Inskip and MacFarlane make great improvement to the model, much in the same way as Hargreaves et al., by allowing the model to address the two-way direction of musical communication. The main issue that remains in the Inskip, MacFarlane model is that it still centres around solo performance. The performance is seen as a single transmission by a single transmitter therefore not encompassing ensemble performance.

Presumably the transmitter in the model could also be an ensemble, in which the case the model would be successful for studio recordings or broadcasts, where the ensemble (and additional technicians and sound engineers) have agreed a finalised sound. However, it does not account for live performance of ensembles. In an ensemble it is not one musician's (one transmitter's) job to communicate to the audience; it is in fact a collective responsibility. All members of an ensemble communicate to negotiate a live performance. As well as playing their parts to one another, they also individually and collectively play to the audience. They receive individual readings of the audience's response to the music they are playing. For example, a violist may be watched by an audience member to whom the violist is visible due to sight lines. Although the audience member has the sound of the entire ensemble to listen to, they may also focus more on just the violist's sound that match their visual cues. In turn the violist, being aware of the audience member's attention, may pay attention to their reactions. In this instance the musician would be communicating with the ensemble, reacting to musical ideas, and ensure that they are playing

with the rest of the ensemble effectively. However, the contribution that they now make will also include an evaluation of the audience's reactions, however subtle. This is not only the audience's behaviour as a whole but the individuals that musicians are able to communicate with, or perceive signals from. This can be achieved through eye contact, physical gesture and verbal utterances. In the setting of a classical concert hall performance these signals from the audience may be subtle, and in a festival concert setting they may be less subtle, due to less social constraints in the informal setting. None the less, the presence of a live audience has more of an immediate influence on an ensemble than one accessing music through a recording. Neither Tagg or Inskip and Macfarlane's models account for this real time exchange.

There is a further problem with these communication models in a live performance setting, they do not account for the communication between audience members. Group behaviour will be present in the audience, as in any other group, and will effect how individuals behave. Rupert Brown explains that '*in crowds people become de-individuated and, as a result act in an antisocial, unreasoning and uncontrolled fashion… behaviour can sometimes become more prosocial and is often aimed at specific targets*' (Brown, R 2000: 20). This analysis of group behaviour proves that an audience, a group which often displays group behaviour, will be communicating with each other and establishing a group identity and behaviours. Brown continues to assert that '*most instances of collective behaviour involve more than one group*' (Brown, R 2000: 20). He terms this intergroup behaviour. In a concert hall setting there are many different groupings that one could make: the people in the performance space as a whole, the musicians, sections within the musicians (e.g. string section or horn section), the staff of the concert hall (and their various groupings through hierarchy), the audience, groups within the audience created by their place in the performance area (those in the cheap seats and those in the premium seats) and social groups and relationships that preexisted the concert hall experience or those created within. One person can belong to many groups at the same time. The membership of each group can exert influence on the behaviour of the individual. All of these group memberships require communication to form and maintain, groups will also communicate with each other through their collective behaviours, however subtly. A successful model of

musical communication requires a consideration of the groupings that exist and how they influence each other.

The idea of group behaviour feeding back to musicians is most easily demonstrated on the macro scale. It is a well-known fact that music programming is determined by anticipation of box office success and that audiences tend to prefer familiar works (Price, S 2020). An economically successful performance venue is one that fills enough of its seats or standing area to turn a profit. The way performance venues achieve this is by selecting types of music and particular artists that they hope will attract a crowd. The people who fix acts for local venues and huge festivals alike, rely on knowing the group and the fandom that follows particular artists of genres of music. In addition to selecting these performers, they also have knowledge of (or can easily research) group behaviour. This allows venues to plan other supplies and infrastructures that they may need. For example, the Brighton Dome programming exhibits an array of performances from classical music concerts and pantomime to heavy rock concerts. The macro group behaviour of audiences, allows the venue to accurately predict the staff and stock it needs for each performance. A pantomime will bring families allowing for more sale of merchandise to children and ice creams at the interval, a rock concert will require more security and sound technicians as well as more alcoholic beverages behind the bar.

Models need developing and research (holistic) needs to be carried out to reveal more depth of knowledge about what musicians are doing when making music. The models above are developed primarily from linguistic studies and then each other. Empirical research is required to underpin and evaluate these theories and to successfully develop stronger models in the future. This study hopes to be a starting step in this direction. Once developed the models should become a useful tool for musicians to help them evaluate how they operate within their respective roles; something which is often left unchallenged in the time pressured rehearsal room with musicians deferring to conventions.

A successful model for musical communication requires a consideration of the modes of communication that are active during music making. It also needs to be able to cope with the multiple channels of communication that exist between the many different groupings within the

ensemble and audience. It should be appropriately mindful of genre specific elements of performance and be able to incorporate the role that recorded music plays in society. Ethnographic investigations into musical communication need to consider the entire behaviour of performers and audience members. It requires a holistic analysis that considers verbal communication, gesture, entrainment, system dynamics and embodiment. This type of multimodal analysis will give firm findings on the intentions of performers and begin to reveal the influences that control the process of interpretation.

Thesis outline

The purpose of the remainder of this thesis is to enable the development of an evidence-based musical communication model for ensembles music-making. This will make the contribution of a new model to the field as well as novel analytical and combined methods for its development. The aim will be to answer and investigate the following research questions:

How does an ensemble communicate during a developing interpretation of a score?

What are the modes of communication?

- What is the role of verbal communication in ensemble rehearsals?
- How do ensemble musicians communicate non-verbally?
- What does the data tell us about group dynamics, leadership roles and relationships between instrumentalists?

How does the interpretation develop?

- How are changes in interpretation negotiated?
- Do we respond to direction more accurately in the short term?
- Does the group entrain more closely as the work becomes more familiar?
- How do ensembles problem solve in rehearsal and performance?

An exploration into these questions will be undertaken in Chapter 2 through a critical engagement with philosophical writings on a work of music and its interpretation. Chapter 3 will outline methodological and analytical approaches to be used in two case studies. The *Alcina* Case Study will examine the interpretation and communication in two rehearsals and three consecutive performances of an opera orchestra performing Handel's Alcina with Opera Alumnus. The *Polaris* Case Study will examine the interpretation and communication in two consecutive rehearsals of this vocal consort, primarily focusing on the choral piece *A Darkling Thrush* by Anthony Esland. The analysis of the case studies will help to inform the final chapter where a new model of musical communication will be developed in conjunction with a novel framework for interpretation.

Musical Works and their Interpretation

Introduction

Performing music in the Western Classical tradition, a set of practices informed by the interpretation of notated music, poses a number of philosophical challenges and ethical dilemmas for the performer. The way in which performers relate to a work of music, and the concept of a work itself, be it through a score, improvised or through aural traditions, is central to their practice. However, in my experiences as a musician, investigations into how their philosophical and ethical frameworks are formed is generally under-interrogated by performers, with practice often stemming from the teaching styles that they have experienced in the academy, performances they have taken part in and performances they have viewed.

This chapter seeks to challenge the status quo in two central areas of music performance philosophy: arguing for a new inclusive direction in the discourse on the properties of a work of music, and rethinking the creative role of both composers and performers; particularly in terms of ownership. This will be argued through a critical discussion of the literature on the 'work' concept in music, which is central to the way in which both performers and audiences think and categorise musical performances and by examining the different ways in which musicians can interpret works of music. This will provide essential theoretical underpinning of the musical communication model. As both case studies utilise scores it is important to examine the role that these have and how they represent the work concept.

Defining Interpretation

It is worth remembering that having scores of musical works is a western centric and relatively new phenomena in the history of musical evolution. When we talk about a score, the most common expectation is that it will be in standard notation, but we should always be mindful of earlier scores, such as mensural notation, and later scores, such as graphic scores. Scores are

the written representation of musical works, where composers and editors codify the musical sounds into notation to be able to share the instructions to a work with others as a starting point for its realisation. The notation is often adorned with performance directions to instruct the performer more closely. To be able to understand a score, we must first of all understand the code that it is written in. Being able to read standard notation is usually the first step in this journey but contextual knowledge of the engraving rules of when work of music was transcribed and performance practice is also important. The contextual knowledge here is not only to have an understanding of stylistic features to allow correct ornamentation, or instrumentation, but for understanding of the score's basic features itself. If a singer is given a part book from the fifteenth century, they will not be able to successfully perform the work without knowledge of mensural notation, and the relationships between duration that are denoted by dotted notes in this tradition (Apel, W 2010). Furthermore, the performing of chant music in this period requires not only the ability to read the earlier notation but knowledge that the adjoining cantor sections of the liturgy would have been sung according to the aural tradition of each church or area. Much of the work in the field of authentic performance, and in early music transcription, make it clear that that the score provided to the church chorister in these times needed to be supported by knowledge of the performance conventions for the work to be anywhere near complete in its realisation[7]; the score here does not represent the whole work. This level of ambiguity resides in later scores too. For example, the duration of notes engraved in the choral scores of Ralph Vaughan Williams. When Vaughan Williams engraves an end phrase tied note over a bar line to a quaver, it is widely followed that this note is to be held sustained to the first beat, not carefully cut off on the off-beat of the first of the bar the quaver resides in. The duration indication is not to present an extra quaver notated in the bar but to ensure the duration from the previous bar[8]. The engravings of this composer have a stylistic element which intend to communicate to the performer about the sustaining of the end of phrases.

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[7] An example of the research required to transcribe pieces in this way, and the extent of research require, is described in detail by Caldwell in *Editing Early Music* (Cadwell, J 1985).

[8] This style of writing out the end of phrases can be seen in many of Vaughan Williams' works. The particular example being recalled here is his *Dona Nobis Pacem* Cantata (Vaughan Williams, R 1964) which presents this style of notation numerous times, particularly the choral phrase endings in the second movement (pg 9 bar 6). Vaughan Williams also uses this extra quaver notation over the centre of the bar; engraving a quaver on the third beat of a 4/4 bar (pg 34 bar 5).

There is also the question of later, less traditionally notated scores where composers develop their own notation rules and systems. For example *Sequenza III for female voice* by Luciano Berio presents a score which features some musical notation devices, but without the preface of composer notes explaining the notation a performer would struggle to understand what was being expressed (Julia, W 2000: 171). The need for explanation in scores like these, and similar scores such as Cage's works for prepared piano, is due to the score not following the standard notation of the day or requiring additional modifications. We must remember that nearly all composers, surely, intend for the realisation of their works to occur not that long after their composition; composers cannot seriously be engraving their scores with the expectation that they may be performed in hundreds of years time. The primary aim has to be to communicate the performance instructions to musicians that understand the same rules and conventions that the composer does. In music that we play from the past, it is necessary to have understanding of these conventions to be able to decode the music from the written score. It is not hard to imagine that the way these works were originally performed may be quite far removed from the process we apply to the score today. Not only because our codifying of the score may not be accurate but other performance conventions such as improvisation and behaviour of the audience may have changed, knowledge lost or incorrect conclusions may have been drawn in the past that are now generally accepted.

Hellaby writes extensively about interpretation, and the way that performers relate to scores, in his book *Reading Musical Interpretation* (Hellaby, J 2009), which presents research into different recordings of piano works. He recognises that *'potential problems suggest themselves in connection with the promotion of work to score. The first concerns the notational tool itself, which is by no means free of lacunae… however sophisticated the notational graphic system has become, and however much its intention is enhanced by performance indications, it will always leave open areas'* (Hellaby, J 2009: 8-9). Musical elements, such as tempo, articulation and dynamics, exist on a spectrum and their execution is relational to the playing of the rest of a score, rather than being numerically fixed; even when numerical directions are given. For example, a mezzo forte marking in one score does not exactly match that of another, but rather it can be judged to have been achieved through its relation to surrounding dynamic markings. A

40

bpm marking of 120 is not an instruction that the whole passage is to be played exactly at this speed but rather that the tempo should be around this tempo; performing live, without the aid of a metronome would make continually following this pace impossible. The same is true for other musical elements, where we have a central permissible ground of judgement which is handed to the performer. Many years ago I attended a conducting school along with my teacher Guy Woolfenden OBE. I distinctly remember conducting during a coaching session where the concert band that had been assembled played Woolfenden's *Mockbeggar Variations*. Conducting this work in front of the composer gave great opportunities to seek further clarification on the meaning of tempo directions in the score, and of score markings that were more ambiguous such as *misterioso*. The most common response from Woolfenden was to show him, and therefore to communicate back, how I thought the piece should sound, instead of him verbally providing answers. This relationship between composer and conductor roles here demonstrated that he viewed there to be multiple permissible interpretations of his work. Moreover, he seemed to enjoy the different presentations that each student directed for their own character, rather than instructing on what the score did not reveal; as some of us requested. Hellaby continues: *'The second potential problem with the idea of work to score projection is that musical texts themselves may sometimes be subject to changes by the composer himself, or mistakes and additions by copyists, or printing anomalies by early publishers'* (Hellaby, J 2009: 9) The case of anomalies between scores of the same work of music is no better demonstrated than when a choir gathers to rehearse a work of music with various different editions. Not only does this then provide a communication barrier between those that have different page and bar numberings, or dynamic and articulation markings, as the director, but whole sections of pieces can be missing where the edition has omitted bars or even movements of the work[9]. The editorial decisions are often made under the guidance of the latest, or the preferred, historical musicological research into the work, or a prevailing theory and link to a version of the work that they believe the composer intended.

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[9] Choirs performing Vivaldi's *Gloria* will note that the Recordi and Novello editions do not match each other, with four and eight bar phrase being omitted by one or the other in a number of the choral movements. Just one example of how a score is a working document.

Problem of the Work Concept

Let us take the example of Elgar's *Cello Concerto in E Minor, Op. 85*. When musicians talk about this concerto we are not simply referring to dots that Elgar wrote on pages in 1919 in Brinkwells cottage in Sussex, nor are we referring solely to the first performance of those notations that followed a year later or, indeed, exclusively the ideas that existed in his head during the composition process. Instead, we are referring to a multitude of elements that make up the concept of that 'work' of music. This includes: its performances, from the premiere in 1919 with the London Symphony Orchestra to the last performance that happened (perhaps even future performances), recordings and their use with other media such as films and advertising, the piece's character, tone and sound structure and the historical context under which it was written. Reception studies and research have shown there is considerably more to the cultural understanding of a work of music than a score, or a single performance.

Thus defining what elements in a work are essential to its identity is a challenge. *'Philosophers have long been puzzled about the identity or nature of the art object in nonphysical arts, e.g., music and literature. In these arts - unlike painting and sculpture - there is no particular physical "thing" that one can plausibly take to be the artwork itself. This puzzlement has sometimes led philosophers (e.g. Croce) to maintain that musical and literary works are purely mental - that they are in fact private intuitive experiences in the minds of the composers and poets. But this does not seem likely, since experiences can be neither played nor read nor heard. More generally, the Crocean view puts the objectivity of musical and literary works in dire peril - they become inaccessible and unsharable. Fortunately, however, there is a way of accepting the non-physicality of such works without undermining their objectivity'* (Levinson, 2011: 63). Musical works can be played, read, and heard and are therefore accessible and sharable; negating the limitations of the Crocean view of private experiences. Works of music are also recognisable to those who can read them, play them and those who identify them through successive performances in which these works realisation are repeated.

What are a works essential and accidental properties? What is the ontology of a work of music? What is the role of the composer and performer in relation to the work of music? It is these questions that we shall examine here.

Musical Ontology

In her book *The Imaginary Museum of Musical Work's* Lydia Goehr summarises the debate in the field of musical ontology. She begins by outlining four main categories that prevail in the literature on the objectivity of a work. Firstly, that some philosophers follow the Platonist view of musical works as types and universal abstract objects. Secondly, others follow the Aristotelean view, which also centres on abstract existence of the work, but focuses on essential sound structures of a work and argues that *'substantiality is exhausted by that of their performances'* (Goehr, L 1992: 15). The third way Goehr categorises the debate around the work concept is to *'attribute them no abstract form of existence… only concrete performances and score-copies exist'* (Goehr, L 1992: 14-15). The final way in which work objectivity is categorised is taken from the writings of Beredetto Croce and R. G. Collingwood who identify works with the ideas in the mind of the composer. They argue that *'these ideas, once formed, find objectified expression through score-copies or performances and are, thereby, made publicly accessible'* (Goehr, L 1992: 18).

All theories of musical works have to settle, first of all, what ontological classification supports their beliefs about musical works and their properties. The core of this debate rests on whether works are universals, abstract objects or concrete particulars. Philosophers often mean different things when using these terms and their meaning can easily become blurred. It would therefore be helpful to have a brief definition of each of these terms to make understanding clearer here. *'We can say that something is a universal if and only if it can be instantiated (whether it can be instantiated by particulars or universals) — otherwise it is a particular. Thus while both particulars and universals can instantiate entities, only universals can be instantiated'* (Rodriguez-Pereyra, G 2015: 2.2). Abstract objects are those that are non-spatiotemporal and causally inert. Concrete particulars exist as spatiotemporal entities.

The platonist view *'in one of its articulations, musical works are argued, contrary to common sense, to be universals - perhaps even natural kinds- constituted by structures of sounds. They lack spatio-temporal properties and exist everlastingly. They exist long before any compositional activity has taken place and long after they perhaps have been forgotten. They exist even if no performance or score-copies are ever produced. To compose a work is less to create a kind, than it is to discover it'* (Goehr, L 1992: 14). Goehr is summarising the thesis of Nicholas Wolterstorff. He was at the forefront of platonism in the discourse on musical works and art ontology in the 1970's and early 80's. The field of debate has since moved from the strictest form of platonism that Wolterstorff argued for to weaker platonism theories. However, he remains rooted in the discourse as a representation of the platonism end of the spectrum. Wolterstorff's theory that works of music are eternal is clearly formed from a strict following of platonism rather than a consideration of what musical works are and how we understand them. Its weakness is rooted in philosophical logic being pursued at the expense of a priori experience. Musical works are experienced through scores, performances and recordings in a way that does not neatly dovetail with the Platonist eternal objectivity.

Opposing this view, at the other end of the spectrum, are those who follow a nominalist theory of musical works such as Goodman. He asserts that works of music exist not in an abstract entity existing apart from its performances and scores but in the particular object of the score; lifting the score as the object as one would view the sculpture. Goodman's theory of music as an allographic art (as opposed to an autographic art) claims that genuine instances must comply perfectly with the score. This highlights a number of issues with notation and realising scores that we will come to later. Goodman's allographic category matches with the experience of music making as it equally values multiple instances of the score (score copies) as instances of the work of music.

Levinson in his text *Music, Art and Metaphysics* recognises that *'Those familiar with recent reflection on the ontological question of works of art will know of the widespread consensus that a musical work is in fact a variety of abstract object - to wit, a structural type or kind'* (Levinson, J

2011: 64). Levinson is a widely cited aesthetician in the field of musical ontology and he is regularly referred to as a Platonist. However, his theory is quasi-platonic as he modifies this view in rejecting one of the founding principles of universalism which asserts that musical works are discovered by composers, not created. The view that works are not created is held by nominalists, such as Goodman, who argue that sound structures of works are pre-existent to the creation of works and therefore the work itself is eternally existent; both before and after composition.

Levinson uses this area of philosophical debate to reject the claim that musical works are pure sound structures. He does so on the grounds of intuition: *'There is probably no idea more central to thought about art than that it is an activity in which participants create things - these things being artworks.'* (Levinson, J 2011: 63) It is a shame that Levinson relies on intuition here as the rest of his theory develops from staunch philosophical logic. Jumping between logical philosophical arguments and simply being asked to trust his judgement on the grounds of intuition is both a weakness and a strength of Levinson's theory. It is weakened as it is not sufficiently backed up by a matching philosophical argument but is strengthened by enabling the flow of thought to run from the music that we experience to the theory that he develops. This is an ancient issue with this branch of philosophy and the shift from building philosophical logic to centering on the human experience is problematic. Either an entire theory needs to stem from philosophical logic and find its way to a human experience that we understand or visa versa.

The element that all theories of musical works have in common is their consideration of sound structures. Sound structures are what is represented in scores (if a score exists), and instantiated in performances. However, the sound structure is not always thought to exist only in these two concrete particulars but as something metaphysical; beyond the score and performances. In answer to what type a work of music is Levinson writes: '*The most natural and common proposal on this question is that a musical work is a sound structure - a structure sequence or pattern of sounds, pure and simple*' (Levinson, J 2011: 64). This on its own is not a conclusion of Levinson's but rather a summation of where the ontological debate about works of music has come to centre.

The debate concerning the ontology of music has moved beyond pure sound structures and creativity. It has become widely recognised as an area of music philosophy and indeed research that has been neglected in the past; whether in reference to compositional activity or performance. A thesis that centres around musical works as pure sound structures is flawed as this requires them to exist eternally; most problematic is the idea that musical works exist before the creative process that composers go through has happened. This would mean that musical works are discovered rather than created, which does not match with the way in which we speak about the act of composition; so Levinson argues. Asserting that all musical works exist eternally lowers the compositional process in the same way that the infinite monkey theory does for the works of Shakespeare. There are too many additional elements, beyond pure sound structure, and meaning behind the sound structure selected that simply does not match with discovery.

Stephen Davies argues that: *'Musical works are not concrete particulars, though they are encountered in or through concrete particulars, such as scores and performances. As abstractions, musical works have been described as universals and particulars. The view is widely rejected, the main lines of objection pointing out that musical works can be created and destroyed, whereas universals exist eternally'* (Davies, S 2001: 37). The claims made by the universalists are also challenged by the discourse used by musicians and audiences about the act of composition. Work's are regularly referred to as products of the creative and artistic process that composers undertake. It is not in our nature to say that Beethoven discovered his Pastoral Symphony or that Stravinsky found The Rite of Spring. Musicians, audiences and critics persist in preferring god-like explanations of the creation of works. Shostakovich wrote *A Spin Through Moscow* and Macmillan crafted the harmonies of his *Miserere*.

Essential and Accidental Properties

Levinson supports his rejection of musical works being pure sound structures further by postulating an identical sound structure composed by two different people. He argues that even

though the sound structure is identical, there would still be two separate works. This is because their composition was by two different people and will have taken place in different geographical, sociological and historical times or places. He states that *'by Leibniz's Law, the musical works themselves must be nonidentical; if W1 has any attribute that W2 lacks, or vice versa, then W1 ≠ W2'* (Levinson, J 2011: 69). It is Levinson's argument here that has shifted the discourse in the ontology of music away from the nominalist and universalist dichotomy focused on pure sound structure. That said, sound structures, and therefore the relationship between score and performance still dominates the philosophy of music, often leaving interrogation of performance philosophy woefully unprepared for anything outside of the classical tradition and other score dependent genres.

Kivy criticises Levinson's use of Leibniz's Law arguing that it *'makes no distinction between essential and accidental properties, whereas common usage and ordinary intuition do'* (Kivy, P 1993: 60). He asserts therefore that Leibniz's principle is not sufficient for Levinson's musico-historical properties of music. It is this criticism that leads Levinson to his third objection to categorising musical works as pure sound structures. He explains that *'if musical works were simply sound structures, then they would not essentially involve any particular means of performance'* (Levinson, J 2011: 73). Works of music, particularly in the classical tradition, prescribe a means of performance through instrumentation in a score. *'Composers do not describe pure sound patterns in qualitative terms, leaving their means of production undiscussed. Rather, what they directly specify are means of production, through which a pure sound pattern is indirectly indicated'* (Levinson, J 2011: 73). Levinson is leading us to the conservative conclusion that works of music, with specified instrumentation, is performance means driven. Put another way, works of music cannot be played on different instruments if the composer has specified certain instrumentation in the score. The sound structure of a work of music has now been inextricably linked to its performance means in what Levinson calls *'a compound or conjunction of a sound structure and a performing-means structure; call it an "S/PM" structure for short'* (Levinson, J 2011: 78).

Following this conclusion Levinson takes us back to his original rejection of pure sound structures as works of music: that our intuition tells us that musical works are created. '*An S/PM structure is no more creatable or context-individuated than a sound structure is. [therefore a work of music should be defined as] S/PM structure-as-indicated-by-X-at-t. Where X is a particular person - the composer - and t the time of composition*' (Levinson, J 2011: 79). The addition of X and t changes the class of type that a work of music is for Levinson. The sound structure and performance means structure, both separately and together, are implicit types; the existence of which predates composition. With the inclusion of X and t the work of music become an initiated type which '*are so called because they begin to exist only when they are initiated by an intentional human act of some kind*' (Levinson, J 2011: 81), which in this instance would be a work's composition.

Stephen Davies comes to a similar conclusion to Levinson. He argues that a work of music is a '*performed sound structure as made normative in a musico-historical setting*' (Davies, S 2001: 97). Davies believes that the context of composition is irremovable from the identity of a work as it contextualises what is notated on the page and allows us to understand the compositional features and basic intentions of the composer. However, he rejects the connection Levinson makes with individual composers, preferring to reference the period of composition. Davies believes that Elgar's Cello Concerto has the essential property of being composed in 1919 and is convinced that the composition happening in Sussex is important. However, the fact that Elgar himself composed the work is seen as an inessential property to Davies as our understanding of the composition is not affected by this, only our approach to hearing the work of music changes.

Julian Dodd is a sonicist and he uses Leibniz's law against Levinson's theory that two musical works can be identical in sound structure and remain two separate works. '*W and W* are numerically identical musical works just in case they have exactly the same acoustic properties normative within them. There is no contextualist argument that should bring us to deny that acoustically indistinguishable works of music are anything other than identical*' (Dodd, J 2007: 275). Here, he has the same aim as Kivy in removing the composer and time (Levinson's 'X' and 't') from being constitutive properties of a musical work. However, it is achieved by arguing that

the numerical facts that are central in a work of music, and indeed that it is the sound structure that prevails even when the composer identity is known to have changed.

It is difficult to pinpoint the essential properties of a work of music. What is clear though, is that musical works are social objects that are shared and repeatable. Although their essential properties are difficult to define, their accidental properties and social associations are easier to see through our human experience. The importance of these accidental and associated properties are, perhaps, under-valued and investigated by the philosophers referenced here.

Creativity in Composition

Scruton comments on Levinson's fear of losing creativity in composition through a commentary on the type/token debate. '*The sense in which types, kind structures, and patterns are eternal does not prevent them from having a history, any more than the kind: tiger is prevented from having a history, from coming into existence and passing away*' (Scruton, R 1997: 114). Types are the eternal abstract objects that Levinson argues musical works cannot be due to composers creative making of them. However, their eternal existence is mischaracterised in Levinson's writing. '*The eternal nature of the type consists merely in the fact that, considered as a type, temporal determinations do not apply to it: it does not imply that it preceded its first token, for it is only through its tokens that it can precede or succeed anything*' (Scruton, R 1997: 114). Therefore if a work of music is a type, although it is eternal, it did not exist before its composition; merely the possibility of the work, the sound structures chosen by the composer, existed before.

There is a common theme in the ontology of music to view works of music as complete, static and unchanging once composed. Musicologists such as Jose Bowen and Renne Cox think of musical works as continually developing types informed by each performance and score. This way of thinking is appealing when considering changes made by the composer in later editions of the same work and editions that become the accepted norm. It also provides space for

understanding changing elements in works for music. For example, the cadenzas in Beethoven's Piano Concertos which are now rigorously edited in and rarely improvised in the modern concert hall; in stark contrast to the improvised nature of cadenzas in the contemporary concert hall. The theories themselves receive little merit or following as they *'fail for the reason that the work's identity does not derive from the set of its performances. We do not classify performances as of the same work merely in terms of their similarity'* (Davies, S 2001: 95). Davies is not willing to recognise that a work of music's accidental properties, which are created through a series of performances, begin to attribute themselves as essential to works of music. How many listeners who are familiar with the transcribed Beethoven cadenzas would permit a newly improvised version. It would go against the repeatability of the that section of the work of music that the listener now expects even though the performance would be obeying the original score and performance conventions. It is unrealistic to expect the average audience member to be able know about the change in convention and a mistake to assign approval only to those in the academy or deemed 'expert' enough; we will examine this in more detail later.

Peter Kivy writes extensively on the philosophy of music and argues for a strong form of platonism; he is one of Levinson's most dedicated critics. He attacks Levinson's claims about the centrality of creativity to an art work. *'It is, then, a gross exaggeration to suggest, as Levinson does , "that it is one of the most firmly entrenched of our beliefs concerning art." And it is just plain false that "the whole tradition of art assumes art is creative in the strict sense… The "tradition of art" did without this until barely two hundred years ago'* (Kivy, P 1993: 42). With the rejection of Levinson's creativity in composition Kivy moves toward composition being a process of discovery. This allows him to characterise works of music as universals or kinds, in the same way that Levinson regards sound structures and performance-means structures, which therefore makes works of music uncreatable and indestructible. Having rejected Levinson's intuition of creativity Kivy turns his attention to the inclusion of X and t in his formula for a work of music. Kivy writes: *'Our intuition here I think is firm, the pull of sound structure as a concrete identity criterion is too powerful for us to waver from it, far to paradoxical, at least for the musical mind, to think of disputes over authorship, or changes in the identity of the work - where, that is to say, the cases are real ones, and not philosophers nightmares'* (Kivy, P 1993: 63). Kivy is asserting that the

authorship of a work of music is not a contingent element. He argues that a piece of music thought to have been composed by one composer that is then known to be by another is still that same work of music.

Kivy remains determined to oppose the details of Levinson's theory of musical works. With regard to the two examples of identical sound structures in compositions given by Levinson, Schoenberg's Pireot Lunaire (1912) being composed by Richard Strauss in 1897 and a Symphony by Johann Stamitz (1717-1757) being written today, Kivy argues that the imagined compositions here '*are both wildly impossible, in the strongest sense of "impossible" short of logical impossibility*' (Kivy, P 1992: 64). Perhaps the use of the word impossible here is supposed to bring the reader around to Kivy's way of thinking. However, he is in fact saying that it is logically possible and therefore asserting that it is unlikely; a point that Levinson himself recognises. Whether or not these imagined identical compositions are unlikely, the possibility of them does raise the question of whether this changes the musical work. In Levinson's theory, the work would be a different work, as the X and t elements of his formula have been changed. What Kivy is arguing here, is that our intuition is more closely linked to a continuing identity from sound structure rather than source. He removes the composer and time of composition from what constitutes the work of music and argues that '*we "hear," in some sense very hard to pin down, "things" in [these works] now that we didn't "hear" there before, and we don't "hear" things that we used to "hear"*' (Kivy, P 1993: 63) when the composer or context of composition is changed. Once again Kivy argues that our intuition leads us to identify the work of music through its sound structure; not its composer or conditions of composition. It is arguable, though, that our performance practices, and therefore our intuitions in action, continually strive to determine a composer or at the very least a context of composition. It is hard to think that a performer would find an anonymous manuscript and not interrogate its origin or estimate its period of composition from musical clues in the score. The process of which informs the performer of the intended realisation of the piece that the composer has in mind.

To conclude his critique of Levinson's theory Kivy explores the difference between creating a work of music and discovering it. He uses the example of Mozart: *'As soon as these musical ideas popped into his head, Mozart dropped his cue and shouted "Eureka! I found it!" "Found what, my dear fellow?," the astounded Salieri asked . "The theme and counterpoint for the Allegro of the damned overture, old boy," Mozart replied.'* (Kivy, P 1992: 69). Kivy does not see any merit in attributing creativity to the process of composition. He is happy to discard creativity for discovery of musical works. Kivy's example here is compelling, and his later writing in his essay Mozart and Monotheism: *An essay in spurious aesthetics*, where he argues that Mozart hears entire works, fully orchestrated in his head, backs his argument for understanding composition as a process of discovery. However, there is something lost in this removal of creativity in music; something which performers have long been sufferers of in philosophical writings on music. It lowers the work of music making to the same level that the infinite monkey theory lowers the works of Shakespeare. This view of musical, and indeed literary, works removes aesthetic qualities from the works. Although it is generally agreed upon that sound structures are universals, viewing works of music in this way ignores the intention with which they were written. Experimental works of music which purely use chance still have compositional intentions behind them; surely this intention merits some consideration in the ontology of musical works. Composers that I have worked with have not displayed a process of discovery but rather a process of developing compositions and their wider creative practice. There is more to their work than discovering melodies that work or not and a process of continual refinement is more evident than eureka moments. Mozart's eureka moment itself seems to me to be more on this method of developing and creating compositions. There is an intentional creative aspect to their process, which can range from philosophical experimentation to representation of emotions for an intended performance. Their intention lies in the reception of their work; in making the musicians and audience feel, understand or experience something other than the pure sonic content of their composition. Kivy's argument here is flawed and supported with the use of a poor example: one we cannot verify the motivation in use of language and have to rely on letters that are hundreds of years old. He clearly takes this step in his thesis to further his attack on Levinson's thesis and to support his own; if musical works are created and not discovered his sonicist thesis begins to fail.

Julian Dodd is also a critic of Levinson's thesis of creativity in composition. However, rather than arguing where intuitions of creativity and discovery lay, Dodd relies upon philosophical logic pinning his critique on the jump in Levinson's argument in understanding the products of cake-bakers and house builders as the same as musical works. *'The thing that cake-bakers and house builders undeniably create are not types, but tokens'* (Dodd, J 2007:129). Musical works are categorised as types by Dodd, he spends two chapters exploring the type/token relationship and concludes that the discovery of musical works is attributed creativity in our discourse about it, due to it adding something to our world. *'Adding something to our culture is not a matter of creating something that did not exist before; it is placing something within our culture that was not there before'* (Dod, J 2007: 130). He uses examples of discovering the Niagara Falls or Tutankhamen's tomb as adding to our world and culture. Clearly in these instance there was a process of discovery that did not require creativity. Once again I feel that this conclusion fails to recognise the intentional creativity in composition. The Niagara Falls and Tutankhamen's tomb were not discovered with the intention of providing something that was to be listened to and interpreted by an audience; they were discovered on the course of expanding our geographical and historical knowledge. There is no end recipient or end goal beyond the discovery. The sonicist's argument can be followed to a point but Levinson's intuitions are still more convincing and better aligned with the discourse about composition. Moreover, Tutankhamen's tomb and the Niagara Falls are not types. Musical works are defined as types by Dodd, and they are so defined as there can be many instances (or tokens) of a work.

The 'Non-Static' Work Concept

Musical works have to be judged through our experience of them and any philosophical determinations about how they are categorised must be secondary to this. Musical Works are defined by time but also by society. It is a language game that we understand and that continually develops and changes. It is brought into existence through human creativity and is a shared social experience. The numerical approach to the essential properties of musical works is an attempt to elevate the score, or particular instant of the work above other iterations. The philosophers above wish to make the work of music stand still in a way that does not match our human experience of

music making. We can access works of music multiple times through performances, recordings and scores. This is enabled by our recognising of works and our knowledge about them. They have a causal link to the work's perceived creation. To reduce musical works to a numerical sound structure removes the work from its social context with the only benefits being to attribute ownership and to retain power in the academy about what correct performance is. The argument that sound structures constitute the musical work, whether in performances or scores, quickly unravels when we consider the wide parameters that scores permit in terms of performance directions.

Essential properties are not the whole numerical sound structure as this is never accurately realised. Correctness and success of performance is judged by audience members and musicians through their evaluation of the social ritual of performance. It is a performance of a particular work, if it was intended so and successful enough for the audience to determine what was being instantiated. When a statue decays or is damaged it does not cease to be that work of art. It is still recognisable or known as the art object even though it is no longer whole. Musical works are the same, they change and develop throughout time due to their changing social use and associated meaning collecting accidental properties which can effect not only musical meaning but the sound structure itself.

Authentic Performance

It is important to consider the role of authentic performance practices largely due to the second case study which will centre on the opera *Alcina* by Handel. The authentic performance movement in music expanded rapidly in the second half of the last century. It has been a hugely successful branch of music due to the shared exploration of music of the past (particularly Early Music) between the academy, where Historical Musicologists have become skilled archeologists in exploring music of bygone eras, and an exciting and talented generation of performers who have engaged audiences using this research to inform or even lead their interpretative style. It is thanks to the vast body of studies and performances by musicians across Europe and America that we have a number of ensembles performing pieces of music which have remained unheard

for hundreds of years and indeed the rise of the number of orchestras playing with the instruments, or replicating the type of instruments, that these works were composed for.

Ultra-conservative philosophers, namely those following the nominalist theory of musical works, would claim that there is only one, ideal, and 'correct' performance of a work of music. Strictly adhering to the score is paramount but alone not sufficient. Authentic performance goes far beyond realising the notes on the score, indeed often the score is removed from its pedestal in favour of contemporary performance practices. Instead of aiming for a performance of Goodman's idealised score, the authentic movement instead moves toward an idealised or true performance; this is usually characterised as the first performance, or more often, how the composer envisaged the first performance in their head (particularly if the premier was ill received). Current writers on interpretation in music tend to accept either a multiplicity of instances of a work of music or at the least, confess that the original imagined or performed ideal performance is gone and remains only in the past. Michael Kraus argues that '*works of music characteristically admit a multiplicity of ideally admissible interpretations and that he who requires that there must be a single right interpretation of musical scores as classically construed will do violence to musical interpretative practice*' (Krausz, M 1993: 75). Even upon the surrendering of this monistic view, many conservative philosophers and musicologists continue to prevail toward a perfect or ideal interpretation for an authentic performance where staying true to the composer and score is paramount, even at the expense of creativity and enjoyment.

In Peter Kivy's book *Music Language and Cognition* he establishes four ways in *'which musical performance might plausibly be described as "authentic"'* (Kivy, P 2007: 97): authenticity of intention, authenticity of sound, authenticity of practice and personal authenticity or originality. Surely a truly authentic performance must meet all of these conditions. We can combine authenticity of sound and authenticity of practice, as the sound of a piece would change if the performance practice changed; these two approaches lead to the same result.

A truly authentic performance must meet three conditions: firstly, it must be an exact acoustic replica of the sound structure found in the original performance or the original intended performance. This means that the instrument(s) must be original, and the ornamentation, dynamics, tempo and phrasing and tuning must all match what was originally performed. Christopher Small would insist that the venue be the same and that there be no modern additions to the setup of the venue through technology; even technology not used in the performance (i.e. air conditioning or lighting) (Small, C 1998: 91). Secondly, the intention behind the performance of the music must be the same, meaning that if we were performing Purcell's Funeral Music for Queen Mary it would need to be performed at a funeral, and the funeral of Queen Mary herself. Moreover, the intention that the performer plays with would originally be to realise the work to the standards and conventions of the day and enable the music to achieve its intended social function. Thirdly, the engagement with the music by performers and by the audience must be undertaken with musical hearing that matches that of the time of the first performance. We cannot listen to Beethoven's 9th Symphony in the same way that the first audience did simply because we have heard music far past that time and some of the melodic, harmonic and indeed structural ideas are not new to us in the way that they were to the contemporary audience.

All three of the conditions for an authentic performance are impossible to achieve. One could collect all the necessary information to attempt an acoustic replica, especially with the spread of authenticity into later music where one is able to listen to original performances, but even if performers did manage to replicate the performance, their intentions would simply be to replicate, which was not the original intention. We are therefore left with no authentic performances. Instead, we now have an array of literature about performance conventions of different eras and localities which we can use to perform in a historically informed way; not an authentic way.

Conservative view

Musicologists and academicians have always been obsessed with playing notes and rhythms correctly rather than interpreting the music. The performer must play every note correctly, act on every dynamic, articulation and phrasing mark. The instrumentation that is specified in the score

must be used. This style of interpretation would be supported by Nelson Goodman and Beardsley who claim that performances are only of that work of music if the sound structure in the performance matches that of the score, anything different or missing would mean that the performance was not of that work. Beardsley writes *'the moment the performer begins to use his own ideas he has abandoned the task of interpretation'* (Kivy, P 2007: 116). It is not only the intention of using ideas that is under fire here, Goodman goes further *'notorious[ly] claim[ing] that a performance with even one misplayed note is not a performance of the work'* (Kivy, P 2007: 129). Goodman goes as far as to challenge non-musical noises heard during performance claiming that they would detract from the work.

Approaching the musical score in this way can work for music of the romantic, and later, periods but falters with music earlier periods. It is well known that music of the baroque period featured ornamentation and improvised sections that are not notated in the score. Music, generally speaking, was a more localised affair which meant that composers only needed to write the bare bones of their compositions down; the performers themselves would know which ornamentation and improvisation was appropriate to that composer and geographical location. Musical works that did travel far from where they were composed would probably not retain these embellishments. Instead, performers would use the performance practice that they knew and that the audiences expected. This changing of interpretative styles in the same period but different geographical locations is an area of historical musicology that takes a lot of research and even guess work. For example, transcribing music from the thirteenth century requires a mastery of mensural notation but also a great depth of knowledge about medieval harmony and polyphony. Moreover, in the transcriptions for mass settings one has to be careful of the geographical location of the composition and usually guess which chant or indeed chants match the service they were intended for. These aspects of knowledge can help to inform musicians on the interpretative decisions that they make. Music from other geographical or historical contexts pose an extra challenge for musicians as they have to decide how much to rely on current performance practices and the notation provided and balance those against a work's original performance conventions and the research that can underpin a more historically informed interpretation.

The liberal view

Influential writers such as Stephen Davies support a more liberal connection between the score and the performance. His approach to philosophy in general stems from a more a priori style. Davies humanises the performer and audience putting trust in them that they can recognise mistakes and overlook them, still recognising the work as admissible. Davies begins to diminish the authority of the score in its entirety claiming that '*not everything in the score has the force of a work-determinative instruction, and some essential elements not registered in the score are implicit in the performance practice*' (Davies, S 2001: 4-5). It is clear through his discourse that he is referring both to the performance practice contemporary to the composition and to the expected conventions of the modern concert hall. Davies continues to develop his theory of admissible interpretations in determining thick and thin constituent properties of musical works. By doing this, it becomes unclear where the line is to be drawn between a performance being of a work and of something else. He leaves the conclusion of this for the audience to determine. This could mean that instructions in the score are ignored, or a different instrumentation or articulation is used and a performance is still admissible.

Ethics

J. O. Urmson's essay *The Ethics of Musical Performance* (1993) which outlines the ethical decisions and obligations that performers face. Most of the writings on the work concept focus on the relationship between the score and its realisation. It is clear that the performer has an obligation to the score first and foremost in the classical tradition, as it is the connecting element between composer and performer. Performers are also viewed to have have moral obligations to the composer whether they are known, or not, as well as the contemporary performance conventions..

However, Urmson highlights the obligation that performers have to their audience, he writes: '*If, as is customary, the performer, or his agent, has published a proposed program, the performer*

seems to be in a quasi-contractual situation in relation to the audience of a commercial kind to deliver, or a consideration, the program promised' (Krausz, M 1993: 160). This means that the performer need not simply consider the score, the composer and the contemporary performance conventions but the current performance expectations of the concert hall or other performance venue. Urmson continues, saying, '*Morally, no performer is likely to deny that he has a duty to his paying audience; the problem is to decide just what that duty is*' (Krausz, M 1993: 160). Simply performing the notes on the page in the way they have been played before is not enough, audiences demand something different, exciting and new in a realisation of a work; creativity from the performer. The diversity of interpretations that top conductors deliver is testament to that. The majority of audiences want to experience the creativity that performers put into their performances rather than hearing a reproduction of what has gone before. The more informed an audience is about contemporary performance practice, the conditions of composition or postulated meaning of a work, and the level of knowledge that can be channeled with the use of program notes, the more particular the audiences expectations are. The way in which performances are advertised often give a prospective audience member a clue about the experience they would have. This can be deduced by knowing the orchestra, performer, or director's name and reputation, to the listing of the works themselves.

Philosophers who focus on the ontological categorising of musical works, as we have discussed above, would overwhelmingly claim that a perfect (or near perfect) execution of its sound structure would be the best performance of a work. However, those that work in music performance, and those who make up audiences, know that an accurate and careful rendition of a work of music can seem neat, clean and altogether boring and unsatisfying. Music lovers prefer an exciting, vibrant interpretation that takes risks, and for this they would be willing to forgive some inaccuracies or interpretative decisions that do not match their own preferences. Urmson takes a gentler approach to this argument in his investigation of performance ethics. '*For a long period in the nineteenth and earlier twentieth centuries a transverse flute was always, and inevitably, substituted for the recorder, since recorders and recorder players were not available. Is it legitimate nowadays to represent a performance with transverse flute substituted for*

recorder…?' (Krauz, M 1993: 157). Is it best here to adhere to the original instrumentation, at what some musicologist would claim is at the expense of balance? Or would it be better to substitute the the recorder to enable the audience better insight into the sound structure of the work through a better balanced performance. The performer has an obligation to follow the composer's instructions, but this can sometimes be at the expense of giving the best performance to an audience; another of the performer's obligations. Adhering to the composer's instructions would mean that performers would have to use the indicated instrumentation, pure sonicists and nominalists such as Goodman would insist on this. However, there are what Davies refers to as timbral sonicists who *'accept a work's tone colour as part of its sound structure and crucial to its identity, yet denies that the work's instrumentation is essential to it'* (Davies, S 2001: 64). The idea that we are battling here is that there is only one single 'best' interpretation of a work of music; a theory supported by sonicists and nominalists. Davies argues differently, he accepts that there is a multiplicity of correct interpretations for a work of music. He *argues this claiming that 'the irremediable and incompleteness of notation means there is no way composers can specify all the detail of what they want'* (Davies, S 2001: 93). Essentially, Davies centres his argument around the weakness in notation. The performer is left with the job of completing the musical work in the instance of their performance as the notation itself is not sufficient and it requires intention and creativity to be instantiated.

Davies creates the theory that works of music *'can be 'thick' or 'thin' in their constitutive properties. If it is thin, the work's determinative properties are comparatively few in number and most of the qualities of a performance are aspects of the performers interpretation, not the work as such'* (Davies, S 2001: 20). Forming a spectrum of strong to weak features of musical works Davies is centring his theory around listeners being able to recognise pieces through successive performances. He continues *'Moreover, not everything recorded in the score is work constitutive and there is no way anybody can tell what is essential and what is contingent, except through educated guesswork known as interpretation'* (Davies, S 2001: 93). Davies' theory of musical interpretation is refreshing, as it breathes freedom into the work of performers and begins to recognise the social role of music and that a performance's permissibility and approval is the job of audiences. Essentially it is the audience's ability to recognise a performance to be a work of

music that is important, not simply accurate execution of sound structure or rigid focus on performance practice. Permitting a multiplicity of interpretations allows performers to be more innovative and creative with the works that they perform. It also helps to ground musical works that have seen development over time. The legends attached to Vatican performances of Allegri's *Miserere (C.1630)* point to a musical composition that has a number of different sources. Mozart provided a score from when he visited the Vatican and later Mendelssohn provides a score that features a different chant and amendments to some of the harmonies. There is no definitive Allegri's *Miserere,* it is shaped and conditioned by performances and listeners and coded into notation. There are certainly features in each version that are considered constitutive elements of that particular work. Davies' thick and thin elements also provide a theory of musical works that stands more securely when challenged with the works of other genres. In the example of Gershwin's Summertime there are elements of melody and harmony that are essential properties and which therefore feature in all performances. This view is also supported by Goran Hermeren 'the musicians and conductor, however, interpret the score (which always leaves a great deal of freedom to the interpreter and hence can be played several different ways).' (Krauz, M 1993: 14).

Success in performance

Another important point made by Davies is that performance is predicated on the notion of success. *'One can aim to perform a piece and bring it off, but one can aim to perform a piece and fail in the attempt… success is a threshold notion allowing of degrees. We distinguish between good and bad performances, and do so with reference to the accuracy with which the composer's work indications are met, as well as the interpretation offered'* (Davies, S 2001: 153). Allowing multiple interpretations of work could be a slippery slope towards performers being able to claim that any performance is a performance of a certain work. Davies is safeguarding against that here, and uses an overview of our discourse around performance to back it up. It is true that performances of works can be described as 'great,' bad,' or 'terrible,' and often these types of description derive from a personal reaction to a performance rather than a factual one. However, when a work of music struggles of fails to provide the constitutive elements then it begins to fail. Robert Martin writes that *'Performances of musical works are governed by rules of correctness.*

Listeners realize that performances can contain mistakes; they assume that such rules are known by the experts in the performers world, and that these rules have to with compliance with the composer's instructions' (Krauz, M 1993: 122). A problem then arises of when a performance fails to be a instance of a particular work. James Ross takes the hard line that *'only insiders know how much wind it takes to fill the trombone before any sound emits, and how long one breath can sustain a certain volume and pitch, and what clarinet and oboe fortissimos alone sound like. With practicing membership, one lacks a cognitive basis for informed judgement; one is an outsider to the circle of informed evaluation'* (Krauz, M 1993: 96). Ross believes that only musicians on the inside of performances can determine when a performance of a work has failed. This conclusion would mean that I would be a better judge of a work composed for viola, than any listener that cannot play the viola; even if I did not know that particular work and they did. The second half of Ross' conclusion is more convincing when separated out from the previous quote. *'We avoid a vicious hermeneutical circle by initiation: novice, probation, auction, and competition, evaluated by group-acknowledgement of accomplishment (e.g. by customs ranging from applause, graduation, prizes and laurels, to respect and deference, even awe)'* (Krauz, M 1993: 97). It is in social affirmation that correctness in music is established. However, this characterisation by Ross perpetuates the authority of establishments and the people conferred by them. Instead, it should be the audiences of the performances that retain the right to judge performances; regardless of their education. This makes the task undertaken by the performer more achievable and the conflicting constraints of performance ethics slightly easier by focusing them toward the audience that is present. Music after all, is a social act.

Rather than relying on social affirmation in the way that Ross and Martin do, Davies defines the following three conditions for a performance of a work: '*(1) the performance matches the work's content, more or less; (2) the performers intend to follow most of the instructions specifying the work, whoever wrote them; and (3) a robust causal chain runs from the performance to the work's creation*' (Davies, S 2001: 196-197). This causal chain can be present without the performer knowing the whole of the chain; we need not know where the work came from.

The philosophy of musical works and their interpretation suffers from a dominance of the classical genre. This dominance has been fostered by the musical establishment who wish to retain the power to decide what performances are worthy and which are not. Slowly but surely the discipline as a whole is coming to the conclusion that music is social ritual and that the definition of correctness is defined by audiences, performers, musicologist and all who partake in music making.

With critics continually predicting the death of classical music, it is time performers review or consider their own philosophies of music and establish whether the hold that the academy still has over 'correct' performance practices and the limitations that this causes for those who wish to be considered 'serious musicians' by the so-called musical elite. I do not believe that this is what classical music lovers want and there are small changes happening to the way live classical music is consumed that indicate a shift closer to performers making musical works their 'own' and a break away from various rule systems that have developed in recent decades. Moreover, although composers can rarely predict the popularity of their works, they want their compositions played and that the performances should be varied and exciting; engaging with a work of music should be approached as a creative collaboration with a composer not an exercise in obedience and mechanical reproduction. It is also vital to remember that composers are aware of the changing performance practices in their lifetime and of the music before their compositions (many of them being performers also); they surely expect the interpretation of their music to change in the future, and this is the price they pay for their works living on. In all, the performer has the obligation to give the best performance they can and it is here where performers have to decide where the weighting on musical performance ethics lay.

Conclusions

In this chapter we have surveyed the philosophical debates that surround the work concept in music. This is a vital step in formation of the philosophical foundations of the musical communication model. The music, be it improvised or contained in a score, is the central focus of ensemble music making. How musicians relate to the work they are performing determined

through performance conventions which stem from philosophical thinking about essential and accidental properties of a work and ethical considerations.

Part of the issue with the philosophical musings that we have surveyed is that they attempt to denote an overarching theory of how the musical work concept operates. In the context of the staunch philosophical logic and the positivistic attraction of the score through numerical dissection, it is easy to forget the roles that are undertaken by those who interact with the music. Creativity is readily attributed to the process of composition, often at the expense of valuing the performer's creative input.

An aspect of Davies' theory that is most admirable is his insistence that the performer makes a *'significant creative contribution in delivering a work'* (Davies 2001:22). This is the driving force behind my agreement with there being a multiplicity of admissible instances and that a work of music is non-static; it changes and develops through the different contexts that it is instantiated in. Classical music is a social ritual and admissible performances should be decided by those involved in the music making. There are many properties of a work of music, a piece's entire performance history, its composition and its use in society help to colour its character and attribute meaning. It is the role of the musician(s) to ascertain which of these properties are essential to their interpretation. Informed research, creative performing decisions and considerations of editions to a score are the starting point of this. Musicians must also consider their audience and wider ethical considerations when making interpretative decisions.

A shift to a more exciting and innovative classical music scene lies in challenging the performers of today and the performers of tomorrow on their philosophical outlooks and options in interpretation of works in an even more liberal way than Davies allows. Representing these aspects of music-making within the model of communication, by ensuring that there is an interpretative framework, will ensure that musicians who use the model fully consider their role. Perhaps this will unchain and reinvigorate classical music for future generations in the same way that challenges to concert dress have invigorated both performer's creativity and audience choice. To decipher where the line should be drawn on admissible performances it is useful to explore the ethical challenges that the performer faces.

Methodology

This thesis employs a combination of musicological and ethnographic research methods to provide an insight into the communication in ensemble settings and the changes in interpretation that occur in rehearsals and performance. Research will be conducted using Grounded Theory as the methodological basis to enable the development of a new musical communication model and interpretation framework.

Building on questions raised in the surveys of current models described in the first two chapters of this thesis, the following research questions have been developed:

How does an ensemble communicate during a developing interpretation of a score?

What are the modes of communication?

- What is the role of verbal communication in ensemble rehearsals?
- How do ensemble musicians communicate non-verbally?
- Can we derive data through case studies that will tell us about group dynamics and leadership roles between instrumentalists?

How does interpretation develop and what can studying this tell us about the nature of the musical work?

- How are changes in interpretation negotiated?
- Do we respond to direction more accurately in the short term?
- Does the group entrain more closely as the work becomes more familiar?
- How do ensembles problem solve in rehearsal and performance?

Rather than testing a preexisting theory, the aim of this study is to develop a communication model with its roots being in empirical observation of musical ensembles; rather than applying

linguistic models as in previous work. Developing the new model from empirical data will ensure that its creation is rooted in the observation of what musicians are doing, rather than the theorising and reapplication of existing models from other disciplines.

Methods were shaped by the need to answer the research questions and to choose an appropriate methodological approach for this study as a whole. It was clear that an inductive approach would be required that would allow for qualitative (analysing communication behaviour) but also quantitative (musical analytical tools) methods of data analysis. The approach to the fieldwork was ethnographic, performed through the case studies analysing the communication and developing interpretations of works in ensemble settings. Grounded Theory was chosen as the best way to develop theories and models from the dataset.

Grounded Theory

Grounded Theory was originally developed by two sociologists, Barney Glaser and Anselm Strauss. They were unhappy about the way in which existing theories dominated sociological research. They argued that researchers needed a method that would allow them to move from data to theory, so that new theories could emerge. Such theories would be specific to the context in which they had been developed. They would be '*grounded' in the data from which they had emerged rather than rely on analytical constructs, categories or variables from pre-existing theories. Grounded theory, therefore, was designed to open up a space for the development of new, contextualized theories*' (Willig, C 2013, 70). This approach met the needs of this study.

There are two main schools of thought in Grounded Theory which represent the divergence between the two original theorists. The general approach remains the same in both schools of thought with an open data collection followed by coding and memoing. Coding, the process of conceptual labelling, can then be used to develop an understanding of the data and to create a theory or model. '*While other methodologies using qualitative data are geared towards sharing participants' stories, experiences or perspectives, the aim of [Grounded Theory] is to develop a conceptual theory that explains participants' behaviour. Data analysis is therefore concerned with*

progressively raising the conceptual level from raw data to abstract, interconnected ideas' (Breckenridge, J 2014)

Grounded Theory has been used before in musical studies to understand participants' experience. Mace and Ward employed Grounded Theory to model the creative art making process (Mace, M., Ward, T 2002). Hohl employed the same methodology for modelling participants perception of immersive telematic artwork (Hohl, M 2009). Kiefer employed Grounded Theory in his thesis on multi-parametric interfaces for fine-grained control of digital music (Kiefer, C 2012). These studies primarily used Grounded Theory for the creation of models and theories through the analysis of interview data. Studies have employed the theory to analyse video footage, as this study will, to investigate leadership in trauma teams (Xiao, Y et.al. 2004) and performance analysis by soccer coaches (Groom, R et.al. 2011)

Following data collection, the method of analysis in Grounded Theory is used to code the video footage to analyse all modes of communication. This is the process of tagging observations of communication from the video footage in NVivo. This process is started with no pre-existing code, with the premise being that the data creates the code itself; known as open coding. The code becomes more defined when the nodes are grouped into cases as it develops, analysing the changes in interpretation to see the connection to the communication that has occurred. Each study in Grounded Theory has a slightly different process of analysis. *'The intent of a Grounded Theory study is to move beyond description and to generate or discover a theory, an abstract analytical schema of a process or action or interaction'* (Creswell J, 2007, 62–63). Here the process investigates the communication within the ensemble setting and how this correlates with a developing interpretation.

Memoing is an important pillar of Grounded Theory. In this study, the process of analysis, coding and writing were undertaken at the same time. The note keeping element of memoing for this project is therefore within the draft writing process of each of the case studies. It also resides in the field notes that were taken in the second case study.

One of the main challenges of using Grounded Theory is avoiding inductive bias. Dealing with the subjective nature of qualitative data requires users of Grounded Theory to ensure that they are aware of their bias so that they can ensure these do not skew the process of data analysis. In this project there is a fine balance between being an expert observer with 'insider-knowledge' and carrying preconceived concepts into the analytical and theorising processes.

Data Collection

The case studies for this thesis captured video and audio footage from rehearsals and performances. The selection of ensembles for this study was chosen primarily as they were accessible and to ensure that the process captured is a real-world example where the rehearsal and performances would occur regardless of the research project. The intention here is that the study will not be a laboratory experiment on communication but will view music-making in its natural setting, unaltered, apart from camera and researcher presence, by the research project. '*The phrase "in-the-wild" is becoming popular again in the field of human-computer interaction (HCI), describing approaches to HCI research and accounts of user experience phenomena that differ from those derived from other lab-based methods*' (Rogers, Y., Marshal, P 2017). Ensuring that the new model of communication is formed by observing real life music-making is essential as laboratory studies may change participant's behaviour and is moves the field of music performance research forward in a similar way as 'in-the-wild' has for HCI. Studies that operate in a controlled setting have been useful for isolating different aspects of musical communication, as discussed in the first chapter, but the model requires a more holistic view of music-making. Undertaking real world case studies for this project will ensure that the data capture and resulting methods are strong.

Cameras were used to capture multiple camera angles in both studies so that face, body and gestures of all participants in the ensemble could be analysed during the coding process. There was consideration of using motion capture technology, which would reveal more in-depth analysis of physical communication. However, this technology is expensive and was not readily available for the project. The analysis of video by viewing the footage multiple times gives enough

qualitative data for conclusions to be made. The data that would have been produced by motion capture technology would provide finer insight into musicians gestures, but for this study it was sufficient for the researcher, an experienced ensemble musician and conductor, to view footage repeatedly on screen for the coding process.

Individual lapel microphones were used in the second study to allow for closer study of individuals and entrainment using Sonic Visualiser. This would be too difficult for a 16-piece orchestra in the first study and would be impossible for the on-stage singers to be recorded in this way without heavily impacting the performance.

The most distinct difference between the two case studies was the changing role of the researcher. In the first case study, the researcher was also the conductor and therefore participant within the study. In the second case study, the researcher took the more traditional ethnographic role of informed observer.

Participating within the first case study was undertaken to give stronger insight into the inner workings of the ensemble. It could be viewed that the dual role of researcher and participant could lead to a distorted, or one-sided, view of the workings of the ensemble. This was managed by separating the two roles as much as possible. During the rehearsals and performances in the first case study, the only researcher duties were to ensure that the cameras captured the session. The setup and recording of the sessions, which was completed well before the start of the sessions was the only researcher duty. There is a short amount of time on each capture before the music-making occurs and during the performances the pressure on the participant role of conductor is substantial. In other studies, there could be the potential for the behaviour of a researcher participant to change due to the knowledge of the project. However, the coding did not occur until a few weeks after all the first case study data was captured, allowing for the researcher to be more objective. The role during the data capture left no time for consideration of future analysis or the research project as a whole.

The researcher as observer role undertaken in the second case study is the same as Amanda Bayley's to the Kreutzer Quartet, in her research into the composer-performer relationship. '*As an*

experienced viola player in string quartets, as well as larger chamber music ensembles and orchestras, I write as outsider with an insider's knowledge' (Bayley, A 2011: 388). As a conductor of choirs and opera, as well as other ensembles, the role of observer here is undertaken with 'insider's knowledge'. Bringing this experience to the observer role allows for detailed understanding of the communication that is occurring and how it relates to the rehearsal process. It also carries with it the risk of bias which has been mitigated by being conscious of it during the coding process and ensuring that the initial code includes all observations not just those posited to be meaningful.

Data Analysis

CODING

NVivo[10] was used to code the video footage for each case study following a Grounded Theory approach. The coding focused on the communication occurring in the rehearsals and performances. With the intention that the first case study would initiate the code which would then be further developed in the context of the second case study. The study is therefore cross-sectional with each case study developing the same code, for the same theory. Each case study can be viewed as individual interviews would be in other cross-sectional Grounded Theory studies study (Hadley, G 2017). Video Coding was used to select areas for further interrogation and in conjunction with discourse analysis to form a rich view of the communication occurring in each case study.

To analyse the changes in interpretation that correspond to the density in coding and communication observed, Sonic Visualiser was utilised to give a detailed analysis of the changes in tempo. *'It embodies a number of concepts which are intended to improve interaction with audio data and features, most notably with respect to the representation of time-synchronous information'* (Cannam, M., et.al. 2006). The process for marking the onsets for tempo analysis followed the method taught at the Interpersonal Entrainment in Music Performance (IEMP). The

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[10] NVivo is a qualitative data analysis computer program where files can be tagged and coded.

IEMP conference at Durham University in 2017 outlined the computational tools that are available for this type of analysis. The manual method of slowing the playback speed to insert instant markers to create annotation layers was taught at this conference. The annotation layers then produce numerical data which can be used to view changes in tempo.

The individual microphone recordings in case study two go further with this technique to gain insight on how the group entrains. For this level of detail, it was necessary to sample sections of the rehearsals. The reasons for selection were driven by the density of coding in the videos which then matched changes in interpretation to when heightened communication is occurring. Further Audio Analysis was undertaken by repeated listening to recordings and comparison between repeated material to see changes in articulation, dynamics and phrasing.

AUDIO ANALYSIS

To track the changes in interpretation both case studies the audio was analysed through repeated listening and by using the Queen Mary University's Sonic Visualiser to accurately mark beats. This method was taught at the Interpersonal Entrainment in Music Performance conference held in Durham in March 2017. It allows for accurate time markers to be placed and then for the changes in tempo, togetherness and entrainment to be determined by entering this data into Numbers. Entrainment data was only available for the Polaris Case Study as this requires individual lapel mics to be used on each member of the ensemble. Viewing the spectrogram helped to aid marking of musicians onsets but most markings were achieved by repeated listening and by slowing down the playback function in the Sonic Visualiser. Expert repeated listening was then used to ascertain changes in dynamics and articulation.

DISCOURSE ANALYSIS

Discourse analysis was undertaken in the second case study to code the transcript which showed the different types of comments that were being made by the musicians. This followed a similar method of discourse analysis to that of Dan Stowell et. al. (Stowell, D., et.al 2008: 3.2). They argue that discourse analysis's '*strength comes from using a structured method which can take apart the language used in discourses (e.g. interviews, written works) and elucidate the connections and*

71

implications contained within, while remaining faithful to the content of the original text (Stowell, D et.al. 2008: 3.2). They present a five-step process: transcription, free association, itemisation (coding of transcribed data), reconstruction of the described world, and examining context. In the second case study the same process was followed apart from reconstructing the described world as the meaning was examined through the context of the rehearsal. The analysis of the type of comments were then followed by investigating impact through analysis of proceeding and preceding musical material to reveal whether discussions are reflected by changes in the interpretation presented.

Amanda Bayley follows a similar approach of coding the transcript and presents discourse analysis data in her research into the string quartet rehearsal process (Bayley, A 2011: 393). Bayley combines coding of the discourse by the participant with her field notes to provide insight into the types of discussions between ensemble members, and how these relate to the rehearsal. In this she presents numerical data which reveals the amount of time spent on discussions on: musicking, chit-chat, humour, context, notion, technique, sound quality and coordination. This is then matched against the time spent playing, which was the most totalling at 41% of the rehearsal time (Bayley, A 2011: 395). Bayley also creates a useful comparative table comparing her categorisations to those of Davidson and Good's in their study of student string quartets: social conversation, nonverbal social interaction, musical conversations, nonverbal musical interactions and musical interactions (Bayley 2011: 393). The categories determined in this study came from the code developed though Grounded Theory.

LIMITATIONS AND POTENTIAL ISSUES

Ideally, case studies would include professional groups as well as amateur groups to give a wider spectrum of music making, however, the study was limited to finding willing ensembles that were available at the right time for the fieldwork to occur.

There are also limitations to the size of this study. Development of a new communication model would benefit from more case studies than are possible to undertake within the scope of this project, so there remains the need for further testing and refinement. The Communication model

is a new theory derived from the case study data, it can now be explored by other researchers and be further refined.

ETHICAL CONSIDERATIONS

The fieldworks for this thesis received ethical approval from the University of Sussex Ethics Committee. All appropriate risk assessments and consents were completed before fieldwork took place[11]. Participation in the study was voluntary and every person was informed of their right to withdraw. Consideration was given to participant's right to privacy, however, the nature of ensemble case studies means that it is often easy to identify participants. This is further complicated by the presenting of videos for future research use and in this study. Permissions were obtained from all persons involved in the study. The permission agreements explained that the participants may be identified in the writing up of the thesis and obtained permission to publicly use the video footage.

It was agreed that a final copy of the thesis would be made available to all participants. Through the analysis in the case studies judgements on participants communicative behaviour and musical accuracy in performances and rehearsals has been made. These have been stated factually and within the analytical context of the research questions. No personal judgements have been made.

It is unlikely that participants will be affected by the analysis undertaken in this study. It may be that receiving the thesis as means of report could help participants reflect on their own practice and that of others .

All research for this thesis has been conducted within the University of Sussex's *Code of Practice for Researchers.*

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[11] Consent forms can be found in Appendix 4.2

Alcina Case Study
Opera Alumnus Alcina Project

Sociocultural and physical contexts

Opera Alumnus was founded in 2014 with the aim of providing a professional performance platform for early career opera singers. Its core aims are to:

- Bring together the best early career opera singers in the South of England to perform operas in English.
- Bring new compositions, librettos and exciting productions to audiences.
- Enable emerging performers to work at the highest possible standards.

Alcina, composed by Handel in 1735, was Opera Alumnus' second opera project following on from a successful tour of Dido and Aeneas in 2014. It took place in St George's Church, Kemptown, Brighton, 17th-19th of November 2016. Saskia Wesnigk-Wood was the Stage Director and undertook to write a new libretto in English for this production I am the Company Director and Musical Director for this Alcina project.

The original story and setting of the opera was changed by the Stage Director to be set in Mexico in the 1960's with the use of magic being replaced with poisoning with magic mushrooms. Character names were also changed to match this setting.

Synopsis: Mary-Betsy and the Professor arrive at Alcina's café searching for her fiancé, Bernard, who has been hiding in Mexico to avoid the draft. He is now addicted to the drugs that the 'witches' Alcina and Morgana have been feeding him. The story unfolds that Bernard no longer remembers who he is and that the professor needs to know which drugs have been used to find an antidote. The relationships between the characters are explored throughout with two love stories and a love triangle playing out. As with the original opera, this version of Alcina culminated in a busy scene where all characters confront each other with the truth revealed.

Seven early career opera singers were engaged for the project and paid with a fee and project profit share.

Alcina - Christine Cunnold (Soprano)

Morgana - Jessica Wise (Soprano)

Mary-Betsy - Emma Lewis (Mezzo Soprano)

Bernard - Alexander Pullinger (Counter Tenor)

Hubert - Lindsay Thompson (Mezzo Soprano)

Professor Jacob-Ross - Andrew Robinson (Baritone)

Oronte - Paul Doling (Tenor)

Singers were auditioned during the summer of 2016; all were early career opera singers; most of whom hold Masters in Opera Studies from a UK Conservatoire. In addition to this, two extra cast members joined the cast, Patrick Gallagher and Andrew Wesby, as actors but not singers. The project also engaged with Brighton City College students who provided makeup and Clifford Dowding and Andrew Wesby as Lighting and Set Designers respectively.

The orchestral musicians were all paid, and made up of a mix of professional musicians, music students and competent amateurs from the local area. Rehearsals for the cast ran from the start of October 2016 for six weeks. The orchestra joined these rehearsals in the last week for the Sitzprobe and dress rehearsal. The orchestra itself was made up of ten players:

Violin I - Richard Sutcliffe. (Experienced Amateur)

Violin II - Jennifer Stocker. (Student)

Viola - Amy Jeffrey. (Amateur)

Double Bass - Tim Loewendahl. (Experienced Amateur)

Bassoon - Matthew Roberts A - Dep. Hilary Ougham. (Experienced Amateur)

Harpsichord - Claire Harris. (Professional)

Oboe I - Gail Taylor. (Experienced Amateur)

Oboe II - Timothy Wilcox. (Experienced Amateur) - Dep. Poppy Hyde (Experienced Amatuer)

Flute I - Andrew Haughton (Amatuer)

Flute II - Harrison Bryans (Student)

This followed the Kalmus edition forces with the exception that the project failed to secure a cellist for the production due to lack of financial resources.

The mix of players were drawn from the Brighton area through contacts of the director. Whilst securing the players, many gave brief outlines of their experience, which enabled me to categorise them as either: professional, music student, experienced amateur and amateur. Professionals are full time musicians and music students were studying at the University of Sussex as undergraduates. The distinction between amateur and experienced amateur has been determined on the amount of orchestral experience, particularly in opera, that the players had.

With the rewriting of the libretto, sections of the original opera were cut and some were reordered. This leaves us with each section being considered below having two names. Firstly, that of the new English libretto and secondly, of the original Barenrieter Urtext. Each have different Act and Scene numbers, throughout I will refer to the new English libretto used for the project throughout.

This case study captured the three performances of Alcina as well as the two rehearsals that the orchestra were present for: the Sitzprobe (non staged rehearsal) and dress rehearsal. Video footage captured five hours of rehearsals and seven hours of performance (the first half of the second night of performance failed to capture).

Purpose of study

The purpose of this study is focused on the orchestral players and was designed to interrogate the channels of communication required in the ensemble and how these musicians negotiated their role in presenting an interpretation of the opera. An orchestra that convenes to accompany an opera production poses unique challenges. The orchestra as a whole has to accompany the cast, follow the direction of the conductor and play effectively as a group. This means that

musical cues come from various sources, such as the conductor, singers and other players in the orchestra. It also means that most of the musically interpretative decisions are already decided upon by the cast and director during the rehearsals period prior to the orchestra arriving on the project.

This study aims to investigate the processes involved in presenting an interpretation of a work of music and the communication that is required for this. In particular, this study focused on:

• The changes in interpretation and how these are negotiated.
• The verbal communication in ensemble rehearsals and investigating whether, as musicians, we respond to direction more accurately in the short term.
• Entrainment
• Forms of non-verbal communication
• Group dynamics and leadership roles between instrumentalists
• Problem solving in performance

Data collection

CAMERAS

The data for this project was mainly captured on video camera. A set of three cameras were used to film the orchestra from different angles. The diagram below shows the layout of the orchestra and these three cameras:
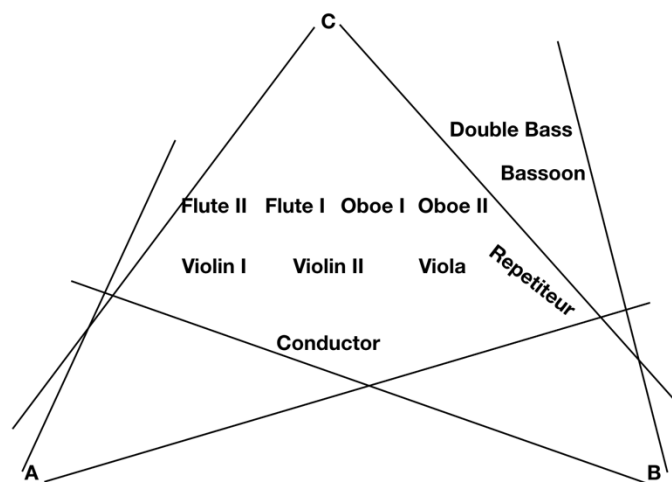
Figure 1:

Diagram showing layout of cameras.

The idea behind this camera placement was to capture the front of each player in the orchestra from camera A and B, and to capture the conductor on camera C. When each rehearsal was setup the chairs were laid out so that the players would be captured in this way and the performances were captured with a similar camera layout, although all the cameras had to be further way so as not to intrude on the audience's view. Camera A was moved the furthest up to a balcony on the left of the church which means the quality of the picture is poorer. Also, during the performances the players were not very well lit, with the focus of the lighting being on the stage. Music stand lights were used by all of the musicians and therefore the lighting of the orchestra area was not a priority. This poor level of lighting coupled with the distance of the cameras means that the picture quality can be very poor at times. This meant that more detailed video analysis, such as using tracking of movement software, was not possible.

As I conducted this opera, and was responsible for the project as a whole, the focus on data capture each evening had to come second to ensuring the show was well run. This caused two issues with the capturing of the orchestra on the cameras. Firstly, although cameras were checked carefully before the rehearsals, and musicians' chairs were carefully placed, some musicians ended up outside the view of the camera. This is particularly noticeable with the bassoonists that were at the dress rehearsal and for the double bass. Neither of these have clear

shots of the front of the player. The angle on the front of the repetiteur is also affected here but there is still a side video from Camera C. Secondly, in the Second Night performance, the cameras were not turned on for the first half meaning that there was no capturing of that part of the performance. This case study collected nearly thirteen hours of camera footage although some of that is the show intervals and setup and clearing of rehearsals.

Methodology

Once the rehearsals and performances were captured, the videos were downloaded from the cameras and loaded into NVivo for coding. There were some issues with the size of the files from the cameras, some being more than 4GB. NVivo and the storage limits on the computer meant that these videos had to be shrunk in size. This means that the quality of the picture again is lowered. Another issue with NVivo was not being able to display the three camera angles at the same time as had been planned. This means that the analysis and coding of the video had to be done on one camera angle, while viewing the two other angles outside of the program.

The coding of the videos began by creating nodes for any perceived communication or important event in the video. The following nodes were created and have developed four overarching categories:

Discourse:

Discussion Whole Orchestra

Discussion Desk Partner Flutes

Discussion Desk Partner Oboes

Discussion Desk Partner Strings

Verbal Instructions from Conductor

Visual:

Increased Body Movement (Head, Body, Foot Tapping)

Looking to Conductor

Flutes Looking to Desk Partner

Oboe Looking to Desk Partner

Strings Looking to Desk Partner

Conduct Gesture Ready

Leading Entry Movement

Flute I Leading Entry Movement

Flute II Leading Entry Movement

Oboe I Leading Entry Movement

Oboe II Leading Entry Movement

Bassoon Leading Entry Movement

Violin I Leading Entry Movement

Violin II Leading Entry Movement

Viola Leading Entry Movement

Double Bass Leading Entry Movement

Repetiteur Leading Entry Movement

Musical:

Timing Change (tempo)

Reacting to Singer

Reacting to Harpsichord

Conductor Demonstrates on Harpsichord

Violin Demonstrates

Bassoon Demonstrates

Conductor Sings

Violin I Sings

Flutes Rehearse (this is when they rehearse as a pair not when the main rehearsal is underway)

Oboes Rehearse (this is when they rehearse as a pair not when the main rehearsal is underway)

Strings Rehearse (this is when they rehearse as a pair not when the main rehearsal is underway)

Tuning

Issues:

Incorrect Entry

Rehearsal stopped

Flute I Mistake

Flute II Mistake

Oboe I Mistake

Oboe II Mistake

Bassoon Mistake

Violin I Mistake

Violin II Mistake

Viola Mistake

Double Bass Mistake

Repetiteur Mistake

Conductor Mistake

This coding was developed through watching the videos of the rehearsals and performances. The code developed throughout the first couple of videos and at the end of the analysis these were then recoded to ensure that all nodes were used throughout the data set.

Following this coding and categorisation, five sections of the opera were chosen to analyse in more detail: Overture, No One Has Held Me (duet aria Mary-Betsy and Bernard), My Little Beauty (aria Bernard), Kitchen scene (accompagnato and duet aria Alcina and Morgana) and But Know, How, My Love (aria Morgana). These were chosen due to coding density. Each of these sections was analysed using the Sonic Visualiser. The audio was separated from the video file and the onsets of each beat were marked in the Sonic Visualiser. This data was then imported into Numbers where graphs showing the changes in tempo and an accurate table of average tempos were created. The graphs are comprised of the timing in seconds and the bar and beat number. The average tempo was calculated by adding all of the beat lengths, in seconds, dividing by the total number of beats to find the average beat and then dividing 60 by that number to produce the beats per minute (BPM). These graphs and tables were then used to interrogate the coding from the videos.

The video coding and further analysis provides a detailed picture of how musicians are working together in the ensemble which will enable the development of the musical communication model to be on strong empirical evidence. All of the analysis tables and files, as well as all data for

project, are contained in Appendix 1 which is accessible on Zenodo. We will take each of the five sections listed above in turn to and discuss the coding, analyse the tempo changes and track any interesting features that arose in that section of music. This will then be linked back to analysing the communication that can be seen on camera providing a detailed analysis of the process of music-making.

Overture

The overture is played by the entire orchestra, with no singers. Although it is not originally scored for the flutes, they double the oboe part. It is the first item played in each rehearsal and performance.

VIDEO CODING

The Overture exhibits one of the most dense areas of coding of the entire project. Being the first piece the group plays in each rehearsal means that it is preceded by conversation, instructions from the director and intermittent practicing of the work by individuals and with desk partners. These mini rehearsals are chosen by flicking through the music and playing sections that look challenging. It is important to note that the desk partners at the start of the Sitzprobe, oboes and flutes, knew each other before the project; this behaviour may be less in groups where players do not know each other. Musicians that know each other may communicate less well; it is unknown whether this has any significant impact on the results of the study.

The coding demonstrates an increased amount of body movement across the ensemble in the slow section of the overture. In the wind instruments, there is an increased movement beyond what one would expect to see for breathing, on each half bar. Although, this movement is in time with and dictated by the double dotted rhythm. The ensemble does not hold the dotted crochets, in B1-2 for example, for their whole value. Instead the orchestra holds the dotted crochet for a crochet, breaths on the off beat and places the semi-quaver, or quaver before this has settled.

DOUBLE DOTTING RHYTHM

The first most noticeable musical negotiation that the ensemble makes in the Sitzprobe is the interpretation of the rhythm to be double dotted which often happens in baroque music. For example both quavers in B2 are played as semi quavers and the crochets become double dotted. It takes until B7 for this to settle and is negotiated by the whole ensemble. The Sitzprobe Double Dotting Table (Appendix 1.A.3) shows how this is negotiated and which players double dot either: the whole bar (Dotted), just the first crochet (Dotted at start), just the second crochet (Dotted at end). It also shows the bars where double dotting is not applicable due to the rhythm written. In all of the recordings of Alcina that I could find, only a handful do not double dot this rhythm throughout the first section of the overture. The instances where double dotting does not occur are when the overture is taken at a much slower tempo.

Interestingly, the Sitzprobe is the only rehearsal where double dotting and straight playing occurs. In the dress rehearsal and performances the whole ensemble double dots every bar. This is with the absence of any discussion on whether or not to double dot the rhythm one would postulate that the resolution to double dot came from four possible sources:

1. Negotiated by players in the Sitzprobe that would then be followed by players joining later in the rehearsal process
2. The director changing from playing with the ensemble to conducting provides gestures that confirm that this rhythm should be double dotted
3. Players who were not present at the Sitzprobe automatically double dot these rhythms.
4. Players who listened to the music between rehearsal (which many commented on having done) adopted the double dotting rhythm that was apparent in all recordings with similar tempo.

It is likely that it was a mix between these four reasons that caused the beginning of the dress rehearsal to have a clear interpretation of double dotting throughout the first section of the overture.

Let us first take, and analyse, the process of negotiating the double dotted rhythm that occurred in the Sitzprobe. It is interesting to note that the director, who plays piano for the Sitzprobe, does not assert this double dotting by playing it this way throughout the rehearsal. This would allow the ensemble to copy the rhythm of the director. The variation between the different rhythmic approaches in the director's column is clear. After not double dotting the first bar, the director then moves to clearly dotting the second and at least some of every bar that follows. Half of the ensemble react to this double dotting on the piano within the second bar. What then unfolds is a mixture of players double dotting rhythms and playing them as written. B7 is the first time that the whole ensemble plays and interprets this rhythm together.

It is interesting to note that without clear direction of how to interpret this rhythm that the ensemble begins to create a general rule. The bars marked NA in the table are bars where rhythms that could not be double dotted are present. With the exception of the bassoonist, all can see this in their parts. The rule that is developed is that a bar that could be double dotted that precedes another bar which could be double dotted is double dotted throughout whereas a bar that precedes a bar that could not be double dotted is double dotted at the beginning of the bar but not the end, creating a rhythmic lean into the next bar.

The anomaly to this rule is when the ensemble repeats the section. As with the first time through, the first bar is not played as a double dotted rhythm. The shift to double dotting the second bar is followed by everyone apart from the second oboe. By this stage the rule of only double dotting the first half of the bar that precede a bar that could not be double dotted is abandoned, as is also the case in the repeat of B5. This rule then resumes in B7-8 and B10-11 and is again abandoned in the repeat of B13.

It is clear that the ensemble is trying to play this rhythm together throughout and that the discrepancy between what is written on the page and what players will have heard in recordings is coming to the fore. With the conductor playing the piano, there is little evidence of the ensemble watching for gestures from the front; there is some clear movement of the director's head and occasional hand gesturers, however these are mostly to denote where the second and fourth beats of the bar are. In fact, throughout the whole project, this is the clearest display of the

ensemble moving together with there being increased body movement each time the overture is played.

Secondly, let us analyse the gestures made by the conductor in the dress rehearsal to see if this is denoting that all rhythms are to be double dotted. It is important to note that neither of the rehearsals saw a discussion about whether the rhythm should be double dotted and that the interpretation in the Sitzprobe was unclear, with what appeared to be negotiated rules being created and broken.

Figure 2:

Conductor's beat pattern in 4/4

From the first bar, the director makes the gestures for beats one and three much stronger than two and four which indicates a strong rhythmic focus towards those beats. This is achieved by making the gesture around the second beat smaller and slower and the journey to the third beat much quicker; similarly, in the third and fourth beats. The pattern is shown in Figure 2. In B2 the conductor makes a small subdivision before the third beat on the semiquaver that needs to be dotted. X is marked on Figure 3 to show where the subdivision occurs on the double dotted rhythm in the first half of the bar. This subdivision is the last semi-quaver of the beat and the diagram shows how much quicker the conductor's hand must move to denote the third beat of the bar. This subdivision is also present at the end of the fourth beat, this is denoted by the dotted line. The conductor stays on the motion between beats four and one but stops on the ascent in the centre, where the dotted line occurs, and then continues the remainder for the journey in the last semiquaver. The change between beating four beats with a weight on the first and third beat and actually gesturing a semiquaver is interchangeable throughout the rest of this section and its repeat with the conductor choosing to reinforce the interpretation at times.

Thirdly, let us consider the players that were not present at the Sitzprobe. It is not simply the addition of players that would enforce the double dotted rhythm. If this were the case, the double dotted rhythm would still be negotiated through the first few bars and the production of another table to display how this was negotiated would be possible. Instead, we must look at who these players are and their musical background. The additional players for the dress rehearsal were: double bass, repetiteur, violin II and the oboe II and bassoon deputies. The players fit into four categories: professional, music student, experienced amateur and amateur as stated above. The majority of players that join for the dress rehearsal are the more experienced amateurs and the professional repetiteur. It would be expected that these players would know the convention of double dotting rhythms.

Figure 3:
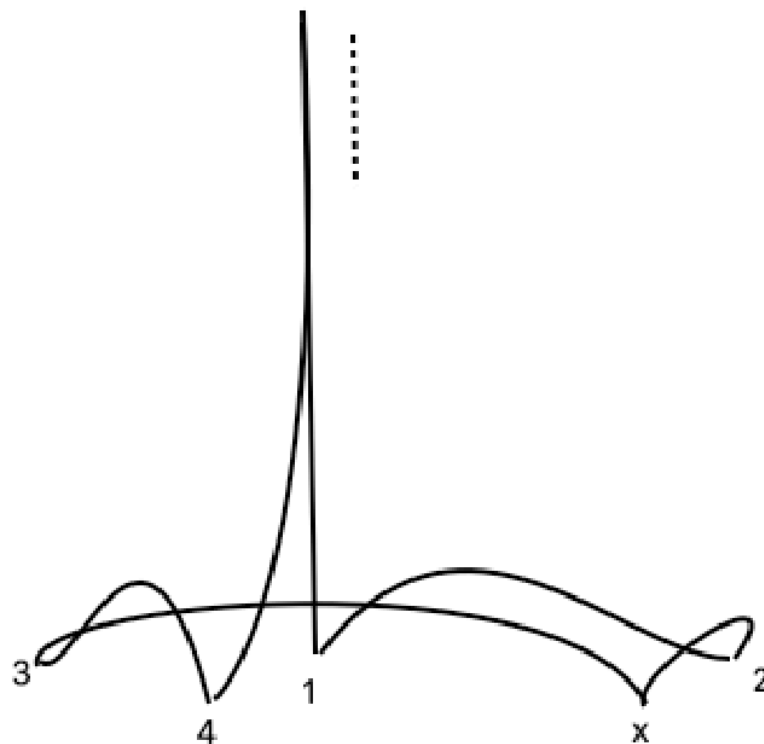
Conductor's beat pattern in 4/4 with double dotting subdivision gesture

Finally, the question remains as to why the players from the Sitzprobe no longer needed to negotiate the dotted rhythm. It is true that the conductor's gestures denote this as discussed above but this subdivision of the semiquaver did not occur until the second bar. From discussions with the players after rehearsals, it was clear that many of them were listening to different versions of the opera on YouTube and Spotify. The musicians' questioned which recordings would be good to listen to before the dress rehearsal but direction on listening was not sought by any players prior to the Sitzprobe. A quick listen through the first three pages of YouTube clips that include the Overture, shows that all bar three double dot this rhythm; the three that do not are at almost half the tempo that was taken in the Sitzprobe. The only recording on Spotify is very similar in tempo to the interpretation given in this project and also double dots this rhythm. It is very likely then that although the players did not fully negotiate the double dotted rhythm during the Sitzprobe, that the listing and practice that they undertook confirmed it. The more experienced players joining

undertook to follow the convention that they have played many times in baroque music meaning that there was no need for negotiating this rhythm. It is therefore vital to consider the impact that practicing and listening between rehearsals have on an interpretation and, most critically here, the power that easily accessible recordings can have on an ensemble's interpretation.

TEMPO

One of the key interpretative features in performing a work of music is determining the tempo that should be taken. This is especially true in earlier works of music where there are no tempo markings or beats per minute dictated. When humans play instruments live, it is impossible for this tempo to stay absolutely constant. It will fluctuate in solo performance to enable the performer to shape and phrase the music. In ensemble performance, the tactus has to be negotiated and kept collectively by the group. This can be initiated and driven by a leader or director but is often controlled by the principle of undertaking solo and accompanying roles in different sections which present within in a complex and fluid hierarchy.

In the case of the overture there is no clear tempo marking for the first section. The Barenreiter edition of the vocal score has no tempo direction in the overture apart from the marking of *allegro* in B17. The Kalmus edition, which was used for the orchestral parts and director's score is marked *Pomposa*. One could argue that the grandeur instructed here gives reason for a tempo not to be too fast or, indeed, too slow. The recordings of this work vary greatly from 60bpm to 90bpm. It is also a regular feature of baroque overture's first movements to have a slow section followed by a quick section before moving onto the dance sections; this denotes further a steady tempo in the first section of the overture to allow for the marked change to allegro when the second section begins in B17.

A clear measure that we can interrogate in this project is the stability of tempo during, and between, successive instances of movements. The table Overture Average Tempos (Appendix 1.A.2) shows the changes in average tempo in the rehearsals and performances in this project. It clearly shows that the speed at which the allegro is taken slows throughout the Sitzprobe, from 116.5bpm to 103.9bpm. In response to this, when the first section of the Overture is played again,

in the dress rehearsal, the tempo has been slowed presumably to ensure that the relationship between the now slower allegro and the first section is matched. The fourth column in this table shows the relationship between the two speeds. Initially the speed between the sections is 0.7. Once the tempo has slowed and settles between 100.4bpm and 108bpm this relationship has doubled to 1.4 It is clear that the original intention is for the overture as a whole to go quicker and that in bringing the ensemble together in the allegro, the pace is slowed overall and the first section tempo adjusted but within 10bpm so that the feel of it is not lost.

In the graphs provided in appendix 1.A.1 we can see that the tempo of each rehearsal and performance of the overture is relatively stable. In fact, the allegro in particular displays a very stable tempo and has very little evidence of bars rushing or slowing down. This means that the ensemble is not negotiating a slower pace of play but rather, each time the section is started the conductor decides that a slower pace is needed. The evidence that this is the decision being taken comes from the start of the allegro being the first place that the ensemble has issues with their entries. In the Sitzprobe, the bassoonist makes two entries a bar early at the start of the *allegro* and in the dress rehearsal the violist enters a bar early in the same section. From the table, we can see that each time the conductor restarts the allegro section of the overture it is at a slightly slower pace, dropping by 4bpm and 9bpm respectively. The steadier pace gives the players time to consider their entries and the conductor to direct them. It is also a reflection of the conductor responding to the capabilities and limitations of the ensemble. When arriving at a rehearsal the director will have an idea of the tempo, dynamics and articulation that they wish the ensemble to play in their head. This is inevitably adjusted to suit the capabilities of the performers, the acoustic of the room or the singer being accompanied. In this instance, the conductor is responding not only to the incorrect entries that have occurred but also the lack of accuracy with which the semiquavers come through. From listening to the false starts of the allegro it is clear that the synchronising of semiquavers becomes better with each slower repetition.

The following discourse occurred in the dress rehearsal after having played the overture through once, restarting the allegro once:

Conductor - Lovely, can we stick an echo bar in where two the bars repeat. Eleven, twelve, thirteen fourteen, yeah fourteen. Yeah fourteen is an echo of thirteen.

Bassoon - er, is this 30

Violin 1 - Yeah bar 30

Repetiteur - Its 35

Conductor - Yes its useful that you have bar numbers

Violin 1 - Have we got the same score

Conductor - It's the same edition it was bought with the same parts. It has no bar numbers, it doesn't have a line for the oboes just very small letters occasionally when the oboes play, you can imagine what I said in my email.

Singer - Fancy that.

Conductor- Yeah. No they told me they understand.

Bassoon - That was a mistake

Conductor - Shall we try it from the top again

(Orchestra plays Overture)

This is one of very few examples of verbal musical direction being given to the ensemble by the conductor. The request is to have an echo where the material is repeated in bar 30 (in the Barenreiter edition). Much of the conversation centres around establishing which bar is meant as the orchestral score had no bar numbers. What is worth investigating here is whether this echo is

established in the play through that followed in the Sitzprobe, and whether this remained for the successive performances.

All of the musicians made some kind of marking to demonstrate the requested echo of B29 in B30. This ranged from writing the work 'echo' to marking the bar 'p', sometimes this 'p' was followed by an 'f' to reinforce that just B30 should be quiet. It is clear from listening to the dress rehearsal's final play through of the overture, that B30 is played slightly quieter than B29; although there is not a huge contrast in dynamic. During both the performances that we have recordings of, the contrast in dynamic is slightly stronger than the dress rehearsal. Both of these are reinforced by the conductor gesturing in four with smaller movements for B30. In the first performance the direction to play more quietly arrives late from the conductor; making the smaller gesture on B30. For the third night the gesture is made to be smaller on b4 of B29. This is more effective conducting practice as it gives the ensemble a beat to react to the dynamic change. One would expect that this would result in there being a starker dynamic contrast than in the first performance. However, interestingly in this example, this is not the case. The dynamic contrast is pretty much the same in the two recorded performances. This would have to lead to a conclusion that the communication of the quieter dynamic was not clear from the conductor, or that the ensemble were not following the conductor closely at this point and that the change in dynamic came mainly from the notes that all had put in their music.

The overture presented an interesting process where the ensemble negotiates when to double dot the notated rhythm. There is some basis of this being reinforced by conducting gesture but it is also organic and is likely to stem from experience of the performing conventions by experienced players and by listening to the work prior to rehearsal. The navigation of the double dotting is quite complex and is negotiated quite quickly and with no discussion. The tempo of the overture slows throughout the first rehearsal which is a refection of the interpretation matching the technical capabilities of the ensemble. Interestingly, the relationship between the pomposa and allegro sections are maintained. This means that the slowing of the tempo to allow for technical ease in the allegro section also effects the preceding section as the performance convention dictates the relationship between the two. The echo effect that is requested by the conductor is also analysed and reveals that the instruction has immediate effect and is reinforced by players

marking their scores. The more stark gestures that are made by the conductor in performance do not result in much starker dynamic contrast which in itself makes a comment on the flexibility of the ensemble's interpretation in performance.

No One Has Held Me (Act II, Scene II - Aria Duet Bernard and Mary-Betsy) - Mi lusinga il dolce affetto (Act II Scene III - Aria 19. Ruggiero)

This aria is sung by Bernard and Mary-Betsy as a duet, although it was originally a solo aria for Bernard (Ruggiero). It is played by the oboes, strings, bassoon and repetiteur. It is a duet where Bernard remembers that he is in love with someone, but does not believe that Mary-Betsy is who she says she is. Mary-Betsy tries to convince Bernard that it is her.

CODING

This duet has dense coding largely due to the verbal communication that happens between the ensemble and conductor, and the singers and conductor. There are discussions around tempo and directions on articulation.

The No One Has Held Me Average Tempo Table (Appendix 1.B.1) shows that the speed of this duet is much faster in the Sitzprobe than in the following rehearsal and performances; this is by around 6-8bpm. The following discourse takes place in reference to the tempo after the first run to B33 during the Sitzprobe:

Conductor - Ok lets to do the Andante Larghetto

(Orchestra and Singers play from B1-B33)

Conductor - Lets just start this one again

Mary Betsy - It feels like it's driving a bit

Conductor - Yeah… We can't go much slower than we started it but we started to speed up and its really important that we don't let it run away. (To Bernard) Can you just sing that bar ah, ah, ah…

Orchestra Laughs

Mary Betsy - Yeah… (Sings B28-30)

Conductor - That's the bar, for the whole thing, that sets the tempo. She can't go that fast there.

Violin 1 - What bar number is that?

Conductor - You want to know what bar number that is? Ooh, erm 29?

Mary Betsy - Yeah in the Barenreiter it is.

Conductor - From the top again 1…2…

(Orchestra Plays from B1-B45)

The start of this discussion shows us that the singer feels that the tempo is driving, and that the conductor agrees but thinks that it started at the correct tempo. The graph for this first run (Appendix 1.B.1) supports this thinking. The first bar is longer than any in this first run and there is clear acceleration through the first three bars. This means that the tempo started by the conductor becomes faster by the second and third bar and the average thereafter is higher. This average is then lowered slightly when the second run occurs in the Sitzprobe with the average tempo falling from 50.85bpm to 47.25bpm. Once again, there is clear acceleration in the first three bars, however this time the average tempo is closer to that of the first bar. In this second run, there is a slowing through B7-9 and a rushing in B10-12. The reason for this is the change in singer. B7-9 is sung by Bernard who follows the tempo of the orchestra who are rushing slightly ahead of the conductor. B10-12 are sung by Mary-Betsy, she asserts her tempo on the ensemble

by not following the rushing and this results in the tempo slowing down. It is clear from the graph that the rest of the second run has a much steadier tempo. The third run, again, demonstrates a rushing of the first three bars, although this is steadier than before. A slight pulling of tempo occurs in B21-23 where the tempo rushes, again this is Bernard being driven by the orchestra, and slowing in B26 when there is a change of singer as before. This pattern in the Sitzprobe of rushing through the first three bars, and the evidence of Bernard rushing and then Mary-Besty slowing down the tempo, supports that the discourse that takes place is an accurate assessment of what is occurring; the orchestra is rushing through the quavers and the tempo set at the start is sped up.

The discussion also covers the reason for this slower tempo; it lies in the second half of B29 and B30. The dotted semiquaver and demisemiquaver requires time to be sung. From viewing the graphs it is clear that there is a slight drop in tempo into B30 in both of the performances and the third run of the Sitzprobe. This slowing could be a reaction to the singer, giving her space to sing the rhythm in the immediately preceding bars. However, one would expect the proceeding bars to remain at this tempo, but in each instance the proceeding bars are slightly faster, particularly in B33-35. A reason for this could be that the soloist is holding a note from B33b3 to B35b3 and the orchestra is therefore free to speed up without guidance from the singer. The conductor throughout this aria conducts the six quaver beats in two groups of three. At this slow tempo, it is difficult to control changes in tempo as there are only two tactus beats per bar. The fact that the material is not very demanding on the orchestral players means that the tendency to rush is greater.

All of the graphs that show a complete play through clearly demonstrate the observing of the marked *adagio* in B42. in all instances this is preempted in the preceding bar and the return to tempo starts in the second half of B43 and settles in B44.

From this discourse the conductor also makes articulation requests to the violinists and bassoonist. This is how the discourse in the Sitzprobe follows on from above:

Mary Betsy - Erm, just that bit there (referring to B42-B43 not being together)

Conductor - Yeah, can we just go back? I want to do the whole thing one more time. Erm… In the violin part…

Violin 1 - Yeah

Conductor - Where you get the original melody back… here… (walks to V1 and shows score. Sings phrase B34-B35) can you slur that in half bars?

Violin 1 - Here?

Conductor - Erm… yeah there. (Walks over to bassoon) and can we have these slurred please? (Points to score)

Bassoon - Oh yeah

Conductor - (sings B12-B13)

Bassoon - And then here where it slows down to like half speed.

Conductor - Yeah. (Walks back to the front) From the top of this one more time. Just be really careful it's the repeated quavers that are driving forward, they're getting faster which is the same as in any music. From the top…

(Orchestra plays from B1- END)

Conductor - Thats where this one ends and you get a little bit of a rit. Matt (to bassonist)

Bassoon - Yeah…

Conductor - When you get erm (plays B on piano) er… just before where I told you to slur

Bassoon - 35?

Conductor - Those two bars of quavers

Bassoon - Yeah

Conductor - They need to be slurred as well on whole bars or half bars. (Sings B36-37)

Violin 1 - Can I just check at B44? I've got (Plays B44-45 - Only slurring first of three quavers in each half bar).

Conductor - Yeah thats the only place it comes. (Goes to bassoon score and points) Yeah, here and here. Excellent the next one is cut.

The violinist is asked to slur B34-35 in half bars, which is not marked in the score. From watching the bowing in each of the successive performances it is clear that violin 1 does slur these in half bars. The violinist marks the slurs in his score during the Sitzprobe. The second violinist plays these bars with each note bowed separately. This shows that they are not responding to the first violinist, although, the first two beats of B34 have a crochet for their part which would make slurring feel slightly odd, especially considering this player was not at the Sitzprobe and the slurring marked elsewhere, in the part and score, slurs the first two of each set of quavers when this theme is set. The intention here would be for the strings all to slur when playing the same rhythm and follow similar bowing.

The bassoonist is similarly asked to slur at B36-37 which is neither marked in the printed score or part. The bassoonist, in the same way as violinist, marks the slurring in the score during the Sitzprobe. This then means that when the bassoonist covers the Third Night performance and plays in the dress rehearsal, they know to slur this section, also in half bars.

The analysis of this aria shows a clear interpretative steer towards a slower tempo. The orchestra rushes the material at the start of the rehearsal. This may be due to the material being easier and also the conductor beating in a slow two which gives the players less visual signals that beating in six would. The rushing of the orchestra is challenged by the soprano through discourse with the conductor and explanation of the tempo is centred around the ideal tempo for a particular musical phrase which dictates the speed of the rest of the aria. The drive of interpretation from the singer and conductor here reflect both their familiarity with the work and the role of the orchestra as accompanier. There are also instructions given on how to articulate phrases through bowing and breathing by the violins and bassoon. The instruction is received by those at the first rehearsal but the same phrasing is not demonstrated by the second violin who joins later.

My Little Beauty (Act II, Scene VI - Aria, Bernard) - (Mio Bel Tesoro (Act II, Scene VI - Aria 21. Ruggiero)

This aria is sung by Bernard and is a song about not believing that Mary-Betsy is his lover and that he loves the drugs that he is being give by Alcina. The aria is the only movement scored for the flutes and features them as solo bars throughout. It is also played by the bassoon, strings and repetiteur.

VIDEO CODING

This aria has been flagged up through the coding due to the increased amount of nodes in the coding. In particular the flutes looking to the conductor for clear entries where they play as a duo for as an unaccompanied solo in response to the singer and body movement have caused this. The eye contact with the conductor is the clearest of the whole project in the Sitzprobe and dress rehearsal but harder to see in the performances due to the distance there was between the camera and performers. This section is also a focus due to both flautists speaking with the conductor between rehearsals and performances about B51, in which both believed the other was playing the rhythm incorrectly.

TEMPO

As with the other sections, it is important to consider the changing interpretation in terms of the different tempo in each instance and the stability of the tempo. The table Average Tempo My Little Beauty (Appendix 1.C.2) shows that there is a significant drop, 20.5bpm, in average tempo between the Sitzprobe and the dress rehearsal. This slow in tempo is set, at the start of the dress rehearsal, by the conductor, and the graphs showing Tempo Change (Appendix 1.C1) demonstrate a stable tempo throughout.

The graphs show spikes at B45, B65 and B45 when it is repeated. This is a reflection of the ensemble doing a ritenuto at the end of each section of music. In B45 this is reinforced by the marking of a fermata and half way through B64 it is marked *Adagio*, a change from the marking at the start of *Andante*. What is interesting with the tempo at the end of these sections is the differing approach each time it occurs.

There are three sections to analyse here:

1. B45 when played for the first time.
2. B65 when played for the only time.
3. B45 when played for the final time.

In the first section, there is a clear change in the interpretation of the pause mark from the two rehearsals to the two performances. In the Sitzprobe and dress rehearsal there is a slowing down from B43 to B45 with the later being slower. In the two performances, the contrast into the last bar of this sections is starker. On the first night the pause is approached and observed only in B45 with the tempo staying static for the preceding bars. On the third night the slowing occurs in the preceding bar and the slowing of tempo is less stark.

In the second section, there are again two approaches, a slowing in the penultimate and final bar of the section, as seen in the First Night graph and only a significant slowing in the last bar of the

section, B65. The first of these interpretations is closer to what the score is instructing as the Adagio section is marked half way through B64.

In the final section, there are again two approaches to the final cadence: a ritenuto in the final bar, B45 when it is repeated, as seen in all but the First Night graph and a slowing down in the repeat of B44 into B45. It is interesting to note here that in the case where the approach is different, the First Night, there is a rushing of tempo from B38-43. Perhaps the different approach to the final cadence, in slowing the tempo a bar early is in response to the rushing of the preceding bars.

It is clear from analysing the videos, that the ensemble are watching the conductor for direction on how to approach and play these sections with tempo change. This means that this is being led by the conductor at B45 as this is a section only played by the orchestra. The second section, B65, is more complicated in terms of leadership. In all instances the conductor is looking to the soloist on stage to determine where the beats should lie. With the absence of a camera shot of the stage it is impossible to conclude if the singer is following the direction of the Adagio section, or whether the conductor is following the singer. It is clear from the video evidence that the ensemble is looking to the conductor rather than simply following the audio cues from the singer. This is particularly evident in the Sitzprobe and dress rehearsal where the togetherness of the ensemble is good but not always in time with the singer which shows a reliance of the orchestra on the visual cues from the conductor which does not match the previous aria when tempo was unstable with the players following the singers. Perhaps the change here is due to the familiarity that has been established with the conductor's gestures, coupled with the successful togetherness, apart from the singer, in previous runs. It is important to remember that the orchestral players, apart from the repetiteur, do not have the vocal line in their parts for the arias.

As well as analysing the *ritenuto* and *adagio* sections, there are handful of anomalies in the graphs that warrant investigation. Firstly, the dress rehearsal sees a small drop in tempo in B18. This seems to be caused by holding the end of the bar for slightly longer before the entry of the violins who provide another layer in the accompaniment; marking the start of a new section. This seems to be led by the conductor as the down beat is delayed, making the second half of the previous bar slightly longer. The second anomaly is in the First Night in B4, this is a slowing of tempo

before the singer enters in B5. On comparing it to the other graphs, they display a similar shape and this is probably due to preempting the singers entry and settling into the tempo. The third and fourth anomalies are in the final performance. There is a rushing in B32 which is caused by the singer speeding up into the next bar along with the violin. This may be a result of the singer running out of breath in the coloratura and the violinist and ensemble responding to the push in tempo. The final anomaly is in B60 on the third night which is a slowing in the bar before the flutes enter with an echo of what the singer has just sung. There are then three types of anomaly: rushing by the soloist (B32), marking a new section (B5) and holding onto the bar before the flutes repeat the material the singer has just sung. These anomalies each only appear in one performance. The rushing of B32 demonstrates the reactive playing of the violinist in speeding up the bar to ensure the end of the coloratura can be met by the soloist.

FLUTE TIMING ISSUE B51

Throughout the whole project there was an issue with B51 which showed up in the coding each time as a mistake in the flute. This is a soli flute bar with the following rhythm:

Figure 4:
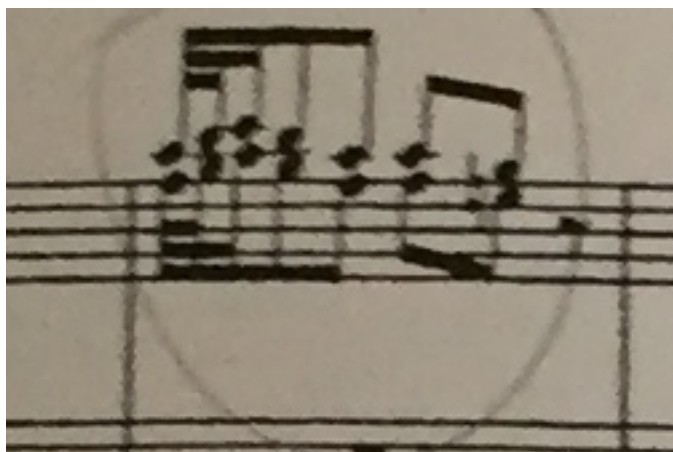
Picture of flute part on timing issue bar.

There are no performances where the flutes play this rhythm together. In addition, both players insisted that they were playing the rhythm correctly and in time.

The Flutes Togetherness Table (Appendix 1.C.3) shows the marked onsets of each entry for each play through of the piece. These were marked by slowing down the entries in Sonic Visualizer and marking the entry as soon as it could be heard. The overwhelming majority of entries are together with it being indecipherable at the slowest setting of Sonic Visualizer to pick up one entry coming before another.

Throughout the project B51 was an issue, each time the first flautist preempts the beginning of the bar. In the table for the Sitzprobe it is marked that the flutes are 'together' this is a reflection of the start of the note being difficult to decipher. The first demi-semi-quaver is inaudible, as the pitch cannot be deciphered from either player, only the sound of air being blown over the mouth piece can be heard. On this occasion, the second half of the bar is reached late by the first flautist by a semi-quaver, but on time by the second flautist. This creates mini suspensions between the parts when they are supposed to be in thirds throughout.

The rhythmic difference of the two players is much clearer on the following evenings, each time the first flautist is ahead of the beat. This is reinforced by the second flautist entering, each time, at the same time as the repetiteur. It can be noted from the marking of the entries in the table that the synchronising of the flutes does improve from the dress rehearsal to the final performance with the difference in seconds decreasing to 0.125 on the Third Night from 0.229 on the First Night, and 0.577 in the dress rehearsal. Having deciphered where the entries are and who is late we must turn to analyse what visual cues there are in the video that support the comment that both players made about being correct about the rhythm and to understand the ways in which they try to lead each other.

The entries of both flautists are made clear by the positioning of their instrument and a movement of the head before and on the beat. This reflects when the player is breathing and occurs at each entry; it reflects the inhale and exhale. During the Sitzprobe, the camera captures some foot tapping from both players, however, this is only ever when they are counting bars rest not when they are playing. The first flautist also has a more tense arm position than the second, this means we can tell when he is playing when the arm is tensed and not when it is more relaxed. This is less

obvious in the later videos due to the distance the players are from the camera. There are further issues in the performance of a lighting stand covering some of the body of both players but it is still possible to make out the movement of the heads. With particular relation to B51, each time it is played after the Sitzprobe the first flautist increases the size of his inhaling and exhaling gesture. Presumably this is so that the second flautist will follow his perceived timing. There is also clear communication between the first flautist and the conductor in the bars preceding B51 during the dress rehearsal. Smiles and raised eyebrows are present which refer to the comments that the flautist had made about getting the rhythm correct, although he was not correct and the issue was with the timing much more than the actual rhythm itself.

There are other entries in the Flute Tables that are not together. Firstly, during the Sitzprobe B49 is not together. In this instance the first flautist is late by 0.166 seconds. This can only just be heard when at tempo. Secondly in the dress rehearsal B47 is not together. Again, the second flautist plays on the beat and the first flautist is late by 0.032 seconds. This is not audible when played at live speed but is detectable when the entry is analysed at a slow setting in the Sonic Visualizer. This demonstrates how together the rest of the entries listed in the table are.

This aria again demonstrates a slowing in tempo in the first rehearsal which is a result of keeping the ensemble together and interpreting the music within their technical ability. There is clear evidence of following the conductor for the rits and pauses. These change in their starkness and where the slowing begins in each performance. This shows that the reliance on the conductor's visual cues that enable the group to play together can also facilitate a more flexible interpretation. Most interestingly, this aria shows the workings of the two flautists and their attempt at problem solving both in rehearsal and performance. The timing of the demi-semi-quaver passage becomes a focal point which both players believe they are playing correctly and attempt to lead a solution albeit to no avail.

Kitchen Scene: Ah I knew it, I knew and Brujas Sabias (Act II, Scene VIII - Alcina, Morgana) - Ah Ruggiero Crudel and Ombre Pallide (Act II, Scene XIII - Accompagnato and Aria 27. Alcina)

The kitchen scene is made up of two movements, an *accompagnato* sung by Alcina and Morgana, as originally scored, and an aria which was only for Alcina but in the new libretto becomes a duet with Morgana. The scene is played by strings and bassoon. The kitchen scene is when Alcina and Morgan make a draft of poison using mushrooms that they plan to give to Bernard.

VIDEO CODING

During the Alcina project this scene was notorious for being the most challenging in terms of achieving musical togetherness and in terms of staging. This scene was performed with the use of UV lighting with the singers a long distance from the orchestra and conductor; sight lines were challenging throughout the performances. The nature of the *accompagnato's* freer timing and the interaction required in this dramatically charged scene made it a demanding part of the opera. It is important to consider this scene as a whole, however, it will be helpful to tackle it in three sections: the start of the accompagnato (B1-14), the remainder of the accompagnato (B15-40) and the Aria. This section has been flagged up by the coding due to the communication required throughout the scene to keep the ensemble as a whole together. It has increased eye contact to the conductor and clear evidence of reacting to the singers throughout.

ACCOMPAGNATO B1-14

The reason for analysing the *accompagnato* in two sections is due to the changing accompanying role of the orchestra. *Accompagnato* is a direction for recitative to be sung more closely to the rhythm the words would be spoken in, rather than following the written rhythm in the music. The composer alludes to what this rhythm is through the musical notation but delivery of phrases can change depending on the character interpretation and the staging of this scene. For this project, to enable the orchestra to accompany effectively, the decision was taken to keep the first fourteen bars reasonably free in time, as per the direction *accompagnato*, but to ensure that the tempo

was not so uneven as to be too difficult for the ensemble to follow. They key in this section was to restrict the changes in tempo in so that it would not stop the conductor from beating four crochets in each bar.

The analysis of the changes in tempo, beat and bar length (see graphs for first section of *accompagnato*, Appendix 1.D.1) show that there are some common themes that appear. Firstly, in each graph there is a shift from B2-3. This is due to the singer moving more quickly through B2 than the tempo established in B1 by the orchestra. The soloist cuts short the E tied crochet, only holding it for half its length, the proceeding crochet is the same length as the following quavers with the addition of there being a slight push in speed throughout this bar. This movement by the singer is enabled by the static holding of one chord and is intended to support the characterisation of the text; mainly that she is angry, and for the second set of quavers (B2b4-B3b1) being a repeat of the same text. The slower pace of B3 in each performance is a reflection of the change of chord in B3b3. This has to be placed before the singer can continue. Secondly, each graph shows B7 as slower than the rest. This is due to the orchestra playing the cadence that marks the end of this sections which follows the end of the text where the theme is mainly anger. There is a hiatus before B7b4 which reflects the change in tone of the text that follows and gives time for the singer to shift the direction of her intention for singing from anger to despair. Finally, the remainder of this section sees a pattern emerge in all but the Sitzprobe and Second Night. The pattern in the other instances is a curve slowing from B8-10 and a rushing of B11. The slowing from B8-10 appears due to the singer driving through the recit at the start but being slowed down by the orchestra throughout two bars that follow. The feature of B11 being highlighted as a faster bar is due the same reason as B2 being faster; the orchestra holds a chord and the singer does not hold the notes for their full value.

Throughout this section the conductor does not always beat in time. Instead, the focus is on clearly setting out the pattern of the four beats in each bar and then holding the beat that precedes a change in chord. A good example of this is B1b3-B4: a suspension chord is held from B1b3-B3b1 which enables the singer to move more freely through the text. Here the conductor could attempt to follow the tempo that the singer performs at. However, preempting a singer's movement through this section of varied tempo would be difficult, reactionary and potentially

confusing for the accompanying players. Instead, here the conductor conducts the pattern 3,4,1,2,3,4 much faster than the singer. He then pauses on B2b4 and catches the singer in the upbeat he displays to the orchestra. This means that everyone lands on B3b1 together. A similar but slightly different technique is used in B3. Here the conductor again does not beat in the tempo, instead he pauses on the first beat and uses the gesture to the second beat as an upbeat to the chord change on the third beat (B3b3). This style of conducting continues throughout this section of the *accompagnato* allowing the singers to move more freely, led by the text rather than the prescribed rhythm. The conducting of this section also gives clear entries to the singers for each time they start a phrase; this cueing is done with the conductor's left hand.

ACCOMPAGNATO B15-39

This next section of the accompagnato is performed much more closely to the way in which the words would be spoken. The analysis of a change in tempo directed by beats is not going to be as useful, particularly as there is not a continuous tactus throughout this section. This is exacerbated by there being no accompaniment to the solo singing from B16b4-B20b1. B15-39 can be easily categorised into sections:

1 - B15-16, B20b2-B21b1 and B24b1-2 which are mini orchestral interludes between the recit.
2 - B16b4-B20b1 which is unaccompanied
3 - B21B2-23b3 and B24b3-B28 which feature the singers with occasional placed crochet chords
4 - B29-36 which have the solo singers' lines played by the violins.

Each of the mini orchestral interludes are preceded by clear upbeats by the conductor. The first of these, B15 (entry 1), has issues with togetherness in its second bar during the dress rehearsal. This is due to some players rushing the demisemiquaver. Apart from this, each of these interludes is played well together.

The unaccompanied section is another example of where the conductor does not beat in time with the singer. Instead, through this section the conductor beats the pattern of four much more quickly, meaning that the fourth beat of B19 is arrived at whilst the singer is yet to reach that bar; the upbeat is then given for the orchestra entry at the next bar. The only time this conducting

differs is on the Third Night performance. At this point the conductor does not beat out the pattern of four but instead gives three clear downbeats at the start of each bar; the same upbeat and orchestra entry then follows. Perhaps this change of conducting gesture here is because he has realised that the extra beats are not necessary, and that he has more confidence in the players knowing the work and them expecting important upbeat gestures.

The sections that feature the crochet chords display the same conducting as the areas described in the first section of the *accompagnato*. The Togetherness Table (Appendix 1.D.3) shows the togetherness of each entry that the orchestra makes from B15 of the accompagnato until the end. From this, it is clear to see that the problem bars in this section are: entry 3 B21b3, entry 4, B22b3, entry 6 B25b1 and entry 10, B27b4.

Entry three shows us that there is an issue with togetherness in the Sitzprobe and dress rehearsal. Both of these issues are caused by the players placing the chord early due to not watching the conductor. They both occur when one player is approaching the material for the first time; the second violin was not available for the Sitzprobe. This demonstrates the expected process of an ensemble developing better togetherness throughout successive instances of the music.

The reason for entry 4 not being together seems to be linked to the Harpsichord preempting the entry before the conductor and rest of the orchestra enter. There must be a misinterpretation of communication between the conductor and repetiteur. It is important to remember that the only player in the ensemble that has the singers' line in their score is the repetiteur. Therefore, their placing of the chord could be reactionary to the singer in the bar as well as to the pacing of the chord by the conductor. The timing is only slightly early in both instances. This, however, does not follow the expected improvement of togetherness throughout successive performances, with the second early entry by the repetiteur in the Second Night performance, following it being together in the First Night.

The most challenging of part of the accompagnato are bars 29-36. Here, both violins play the melody that the singers do. During the rehearsals leading up to the orchestra arriving, the timing of these bars was intentionally tightened to be more rhythmical. At first these were very free,

which is possible when only accompanied by a repetiteur. The challenge of getting the violinists to play this passage as free as they had been was avoided by insisting on a strict four, with clear cues on the second beat where the entries were. This section as a whole is very together following this primitive measure of stabilising the timing but possibly less artistically pleasing . There are two comments worth making here though. Firstly, from the discourse in the Sitzprobe, the interpretation to slow down B35 was made clear:

Violin 1 - Just going back to that last one…

Conductor - Yep

Violin 1 - 1,2,3,4, 5 bars before the end it slows up a in that bar?

Conductor - Yeah (sings).

This discourse confirms that there is a *ritenuto* through B35 which reinforces what violin 1 had just played in accompanying the singers and by following the conductor. The first violinist also makes the mark of a horizontal wiggly line above the notes in B35 to ensure he remembers this.

The last three bars of this section are more similar to the B1-15 section and are led with the same conducting. It is played well together apart from on the Second Night performance which sees the Strings enter early in entry B, B38b1, and the bassoon, double bass and repetiteur enter and become a beat ahead in entry C, B38b2. The reasons for both of these entries not being together, and some of the orchestra become a beat out is not clear. The conducting is the same as on previous night, however, the chord does not come as quickly as it did in the previous night, with the singer taking more time over the phrase in B37. The gesture for placing of the resolution note, the A in B37, is interpreted by the bassoon and double bass as moving to the first beat of B38. The repetiteur then follows this timing meaning that half the orchestra is playing the wrong chord in B38 b1. The conductor then does not place the chord on B38b3 and next conducts the downbeat to B39b1. This means that when this chord starts half the players are still on the notes for the preceding chord. In holding the note, the orchestra realises that it is the last of the

108

accompagnato and resolve their notes to the final chord; creating a strange suspension in the last bar but resolving the issue. This is a good example of the orchestra using their aural skills to resolve a mistake in performance. The misinterpretation of gesture by the conductor, which is largely down to those players not having another note that moves in their part, is then resolved by the orchestra realising that the chord being held is the last chord of the section and that their note does not fit.

ARIA

The Aria that follows the *accompagnato*, and which completes the Kitchen Scene, has coding density which is caused by communication required to ensure the correct entries and the responsiveness of players and singers in keeping the timing.

The communication required to get the instrumental entries together at the start of this aria was one of only a handful of times that the rehearsal had to be stopped more than twice to rectify a mistake. The transcript from the rehearsal lays out the discourse that surrounds these mistakes:

Conductor - and straight to this next one.

     (Conducts no one enters during B1 bassoon enters in second bar)

Conductor - The andante? (To violin 1)

Violin 1 - Is there an upbeat to that?

Bassoon - You skipped the upbeat.

Conductor - So what will happen is there will be an cut off…

Violin 1 - Oh for goodness…

Conductor - At then end of that bar…

Violin 1 - … sorry they keep leaving bar lines off the end of the bar

Conductor - Yeah, it does that in the score each time there is a hemiola.

Bassoon - There's a crochet rest on its own shall I just ignore that?

Conductor - That will be the downbeat. So you'll probably just get..

Violin 1 - So no body plays that?

Conductor - No, nobody plays that so your first in

Violin 1 - Ok

(MD and Bassoon looking at bassoon score inaudible)

Violin 1 - Just going back to that last one…

Conductor - Yep

V1 - 1,2,3,4, 5 bars before the end it slows up a in that bar?

Conductor - Yeah (sings). From the andante. So 1…

Orchestra plays aria basoon mistake on second entry.

Viola misses entry B14b3 conductor sings part. Viola enters with wrong material B17b2

Stops rehearsals

Conductor - Lets get, lets get this right this right…back to the same place

Bassoon - Can we go back to the start?

Conductor - Yes, lets go back to the start, this is musically the hardest one.

Orchestra starts again bassoon plays in B1 rather than B2.

Bassoon - Oh sorry no

Conductor - Again.. 3,4

Orchestra plays aria to B28

Singer - Sorry, sorry I got that completely wrong.

Orchestra Stops

Conductor - Lets just pick it up from there, sorry I don't have bar numbers

Singer - 28 is where I went wrong

Conductor - can we go from Morgana's entry, 25? (Plays the soprano line) With the echo, which bar is that?

Bassoon - 25

Conductor - Yeah from that bar. 3,4…

Orchestra plays to B49

Conductor - And that one ends there

Singer - No it doesn't

Stage Director - Darkness surrounds us....

Conductor - It goes back to there and the cuts to…

Singer - It keeps going

Conductor - Oh I have a cut written there and I'm tired; we play through and then cut there after. Just play that chord, the fine bar chord.

Orchestra plays from B49 to end

Conductor - And of course it ends there, haha

Orchestra laughs.

This discourse shows how the ensembles understanding of the music builds through the mistakes that it makes. It needs to be analysed in conjunction with the visual cues that the conductor is giving.

At the end of the accompagnato, the conductor cuts off the final chord with a third beat gesture. At the same time he says: 'and straight to this next one,' he beats the fourth up beat and the first bar of the aria, however, the violin does not enter, nor does the violas; only the bassoon enters in the second bar as written. The conductor looks to violinist during this first bar but does not get a response. The discussion that ensues is around the missing upbeat. The gesture of the third and fourth upbeats as a cut off and continuation from the conductor were not clear to this player. It is explained that no one enters on the first beat which implies that the violinist was waiting for a cue from another play before starting on the second beat. Once it had been made clear that first beat

was empty, the Violinist did not make another mistake when this material was repeated. The violinist had made the assumption that the first beat of the bar would be played by another orchestra member, so when the gesture comes from the conductor but with no sound he assumed the gesture may be wrong and waits.

After the discussion which clarifies the absence of anyone playing on the first beat of the aria, the conductor restarts the aria by saying 'so, 1' with so being in time with a beat four gesture and one with the down beat. This time the violinist enters correctly, but the bassoon misses his entry. Instead of stopping the rehearsal, the conductor sings the bassoon's line and smiles at the bassoonist. The aria continues, and the bassoon then enters a bar early, in B6b2 rather than B7b2. The conductor immediately turn to the bassoon and holds one finger up to gesture that he should stop, he then cues the bassoon at B7b2 and the bassoon then enters correctly. The viola then misses the entry at B10b2, the conductor picks up on this during B13 and cues her in B15b2, but she does not enter. The conductor once again continues and sings the viola line whilst looking at her. He then cues her again clearly at B17b2 and she enters but with the music from B23; the conductor then stops the aria.

The aria is restarted, with one false start due to the bassoon entering in B1 instead of B2. The orchestra then plays from B1-B28. During this section the conductor cues the violin in B1 and then throughout this section focuses on cueing the bassoon and viola for each of their entires. The cueing is a follows:

B2b2 Viola and Bassoon

B5b2 Singer

B6b2 Violin 1

B10b2 Viola

B14b3 Singer

B20b2 Bassoon

B23b1 Viola

B25b2 Singer

The rehearsal is then stopped at during B28 and the singer apologies for entering incorrectly. The conductor stops the rehearsal as the singer becomes lost. What is interesting here is that it is not the singer who makes the timing mistake. The viola who at the time is the only person carrying the semiquaver line enters B28 a beat late. This means that on the second beat of the bar it becomes clear to the singer that the timing is out. In the earlier rehearsals, where before the orchestra joins the project, both singers in this aria had some timing difficulties with the rhythms that precede the coloratura. Perhaps this is a reason why the singer thought that it was her mistake. The aria is then restarted from B25. Once again, the conductor focuses on cueing the bassoon and viola. The following cues occur from the play through that starts at B25:

B25b2 Singer

B28b2 Viola

B50b2 Viola - not cue to bassoon but same entry point

Repeat:

B1b2 Violin 1

B2b2 Viola - not cue to bassoon but same entry point

B6b2 Bassoon hold gesture as enter bar early

B7b2 Bassoon

B10b1 Bassoon

B17b2 Viola

B20b2 Bassoon

B23b1 Viola

B23b2 Violin 1

B25b2 Singer

B28b2 Viola

B32b2 Bassoon

B33b2 Viola

In this aria there are 63 possible cues that the conductor could give for entries to the instrumentalists: 17 for the violin 1, 15 for the viola and 16 for the bassoon. A possible entry is an entry which the conductor could cue for an instrumentalist. This is due to one of three reasons:

the beginning of a semiquaver passage, the entry of a musician after a crochet rest or more or the start of a new section. In addition to the cues listed above for each instrumentalist, the whole orchestra has five cues. Although the violin 1 has the most possible cues, of these 17 only 3 are given. For the bassoon, 6 out of 15 are given and for the viola 10 out of 15 are given. Although there were issues with the bassoon entries at the start, the conductor focuses on the entries that are needed by the viola player more than any other, almost double that of the bassoon. This is a reflection of the level of guidance that the conductor feels this player needs and demonstrates a response to the capabilities of the players. The dynamic of the group is such that the conductor is able to leave the violinist pretty much on his own, with very few cues. The bassoonist requires half the cues that the Viola player does although their potential cues from analysing the score are similar. In the instances that follow the cues become less for all the instrumentalists. This is in response to them learning the audio cues before their entries and demonstrating more confidence with their playing of the piece.

TEMPO

The graphs showing the beat tempo and average bar tempo for the aria (Appendix 1.D.1) show a clear tightening of the stability of the tempo in each successive instance. The outlying points on each graph are for bars at the end of sections: B42 where there is a *ritenuto* in the singers' final passage of the first section and on its repeat and B59 which is marked Adagio and is the end of the second section. The other feature which becomes more prevalent throughout the instances is in B5. This bar is longer than those preceding and proceeding it which is due to the singer pausing slightly on their first note and the tempo not returning to the speed of the introduction until the start of the next bar.

The average tempo for each instance can be seen in Average Tempo Table (Appendix 1.D.2). This shows a steadiness in tempo throughout the Sitzprobe, all between 73bpm and 74bpm. It also shows a steadiness in the remaining instances, between 60bpm and 63bpm. The reason for the drop in tempo after the Sitzprobe is due to a conversation not caught on camera with the singer playing the part of Alcina, who requested a slightly slower tempo to make the movement through the theme in B9, and where it repeats, to be steadier.

This aria reveals a premeditated approach to the interpretation by the conductor to facilitate togetherness in the accompagnato section. The conductor's beating carves the beats but not necessarily in time. This allows the ensemble to clearly see when the chord changes should occur. It shows a tightening of the stability of tempo as the aria becomes more familiar to the ensemble. A drop in tempo after the Sitzprobe is caused by an off camera discussion with the director and singers.

But Know, How, My Love, I Suffer (Act II, Scene X - Morgana) - Credete Al Mio Dolore (Act III, Scene - Aria 32. Morgana)

This aria is sung by Morgana, and is reaffirming her love for Oronte. It is originally scored for cello and continuo. Not being able to secure a cellist for the project the decision was taken to give this solo to the bassoon.

VIDEO CODING

This aria displayed dense areas of video coding which is largely down to the fact that there are mistakes in a rehearsal and a performance and that the communication, including body movement, watching of the conductor and reacting to other players was the most seen throughout the project, the need for communication to correct this mistake is clear.

Throughout the instances of this aria there are a number of mistakes by the solo bassoon, which played the cello solo in the absence of having a complete string section. It is important to note that the bassoon was one of the parts which had a player deputising. Player 1 was at the Sitzprobe, dress rehearsal (although did not play the solo), first and second performances. Player two was only at the dress rehearsal (playing this solo) and the performance on the third night.

The main mistake that becomes highlighted through the coding is made by the player 2; although in the first instance they are not alone in the mistake. During the dress rehearsal there is a misinterpretation of the conductor's up beat. The bassoonist, double bassist and repetiteur interpret the conducting to be crochet beats rather than quaver beats which had been set in the

Sitzprobe that none of these players were at. This resulted in the start of the piece being at double the tempo the conductor had intended. This rushing can be seen in the graphs for these two instances (Appendix 1.E.1). During the dress rehearsal the conductor decides not to stop the rehearsal, as was normal with issues with entries in the Sitzprobe. Instead, he sings the solo part from half way through the second beat of the first bar. Which in turn stops the bassoonist and double bassist from playing. He then says: 'It's in eight, sorry' and continues to sing until the end of B2. At the end of B2 b4 the repetiteur re-enters and is then joined by the double bass at the correct tempo at the start of B3; they both plays the remainder of the introduction correctly. The bassoonist does not begin playing again until the beginning of B4. This re-entry is immediately preceded by bassoon player 1 pointing to the where the repetiteur and conductor are in the music. The bassoonist continues to play the remainder of the introduction correctly. Following the rejoining of the bassoon, the repetiteur leaves out the solo line, from B6, just playing a continuo part by filling some chords around the bass line.

There are some interesting lines of communication here which warrant discussion. Firstly, is a judgement on the clarity of the upbeat given by the conductor.

Figure 5:
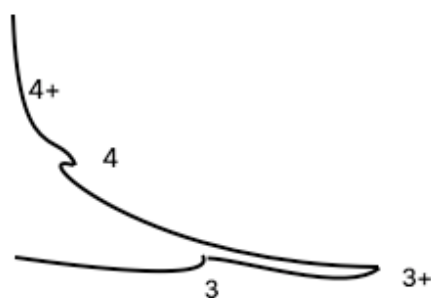
Pattern of the four upbeats given by the conductor.

It is clear that the gesture intends to communicate a subdivided third and fourth beat. There is more emphasis put on the fourth and a half beat which is probably intended to highlight the entry of the bassoon on that quaver beat. What unfolds is that the bassoon and repetiteur enter on the semi-quaver and the playing of the first bar at double speed ensues, interpreting the accented eighth quaver beat as a fourth crochet beat. Frustratingly, the cameras angles did not cover a front shot of the bassoonist or repetiteur during the dress rehearsal so it is not possible to gauge to what extent they are looking to the conductor. From the camera at the back of the ensemble, one can make out that the bassoonist's head is moving up, presumable to view the conductor, and back towards the music a number of times before reentering but this is mostly blocked by bassoon player 1 sitting forward in his chair. This camera angle provides a side on profile of the repetiteur, even though the repetiteur appears quite far in the distance, her head movements make it clear that she looks to the conductor twice in the second half of B2 before placing the F on b4. The repetiteur is able to follow the subdivided four that the conductor gestures throughout and correct the tempo.

In the resolution of this mistaken interpretation of the tempo, it is clear that the players rely heavily on both audio and visual cues. Firstly from the conductor, whose singing of their part at the slower tempo and verbally communicating that it is in eight rather than four, confirms that there is an issue with the tempo. Secondly, the repetiteur resuming to play in B2 b4 provides further audio cues to the double bass and bassoon; with the double bass entering in the next beat. There is also the further reaction of the repetiteur to not play the solo part once the bassoon has established where we are in the music and the correct tempo.

The nature of this mistake being made in a rehearsal meant that there was no problem with stopping and re-entering when the correct tempo had been established. The misinterpretation of the subdivided upbeats is again repeated on the third evening when bassoon player 2 deputises for her only performance. In this instance the conductor does not have the luxury of being able to sing the bassoon solo and the ensemble as a whole has to negotiate a slowing of the tempo throughout the introduction. This slowing of the tempo is clearly demonstrated in the graph displaying bar lengths for this aria (Appendix 1.E.1). In the third performance, the conducting gestures remain the same as described in the dress rehearsal above. However, there is still a

tempo issue in the first bar. What is interesting here, is that the quaver upbeat, which is only played by the bassoon, is in time. It is only when the bassoonist plays the first bar that she doubles the speed. As can be seen on the graph of bar lengths, the first bar here is much quicker than the following bars. This reflects the slowing in tempo that is achieved by the ensemble as a whole. The conductor catches the soloist in her tempo and clearly conducts a slowing subdivided four pattern. The repetiteur can be seen to clearly watch the conductor through this passage and react to the speed changes, she also demonstrates the beat by swaying the body forward and backwards. The double bass, although not as clear in the camera show, can also be seen to keep the time with the ensemble. During the first two bars the repetiteur plays an accompanying role, leaving out the solo part, and again filling in chord. On the upbeat to B3 she makes a decision to play the solo part with the bassoonist, in an attempt to further settle the tempo. As can be seen from the graph this slowing of the tempo, although abrupt in the first bar, continues steadily until the singer enters in B8. The singer then enters at a slightly slower pace in B8.

It is worth examining why this mistake in the bassoon solo is not present in the Sitzprobe. The following conversation precedes the first play through of this aria:

Conductor - Good… The Morgana Aria! It then cuts from there to a Larghetto, backwards to a Larghetto, in D Minor

Bassoon - Sorry?

Conductor - Which is just bassoon.

Bassoon - After that is there a recit in between?

Conductor - There is some recit, yeah

Violin 1 - What was that, Morgana?

(Conductor plays first bar of Morgana's Aria)

Bassoon - And then it goes to what sorry?

Violin 1 - Morgana, is that number 23?

(Conductor sings the solo part of the first bar whilst looking through the score)

Bassoon - 23? Oh god, that one!

Violin 1 - Yes, oh god! Morgana!

Bassoon - Oh no, I've lost where I was now

(Bassoon makes notes on his music)

Conductor - I'll put the harpsichord in. Ready? three, four.

(Morgana's Aria is played)

Most of this discussion, and those captured throughout the project, is centred around the navigation of the opera as many sections were reordered when the librettist wrote the new translation. What is interesting here is that during this discussion the conductor plays the first bar of the aria and then sings just the solo line. This is intended to help the musicians find the aria as the editions of the scores were varied and not always clearly labelled. Perhaps the conductor playing this solo line and playing it before the run through could have some bearing on the tempo being interpreted correctly. Also, in this rehearsal there was no conducting of the subdivided beats, only the counting '*three, four…*' to start the aria. The counting of '*three, four…*' was just counting the crochet beats. Perhaps it would have been clearer in the following instances not to subdivide the upbeats.

During this first play through, the conductor plays the harpsichord, including the solo. The bassoonist makes two rhythmic mistakes: firstly in B1b1 where the first set of semiquaver triplets is played at twice the speed, and secondly, B2b1 where the move onto the semiquavers on the second half of the beat fall on the first. The conductor also makes rhythmic mistake going into B7; B6b4 is rushed and played at twice the speed. Both players react to these mistakes to keep the duet together.

There is a layer of changing interpretation in the instances of this aria which has already been alluded to. This is that, the harpsichord changed from accompanying to also playing the solo part with the bassoonist. The idea here, which was discussed after the Sitzprobe but not captured on camera, was for the bassoon to take the solo throughout and for the repetiteur to accompany and play the continuo part filing in with chords to pad out the texture. This was the intention for the dress rehearsal, however, the misinterpretation of the tempo meant that the repetituer covered the solo, and played with the bassoonist until B20. From there until the end the players reverted to the ideal discussed. The discussed approach was also used throughout the first performance although a discussion after that performance with the bassoonist revealed an uneasiness with how exposed the solo was and the singer for this aria expressed concern with the reliability of the intonation of the bassoon. For the final two performances, the plan was for the repetiteur to also play the solo line to reinforce the bassoon. This is what unfolded in the second performance but the third, with the mistake in tempo again, saw the repetiteur drop out of playing the solo, and just accompany for the first two bars. This was a good reactive decision of the repetiteur as it enabled the bassoonist to slow down through the first two bars.

TEMPO

Examining these graphs of bar lengths further (Appendix 1.E.1), gives us an insight into the changes in tempo and alludes to number of interpretative changes that occur throughout the instances. Looking at each of the graphs in chronological succession, it is clear that the stability of the tempo becomes tighter throughout, particularly when discounting the first seven bars where the misinterpretation of the conducted tempo is in the dress rehearsal and Third Night performance. This settling of the tempo is concurrent with the table of average tempo (Appendix

1.E.2) which shows a slight slowing of the tempo from the rehearsals into the performances, which could be a reflection of the bassoon soloist rushing less or the change in acoustics. Throughout the successive instances there are very little changes in the average tempo and the table includes the average tempo without the first seven bars included in the calculation for clarity, although it makes very little difference to the overall number.

There are a couple of patterns that appear in the graphs. Firstly, there is a pattern of the singer responding to the rushed tempo in the introduction; this is in B8 when the singer enters. At this point both the continuo players and the bassoon soloist only have crochets to accompany the singer. This gives the soprano the opportunity to slow the tempo further than had been achieved by the ensemble in the introduction; both time this tempo is pretty close to the average that follows. Secondly, in the first three instances there is a rushing of B20-21. This is not immediately recognisable in listening to the recordings, however, on closer inspection it is clear that both the bassoon and singer rush the semiquavers in these bars. Thirdly. apart from the Sitzprobe, all of the graphs highlight B26. This is the final bar for the singer and the graph here highlights a change in how it is performed. All performances see the singer take a breath before the start of B26, cutting the minim at the end of B25 short to enable this. In the Sitzprobe the singer sings through B26 and first half of B27 without taking another breath. There is a small trill on the E, B26b4. In all of the other performances, the singer takes a breath before the fourth beat and puts a much longer trill on the E. This results in there effectively being a pause on this note, and the length of the bar is then increased. Finally, the bassoon ad lib. cadenza in B27-9 tempo changes to be more stable after the Sitzprobe. During the Sitzprobe these bars are rushed as can clearly be seen in the graph. In the following instances, the tempo is much more stable and the reasons for this are twofold. One reason is the change of player. In the dress rehearsal and Third Night, the solo is taken by the deputising bassoon, player 2. Both times these bars are played, as written, without much variation in tempo. The Sitzprobe, First and Second Nights are performed by the other bassoonist, player one. They asked after the Sitzprobe what ad lib. meant and whether they should play any differently. It was agreed that they could embrace the improvised nature of the instruction in the melody of the cadenza. This resulted in a descending scale being added between the D and G in B30. A by-product of this improvisation is that the rushing, which could

also be seen as an alternative interpretation of ad lib. in terms of playing the passage in a freer time, ceases and the bars become more stable in tempo.

This aria shows problem solving in both rehearsal and in performance due to misinterpretation of the conductor's subdivided beating. It shows the same mistake by each of the bassoonists and how these are resolved. The tempo is reasonably stable for this aria although the singer and bassoonist show some evidence of rushing semiquavers. The bassoon also has ad. lib. engraved in their part and there are clear changes in interpretation when the first bassoonist adds a scalic improvised passage to the end of the aria.

Conclusions

An issue with this case study is that the negotiation of the interpretation has already taken place before the recorded part of the rehearsal process when the orchestra joins the project. This means that the idealised performance, in the mind of the singers has been set throughout successive rehearsals, and that the orchestra, rather than negotiating its ideas about the performance, become subservient to the consensus that has been reached between the singers and the conductor. A totally free exchange of ideas would only happen when ensemble starts a piece at the same time; this would mean that initial interpretative ideas could be shared. This is not to say that there is not a development of the interpretation throughout the successive performances of the opera.

INTERPRETATION MIGHT BE AFFECTED BY MUSICIANS' ACTIVITIES OUTSIDE OF REHEARSALS

From examining the five focus areas, we can see changes in the tempo, particularly in moving from the Sitzprobe to the dress rehearsal. The focus sections also reveal changes in: dynamics and double dotting of rhythm in the overture and articulation in No One Has Held Me. These changes in the way that the musicians play are not always instantiated by the conductor; the best example of this is the double dotted rhythm in the Overture. This performance convention is negotiated by the ensemble listening to each other and a will to develop better togetherness. The effect of listening and practicing at home is an area that warrants further investigation to establish

123

the impact that recordings have on the interpretation of musical works. There is no conclusive evidence of their impact here but the data hints that this could be a factor. The investigation into the double dotted rhythm, and future investigations into the process of negotiating an interpretation of a work, would be strengthened by capturing the practicing that occurs away from the rehearsal room; this could be done by recording practice sessions on mobile phones. In addition to this, capturing the conversations that happen outside the rehearsal room, or after the cameras are switched off, would be useful in determining players thoughts, motives and a clearer picture of the group dynamics. Perhaps asking musicians to keep a diary about the performance may shed light on this area.

THE VERBAL COMMUNICATION IN ENSEMBLE REHEARSALS AND INVESTIGATING WHETHER, AS MUSICIANS, WE RESPOND TO DIRECTION MORE ACCURATELY IN THE SHORT TERM.

The verbal communication in ensemble rehearsals and investigating whether, as musicians, we respond to direction more accurately in the short term is an area that is covered by the Overture echo B30 and No One Has Held Me articulation directions given to the bassoon and violin 1. The echo in B30 is marked in many of the players scores. It is also directed more clearly in the performances but the reaction to this is not clear. The analysis of how much the ensemble is changing the dynamic is based only on listening to the videos. For future case studies it would be useful to consider how the dynamics can be visually displayed to show the changing interpretation and extent of the change in dynamics in successive instances. It is clear that there is a response to the discourse but not so clear that the conductor's gestures are being followed. In studying the reactiveness of the ensemble to the conductor it would interesting to have examples of clear dynamic change that are not accompanied by discourse. This in turn could be coupled with an in-depth analysis of the size of the and shape beat and any other gestures that the conductor may make.

The articulation in No One Has Held, is another example of the discourse directly changing the way the music is played. The slurring in the violin I part and bassoon remain once they are requested by the conductor. Interestingly it is not then copied by the violin II. This demonstrates that the violin II is not reacting to the bowing and articulation of the violin I. Although, this is over a

small area of musical material and only one player is being considered in this instance meaning that this is not sufficient data to form a conclusion. It would be worth considering the material for future case studies carefully to ensure that there is the opportunity for articulations to be negotiated by the ensemble.

ENTRAINMENT

The quality of the recordings, and the fact that they are captured by the microphones on the camera made investigations into entrainment in the ensemble difficult to analyse; this is addressed in the next case study. The flute entries in My Little Beauty were clear enough in the recordings to determine their onsets. This is only due to most of their entries being unaccompanied and that they are playing mostly in in third and sixths, which can be heard clearly when the tempo is slowed in the Sonic Visualiser. This analysis of entrainment is not extensive as it is only the entry; not the tactus that each player has. A better analysis of entrainment could be achieved by using a microphone for each player, making the determining of each persons onset clearer to analyse. The larger the group of players, the more difficult the investigation into togetherness and acquisition of detailed data to determine how they entrain become.

FORMS OF NON-VERBAL COMMUNICATION

A large set of the nodes developed in the coding are centred around non verbal communication. Some of these are only present as there is a conductor leading this ensemble. In performance the conductor can only rely on gesture to get his message across to the ensemble, whereas the rest of the ensemble can play and adjust their sound according to what they are hearing from each other.

GROUP DYNAMICS AND LEADERSHIP ROLES BETWEEN INSTRUMENTALISTS

The general group dynamics in this study are complex. There are relationships that existed before the project started. The conductor knew, and had worked with, Morgana and the Professor. He also knew the flautists, violin II and the first bassoonist. The wind desk partners had all played together before the project, but they did not know the other instrumentalists, apart from the

second bassoon who knew the oboists. The first violinist, viola player and repetiteur did not know the rest of the orchestra before the project. Mary-Betsy and Bernard had studied their Masters together. The complex nature of the relations between the players is difficult to investigate without interviewing and surveying them about who they know and where they felt their position in the ensemble was and it is difficult to tell whether this was significant or not.

An interesting area flagged up in the focus sections above is the leadership between the flautists. Conversations with both players about the rhythm in B51 of My Little Beauty revealed that they both believed the other was playing incorrectly. Analysis of the video shows that the movement of the first flautist increased throughout the rehearsal process as to lead the second flautist. During the project it was believed that the first flautist was correct in his assertion that he played the rhythm correctly and on time. However, the analysis of the entries showed that the opposite was true.

Another area of group dynamics that warrants discussion is the dynamic between the orchestra and the singers. Traditionally in opera it is the singer that leads the performance with the conductor leading the orchestra to accompany them. The leadership role of singers in this instance is clearest with Mary-Betsy where she resisted the driving of the tempo in No One Has Held Me. The conductor supported this by demonstrating the reason for the previously negotiated tempo; B28-29 in B30. The leadership of Bernard in this duet is less rigid and allows the orchestra to rush. Both these singers are experienced soloists and their differing approach to the tempo changes is interesting. Having data about their practicing and thoughts on the interpretation of the movement would have enabled us to interrogate whether there was a lack of leadership from Bernard, or a will to take the aria at a faster tempo

The investigation into the number of cues given for the violin, viola and bassoon entries in the Kitchen Scene also shed light on the dynamic in the group. The attention of the director is taken by the player who is making the most mistakes. In working with amateur musicians a large part of the director's role is to enable the players and help them to play the music. This is often at the expense of guiding the more competent players and developing the artistic interpretation of a work.

126

PROBLEM SOLVING

There is evidence of different approaches to problem solving in the rehearsals. From talking about the music and its structure, to visual cues and demonstrating by singing or playing sections of the music. Problem solving in performance is more difficult as there is a convention for players not talking or making overly obvious gestures. Instead, ensembles have to reply on gesture and players reacting to each other. But Know, How My Love demonstrates how this non-verbal communication can rescue mistakes in performance. The double speed playing of the second bassoon in their solo during the dress rehearsal and Third Night performance demonstrates this. In the performance, the conductor and continuo players react to the speed of the bassoon accompanying them but also following the slowing of tempo by the conductor. The flexibility of the players to play at the faster pace and the visual communication and understanding of the conductor's gesture allows the ensemble to negotiate its way back to the correct tempo. This is reinforced by the repetiteur playing bassoon solo in this section, and in other instances where mistakes are occurring. Having this player join the solo line meant that the conductor had more control over the tempo. As this move to playing the solo line was not directed by anyone it is another reflection of the dynamics in the group. The repetiteur had the reactive ability and confidence to fill in this part and the bassoonist had the trust to follow the audio and visual cues.

Problems in rehearsals are not always the property of those who claim them. In the Kitchen Scene the soloist takes responsibility and apologises for making a mistake with her timing in B28 of the aria, however, on closer inspection it is the viola player who is responsible. This is a small piece of evidence that musicians are not always aware of what is actually happening. This combined with flute 1 thinking they are correct in B51 of My Little Beauty, when they are making the mistake, not only sheds light on the group dynamics but also shows us that musicians do not always know what is happening when they are playing.

Improvements to Case Study

The size of the data collected in this study was probably too large. The number of players and their layout makes the video analysis, and the collection of data from the videos difficult. A future

case study would benefit from having 4-6 players in the ensemble. As well as the size, the make-up of the group could be improved. Either players all knowing each other, or not knowing each other at all would enable a better interrogation of the group formation. It would also be useful to consider a study where the players are the same standard; either all professionals or all amateurs.

The biggest weakness of this case study, in light of the thesis as a whole, is that the interpretation had been set by the cast through many rehearsals before the orchestra joins. This means the organic development of the interpretation is not captured by this project. In most ensembles, and even solo rehearsals, there is a tendency to try different approaches to the interpretation. These changes to the interpretation happen early in the rehearsal process and in the case of opera develop through the staging and blocking. A future case study would benefit from capturing the whole rehearsal process, enabling the analysis of the interpretation from the start of the group engaging with the work.

Another factor which impacts on the group dynamic and the negotiation of an interpretation is the role of the conductor. It is often viewed that the conductor is an authority figure who directs the ensemble to the interpretation that they desire. The truth is that the conductor arrives with ideas, as do all the musicians who know the work, and a history of performances and experiences behind them. They are then able to drive the ideas they have but this is inevitably in response to the capabilities of an ensemble and in the process of communicating their ideas a conductor will hear other approaches from the ensemble. The dynamic is though, in this case study, that the interpretation had been mostly set by the time the orchestra arrived and that the main focus of the rehearsals was to ensure that the orchestra could accompany the singers. Most movements were only played a couple of times, not leaving much time or opportunity for the sharing of ideas. It would be good to consider using less material and having a less time pressure in a further case studies.

The criticisms that have been described above intend to paint an honest picture of the weaknesses of this case study. None the less the quality of the data that has been collected and analysis of this is still robust.

Improvements to Data Collection Analysis

The placement of the cameras needs to be carefully monitored so that the musicians are captured in all instances. Future case studies to interrogate the interplay between interpretation and communication would benefit from there being fewer players to focus on and not having a conductor. This in turn should mean that using only one camera would be possible, which in turn means the process of using NVivo, and quality of the picture, could be improved.

The capturing of the sound could also be improved through the use of individual microphones. This would allow the analysis of the onsets of each player to be determined accurately, meaning that an investigation into the changes in entrainment in a group could be undertaken.

In addition to the more precise capturing of data by better placed microphones, there needs to be a consideration of how a future case study can display this data effectively. The visual nature of the tempo graphs made it quick and easy to see the changes in interpretation through the successive instances. It would be useful to design a visual graphic for the changes in dynamics and articulation, or possibly to combine the three. It would be worth considering the work by Hellaby (Hellaby, J 2009) on his Interpretative Tower and whether this could be utilised to enable a visual representation of works in more detail making comparisons easier.

The size of the initial data captured in this case study was too large. It would be better to focus on much less musical material. Over sixteen hours of rehearsal and performance was captured. With each hour taking many hours to code, this size of data capture becomes difficult to manage. It would be good to use less musical material in a future case study; maybe 2-3 short pieces which could then be rehearsed in more detail.

This case study has been a useful start in investigating the interplay between negotiating and establishing an interpretation and the communication that is required for this. The case study raises many questions about the exchanges that occur in ensembles but unfortunately answers

few of them. A further case study, of a smaller ensemble, with a better data capture and therefore enhanced analysis would yield more answers to the questions raised here.

Polaris Case Study

Purpose of study

Building on the methodology and findings of the Alcina case study, the purpose of this study was focused on the ensemble as a whole, interrogating the channels of communication in two consecutive rehearsals and how these influence changes in the interpretation of the music. With the director singing within the group posing extra challenges of balancing their own singing role against her directing responsibilities, this is a role often adopted in small consorts. The study investigated the group dynamics and workings across the two rehearsals to determine how leadership was manifested within the group. It also analysed the changes in the interpretation throughout the process to investigate how changes were negotiated. This interrogation focused on non-verbal, verbal and physical communication and will build on the coding developed in the Alcina case study with Opera Alumnus.

To support the aims of the thesis in its entirety, this study intends to investigate the processes involved in preparing an interpretation of a work of music and the communication that is required for this. In particular, this study focused on:

- The changes in interpretation and how these are negotiated.
- The verbal communication in ensemble rehearsals and investigating whether, as musicians, we respond to direction more accurately in the short term.
- Entrainment
- Forms of non-verbal communication
- Group dynamics and leadership roles between performers
- Problem solving in the learning process.

It was intended that this holistic study would be more in-depth in its analysis to allow for the development of the communication models examined in the Alcina case study. This second case study is important as it addresses some of the shortcomings of the Alcina case study. Primarily, it revealed the workings of the ensemble at the start of the rehearsal process. This was missing in

the Alcina case study as the data capture did not extend to the work that occurred prior to the orchestra joining the process. The conclusions made in the first case study were therefore centred around the impact that the orchestra had on the interpretation, with only the overture providing a picture of the changes in interpretation; as the singers were not involved in this movement and therefore did not put the orchestra in an accompanying role.

Focusing solely on one piece that the consort was rehearsing allowed for much more in-depth analysis than the first case study. The level of detail had been further increased by the use of individual microphones in the data capture and more extensive analysis of the piece.

Findings

We will consider the overall findings of the case study before delving into a more detailed discussion.

This study shows that interpretation focuses and narrows, in this case largely around the directions in the score, but it does not completely settle[12]. Although one interpretation will eventually be presented in the intended performance of the piece, the journey to that interpretation is not a linear one. With the groups need to achieve balance between the parts, it is necessary for them to continually listen and respond to each other throughout the rehearsals and performances. As the changes in interpretation are not always negotiated through dialogue or physical communication, it has to be concluded that the majority of the communication that occurs in the rehearsal is purely musical, through continual listening and adjustment. There is clear evidence that even when verbal discussions occur they are then reinforced by repetition of the music itself. This is how they achieve differing tempos, speed changes and gradation of tone. Rehearsals are a continually communicative experience, where live reciprocal feedback through listening is guided by dialogue and physical communication between ensemble members.

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[12] Detailed analysis and commentary can be found in Appendix 2 Polaris Analysis

The rehearsing of The Darkling Thrush is heavily score focused in these rehearsals. This is reflective of the traditional classical conventions that the ensemble is operating within, but also the added responsibility of premiering a work of music where the composer will be present. The results suggest that the ensemble may have negotiated an interpretation that differed slightly more from the score directions without this pressure, as the conductor and singers reflected themselves in their interview answers. The dedication to following the engravings in the score is also likely to be a reflection of the early stage these two rehearsals represent in the development of the piece before the concert. The score has to be the starting point for this early stage when operating under the traditional conventions. The group does begin to question performance directions in the score, mainly dynamics and tempo markings, but rather than discussing how to solve these queries in the rehearsal the conductor intends to check with the composer. If the chosen piece was of a composer that was not contactable, the discussions about the tempo, and its playability on the harp, as well as the dynamic performance directions, would have needed to be made by the ensemble and this may have resulted in a freer approach to the groups interpretation.

Although verbal communication is clearly used, with good effect to highlight problems, to express ideas and to resolve musical issues, its context is paramount. Often, excerpts of the music are sung or demonstrated in the flow of conversation. The communication in rehearsals is multifaceted and the different mediums are used concurrently. Verbal communication is less accurately expressive of how to resolve issues than singing a section of the music and is often used to share views, feedback and to establish an approach for resolving issues; repetition of the passage in question is always used to underpin the discussions. This implies that, although signposting structure to rehearsal, it is often secondary to rehearsing of the music itself.

There is clear evidence in this study that the ensemble is not always presenting the score accurate interpretation that they think they are. The case of the tempo being above that marked in the score, when the conductor reflects that it was under the tempo is the clearest of these. Each run in the rehearsal makes an estimation of tempo. In addition, both changes in pitching and tempo are then negotiated relationally; the group is not measuring the BPM or the exact pitches they are singing. Instead, they are listening and fitting their part into the whole.

Togetherness improves when shaping of phrases matches and with growing familiarity and eradication of mistakes. This is a reflection of the change in focus from note security to a feeling of the music's shape by the group. The quality of the individual singer's tone also improves with the growing familiarity.

The analysis of the changing interpretation of this work, and the communication that surrounds it, highlights the need for the work concept to permit multiple and different instances. Each detailed measure of the changes in interpretation show that the realisation of a work is not an exact science where we simply obey the score but rather a creative process with many permissible outcomes. Consideration of the continual negation and continually changing interpretation need to feed into this. Communication in achieving this is heavily reliant on the listening skills, and responsiveness, of the ensemble members.

Sociocultural and Physical Contexts

Polaris was founded in Autumn 2015 by Nicola Starkie during her Master of Music study at the Royal Birmingham Conservatoire. It initially comprised of current students of the conservatoire, both postgraduate and undergraduate. Initially the ensemble was a broad mix of singing and sight reading capabilities, performed regularly and had weekly rehearsals and sections. Polaris is non-auditioned. Now in its third season, the group is comprised of five singers, including the founder, Nicola. Originally, the ensemble was conducted by Nicola, but being made up of fewer singers now, she sings with the group whilst directing. The ensemble's rehearsal schedule is now more project based and they no longer have sectionals. This is largely down to the group being a mix of those still at the conservatoire and those who have graduated, and in some cases left the area. This case study will focus on the first two rehearsals of the Spring Term 2019. Polaris was focusing on their upcoming concerts based on the theme of seasons, which was a public performance at the end of term.

Ensemble Members:

Nicola Starkie - Director / Alto

Kate Liggins - Soprano

Alexis Cooling - Soprano

Imogen Baker - Alto

Charlotte Sleet - Alto

Eleanor Turner - Harpist

Nicola Starkie – Director/ Alto

Nicola is a professional choral director working with multiple choirs in the West Midlands. She is a music graduate of Downing College Cambridge, where she was an organ scholar, and holds a MMus. in Choral Conducting from the Royal Birmingham Conservatoire. Nicola has worked as a secondary school music teacher and continues to work as an accompanist and piano teacher.

Kate Liggins - Soprano

Kate Liggins graduated from the Royal Birmingham Conservatoire with a BMus in Vocal Studies in 2018. She has a strong background in choral music, having sung with the Conservatoire Chamber Choir, and as an Armonico Consort Young Artist and Choral Scholar at both St. Martin-in-the-Fields and St. Mary's, Primrose Hill.

Alexis Cooling - Soprano

Alexis Cooling studies on the BMus. course at the Royal Birmingham Conservatoire.

Imogen Baker - Alto

Imogen Baker is a Soprano studying voice at the Royal Birmingham Conservatoire.

Charlotte Sleet - Alto

Charlotte Sleet is a Mezzo Soprano who studies at the Royal Birmingham Conservatoire. She sings as a choral scholar of St Chad's Cathedral, Birmingham and as an Ex Cathedra Student Scholar.

Eleanor Turner - Harpist

Eleanor Turner is a Harp Tutor at the Royal Birmingham Conservatoire. She Studied under Daphne Boden at the Royal College of Music Junior Department and later with Alison Nicholls. Eleanor won Second Prize in the Gaudeamus Interpreters Competition in Amsterdam and First Prize for the 2007 European Harp Competition.

Composer - Anthony Esland

Anthony Esland is an award-winning British composer. He studied composition and musicology as an organ scholar at Cambridge University, conducting at the Guildhall School of Music and has an M.A. in Composing for Film and TV from the National Film and Television School.

He has written scores for several films, TV shows and games and composed concert music for soloists, choirs and ensembles. His choral music has been performed by choirs such as the BBC Singers in the UK and Cincinnati Camerata in the USA, and his chamber music has been broadcast on BBC Radio 3.

Data collection

CAMERAS

The data for this project was primarily captured on cameras. A set of two cameras were used to film the ensemble from two different angles. The layout of the ensemble or knowledge of the room

was not known until the data capture days. There are a number of reasons for using only two cameras, as opposed to the three used in the previous study, for this case study. Firstly, due to the smaller size of this ensemble it meant that fewer angles were required to see musicians on the second row. Secondly, the director acting from within the group largely negated the need for a third camera angle viewing the director from the ensembles point of view. Thirdly, on reflection, the analysis process in the Alcina case study, using NVivo for coding means that only one video can be shown at a time in the program and only one video will be tagged; with reference made to the others. It is possible to analyse a recording from multiple angles but largely the last study focused on two main angles as visually this is more manageable on screen. The two angles that were used most during analysis were the conductor camera and an ensemble camera. Most importantly, the two angles are sufficient to see the communication between the group throughout the two rehearsals.

It was intended that the two cameras would capture the ensemble from the front as shown in the diagram below:

Figure 1:
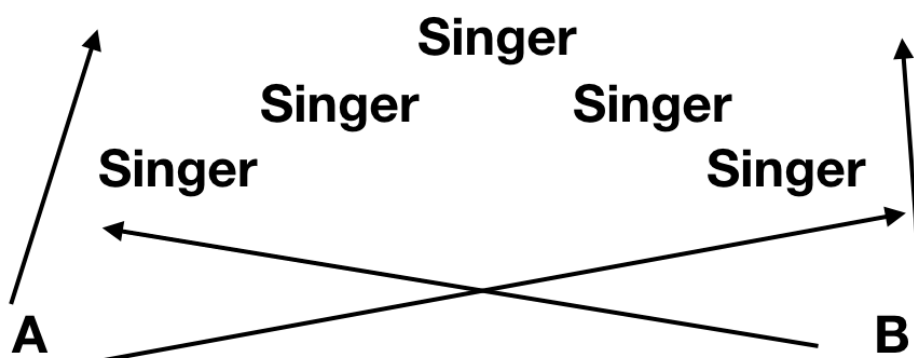
Layout of ensemble and placement of cameras.

The idea behind this camera placement is to capture the front of each player in the ensemble from cameras A and B with the singers sitting in a semi-circle. It was the intention to capture the faces

137

of each ensemble member to allow for NVivo coding and analysis of gesture and movement. It was not intended for the videos to be analysed using computer software.

The size of the rooms for the two rehearsals meant that the camera angles had to be closer than originally intended and that, although cameras A and B did capture the whole of the front of the ensemble, in the first rehearsals the angles are shallower than that shown above, and some of the screen is dominated by the grand piano. In the second rehearsal, the positioning of the door in the room, the group being joined by the harpist and the practice room being smaller, meant that both camera angles were on the right of the ensemble but focused in different directions. It is still possible to see the members of the ensemble and their interactions.

MICROPHONES

In addition to the two cameras, lapel microphones were also used to allow close interrogation of the entrainment of the group as a whole and to investigate the entrainment between those singing the same part. The lapel microphones were USB microphones which were connected to a laptop through Garage Band. This enables each of the singers to be heard individually, or at the least with their voice as a clear focus in the track. Recording the sound through the lapel microphones straight into garage band also allowed for exporting sound files for each section that start and end in exactly the same place, making any numerical analysis, such as for tempo or entrainment, accurate. A microphone was not provided for the harpist who accompanied the ensemble, though this was captured in the background of the Garageband files and the audio of the camera recordings.

INTERVIEW

In addition to the capturing of the rehearsals, singers in the ensemble attended a short interview after the second rehearsal to reflect on the two consecutive rehearsals. This was recorded using Garageband. The conductor could not remain for the interview as she was attending a funeral. The conductor therefore completed a short questionnaire, with similar questions to the live interview; which was submitted by email.

Data Analysis

CODING

Once the rehearsals were captured, the videos were downloaded from the cameras and entered into NVivo for coding. As with the previous case study there were some issues with the size of the files from the cameras. The same process was used for shrinking the files for use in the NVivo program.

The coding of the videos was undertaken building on what had been learned by developing the code during the Alcina case study. The coding developed throughout the analysis of the initial videos using Grounded Theory as described before. It still operates within the four case areas: Discourse, Visual, Musical and Issues. All of these categories had enough data to be confident that they were saturated.

The Discourse Case saw the nodes changed slightly to determine more closely what the verbal discourse was about whilst retaining a focus on who this was between. The addition of Interpretation Discussion, Social Discussion and Editorial Discussion were added to bring more focus to the types of discussion that occurred. Interpretation Discussion node was added to highlight when the group were dealing with general interpretation decisions. A subset to this was the Editorial Discussions, these are when the group made changes to their scores, most often removing a quaver or a beat from the end of a phrase so that breathing and word ending formed together more easily. These were more a continual editing of the score with the assumption being that this was what the composer wanted, much like many interpret the vocal writing of Vaughan Williams where the last quaver written, often at the start of the bar, is where the end of the note is placed, rather than sustaining until the end of the written time.

Visually the analysis codes largely remained the same as the previous case study although the focus on different instruments were removed and replaced simply with 'Singer' 1 through 4. This case also saw the addition of Singer Gesture, where the members of the ensemble make gestures with their arms. Singer Gesture to Show Mistake was also added, this was a specific feature

within the communication in the ensemble whilst a rehearsal continued where the raising of a hand highlighted the singers noting of their own mistake. It was appropriate to highlight this outside of the general gestures made as they are a physical communication and a notification of one's own mistake.

Musical Case saw the addition of the piano being used to demonstrate which became a regular feature throughout the first rehearsal where learning of the material occurred. The addition to Conductor Accompanies - Accompaniment and Conductor Accompanies - Singers Part were developed to demonstrate when the director felt the vocal parts needed more support. Often then moving onto the accompaniment or continuing unaccompanied, as most of the rehearsals were. It was also useful to highlight the warm up sections of the rehearsal but this was largely for the navigation of the coding rather than analysis per se.

Issues Case now includes more focus on problem solving in the learning process through the highlighting of different mistakes - Pitching and Rhythmic Mistakes and Not Together were added.

CODE

Discourse:

Discussion Ensemble

Instructions from Conductor

Discussion Partners

Social Discussion

Interpretation Discussion

Editorial Discussion

Musical Issues/ Mistake Discussion

Visual:

Increased Body Movement (Head, Body, Foot Tapping)

Looking to Conductor

Looking to Partner

Looking to Other Singer

Conduct Gesture

Singer Gesture

Singer Gesture Mistake

Leading Entry Movement

Musical:

Reacting to Conductor

Reacting to Singer

Reacting to Harp

Conductor Demonstrates on Piano/ Voice

Conductor Accompanies - Accompaniment

Conductor Accompanies Singers Parts

Harp Accompanies

Warm Up

Issues:

Incorrect Entry

Rehearsal stopped

Pitching Mistake

Rhythmic Mistake

General Mistake

Conductor Mistake

Not Together (Mistake)

This coding was developed through watching the videos of the rehearsals and performances. The code grew organically throughout the first couple of videos and at the end of the analysis these were then recoded to ensure that all nodes were used throughout the data set.

The main focus of the two rehearsals were on a piece called The Darkling Thrush, a new composition by Anthony Esland which the group were premiering at their end-of-term concert. The Coding was used to highlight where discussions of interpretation were occurring and to

enable and understanding of what this was preceded and proceeded by, as well as highlighting the communication between ensemble members.

DISCOURSE

Although the discourse was coded using the video nodes described above, an analysis of the discourse was also undertaken using the transcript of the rehearsal. The nodes were developed from scratch using Grounded Theory and are as follows:

Communicating about rehearsing:

Feedback from Conductor

Conductor Demonstrates

Instruction from Conductor

Question from Conductor to Ensemble

Question to Conductor

General and Social:

General Discussion Repertoire

Humour

Social Discussion

Warm Up

Interpretation:

Comment about dynamics

Comment about sound quality

Comment about tempo

Comment about togetherness

Interpretative suggestion

Node Navigation:

Rehearsal 1

Rehearsal 2

Ensemble Rehearses

People:

Conductor

Ensemble

Harpist

Researcher

Singer 1

Singer 2

Singer 3

Singer 4

Problem Solving:

Musical Issue - Rhythmic

Musical Issue - Pitching

Partner Discussion - Breathing

Pitching Solution

Use of Piano

These discourse nodes are more focused and allowed the extraction of all comments about particular aspects of interpretation which can then be correlated with the data. It also allowed for analysis of the roles and dynamic between the different members of the ensemble. The video coding alone allowed the marking of this data but not the extraction and therefore interrogation.

TEMPO

Each section of the rehearsal of The Darkling Thrush was analysed using the Sonic Visualiser to determine tempo changes. The audio was taken from the Garageband file and each beat was

marked in the Sonic Visualiser. This data was then imported into Numbers where graphs showing the changes in tempo and an accurate table of average tempos were created. The graphs are comprised of the timing in seconds and the bar and beat number. The average tempo was calculated by adding all of the beats, in seconds, dividing by the total number of beats to find the average beat, and then dividing 60 by that number to produce the beats per minute (BPM). These graphs and tables were then used to interrogate the coding from the videos. To ensure that the average BPM for a section was accurate, outliers were removed, most often by removing a whole bar. This mostly happened where an analysis section crossed a bar with a pause.

Each instant where the ensemble rehearses has been numbered in the rehearsal transcript. This number has then been used to create the file name for the instant being preceded by 'PR' which stands for Polaris Rehearsal, the number of the rehearsal (1 or 2) and then the instant. For example PR1 - 1 would be the first rehearsal first instant in the transcript. The files were then further labelled when instances from the transcript needed splitting for changes in section. These additional files have been denoted with a decimal point: for example PR2 - 1.2 would be the second rehearsal first instant from the transcript, second section of that instant. This may seem like a complicated division of the rehearsal but will allow for comparisons between repeated sections and repeated thematic material.

ENTRAINMENT

The recordings from the lapel microphoness which were created in Garage Band were exported as individual MP3 files and cut to sections which warranted analysis of entrainment. These were then entered into Sonic Visualiser to determine the onsets and a comparison between singers onsets allowed for a numerical difference between time instants to be analysed.

The Darkling Thrush

The main focus of the first two rehearsals of term was a new composition *The Darkling Thrush*. It was composed by Anthony Esland and was premiered at the end of term concert. 'Thomas Hardy wrote *The Darkling Thrush* in 1899, originally naming the poem *The Century's End, 1900* to reflect its central tenet: an expression of despair about the state of the world at the end of the 19th century; indeed, the poem was first printed in December 1900 with the title *By the Century's Deathbed*. It is written in the form of an ode, and is one of Hardy's most lyrical poems' (Athonny Esland's program notes)

THEMATIC FRAMEWORK FOR ANALYSIS

As this composition divides into clear sections which have repeated material, it was decided to approach the analysis of the work by those thematic sections to allow for more comparative data. The composition divides into seven clear thematic sections, as shown in the table below:

Figure 2[13]:

The Darkling Thrush

Sections	Bar Numbers	Thematic Material	Time Signature
1	01-34	1	3/4
2	35-54	2	6/8
3	56-89	1	3/4
4	89-109	2	6/8
5	111-148	3	6/8
6	150-181	1*	3/4
7	180-212	2*	6/8

*Rhythmically the same but some notes are different.

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[13] A full score can be found in Appendix 3.

Dividing the piece into these sections will allow for analysis of changes in the musical interpretation where the same thematic material repeats. It is important to bear in mind that the words have changed in successive sections, however, when considering the learning process and problem solving as well as tempo it is fair to analyse these sections against each other as the notation is identical, or in the case of 1* nearly identical. The ensemble discusses how similar the material is describing it as 'familiar' when it appears in their first run through of the piece.

THEMATIC SECTION 1

Thematic section one is made up of the first and third sections of the piece listed in the table. The first section runs from the start of the introduction to bar 34 where the meter changes from 3/4 to 6/8. The third section runs from bar 56 until 89 and although presenting different words, is an exact repeat of the music material of section 1.

THEMATIC SECTION 2

Thematic Section two follows thematic section one each time. It is made up of the second and fourth sections listed in the table. The second sections then runs from bar 35 until bar 54. Then half a bar with a pause followed by a general pause bar clearly denoting a break between these sections. Section four runs from bar 89-109, again being followed by a half bar with a pause and a general pause bar. Again, with different words, this section is an exact repeat of the musical material of section two, apart from the last four bars (bars 50-54) which has a different chord.

THEMATIC SECTION 3

Thematic Section three presents new material following on from the previous thematic sections having been repeated. Musically it is made up of two sub sections, denoted by the double bar lines in the score. For the purposes of analysis these subsections are taken together and listed as section five in the table. Section five runs from bar 111 to 148 presents new musical material and can also be subdivided into two sections: a) from bar 111-140 and b) from bar 141-148. This separation is useful particularly for tempo analysis as there is change from dotted crochet equals 92 to 88 respectively. As this is the smallest and least rehearsed section, and indeed the musical

material is repeated a lot less in rehearsal it is suffice to leave the section as a whole rather than dividing into a and b as described.

THEMATIC SECTION 1* AND 2*

The musical material of sections one and two are repeated in a developed way at the end of the piece. These sections are made up of six and seven in table respectively. Section six runs from bar 150-181. It is a development of the thematic material of sections 1 transposed and with some minor rhythmic changes, primarily to the first soprano descant part. Section seven is a development of section two's musical material. Rhythmically and thematically, it is nearly identical, however the soprano lines are less static; for example bar 34-37 and b188-191. Although these sections are not musically identical, they are very similar to the first two thematic sections and it is therefore appropriate to group the tracking of analysis within section 1 and 2 whilst being mindful of the slight changes in the score.

Discussion

Taking each of the research questions in turn, we will now discuss the findings of the case study.

HOW DOES THE INTERPRETATION CHANGE THROUGH THE REHEARSAL PROCESS?

TEMPO

Using the Sonic Visualiser, the tempo of each thematic section has been tracked by marking the beats and exporting the time instants into tables in Numbers[14].

A large part of the rehearsal process was the ensemble familiarising themselves with the notes in the piece. The conductor intentionally set a slower tempo to enable the ensemble to develop note security through repetition. The conductor verbally confirms rehearsing under tempo early in the

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[14] Detailed analysis of each thematic section and accompanying graphs can be found in Appendix 2.1

first rehearsal: *'It will be a little faster eventually'* (After PR1-18). Although a slower tempo is used throughout the first rehearsal, most notably for the first thematic section, the comment from the conductor advising the group that it will go faster confirms that this is not intended for the final presentation of the piece[15].

There is clear shift in the tempo directed at the start of the second rehearsal which the ensemble struggles to accurately pick up from the director. The conductor beats closer to the engraved tempo than was undertaken in the first rehearsal. Although the entries are reasonably secure in the first two instants of rehearsal two, the tempo that the ensemble achieves struggles to match that of the conductor[16]. This results in the conductor having to stop and restart the rehearsal to secure the tempo. It is clear in this section of the rehearsal that the beating of the tempo is being lost by the ensemble, with their expectation of the tempo they have experienced in the previous rehearsal prevailing. The fact that the entries are secure means that the singers are understanding where the beat the conductor gives occurs but then they are relying on memory and listening to keep the group together, rather than physical cues from the conductor. The conductor here attempts to push the tempo on but not at the expense of the group not being together. After the instruction from the conductor that the group needs to 'pick up the pulse' (After PR2-1) and 'we've got to get this pulse more, erm, joined up and together' (After PR2-2) the group then begins to achieve the new tempo. Throughout the first three instants of rehearsals two there is increasing eye contact and embodied movement from all participants, which is evidenced by the coding and through video observation, which helps to enable the group to secure the faster tempo.

It is clear throughout the rehearsals that the ensemble aims to closely follow the tempo directions in the score and the conductor has studied the piece by listening to the Sibelius file and playing it

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[15] More detailed analysis can be found in Appendix 2 where it is clear that the initial slowed tempo slows further to enable the development of note security.

[16] The conductor makes references to her experience of studying the score on Sibelius where the marked tempo is always stable and accurate. In her interview, she also talks about the practice that she did between the sessions and that she utilised Sibelius for those sessions. There is clearly a mismatch, between the conductor and singers, in the expected tempo of this opening section. One could posit that the individual study of the conductor, of which little was undertaken by the rest of the ensemble at this stage, has an impact on her memory of the tempo that was achieved in the first rehearsal.

on the piano. Apart from reviewing the tempo of thematic section three right at the end of the second rehearsal, all of the tempos are set by the conductor without the use of a metronome. As well as the clear shift in tempo at the start of the second rehearsal, there is a further, less substantial, shift when the harpist joins the rehearsal. There is a continuation of the piece speeding up for the first thematic section. The increasing speed here follows a conversation, at the end of the first run, where the harpist expresses that the tempo is at the upper limit of what is possible on her instrument. The exchange here implies that the group is considering a slower tempo for their interpretation, however, the following instants continue to be slightly faster than those before and the tempo, for the first thematic section begins to be faster than that marked in the score. It is interesting that the discussion around tempo being at the upper limit of what is possible on the harp did not result in the next instant being slower. Instead, the first thematic section starts to demonstrate how much the conductor is driving the tempo here. It would be interesting to have more data in the following rehearsals, both with and without the harpist, which would allow us to examine whether the tempo for thematic section one continues to be marginally faster than that engraved. From the evidence we have, we have to assume that exchange between conductor and harpist about tempo has little impact on the interpretation

The tempos of the second and third thematic sections are more settled in the second rehearsal than thematic section one. Although they are more stable, they both remain under the engraved tempo. This is particularly odd for the second thematic section. Although the singers have two bars rest between the two thematic sections, the accompaniment continues and there is no marked tempo change. The metre changes from 3/4 to 6/8 and it is marked quaver equals quaver. This should therefore mean that the tempo of the second thematic section should match that of the first. The conductor highlights this change in the first rehearsal and demonstrates the change in the metre from feeling in three to two. The conductor explaining this means that the intention of the interpretation is to follow the score direction for the tempo here. However, there is an unintentional aspect of the interpretation that develops of the second thematic section being under the marked tempo and therefore also under tempo in its relation to the first thematic section. Thematic section three, which is continually under the engraved tempo, is checked with a metronome at the end of the second rehearsal following the tempo being questioned by the conductor. The checking here again demonstrates an intention to follow the score directions and

it would be fair to assume that this would be corrected in the following rehearsal. The fact that the conductor did not feel the need to check the tempos for the other sections further reinforces that the slightly under tempo thematic section two is an unintentional part of the group's interpretation.

PERFORMANCE DIRECTIONS: TEMPO

There are four main tempo performance directions in the score that that have been analysed: poco rit. in thematic section one, poco accel. in thematic section two, poco rall. in thematic section two and poco rit. in thematic sections three[17]. For the analysis of these performance directions only the fuller runs of the music was analysed, rather than the piecemeal note learning sections of the rehearsal, as these were focused toward note learning rather than shape.

The analysis of the poco rit. in thematic section one shows that the first rehearsal sees the gradual establishment and strengthening of the rit.; being clearest in its last instant. Although the establishing of the poco rit. follows a linear path of development in the first rehearsal, the presence of the a tempo, that is engraved to follow, does not match this continuous pattern. The conductor is accompanying the group on the piano for the run throughs in the first rehearsal, and although there is a slight a tempo observed in PR1 - 57, PR1 - 57.3 has a similar rit. but the group does not return to the previous tempo for thematic section two. The analysis of rehearsal one shows us that the performance directions become more secure through repetition and develop after the initial note securing process.

In the first run through with the harpist, in rehearsal two, the conductor does not beat through the bars where the poco rit. is marked and it is not present in this instant. After this point the poco rit. becomes established and is present in every instant apart from the last, PR2 - 32.2. Although the poco rit. is present in all of these instants, the section does not return to the previous tempo at the marked a tempo; even though the engraved marking at the metre change is quaver equals quaver. The camera fail for PR2 - 32.2 means we do not have adequate visuals to analyse the communication in the ensemble at this point. From the conducting that has been consistently present in all the previous instants it would be reasonable to assume that the conductor is still

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[17] Detailed analysis of these engraved tempo directions can be read in Appendix 2.2

beating here. The comment from the conductor that follows the previous instant is that she feels that *'it needs to go a tiny bit faster'*. The intention of increase in speed here, may have been at the expense of the poco rit. in this instant. However, with no further data beyond this point we cannot ascertain whether this is an anomaly or not. The analysis of rehearsal two shows us a similar journey to the first rehearsal and the establishing of the unintentional omission of the poco rit. This then means that the tempo the composer intends for the following section is slower and that the quaver equals quaver instruction has not been followed. It is clear that this is unintentional as there are numerous comments, in both rehearsals, where the conductor outlines the shift in metre and instructs that the quaver should equal quaver across the metre change. As there is continual quaver movement in the accompaniment through both of these sections and the material is similar for the harpist, it is reasonable to assume that the tempo of this section is not being impacted by the limitations of the harp. As there are other discussions about tempo, we would expect the conductor to question the tempo change here if she was not happy with it. In addition to this the conductor regularly beats to set the tempo across these bars, this unintentional part of the groups interpretation is therefore clearly led by the conductor.

The analysis of the poco accel. in thematic section two again shows that the group is reliant on the beating from the conductor for the performance directions to be realised. The first rehearsal starts with a slight poco accel. which the conductor beats through. In the following instants the poco accel. is not present and the conductor is not beating through these bars. The poco accel. returns in the final instant of the first rehearsal, PR1 - 58.3, where the conductor is accompanying the group on the piano. The first rehearsal here shows how reliant the group are on the conductor for observing the poco rit. and the development of it through this rehearsal is not linear.

The first instant of this material in the second rehearsal does present the poco accel. even though the conductor is beating time through this passage. This is the only instant where the conductor is beating through the poco accel. and it is not realised. In this instant, PR 2 - 6.2, there are significant note issues in the soprano part which is likely the reason that the poco accel. is not directed by the conductor. All of the following times the group sing through this passage the poco accel. is presented. The degree to which the poco accel. is done varies throughout the second rehearsal. The second rehearsal shows that the conductor beats to ensure the poco accel. There

is also a comment from the conductor after PR2 - 33 that the ensemble need to *'drive all the way'*. This results in the two last instants having the clearest poco accel. with the last instant firmly driving this to the end. The camera-fail at the end of rehearsal two means we do not have the visual analysis of the communication at this point but the impact of the verbal communication is clear from the analysis of the recording. If there were recordings of further rehearsals and performances, we would have a clearer picture of how engrained this decision becomes.

The analysis of the poco rall. in thematic section two again shows that the group is reliant on the conductor beating to achieve the performance direction. In the first rehearsal the poco rall. is only present the last time this material is visited. This is the run where the conductor accompanies the group on piano. Although the conductor does beat through these bars, the poco rall. is not present in the earlier instants. The focus of the group in the earlier instants is note security. The soprano struggles with the pitching through this passage in its first instant and the following instant is a repeat of the material to secure the notes.

In the second rehearsal the first time the group run this material the conductor does not beat through the poco rall. and the group do not present one. The material is then not rehearsed until the harpist joins the rehearsal. From this point there is a linear development of the poco rall. with it becoming clearer. Unfortunately, the camera failing at the end of the second rehearsal means that we cannot analyse the physical communication in the group that enables this but it is fair to assume, due to the previous examples, that the conductor continues to direct these with gestures.

The analysis of the poco rit. in thematic section three again supports the conclusion that the conductor is driving these performance directions. The poco rit. is present in every instant and these are either led by the conductor beating or the conductor accompanying the group on the piano. The extent to which this performance direction is observed does not develop in a linear way, with it being most clear in PR2 - 29.5 but becoming less clear after this.

It is clear through the analysis of these performance directions that the realisation of these instructions is being driven by the conductor and in the instants where she is not beating, or

accompanying on the piano. the performance directions are not present. This means that this aspect of the interpretation is being set by the conductor, rather than being negotiated by the ensemble as collective. There is a common theme that performance directions are established after the note securing process at the start of the first rehearsal. The ensemble revisits this mode of rehearsal at the start of the second rehearsal; where the additional soprano is new to the material. The focus shifts on the arrival of the harpist and the conductor takes a stronger and clearer director role in the ensemble at this point to join the singers with the accompaniment. The focus of the ensemble is then between each member of the group and the conductor rather than being more of a collective in terms of communication.

The analysis of tempo is the most in-depth and numerically rich of this case study. It reveals that the interpretation, in terms of tempo, narrows towards the directions engraved in the score throughout the rehearsals. It also gives insight into the roles in the ensemble with the tempo setting being the responsibility of the conductor and the following of tempo performance directions only being present when clearly gestured by her. The analysis also provides an example of where the ensemble believes it is following the score, at the metre change, but not presenting the engraved a tempo, the second thematic section remains consistently under tempo both to that of the score and in relation to the previous section.

COMMENTS ABOUT TEMPO

Having transcribed and coded the transcript, for ease of use compared to the video code, 26 references can be found referring to discourse about tempo[18].

A majority of the references refer to the meter feeling either two or one in a bar. These particularly reference the change in feeling when moving from 3/4 to the 6/8 passages. These discussions are often at the start of sections, and clearly earlier on in the rehearsal process. They are used to convey not only the feeling of the meter but also how the ensemble should expect the conductor to beat the meter. The quaver equals quaver marking instructs the ensemble to remain at the

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[18] Detailed description of comments and analysis, including a detailed table (Figure 14) can be found in Appendix 2.3.

same quaver pulse but it is clear that this is not being achieved by the group despite the discussions addressing this.

There are also a number of references that comment on the tempo directions in the score. Direct references to rit. or accel. are made in six of the references. In this set we can also include two further references where the conductor talks about driving to the end of the piece. Here she is both talking about maintaining the tempo, and the accelerando marked at the end. The data shows that these sections get faster throughout the remainder of the rehearsal and that the accelerando at the end is clear apart from in the last instant.

Three references comment on the new material in thematic section three being approached for the first time and reflect the engraved tempo. In one reference about this section is made by Singer 4 who expresses the need to rehearse the changes in speed in this section. This provides further insight into the collaborative approach of the ensemble where control of the direction of the rehearsal is shared with the conductor.

DYNAMICS

The analysis of dynamics in this case study was approached from the transcript where the ensemble discussed changes needed in their presentation of the score. Throughout the two rehearsals there is an increase in the presence and refinement of dynamics. They are more prevalent at the latter end of the two rehearsals where the group are running longer passages of the music, rather than the earlier shorter sections where the focus remained note security. Many of the comments about dynamics are general directions from the conductor where she is asking for the next run of that material to shift focus to include the dynamic written in the score[19]. From the comments analysed, these comments have the least impact, particularly for the subsequent instants from the comment. Instead, for the general comments, more impact is seen through repetition of the section and often a reminder. In these instants it is clear that the negotiating of the dynamics is being achieved through repetition. The development of dynamics that follow the general comments are not always instant or linear. It is clear in the earlier stages of the rehearsals that there is a conflict between note security and focus on dynamics.

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[19] Detailed analysis of the Comments About Dynamics Node can be found in Appendix 2.4

Specific score-based references to dynamic directions show a clearer and more instant shift between instants than general reminders. The specific requests are all from the conductor to the ensemble and sometimes involve pointing at the score to determine where in the piece she means. Although most of the analysis shows instant change for the score-based directions, there is evidence that these become stronger with repetition, reinforcing the idea that the ensemble negotiates these through singing. The most interesting analysis for score based dynamics, is 2. diminuendo for bars 29-33. Here, the conductor instructs the ensemble to follow the dim. marking more closely. In the instant that follows the group achieves this as an overall effect. However, the individual recordings reveal that the shape of the diminuendo is presented by singer 1 and 3 with the conductor and singer 2 presenting a more marked shift on the note change, a more sudden change. Although the conductor is leading the ensemble in terms of highlighting these dynamics verbally, this example shows that she is not always leading these vocally.

Overall, there is evidence that specific instructions about dynamics have more instant impact than general comments. The analysis also shows that the development of dynamics is most often achieved through the ensemble repeating the material. The group regularly annotate their scores during these specific instructions, but copies of each score were not taken after the rehearsals. The analysis does not provide enough evidence to conclude whether the dynamics are more established in the short term. There is also little evidence of dynamic decisions being beyond what is engraved in the score. There are no specific comments about dynamics that should be added to the score.

The Interpretative Suggestion node differs from the instructions that are given by the conductor as they are interpretative suggestion that are given by members of the ensemble. There is only one of these and it comes in after being invited by the conductor in the first rehearsal:

[20] B63-88

C: Ok, because we know these notes already I think we should go back and refine it a little. So we've got another voice other than mine, any suggestions of what we can do there? To enhance it a little bit

1: Things like the accent on canopy could be quite atmospheric

C: hmm

1: Like the text is so unusual that on the first hearing you're not going to get it so it is better to kind of paint it more…

C: Corpse out lent maybe more, more time on the C there. Alright let's try it through for the sake of that. So we'll go from, actually we'll go from Kate's entry.

When answering the survey questions following the two rehearsals the conductor said the following about decision making in the ensemble:

> '*I approach rehearsals with some clear ideas about the pieces and my interpretation of them and so I will often take a clear lead on decisions e.g. phrase breaks. Now that we are working as a consort I am trying more to ask the other singers for their opinions and to encourage them to contribute ideas and mention areas for improvement that they have noticed.*
> *In terms of planning performances and rehearsal schedules, I facilitate group discussion so that we form a plan that is manageable for everybody.*'

Although the invitation is made a couple of times during the rehearsals, the ensemble only provides interpretive suggestions this once. It would be unfair to assume from this that the shift in role that the conductor describes here, from conducting in front of the ensemble and not singing, to the consort approach she mentions, is therefore not being enacted. An analysis purely looking at the dialogue may come to this conclusion, however, in the dynamics analysis above, it is clear that each member of the ensemble is shaping and reshaping the interpretation, as discussed in dynamics reference 8. Therefore, the operation of a small consort is, perhaps, less reliant on suggesting changes to the interpretation, but as the singers can all hear each other clearly, these can be negotiated more organically through rehearsing the music.

COMMENT ABOUT TOGETHERNESS

The next node to consider from the transcript are the comments about the ensembles

togetherness[20].We can categories these twelve references into three groups: phrase endings,

entry, togetherness in general and shape.

PHRASE ENDINGS

References to phrase endings are particularly concerned with achieving togetherness with phrase

endings; seven of these are made in the rehearsals.

For each of these references the phrase ending was analysed in Sonic Visualiser. This was done

by reducing the playback speed of the file to ensure the end of the phrase could be accurately

marked to give a time instant. The instants are marked when the vowel sound ceases for non-

consonant endings, such as 'day'. For the consonant endings the marking is made at the start of

the final consonant. Often, when the file is slowed and the visual in Sonic Visualiser is zoomed,

there is a gap where the sound ceases between the vowel end and the consonant ending. The

reason for marking the start of the consonant as the end of the phrase is because the gap before

the constant, and the length of the consonant itself, can vary in length and it is common practice

for consonant ending to be placed at the start of the next beat; where the phrase ends in the

written music.

This analytical process was used for each instant which the comments refer to, and the

surrounding instants that present a repetition of that musical material[21]. This analysis provides

evidence of the Conductor leading phrase ending both vocally in her role as singer, by ending

first, but also by supporting this with gestures; though gestures are intermittent.
When the conductor's cut off gesture is missing and the ensemble still manage to achieve

togetherness in the phrase ending it is supported by increased eye contact. We can draw more

detailed evidence of this from the examples where the conductor and one singer are very close in

their timings and are making eye contact. It is clear that they are looking to the conductor for

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[20] Detailed analysis and table with explantation can be found in Appendix 2.5

[21] Appendix 2.5 gives detailed description of this analysis and tables (Figures 17-19) with this data.

leadership here. Even when the conductor's gesture is missing, observation shows that eye contact improves togetherness in phrase endings. Overall, the tracking of phrase endings shows improvement of togetherness throughout the rehearsals. This could be down to a developing familiarity with the piece and expected timings, but is undoubtedly enabled and improved by eye contact, conductor gesture and swaying to the pulse.

There is one comment about togetherness which refers to the ensemble's entry on the first chord. Analysis of this entry and its proceeding instant show increased eye contact and a clear gesture from the conductor to achieve togetherness on the entry. It is worth noting that only once is the entry of the ensemble an issue that is raised in the discourse throughout the two rehearsals. This clearly indicates that the visual and audio (counting aloud) cuing by the conductor is clear and closely followed by the ensemble.

Entrainment

In this section we will focus on how the groups entrainment develops over the two rehearsals. To investigate this, we will analyse each instant of bars 130 - 138 having accurately marked the singers' onsets through this passage in Sonic Visualiser[22]. The hypothesis is that entrainment would tighten each time the material repeated, particularly when there is a shift in focus from note learning to interpretation and also that the singers with the same part would be more together than the whole ensemble.

As before, the individual tracks were cut from Garage Band and entered in the Sonic Visualiser. To enable accurate marking of the onsets, the play back speed was set to its minimum, the heat pitch map was opened and the zoom was used so that the placement of the instant and visual clues would be clear. The pitch map was particularly useful when weaker and lower voices, that are not as clear in the visualiser's main screen, were being analysed. There was a bug in the program that regularly caused the application to quit if the pitch map was open, especially if it

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[22] Detailed analysis can be found in Appendix 2.6

was a larger file. In these cases only the slowing of the play back speed and the standard window were used.

This passage of the piece was selected due to the homophony and unison between the parts. This means that when listening to the playback at a slower speed the bleeding of other parts has minimal distraction. That said, particular focus on the sound of each individual voice was required to accurately mark in Sonic Visualiser. In addition to the unison of both notes and text, the slower tempo of this section enabled the marking to be accurate. Bars 188 - 212 were also considered for this analysis, however Sonic Visualiser did not have the ability to slow the playback of this faster tempo enough to be as accurate; the chosen section already required the maximum slowing of playback to hear where the markers should be. It is intended that this section should act as a sample to test the hypotheses. More data from additional studies would be required for fuller conclusions.

The process of analysis here will only investigate the togetherness of each of the note changes, as this will provide accurate data of how far apart onsets are. Marking these onsets and then projecting where quaver beats that are not sounded lay was considered. This would show in more detail how each singer is working in their own rhythmic ecosystem. However, for the initial investigations into entrainment between singers, the raw data of each engraved note is sufficient. A process for projecting beats that are not sounded would also require further thought and trial analysis to determine how to mathematically project these from the preceding sounded instants. This is worthy of consideration of further study as it would allow investigation of the interplay between the tactus of each signer, and therefore the reactiveness between ensemble members, but this does not fit within the scope of this case study.

Previous studies into entrainment in ensembles have analysed togetherness in instrumental groups (Clayton, M et.at. 2013) . The onsets of instrumentalists, compared with singers, are easier to determine due to note shifts occurring by bow movements, finger placements or pressing of keys. To be able to accurately mark singers' onsets for this study, we must first determine where the onset should be. Generally, singers would agree that it is the start of the vowel that is placed on the note; with any consonant or fricative preceding this. This has long been the approach in

159

classical voice training and in choirs with this rule only being broken for effects such as accent or stress. 'Although the consonant is mostly considered as the start of a syllable in phonetics and orthography, musicians generally agree that the vowel onset in singing should be synchronized with the beat' (Sundberg, J., Bauer-Huppmann, J 2007:1). Instrumentalist onsets are the start of vibration from the instrument, as they do not have a fricative preceding it. With the placement of vowels on the beat, and consonants before, more detailed analysis of onsets is required when analysing entrainment.

MARKING ONSETS

Figure 3:

Singer Onset Marking B130 - 138

Syllable	Syllable start	Syllable End	Onset	Marking Notes
In	Vowel	Voiced consonant	Glottal	Mark start of phonation
A	Vowel	Vowel	None	Mark start of vowel sound after 'N'
Full	Unvoiced Fricative to Vowel	Vowel	Simultaneous	Mark start of phonation
Full (note change)	Vowel Continued	Voiced consonant	None	Mark pitch change
Hear	Unvoiced Fricative to Vowel	Vowel	Aspirate	Mark start of phonation after 'H'
Ted	Unvoiced Fricative to Vowel	Voiced consonant	Simultaneous	Mark the start of phonation
E	Vowel	Vowel	None	Mark start of vowel sound after 'D'
Ven	Voiced Fricative to Vowel	Voiced consonant	None	Mark start of vowel after 'V'
Song	Unvoiced Fricative to Vowel	Voiced consonant	Simultaneous	Mark start of of phonation
Of	Vowel	n/a	Glottal	Mark start of phonation
Of (note change)	Vowel Continued	Unvoiced Fricative	None	Mark pitch change
Joy	Voiced Fricative to vowel	Dipthong	Simultaneous	Mark start off vowel after 'J'
El	Vowel	Voiced consonant	None	Mark start of vowel after Dipthong
Im	Vowel	Voiced consonant	None	Mark start of vowel after 'L'
It	Vowel	Unvoiced Consonant	None	Mark start of vowel after 'M'
ed	Vowel	Voiced consonant	Simultaneous	Mark start of phonation

Unvoiced Fricatives are consonants that do not require phonation in the voice box. A release of air is heard with friction caused by lips or in the mouth such as 'S' and 'F'.

Voiced Fricative are consonants that require phonation in the voice box. The friction is again heard from the mouth or lips but the sound is changed due to the supporting phonation. 'S' becomes 'Z' and 'F' becomes 'V'.

A **Glottal Onset** is when the vocal folds are brought together before phonation begins.

A **Simultaneous Onset** occurs when the vocal folds come together as the air flow starts and phonation begins.

An **Aspirate Onset** creates a breathy sound by the folds not fully being together when the air flow starts ('H') and phonation beginning after that.

The table above takes each syllable of each note in the passage from bar 130 - 138 and describes where the marking of the beat should be. Here we end up with four different types of syllable.

Firstly, a pure vowel where the singer's first phonation is the start of the note. As this study is with classical singers that have been trained to a high standard, the expectation is that each of these onsets will be clear through the use of a glottal onset.

Figure 4:
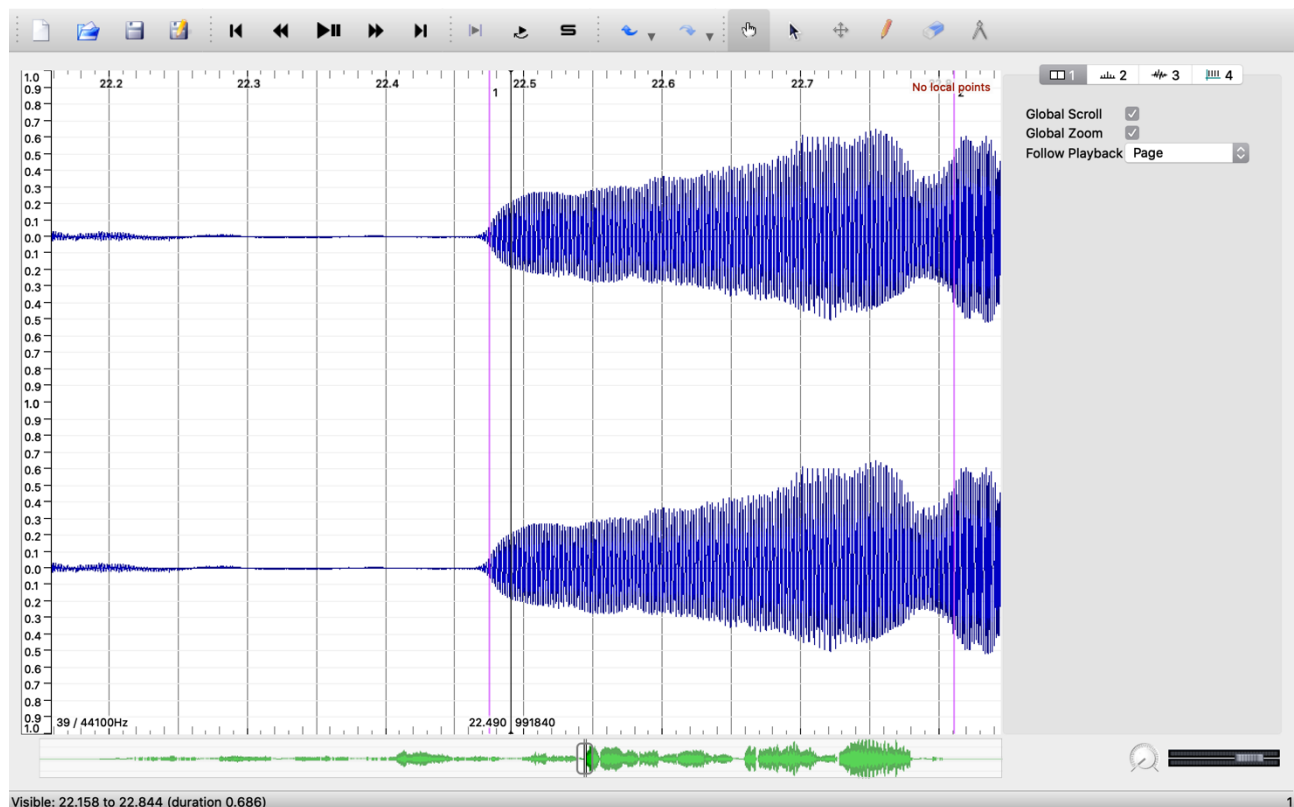
Marking of onset 'in' in Sonic Visualiser.

Figure 4 shows the marking of 'In' at the start of the passage concerned for Soprano P1. The instant set, numbered 1, is the mark of the singer's onset. In this case, the slight bit of increased blue before the marking is the bleeding of another singers onset in the background. We can then see the second pink marker, 2, this is where the second vowel 'A' starts. The drop in volume before is due to the voiced consonant 'N' at the end of the word 'In'.

Secondly, we have unvoiced fricatives, such as 'f' in the word 'full'. Here, as described above, the timing of the vowel should be placed on the note. This means that the fricative should precede the note; making up the last part of the previous note or rest. Here the singers will produce a simultaneous onset, where the air flow is moving through the vocal folds before phonation starts. Sonic Visualiser makes these onsets quite clear as figure 5 shows:
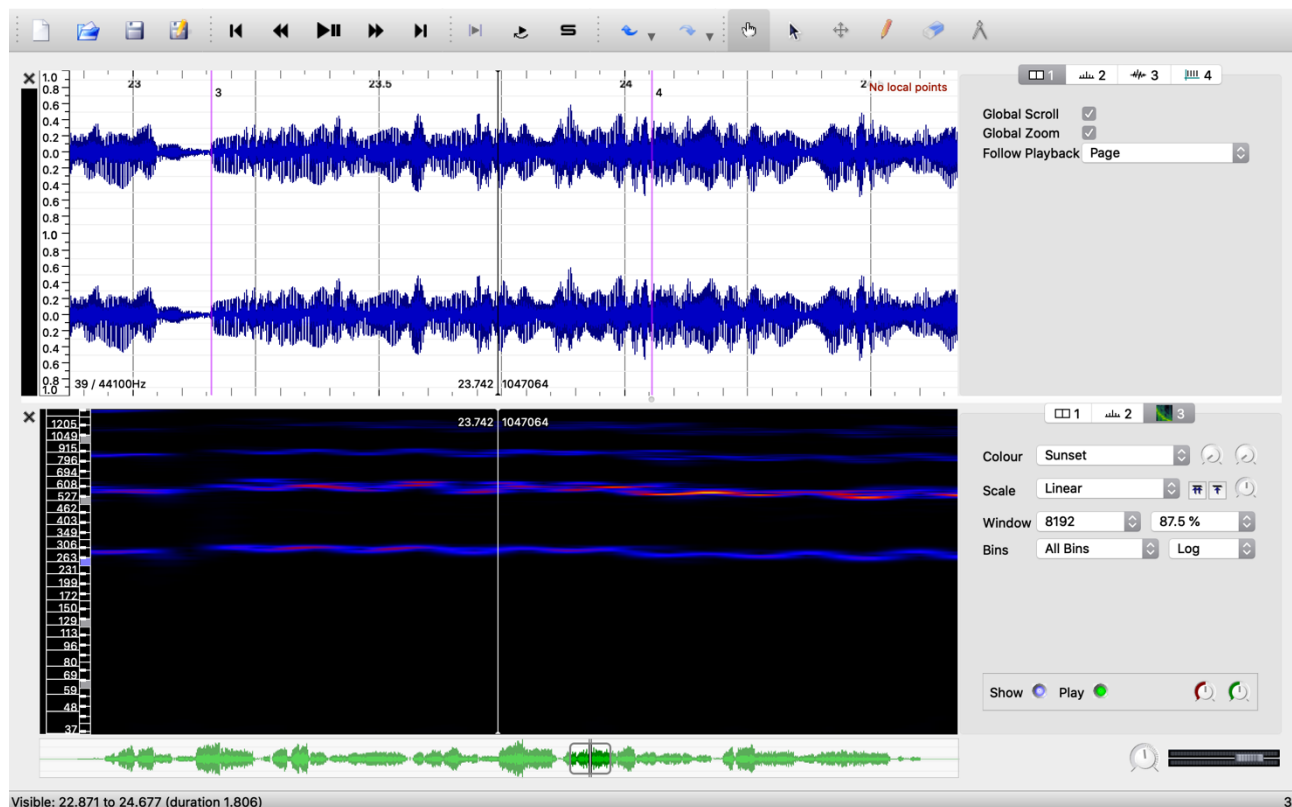
Figure 5:
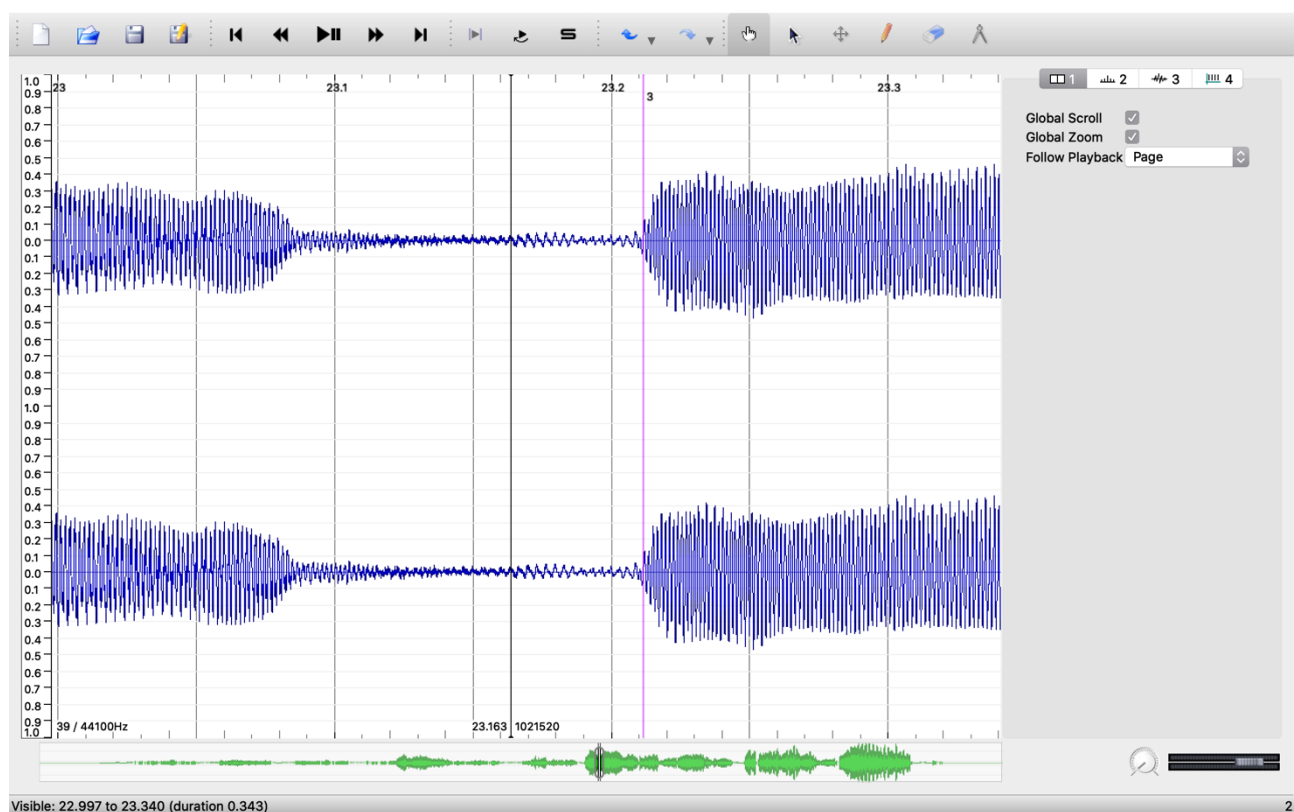
Fricative onset marking in Sonic Visualiser.

Here the Soprano P1 is shown again with the pink marker, 3, showing the onset of the vowel after the unvoiced fricative on the syllable 'Full'

Thirdly, there are two occasions where the note changes but the syllable does not, continuing the vowel sound over two tied notes. Here we mark where the note has changed. Due to the voices using vibrato throughout, when the playback is slowed it can be challenging to determine the pitch as the note is continually wavering. Unfortunately, both of the instances where the vowel is continued are close intervals, a semitone and a tone respectively. The marking of these onsets requires checking at several different speeds. As the voice box is freely oscillating when pitch is held with vibrato, the volume produced is slightly louder than the controlled resetting of the larynx when starting the new note. This means that the Sonic Visualiser can help us to determine where this note change occurs, not only with the pitch map but also by a slight drop in volume before the change is heard. This is shown in figure 6.

Figure 6:

Pitch Marking in Sonic Visualiser.

This figure shows alto P3 with marker 4 showing the change in pitch from Eb to D in bar 130 on the 'U' vowel of the word 'Full'.

Finally, we have voiced fricatives that precede vowels; such as 'J' not 'Joy' and 'V' in 'Evensong'. Again it is the vowel that should be marked here as where the note begins. Voiced fricatives are the hardest syllable to determine due to the tendency of singers to approach the pitch of the vowel through the voiced fricative. This can often mean, even in highly trained singers in this ensemble, that there can be a discrepancy between the start of the vowel and achieving the pitch of the vowel. Compared with the note change where the larynx is reset to achieve a different pitch and the shift from the unvoiced fricative to vowel where the start of phonation is clear, the tongue, lip and jaw movement to transition from a voiced fricative to a vowel is much slower. The effect of swooping up to the note through the voiced fricative combined with the relatively slow movement of the mouth to establish the vowel sound, means that to accurately determine the start of the note here requires a consideration of when the pitch arrives. Trailing marking only the vowel start,

it became clear that the distinction of where the vowel begins after a voiced fricative was going to be a lot less clear than the other onsets. Therefore, the determination of where the note starts for voiced fricatives requires the clear vowel sound and the pitch to have settled. This enables the marker to be accurate down to the hundredth or even thousandth of a second. It is important to note here that due to the tempo of the piece, the swooping to the note, which all singers in the group display, is not a stylistic portamento but rather a fault left by muscle memory of speech where this pitch change naturally occurs. This is where the larynx is not in position to create the desired pitch as phonation occurs but instead moves into this positions causing an approach to the pitch rather than a clean start to the note.

The method of marking singer's onsets here incorporates the convention of placing the vowel on the beat. It improves on previous methods by fully recognising where the beat occurs and removing the confusion that consonants can cause. Although the method gives a more accurate measure of singer's onsets, it is heavily reliant on expert analysis and therefore has potential for error. It also requires deconstruction of the text to determine where markings should occur which is more time consuming.

ANALYSIS

Having marked the sixteen onsets from bar 130 - 138 (including the two quaver upbeats) in Sonic Visualiser, the data was then exported into Numbers to create the tables (Appendix 3.A.7). The tables for rehearsal 1 show each of the sixteen note changes and their time instants to nine decimal places. The accuracy here is securely in the thousandths of a second. The columns on the right-hand side of the table show the average and the median as well as the range. It was useful to use a colour gradient in each row of results to make the tables more visual. This made finding the difference displayed in the range column easier and quicker, as this had to be done manually. It also gives a clear visual overview of the order the singers onsets come in. At the bottom of each table is the total of the average, median and range as well as the average for beat 1 (b1) of the range; these are then divided by 16 or 7 (number of beats or first beats) respectively to show the average.

For rehearsals two, where the two sopranos and two altos had lapel microphones, but not the conductor; a further analysis on the right-hand side of the table shows the difference firstly, between the soprano and alto parts and then between each other combination of singer with a lapel microphone. This is to enable us to investigate whether the parts entrain more closely, or whether proximity of singers leads to closer entrainment.

Figure 7:
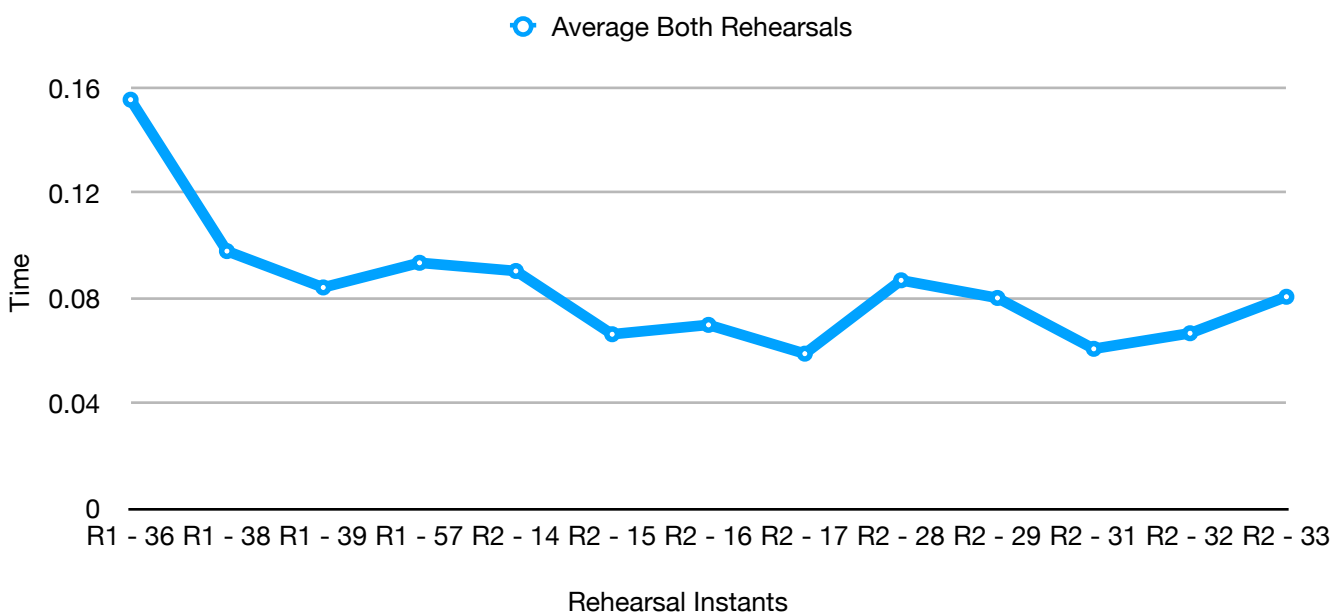
Average Time Difference of instants through rehearsal.

Figure 7 shows the average time difference from each instant of the passage throughout both rehearsals. Here, as in the graphs in appendix 2.6 and 2.7, we can see a trend of tightening of the entrainment throughout. This pattern is not linear in its development and improvements are larger to start with. Here it is worth examining when the instants occurred in each rehearsal. If we look at where the passage is rehearsed in consecutive instants, there seems to be a clearer trend of entrainment improving. The trend is first broken at the end of rehearsal one, R1 57, which occurs a while after the first three instants. In rehearsal two the trend of entrainment tightening is clear across the first four instants, R2 - 14 through R2 - 17, with a very minor decrease in R2 - 16. The biggest disturbance in the second half of the graph is at R2 - 28. As with the last instant of rehearsal one, there has been a long passage of time between the instants here. This could lead us to begin to conclude that consecutive instants of the same passage exhibit tightening of

167

entrainment in the passage. The trend continues from instant R2 - 28 through to the end. However, the last two instants in the graph go against this trend, but only by a small margin. Perhaps here, the optimum entrainment with the group is plateauing. It is also worth considering the amount of time between these rehearsals, where the group has moved on from note learning, as in rehearsal one and the earlier instants of rehearsal two, to fuller runs. This means that the musical material after this section of the piece is rehearsed each time between the instants of the passage being revisited.

The analysis of entrainment here begins to reveal tightening through repetition, particularly when material is repeated in quick succession. Further entrainment analysis, which can be found in appendix 2.7 begins to reveal how the entrainment operates between the singers; particularly its strength between the altos.

Figure 8:
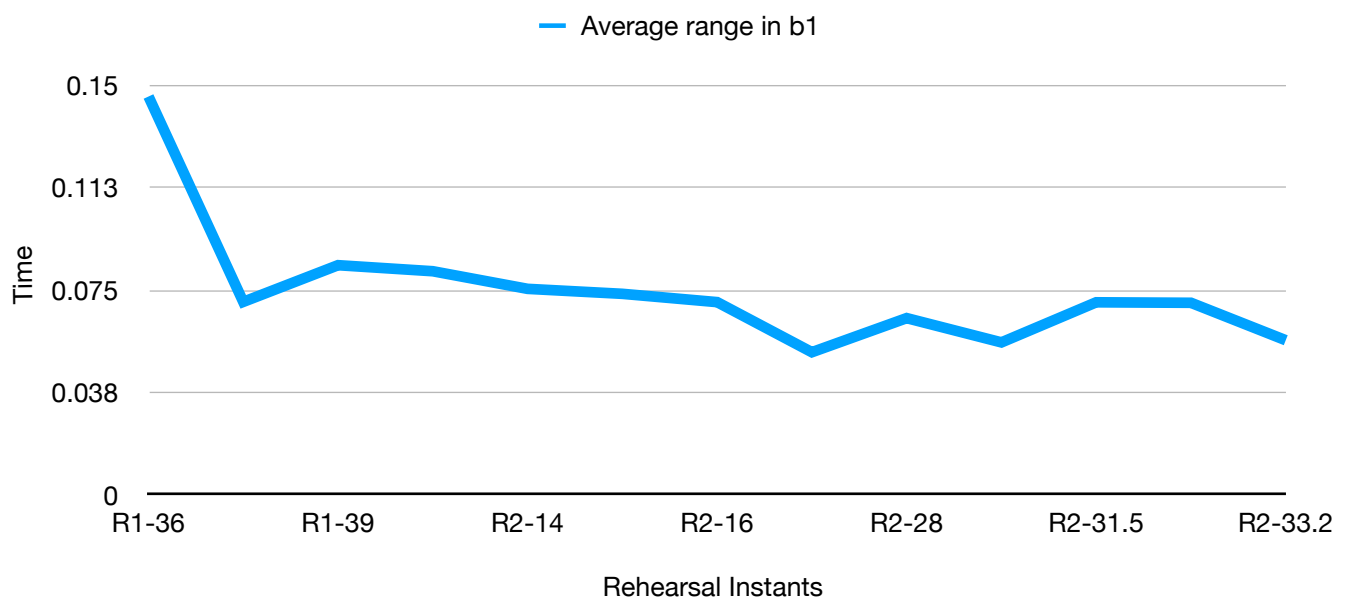
Average range in onsets through rehearsals.

The graph above shows the first beat of the bar (b1) range in time instants between the singers with lapel mics. This shows that the entrainment data tightens throughout the rehearsal process but more continuously with each consecutive instant of the material being repeated.

Problem solving

The *problem solving* node case from the transcript shows 31 references where verbal communication is used to facilitate resolution of issues. These are mostly around note security and tuning in the first rehearsal, but also some rhythmic issues, demonstrations from the conductor and use of the piano. These references, along with the gestures that the ensemble members make to signal that they know they have made a mistake whilst rehearsing, demonstrate three main ways that the ensemble problem solves.

Firstly, and most common, is the admission of a mistake, either through gesture or in the dialogue. Sometimes these are specific, such as '1 - sorry I was a bit sharp there' or more general such as '*C - Whoops I've recomposed that*'. Each time these mistakes are noted the ensemble restarts or runs the section again.

Secondly, the conductor points out issues, either to the ensemble as a whole, or a part , or individual. These again can be specific '*C - Just make sure that Eb is a little flatter it's been pushing it a bit before…*' or more general '*C- Yeah, so I think we can be more unanimous with pitch, and missive rit. there*'.

Thirdly, the mistakes are flagged up as described above, either by the singer themselves, or the conductor, and a discussion occurs on how to solve the issue. This mostly occurs when multiple mistakes happen at once, or when a problem is persisting and a way of solving the problem is required. This happens mostly at the start of the first rehearsal, focused on issues with pitching the notes.

Most musical issues are resolved when the material is next repeated. There are a couple of cases where this takes more than one run to resolve and one persistent problem. The persistent problem is Singer 1 mis-pitching the Cb in bar 29, and when this melodic theme repeats. There is an extended discussion of how to resolve this issue, but it is decided by the conductor to move on from this issue so that the singer can secure the notes at home by listening to the Sibelius file.

There is an expectation that the ensemble look at the music before the first rehearsal and between the rehearsals. In the interview discussion, the singers admit that they spend less time practicing for the rehearsals than they would like due to the pressure of other commitments at the Conservatoire.

Roles

Polaris was originally a small student choir, led by the conductor during her masters in choral conducting. By the time of this study, it was in its third season, and comprised of a mix of current students and graduates. This is a professional standard consort and both the conductor and Singer 1 are full time professional musicians. Singer 3 is in her third year of study, and has sung in the ensemble for over a year. Singers 2 and 4 are the newest members to the ensemble and in the earlier stages of their undergraduate study.

In the answers to questions that were completed after the rehearsal, the conductor states the following about the group history:

'*I set the group up as a small upper voices choir in Autumn 2015 in order to explore music from the Baltics and Scandinavia. We had about 14 singers at that time and I usually conducted the group rather than singing within it. Since then the group has decreased in size as some people have completed their studies and moved away from Birmingham or withdrew for other reasons*'.

Now comprising of five members, the harpist only joining to accompany two pieces in their upcoming concert, the conductor now operates more as a singer that is leading, rather than a conductor. It is clear throughout the two rehearsals that drives the pace and focus of the rehearsals. The high standard of the group, and their training at the conservatoire in a professionalism, means that the rehearsals are extremely focused. As the conductor and Singer 1 are not on based campus, Singer 1 having travelled up from London, it may be that there is a feeling of time pressure on the ensemble, which no longer rehearses weekly. During both rehearsals, the conductor makes clear decisions to move on from sections that she herself, or the

170

group as a whole, are not confident about. She draws a clear line between the work the ensemble members need to compete at home between the rehearsals and the areas that require the presence of the whole group. The structure of the rehearsals, from what order to rehearse pieces, right through to deciding the next section to be covered are all made by the conductor. The conductor stated the following when asked how the ensemble makes decisions:

'I approach rehearsals with some clear ideas about the pieces and my interpretation of them and so I will often take a clear lead on decisions e.g. phrase breaks. Now that we are working as a consort I am trying more to ask the other singers for their opinions and to encourage them to contribute ideas and mention areas for improvement that they have noticed. In terms of planning performances and rehearsal schedules, I facilitate group discussion so that we form a plan that is manageable for everybody.'

Here the conductor is reflecting on the change in the size of the ensemble and how she feels that her style of leadership has changed, moving from a medium sized group to a small one. As well as being the driving force for the structure of the rehearsals, it is clear from reviewing the dialogue that she is also the main driver for the interpretation. The conductor regularly gives feedback to the ensemble, mostly positive, or picking up on required improvements and focuses for the next run. She regularly poses instructions as rhetorical questions, such as *'Shall we go from…'*. There is only one instant in the two rehearsals where she invites direction on the interpretation from the ensemble, this is responded to by the two longer standing members of the group, which may begin to give us an insight to the inner workings of the group. It is the same two singers, 1 and 3, that include themselves in the problem solving discussions on pitching and note security. This could be due to their seniority at the Conservatoire, being two years above and a graduate, or it could be due to the familiarity with the group, and therefore a secure relationship with the conductor. It is worth remembering here that this study has focused on two short rehearsals of the same piece and that Singer 4 was not present for the first rehearsal. Bearing this in mind, the nodes reflect that singers 1 and 3 are not only the most involved in interpretative suggestions and problem solving, but that they talk more than the other two singers. From the analysis of the transcript, we can see the coverage percentages (the amount within the text) are as follows: 1.

5.5% 2. 2.02% 3. 4.63% 4. 1.68% (only one rehearsal), The coverage for the conductor is much higher, 70.17%, which reinforces the comments made about her driving the rehearsals.

It is clear from viewing the videos that the eye contact and dialogue throughout the rehearsal is between the conductor and the singers, rather than among the group as a whole. When the harpist joins, in the second rehearsal, the dialogue is mostly between her and the conductor. Even a quick glance at the body positions during the second rehearsal show that the singers are facing the conductor, and slightly away from the harpist. Although the conductor has reflected on the change in the size of the ensemble, and her role is now twofold being an alto and conductor, it is clear that she is leading the group both through the dialogue and non-verbal communication.

Both rehearsals begin with the group setting up the room. During this, and surrounding the groups warmup, the ensemble has informal discussion, in which all members are engaged. During these discussions there is a different dynamic in the group. The singers and conductor take part as equal members in these parts of the dialogue, without a particular member seeming to lead. The dynamic then changes as the conductor starts the warmup and then the main rehearsal. These social discussions then resume at the end of the rehearsals. The ensemble does not slip back into the social discussions while the music is being rehearsed. From the outset of a piece being started, until it is concluded, the ensemble remains focused on practicing. The language that is used is soft, polite and light hearted. Although the group is clearly heavily focused on the task they find time for humour in their musical discussions and interactions.

It is clear that the responsibility for ensuring the success of the rehearsals lies both individually and collectively. Although the collective responsibility is led by the conductor, in terms of pace and decision making, the individual singers have responsibility for their part and their own practice outside of the rehearsal room.

Although not present, another role in The Darkling Thrush rehearsal is that of the composer. As there were meetings between the conductor and composer prior to rehearsals it is important to include a consideration of his role in the rehearsal. The composer is referred to in the second rehearsal when the ensemble is considering the engraved crescendo in the harp part against a

172

diminuendo in the vocal parts; bar 164. Here the conductor goes beyond interpreting the score, and says that she will email Anthony to check this marking is what he wants. For the majority of the repertoire that this ensemble performs, and indeed for most musicians, talking to the composer is a rarity. There is a different feel of responsibility in the ensembles approach to this piece, as it is the work's premier and the composer is to be present at the performance. In the interview after the second rehearsal, the singers reflect on feeling added pressure when premiering a work, and a desire to 'get it right' for the composer. The conductor also reflects on this when answering interview question:

'I do feel an added sense of responsibility to do a good job for the composer! I'm particularly mindful of the tempi and expression markings because I feel that the composer will have a very definite conception of the piece and that there is less space for my/our own interpretation. Maybe if there was rehearsal time with the composer, I would feel more at liberty to make little adjustments because we could discuss them with him and check that he was happy with them. Having said this, we did take a slightly slower tempo for one or two sections of 'The Darkling Thrush' because the harpist found the tempo indicated to be impractical'.

The conductor outlines here a more stringent adherence to the directions in the score. Without the composer in the room, she feels less inclined to take liberties with what is written in the score as her overriding aim is to present the conception that the composer intended. Interestingly, she mistakenly states that the tempo is taken slower in some of the sections of this piece. The average tempo analysis show us that this is not actually what happened. The tempo, in actual fact, slightly surpassed that prescribed in the score.

It is clear that the ensemble is operating within clearly defined roles in terms of conductor and singers. The conductor facilitates the structure of the rehearsal and drives interpretative decisions whilst being mindful to invite collaboration on decision making from the rest of the group.

173

Reflections on Methodology

Although streamlining camera use had the intention of making the analysis process better, as only one video can be coded in NVivo, it would be better to carry out this case study again with extra camera angles. This is primarily down to the group being flexible with their formation, due to the change in shape and size of rehearsal rooms each week at the Conservatoire. During the second rehearsal, in a much smaller room, the ensemble were joined by the harpist. This meant that the camera furthest away from the conductor had to be moved and the angles were not as clear. Toward the end of the second rehearsal this camera also cut out, due to having filled its memory card. This means that that angle is missing for the last handful of instants. The camera setup planned just about works, without the technical issue, well enough for the case study. However, with only two cameras in use and neither capturing the whole picture needed, there was a lack of flexibility to this setup. There are two possible solutions to the setup of the cameras. Firstly, it would be easier to work with a group which makes use of the same rehearsal space and setup. This would negate the need to build in flexibility to the setup. Secondly, an additional two cameras could be used, at similar angles, to provide a back up, incase another camera fails. Although more camera angles would give a more detailed view of the ensemble, the capture which was achieved does provide enough data for this project.

The microphone setup worked well for analysing the first rehearsals; where all singers wore lapel microphones. The second rehearsal worked less well, with the system not laying down the microphone feed from the conductor. Also, it is a further weakness not to have recorded the harp with a microphone as this would have been useful to further interrogate the entrainment data. Having reviewed the microphone system, it is clear that there is an issue in using more than four USB microphones into Garageband through a USB multiport system. Often, the program does not lay down one of the tracks as it cannot recognise the fifth lapel mic. This is likely to be an issue with running the USB mic through one port on the laptop. Unfortunately, the computer used for the study only has a USB-C port. This was tested, and worked before the days with the ensemble but failed on the day. It may be better to run the lapel microphones through a more sophisticated system. An extra lapel microphone would have allowed further analysis of

entrainment, particularly the conductor's role in the ensemble and within the subgroup of the altos.

The placement of lapel microphones could also be neatened. Although you can clearly hear each singer in the Garageband files, there is significant bleeding of other, stronger, parts across the files which makes the accurate analysis of files more challenging. At times it required more tuning of the ear to the to the tone of a voice, rather than carrying a clear line from each singer. This is particularly true for the weaker voices in the ensemble, and more so of those singing lower notes. Placing the lapel microphones closer to the singer's mouth may cure some of the bleeding that occurs. If the singers were at more of a distance when singing that may also help. However, it would then mean that the research setup was starting to interfere with the normal proximity and behaviour of the ensemble. This was only a minor issue for the weaker, lower voices of the ensemble when masked by higher, strong singers in close proximity. Most of the issues were overcome by repeated listening.

As well as ensuring a more complete capture of the rehearsals, there could also be some improvements made to the data analysis. The analysis here has relied mostly on averages to draw comparisons of headline data. Further statistical analysis could bring further detail to this and enable the examination of the relationship between successive instants. This may give a clearer picture of how ensemble members move in and out of sync. It would also be interesting to develop a model that would project where the next instant occurs, based on previous beats. This would allow us to determine where the negotiated beat should occur and how each member of the ensemble is interacting around that. This would be a good challenge for machine learning.

The video coding in NVivo has been useful to the analysis process but less fundamental than in the precious case study. In hind sight, beginning with the analysis of the videos may be less productive than starting by interrogating the changes in interpretation and then reflecting on the communication through video analysis. Coding the videos was useful in ensuring that the behaviours of the ensemble were understood but is a time-consuming process. The most enlightening areas were developed from the changes in the interpretation and from the script and then investigation of the videos were made in reference to this. Furthermore, the navigation of the

rehearsal by means of the script and the numbering, and subsequently filing, system is much easier than using the coded video.

This study would be further strengthened by capturing the whole musical process, from first rehearsal through successive performances. This would give a much stronger picture of interpretation, how these change, and how settled they become. This would require a much longer period of time for data capture and therefore a lot more data to analyse. Perhaps a more focused approach, in terms of analysis (tempo, entrainment, verbal or non-verbal communication) could enable this, however part of the focus of the study and reason for Grounded Theory methodology was to allow for a more holistic case study.

A New Model of Interpretation and Communication for Ensemble Music-Making

Introduction

This chapter will draw together the evidence collected and analysed through *Alcina* and *Polaris* case studies about the communication that occurs in ensemble rehearsals and performances. Building on the literature survey in the first two chapters of the thesis, to produce a new musical communication model as well as an interpretation framework for classical music. To interrogate interpretation in a score-based tradition, it is necessary to reevaluate what constitutes a musical work through empirical experience and moving beyond the discussion in the second chapter of this thesis. This thesis does not intend to redefine and defend stringent philosophical arguments on what constitutes a work of music, as this would be a whole thesis in itself. Instead, it will base the experience of music making at the centre of the debate. Although for the western art tradition these two strains, of work and interpretation, will inevitably and naturally interact with each other, the musical communication model will need to be mindful that it can still work for non-classical music, where the idea of the 'work', and therefore its objectivity as derived from a score, is less stringently formed.

A New Communication Model

Taking into consideration the critiques of previous models and discussions in previous chapters forms the basis for the development of a new communication model:

Figure 1:
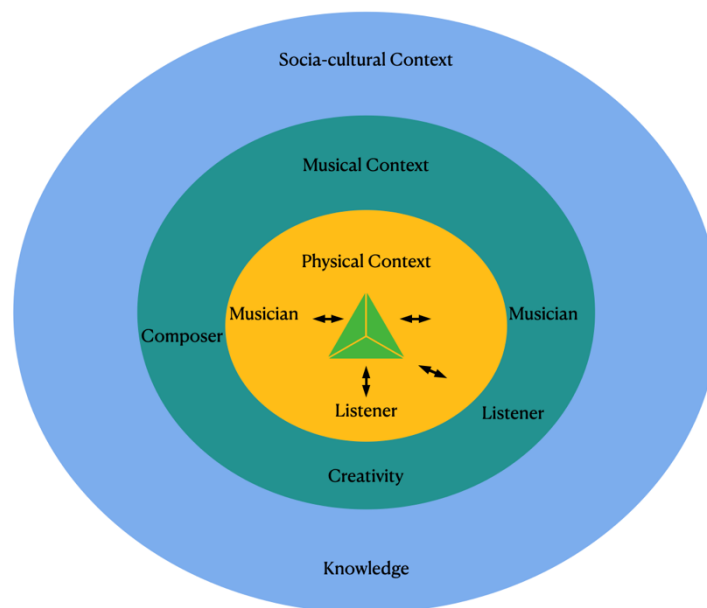
Context Model of Musical Communication.

This model attempts to situate musical communication clearly within the context that it occurs. Each circle represents a level of context, in which the next is subsumed. The triangle in the centre represents the sounding music and the roles are then layered around this, on top of the context circles, in a way which demonstrates whether they are necessary to the physical context of the performance or not. This model has been developed from the findings of the two case studies and the resulting code. It is clear that participation in any music-making requires presence in the same physical context where the sound is occurring. These layers of context also start to allow us to consider how understanding of musical rituals and material derive from experience and expectation. The layers of context were features of predating models (Hargreaves et.al.) that were clearly evidenced by the behaviour of both case study groups. The roles have been layered on top as individual humans that interact with each other undertaking distinct roles (listener, musician,

composer). These roles were also evident in the case studies when examining how the ensembles worked together and the group dynamics therein.

Contexts

Let us take each of the elements of the Context Model in turn:

SOCIO-CULTURAL CONTEXT

Our entire experience and understanding of music are conditioned by socio-cultural context. In the act of music-making, participants build up an understanding of conventions and rules and an understanding of its place within society. This is how we understand when a busker on a street is performing or how we walk past a concert hall with an idea of what occurs inside. Although this study is centred on classical music, it useful to considered how the model works for non-western art centric music of other cultures and beyond the concert hall. Music is heavily rooted within its social context such as Indian ensembles performing Ragas which stem from the Hindu Vedic traditions, or early choral music which was the preserve of churches and cathedrals or the Afro-Brazilian Congado ritual described by Clayton (Clayton, M 2013: 21). It is also important here to remember that the socio-cultural context may be made up of multiple cultures and societies. For example, the piece of music that is being played may be from a period of history where the culture predates the one the performance occurs in. Knowledge of both of these socio-cultural contexts will inform those experiencing and understanding of the music. Another example could be that of fusion music, that which makes use of conventions and knowledge from multiple cultures and geographic locations; the knowledge here informs those involved in the music making and gives the back drop for musical meaning to be found through representation in the musical sound. The entire background of socio-cultural context should include the knowledge of the human agents that exist and those used to enable the performance conventions for the physical performance. This layer could be linked to the outer layers of Small's *Musicking* (Small C 1998: 130-144). However, I would not go as far as Small to include the most distant activities from the performance. For example, his inclusion of the road networks to a concert hall, the bar and the builders of the performance venue are not included here as they do not directly interact with

the musicking or the art object during the event. In both case studies, although the surrounding economic structures that Small discusses are present, the music-making is not dependant on these outside of the physical context of performance; any element could be closed or missing and the projects still occur.

MUSICAL CONTEXT

The second layer is the musical context which focuses beyond the cultural and social conventions, and begins to develop understanding from musical conventions and genres. Again, this is knowledge that is built up through exposure to musical performances. The musical context allows us to understand whether we are listening to a symphony or a heavy metal band. It also allows us to understand when conventions are being purposefully, or accidentally, broken within these contexts. For example, a heavy metal band could present a classical symphony. Complete understanding is not required by everyone who is involved in the musicking, or there would be no room for learning, but this context exists whether it is known or not. It is unlikely that anyone involved in the music making will have a complete understanding of the socio-cultural or musical contexts.

As well as considering the genre that a piece resides within, the musical context should also provide understanding of a works topicality. Hellaby defines topic as *'a musical type often associated with a particular function (such as a dance, a march or a fanfare) and recognisable by certain related characteristics'* (Hellaby, J 2009: 36). In a later article, Hellaby considers the role of topics in reference to realisations of piano works by John Ireland and reveals how consideration of these, when encoded in the score by the composer, can alter the *'interpretative thinking at a deep level'* (Hellaby, J 2020: 51)

The Overture of Alcina case study showed the effect of the musical context on the interpretation. The quick collective negotiation of the double dotting rhythm clearly demonstrated differences in each players knowledge of this performing convention; and the ability for those with less exposure to the convention to learn. This aspect of the case study clearly demonstrates how the musical context directly impacts the interpretation that is presented.

180

The definition of a musical work, which we will come to later, should neatly interact with this model of musical communication. In addition to allowing us to understand what genre the music is, the musical context also allows us to have expectations of the rest of the piece during the musicking. This expectation can only be developed from listening to the music, as a tertiary object, which involves creativity from all parties. Therefore, in the model above knowledge, which is learnt from socio-cultural context, is creativity. Everything within this circle of the model requires creative engagement. The absence of creatively engaging with music through use of imagination would render the music only to be heard as sound. As we saw in both case studies, commitment and repetition are vital to the process of music-making and crucial for understanding the meaning of music. Indeed, to form part of either ensemble required many years of commitment, training and exposure to music.

PHYSICAL CONTEXT

It is important to consider the physical context of performances, whether it be a concert hall, music practice room or on the street. There has always been a physical space where music occurs, where the musicians gather and form the music together. If that music is recorded it can then be reinstantiated or broadcast into another physical space[23]. This circle on the communication model allows us to layer the humans, represented by their roles, who interact with music, represented by the central triangle, to demonstrate whether their presence is required in the physical context of the performance or rehearsal (see roles below). The physical context, where the music making occurs, should include all areas that the music reaches. A pianist rehearsing at home first fills the room they are practicing in, the house that room resides in and perhaps out into the street and neighbouring houses. The experience of the music will differ for those in different physical locations not only in terms of loudness but also pitch perception. We could take further visual consideration here, that when viewing music being played, our decoding of the music to match its visual presentation can transform our hearing. For example, if we are

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[23] The ongoing challenges of the pandemic and developments in technology are beginning to bring about distributed music-making spaces online. Here the physical context become a virtual one.

watching an orchestra and viewing a particular section or player, experience of the music, and our focus within the soundscape, can change.

An example that comes to mind is a performance of Holst's *The Planets Op. 32*. For me the most memorable performance of this piece was during the *1934* BBC Prom in 2009 with the BBC Philharmonic and BBC Singers, conducted by Sir Charles Mackerras. In the last movement of the suite, *Neptune, the Mystic*, the BBC Singers took over the work from the BBC Philharmonic. The exchange from orchestra to choir occurs gradually in the score, and the off-stage chorus sang in the top gallery of the Royal Albert Hall, out of the sight of most of the audience. The off-stage nature of the chorus meant that the source of the sound was unclear to the majority of the audience. When the choir first entered it was hard to attribute the singing to voices as they were not present on stage. At first the sound blended with the string section so well that the realisation of the offstage choir came slowly; adding to the ethereal nature of the mystic movement. It also had the effect of lifting the sound up through the concert hall to the choir's location in the gallery. The experience of this effect will have been different for each person in the concert hall. Each person's proximity to the orchestra, or the choir, would mean a different perception of the exchange from orchestra to choir due to the balance changing at different times depending on where each person was sitting. If the singers were not hidden behind screens, as denoted in the score, audience members who had sight lines to the choir in the gallery would perhaps realise the entering of the choir more quickly due to having visual link with the source of the sound.

The change in perception of music by proximity and view can be further demonstrated when considering music playing in a passing car. Everyone will have had the experience of hearing a passing car playing music loudly whilst driving through a town; we may even be able to discern what the piece of music being played is. In this physical environment the pitch of the sound changes for the stationary listener, whilst remaining unchanged for those in the car. This is a result of the doppler effect. The process of this effect is described through the pressing of moving car horn by Harvey and Donald White in *Physics and Music* (2014). *'With each new wave sent out by the source, the car is closer to the preceding wave sent to the left and father from the preceding wave sent to the right. The result is that consecutive waves traveling to the left are shorter while*

those traveling to the right are longer. Sine the velocity of sound is always the same in all directions, an observer at O2 [behind the moving car] hears fewer waves per second, and an observer at O1 [in front of the moving car] hears more waves per second' (White E et. al. 2014:59). The same effect occurs for the sound emitting from the car speaker system. The pitch changes depending on the listener's location meaning further reinforcing the differing experiences. The differing experience of the music does not only apply to pitch, but to broader acoustics affected by architecture and temperature. The analysis of the entrainment data from the Polaris case study (Appendix 2.6) revealed some signs of pairs of singers entraining more closely, particularly when singing the same part, but also when in closer proximity to each other. It is clear that musician's location within the physical context can have an impact even in a very small room. The effects only become more clear in larger settings where musicians are more spaced out. Often when playing from the back of a large orchestra players are required to play slightly before where they hear the beat, so that when the sound reaches the centre it is still in time.

Roles

As described in more detail below, the roles layered onto the context circles and are not mutually exclusive. The expectation of the model here is that the musician(s) will also be a listener, and the exchange of communication will occur between all those physically present, in a reciprocal way. The second circle also allows for the communication to be to those who are not present through broadcast and recording. The communication outside the physical space of performance circle will be less immediately reciprocal but communication back up the reciprocal channel is still possible through technology and economics; through reviews and future ticket sales. Some of the roles have been layered onto the second layer to represent their need not to necessarily be in the physical context of the music-making; all roles on the model are as an example. Although the roles are not mutually exclusive and their roots in the western art tradition has been critiqued below, it is useful to keep them situated on the model as they are the roles that we primarily use to describe those that are involved in the process of music making.

MUSICIAN

Although the role of the musician is not mutually exclusive from that of the listener, it is a specific role that is rooted in the language that we use to describe music making. As a starting point for determining the boundaries of this role, it would be useful to consider the connections and distinctions that Waters makes between performer, instrument and environment, in *Performance Ecosystems*: '*The terms reify the corporeality (bodilyness) of the first, the goal-orientedness of the second, the otherness of the third*' (Waters, S 2007: 2). Waters describes the necessary connection between the player's physicality, the instrument (through the example of a clarinet and baroque flute) and the environment. For the baroque flute to sound, in the way in which it has been designed, requires the performers diaphragm, lungs and lips to create the source of the sound. The instrument can then by physically manipulated through touch to change its length and the pitches emitted. Finally, the environment in which an instrument is played further amplifies this sound. Waters quantifies these elements for the baroque flute, *'perhaps 40% of the sound depends on the instrument, 30% on the acoustic, and 30% on the player negotiating a relationship of reinforcement between the two through appropriate technique,'* and further compares this to experiences he has with laptop performances (Waters, S 2007: 3). It is clear that there are interdependencies between performer, instrument and environment and it is the role of the musician to negotiate these. It is the musician's function to create and control the sound. In live performance this is a result of continual feedback through listening and in ensemble performance this activity becomes a group endeavour rather than a task for a single person. It may well be that a listener, or many listeners, will have an effect on the sound through being present in the room. Often choral work rehearsals sound very different to their performances in front of audiences, with large numbers of soft bodies dampening the sound that the musicians are making lessening the resonance of large performance spaces. Although these audience members have an effect the sound, it is not created by them and they do not undertake the task of continually editing their effect on the sound. The environment and performer will always be present in some form for music-making but there are many types of music where performers do not require the use of an external instrument, such as singing, where the performer can rely solely on their physicality to produce sound. In these instances, it could be the parts of the body used to create the sound become the instrument.

Having concluded that the role of the musician is to produce sound, with or without an instrument, and to continually adjust this production in relation to the environment, leads us to consider the roles that connect musicians. Taking the example of a solo singer with an accompanist, we can start to explore the exchange within the musician role in terms of leadership of adjusting the sound that we produce. When accompanying a professional singer, a pianist has to negotiate their role in relation to the singers. Usually, the singer takes the majority of the leadership role here, particularly in a formal concert or lieder settings. The convention is that the singer will communicate to the pianist when they are ready to start and throughout the expectation is that the accompanist will follow the singer in terms of tempo, articulation and dynamics. Here, the singer will be negotiating the sound that they make to the environment, as well as to the piano that accompanies them. In theory the negotiating of the sound here would be primarily through the singer, but in reality it has to be continually negotiated by each individual involved. A successful performance, for the singer and pianist, is surely one where they both feel they have continually shaped the sound as a collaborative unit. Obviously, this ideal is not always met. Sometimes the opposite can occur, particularly in less formal settings, for example when teachers accompany their students and may use the over voicing of their part to drive the timing, dynamics or articulation of the other. We can see at this stage that the interplay between the roles of multiple musicians is complex and instantly reciprocal in its feedback; a feature that the Hargreaves et.al. model features. The further complication of ensemble performance, and therefore in the design of this model, is to represent the complex and fluid group dynamics that exist within ensembles.

The complexity of communication only increases with the addition of more players. Take an orchestra for example. Many players coming together, each with their own part in front of them. The task of these ensemble musicians still requires the continual editing of their individual sound, but also how that relates to others the orchestra. A violist has to consider their sound, how that sound matches with their desk partner, how their desk relates to the sound the viola section makes, the role of the sound of the viola section within uppers strings and then strings as a whole and then in relation to the rest of the orchestra. This multi-level nature to large ensembles which require continual adjustment both negotiated through the roles within the hierarchy (section

leader, leader, conductor) but necessarily by every individual member of the ensemble. The task is also not simply layered in the instrumental hierarchy described above, but also through which section you need to be working with, or against, at any particular time due to the thematic material being presented. The analysis of the entrainment data from the Polaris case study (appendix 2.6) provides some evidence toward these layers of hierarchy. It shows that the workings of pairs of musicians who are singing the same part, or in octaves, entrain more closely; surely an effect of being more focused on the inter-grouping than the collective sound. The data in this section is further enriched by the visual observations of the tendency of the singers to watch the conductor, revealing the complexity and fluidity of the hierarchy in the group.

In the model, the musician role has been layered onto the physical circle to represent the interplay between musicians above. This role has also been layered onto the second circle, where humans involved are not necessarily required in the physical space. This is to reflect the increasing role that recorded music has in live performance and as an instant of past performances. Many cabaret singers perform with the backing of full orchestras or bands, some heavily synthesised and some live. In the case of studio recorded backing tracks, or more commonly where the vocal line has been removed from a popular recording, the musicians performing for the recording of the track exist in a separate physical space and time. Therefore, the recording is a snap shot of the original performance which is then used again for future live performances. The role of the multiple musicians involved in a recording then become subsumed under the responsibility of the person in control of the sound system who now has limited ability to amend the sound in its new physical context; probably only by volume. The studio musicians will have already adjusted their sound to each other, either live or through layered recordings. The live performer(s) will then adjust their sound according to their environment and the balance preset on the backing track.

A good example of the use of recorded music in live performance is Steve Reich's *New York Counterpoint.* Composed in 1985, this minimalist layered and phased work is scored for nine clarinets and three bass clarinets. However, the scored live performance is for one live solo clarinet with the rest of the parts being prerecorded allowing for intricate phasing of the parts. As in the example of the cabaret backing track, the clarinetist recording the tapes for the non-live parts performs in a separate physical context which exists in a different time. The musician role

exists during this recording, with the presence of the players physicality, the instrument and the environment it is recorded in. Once recorded it is then used to accompany the live clarinetist. The person controlling the amplification of the recorded track maintains some element of the musician role, but has less control over the musician role than the degree to which a live performer would. Whether or not the recording clarinetist has considered the environment of the live performance, it is impossible for prerecorded music to be involved in the liveness of the performance and the elements in Waters ecology as the liveness has been removed through the recording process.

This definition of the musician extends to sound engineers adjusting the sound to its environment, and DJ's manipulating tracks together to create new musical syntheses. The musician's role is to create and adjust musical sound for artistic purposes, using physicality, instrument(s), technology and environment, and constant editing of this sound in the physical context of performance. The role of recorded music is therefore covered by the musician role in the model as the person who controls the pre-recorded output into the physical environment, who has the ability to adjust the sound in terms of volume or deciding which speakers to use and where to position them, is the person editing the sound; the sound system is the instrument.

LISTENER

The listener covers every person that hears, and processes, the sounds made in the performance, including those who are involved in making the music. Listening to music cannot be a passive activity as it requires our imagination to categorise the sound we hear into music and to perceive the musical sound.[24] The activity of listening requires us to explore the relationships between the musical elements, sound, rhythm, pitch, which in itself is a creative process that is rooted in our previous musical experiences. Grewe et.al. develop this point when researching the chill response when listening to music: *'It would be a misunderstanding to interpret listening to music as passive act. Music arouses different emotional processes in people; it sets them to (e-)*motion' (Grewe, O et.al. 2007: 312). The active listening here does not need to be the sole focus of what we are doing at that time, such as the concert hall audience member. We regularly listen to music as

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[24] Scruton initially describes this listening as the tertiary object of sound before further developing it into the idea of musical movement, up and down, through the pitches in the music space. (Scruton, R 2009)

secondary when viewing films or dancing with our creative process of exploring the musical elements in the sound and projecting expectation continually driving our understanding. The level of focus that we can have on a piece of music can change in the same way that we can focus between anything in our visual field. The gestalt principle of grouping or relating what our eyes depict is the same for the information that the brain decodes from vibrations through the ear. '*In General, sequences of sounds are 'streamed' in our perception - each allocated to a temporal Gestalt, formed according to temporal analogues of the principles of Gestalt information in vision. Proximity in pitch, duration, timbre, loudness and so on lead to streams which endure through silences, interruptions, competing streams and unstreamed events*' (Scruton, R 2009: 22)

The shift that needs to occur moving away from previous writings in this area is that the role of the listener is creative and imaginative. This creativity is internal, in our cognitive processing, rather than a projected creativity role like the composer and musician. *'Psychology has long since viewed perception as an active process of cognitive construction in which new sensory input is interpreted in the light of the perceiver's accumulated schemata, or mental representations, and this includes music listening'* (Hargreaves, D et. al. 2012:160).

This creative listener goes beyond the description of the concert hall audience member that Small describes (Small, C 1998:41-42). Small acknowledges the listener's performative role in the concert hall, making particular reference to this in terms of their economic and social power and he describes that this occurs in and around the building as well as through their position within the hall itself. However, the channel of communication is termed by Small in such a way that it presents the passivity of the concert goer as only receptive (Small,C 1998:27). The passivity enacted by concert goers in Small's concert hall is an instant where intentional social inaction seems inactive but it actually takes a lot of effort to be inactive to the socially acceptable extent required in a concert hall. The suppressing of sounds and movements that would be normal in any other gathering in that number are suppressed by all to not disturb the music or other audience members (Small C 1998: 27). This is why the bustling and coughing of an audience is often increased between movements of a symphony before the audience returns to it role of silence. Even within the constraints of the concert hall, which is designed to encourage and

control this behaviour, the listener is actively and creatively engaging with the music. For less formal music, such as open mic nights and stadium concerts, the listener is permitted to have much freer responses to the music. Verbal conversations with friends and physical embodied reactions to the music freely occur.

Listening can go further in its creativity than simply recognising music in a multitude of contexts. It is possible for a listener to intentionally engage with sounds to create music out of them. Many of us will have experienced this on trains. When leaving a station and gathering speed, the clunking of train wheels shifting between tracks can be heard as rhythm. The repeating clunks become grouped in our mind with us projecting our expectation on when the next will sound. This projection is the creativity of making these sounds become rhythmic and therefore listening to them as music (Scruton, R 2009: 22-23)

On the model the listener has been placed in both the physical context, and outside it. This is to represent the role that recorded music has in allowing listeners to access music outside of the physical context in which it occurred. Through a recording the music can be reinstantiated in another physical context, or directly into the ears of the lister via headphones, creating a secondary physical context.

COMPOSER

The traditional view of the composer is rooted in the classical tradition of the creator sat at a candle lit desk marking up a score which is then to be handed over to musicians in a court or church. This process of an external composer still remains with us today and we cannot deny the existence of this role where the creation of a work of music, by a single person, is external to the live music making in the physical context. This role is able to occur outside the physical context of the musicking when communicating with the musicians through a score. However, we also need to consider more modern, and non-classical, routes to music making where the composer's role resides within this physical context and may be a role shared by more than one person. The external nature of the role of a classical composer may have some bearing on the elevating of the composer in the western mind, resulting in too much ownership and divination being attributed to

them and indeed too much creativity being taken away from performers. The external composer requires the classical musician for their work and vice versa.

Littleton and Mercer's research into *How Musicians negotiate a Collective Sound* (Hargreaves et. al. 2012: 233-256) investigates the verbal communication in rehearsals of a band made up of three players. This study highlights the compositional role that can be undertaken collectively by a group and their process of trial and error combined with verbal feedback to make creative decisions. The process of rehearsal in this study does not begin by approaching a score but rather through creating and editing the sounds the ensemble can make. The creative processes of composition and interpretation become blurred. When considering the approaches in the multitude of genres that we have available to us, we need to consider whether the composer role, as described above, is the prevailing starting point for works of music or if this is just an anomaly of the classical tradition. The composer alone in another room is a strange creation, a result of economic structures and perceived ownership over music. Amanda Bayley's research into the Kruetzer Quartet shines a light on the more collaborative approach that can exist when a composer is present (Bayley, A 2017) The role of the composer is also heavily rooted in the traditional process of rehearsing and formal concert hall performances.

Creativity

Every role within the musical context of the model requires creativity; musician, listener and composer. There is a habit within the discourse in music, and in how we talk about its ownership, to attribute all, or the majority, of the creative input to the role of the composer. Considering the roles on the communication model, and their mutual dependency, as well as the ability for each person involved to assume more than one role gives the opportunity to consider the role of creativity in the process of music making. Creativity continues from composition into interpretation and reception. The idea that musical works are completed when they leave a composer's hands is a fallacy. The creative process continues through interpretation during the rehearsal process and in performance, as shown through the works analysed in the two case studies. The role of the musician is far from a robotic operation where the score is realised through a methodic computer like system. There are many decisions that each musician has to

make, and remake, during a rehearsal or performance; especially an ensemble performance where the coordination of a group needs to be balanced against each individual's creative ideas in a responsive way. The idea of a composer in another room has developed out of the over repeated classical cannon in the concert hall, where music of the past is often billed as headline for economic reasons; to ensure seats are filled and ticket money collected. Of course, we work with scores from the past and engaging with music through scores of an absent composer is common in the western art tradition. However, taking all music into account, often the composer is unknown or not the focus of how we refer about the music in normal conversation. More often than not, we talk about non classical musical works in terms of their title and who performs them. It is the concert hall tradition that bucks this trend, rather than it being the norm itself. In the Polaris case study, although the composer was not present in the room for the rehearsals, there was contact with the composer via email. This exchange with a composer is a common feature with contemporary score-based genres and provides the composer with the opportunity to improve their craft through engaging with instrumentalists for feedback and for musicians to seek answers that cannot be concluded solely through the score. Although some constituent parts of a work can be denoted in a score, the creative process is continued by all involved in presenting the work of music. The pitches and rhythms may be set in the score for non-improvising genres, but how we play the notes in terms of: dynamics, articulation, tempo, rubato etc., require interpretation and creativity from the musician(s). Even though it removes us further away from total completeness when dealing with works of music, we should ask ourselves the question: is a work of music ever really finished? Surely, when a work of music ceases to have creative input, through the roles outlined in the model, this is when it ceases to exist. It is no longer engaged with. The process is over and the piece never performed again.

COMMUNICATION

All types of communication that we encountered in the case studies occur within the model. We need to move beyond the transmitter to receiver, and reciprocal feedback addition, to recognise that there are multiple channels of communication occurring at once when we encounter music. Primarily these are through the art object, through the tertiary object of sound where we imagine the connections between the pitch and rhythmic relations. Communication also occurs around the music, both to enable its existence and for the social aspect of the experience. Both of the case

studies in this thesis highlight the requirement for ensembles to continually communicate, not only through listening to their own, and others, sound but through gesture, movement, embodiment, eye contact and when appropriate verbally. Transmitter and receiver should be possible between all humans involved in the music making, the ensemble and audience and between the groups that operate within an ensemble. What is instantiated during a performance, or rehearsal, is an experience. This experience is both shared and individuated. It is shared due to the engagement with the music, the vibrations that we collectively perceive as tones, rhythm and harmony, as well as through our experience of assuming the roles of listener or musician. It is individuated by each person's experience being different due to their differing proximities and their creative role[25]. The communication that therefore occurs within the suggested model are all the types that have been previous explored that arose from the case studies: verbal and non-verbal; gesture, embodiment, facial expression and through the music itself (listening). The model attempts to situate the musicking within its contexts and centre the communication between the humans that are interacting with agency in an individuated and holistic way.

CREATIVITY AND OWNERSHIP

In the first chapter of this thesis I undertook a review of the current prevailing arguments in the discourse of a work of music. What became clear through writing that chapter, was that matching our human experience and use of language in relation to music making, with the staunch philosophical categorisations and lines of argument, is extremely difficult. Surely the starting point in the philosophical categorisation of anything has to stem from our a priori experiences. If we are not basing our theories on what we do and how we interact with works of music then we are simply writing philosophical treatise that are in danger of not bearing any relation to the real world. Levinson amends his philosophical line of argument to include this, which goes a long way in strengthening his argument. '*There is no idea more central to thought about art than that it is an activity in which participants create things - these things being artworks'* (Levinson, J 2011: 64). Levinson uses the way in which we talk about musical works to support his philosophical beliefs about its ontology. Our primary task as musicians, and the task at hand here, should be to provide

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[25] Small discusses the group self identification within musicking. 'Those taking part in this or any other musical event are, at some level of awareness, saying, to themselves, to one anther and to anyone who may be taking notice, *This is who we are*. (Small. C, 1998:43)

philosophers with detail on of how we interact with works of music by providing evidence of the human experience so that they can develop philosophical arguments which are rooted in the experiences of musicians and listeners.

We generally refer to a work of music by its title coupled with its perceived ownership for example: Elgar's *Cello Concerto, Let it be* by the Beatles or *Before The Parade Passes By* by Barbara Streisand. The language used here is familiar but each reveals subtle differences in their meaning and implied ownership. For Elgar's *Cello Concerto* we refer to the work of music as belonging to the composer. Whereas, in the case of the Beatles we place the ownership on the band that created and performed *Let it be*. In Barbara Streisand's example of *Before The Parade Passes By*, we classify the piece by the performer rather than Jerry Herman the composer of the musical the song originates from. In our use of language it is clear that the ownership of a work of music derives not only from its composition, particularly if there is more than one composer, but also its performance or the performance that we are familiar with. We can refer to a work of music simply through familiarity with its title, such as the example of *Bye Bye Blackbird* outlined later in this chapter, each example of which finds commonality through its title and its connection through successive performances. In contemporary music, outside the classical tradition, we often refer to a work of music through the version we experienced it with the performer, or lead performer, taking over the perceived ownership from the composer. The ownership of a performance rests heavily on those that are presenting it. Yet those that create the journey of causal link back to its creation are also often referenced; particularly though the phrase 'made popular by'. In program notes and copyright documents, composers, arrangers, lyricists and translators are listed as a team that create works together. This creative team needs to extend to the performers, who put their own creative input into the work of music and work in a capacity that requires more than just presentation. Anyone who has creative control over the musical work should be attributed to its creation; not just the composer. Levinson comes close to defining a work of music in the same way. He argues that a work of music is a sound/ performance means 'structure-as-indicated-by-X-at-t. Where X is a particular person - the composer - and t the time of composition' (Levinson, J 2011: 79). The mistake here is for X to be categorised as a single person; the composer. A work

can be, and often is, created by more than one person and the realisation of that work adds creatively to it meaning that works of music usually require a team of people.

The arguments that the essential property of works of music is their sound structure were outlined in the first chapter of this thesis. The issues that we have in determining sound structures as the only essential properties of works of music is that the accuracy of that sound structure cannot be repeated in another instant. The analysis of the case studies, particularly the individual microphone analysis in the Polaris case study which demonstrate a continually changing and developing interpretation, provides evidence that the music that we are making requires continual estimations of corrections in terms of pitch and timing. Each singer's note in the Polaris case study, and in all choirs, is not only made up of a series of overtones and undertones of continually changing weight but also a fluctuation through the use of vibrato. The singers were operating within the performance conventions of the piece, but the score was not directing this. Mistakes are always going to be made when humans make music, whether in relation to score or what a musician has planned. This is a symptom of being human and which creates the liveness we perceive in performance. The issue with defining the properties of a work of music is that we are unable to tie down the essential parts. Whether we try to locate them in the score or in the comparing with the first performance, the live sound will never truly match; the score is a starting place and a representation of formative ideas. The locating of the musical work in the composer's head is also a mistake. If it resides there it cannot be repeated and reinstantiated; we would not be able to talk about the work of music at all. We must therefore insert a level of acceptability in what is permissible in the realisation of works. It attributes too much ability to composers through positing that they can 'hear' the complete work in their head. It also takes away an exciting part of the compositional process, where composers collaborate with performers and explore the parameters of the work of music[26].

We can still use the term sound structure to form our definition of a musical work if the definition of the sound structure is altered. What we require from a sound structure is not every aspect of a

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[26] As mentioned before, Bayley's research into the collaborative journey with the composer Michael Finnissy provides further insight into this process. These assertions are also reinforced by my own professional experience of working with composers, and working on my own arrangements, with ensembles, as a conductor.

piece but to be able to reasonably permit it as recognisable as an instant of a work of music. This enters us into an uncomfortable grey area which philosophers will have to wrangle with. However, we must recognise that the conservative philosophical approach will always end in musical works being categorised so that human experience cannot access and share them. Works of music will have to remain as pure unshared and untouchable sound structures in the head of the composer. Furthermore, deciding what is permitted as an acceptable realisation of a work of music already occurs in the discourse around music. We can resolve the grey area of acceptability here by trusting in our judgement of when a work is being realised. In the end this has to come down to intention and reception as well as repeatability and recognisability. We can link the intention to the composer and musician roles in the communication model (outlined in detail later in this chapter). The reception and recognisability can be linked to the listener role in the communication model. Take the example of work *A*. A score of work *A* is presented to a musician by a composer. The musician plays work *A* and the listener hears the piece. Here the work of music presented would be work *A* by the composer (x) composed at time (t) performed by musicians (m) at time (t2); which is then heard by the listener. For the listeners to determine, for themselves or collectively for society, that work *A* has been instantiated requires knowledge of the work either through previous exposure through a performance or by having access to, and ability to understand a score; recognisability. Without this knowledge, unless we recognise what is played to be another piece that we know, we have to trust that the work being played is what we are told by the performer and what they intend to be. With prior knowledge of the work we enter into the possibility of exercising judgement on whether it is that work of music which must stem from their being a casual link to its creation and then we are able to make a further judgement on whether the performance is successful.

In determining that works of music are owned by composers we enter into two traps of traditional musicological thinking. The first trap is that the way that the work is communicated needs to be through the medium of a score. It is the traditional act of realising scores in the classical tradition that leads to full ownership being placed on the composer of a work. There is a fallacy in this conservative mode of interpretation, that prevails for a huge collection of classical repertoire, where the performer is the obedient servant of the composer. This is a fallacy, not only due to the

fact that performers, more often than not, play music from edited scores where musicologists may have engraved their own interpretative decisions, no matter how well intentioned to be true to the original sources. We must also consider traditions that do not utilise a score to communicate works of music. These have, for too long, been seen as lesser by the academy. In determining a process of ownership, the theories quickly fail when projected onto pieces in the folk and aural traditions. The second trap that is created through this thinking is that the use of a score means that the score is the only link back to the composer. In most music, performances of works are equally, if not more, insightful to performers interpreting a work. Among conservative, authentic performers, there is the notion that the score and the engraved intentions come first. In reality, performers listen to other realisations of the work, both recorded and live, making judgements about interpretation that then feed into their own. Even a cursory listening to recordings of particular symphonies reveal stylistic changes in interpretation over time. There is also a link back to composers, particularly of works in the classical cannon, through successive realisations. In addition, centring a work of music in its history of performances, we should also consider that the performer has a duty to the expectations of their audience which can be equally as strong in altering an interpretation as markings on a written score; some of these expectations may come from recordings. It was evident in the Alcina case study that those who had either experience of playing similar music or had listened to recordings previously, had the expectation to double dot the rhythms in the overture; moving beyond referring to the score and linking back to previous interpretations.

In his seminal text *Noise: The Political Economy of Music* (1977), Attali assesses our relationship to music through the lens of changing socio-economic structures of the past, present and future. Within this he addresses the question of ownership. This is neatly summarised by McClary in the afterword: 'Attali's term for the hope of the future, *Composition,* seems strange at first glance, for this is the word used in Western culture for centuries to designate the creation of music in general. But the word has been mystified since the nineteenth century, such that it summons up the figure of a semi-divine being, struck by holy inspiration, and delivering forth ineffable delphic utterances. Attali's usage returns us to the literal components of the word, which quite simply means "to put together." It is this demystified yet humanly dignified activity that Attali wishes to remove from the rigid institutions of specialized musical training in order to return it to all

members of society. For in Attali's eyes, it is only if the individuals in society choose to reappropriate the means of producing art themselves that the infinite regress of Repetition (whether in the sense of externally generated serial writing or of mass reproduction) can be escaped. (Attali, J 1985: 168). Attali's use of the word composing shifts the ownership of the work of music to a more individual level. This is not only true for its consumption but also for its creation and use in human experience. Although music can be a shared experience, and it often is, the relationship to it is individual and the accessing of it requires creativity and imagination. The move here is away from the academy control of permissible realisations of work through musical training to a position where everyone has the decision making role. This way of viewing can then be undertaken when accessing music of the past as the context that it is being instantiated in is the present. Musicians who consider this view to be true will be able to access a wider permissible spectrum of interpretation and be able to present and enjoy a more varied experience of repertoire. The inclusion of this approach in the model should help musicians engage with this wider spectrum of interpretation.

Although we categorise music and talk about works attributing them to their creator(s), we do not necessarily need to have correct information about its origins. Stephen Davies recognises this when he defines a works of music as a *'performed sound structure as made normative in a musico-historical setting'* (Davies, S 2001: 97). Davies removes the composer from his essential properties of musical work, arguing that mistaken identity does not change the work. There are numerous examples in historical musicology where the composer of a work of music is disputed. Many of Mozart's early compositions are doubted to have been composed by him and thought more likely to be by his father. These works would still be defined within their musico-historical setting for Davies, not matter who composed them. In agreeing with this removal of the individual composer we then need to consider whether the musico-historical setting is also an essential property, as Davies argues. Very often when we research the compositional context of a work of music we are left with a grey area, or guess work, about the exact time of its composition. Often there can be a number of years between where the composition is known to have happened. There are also cases of composers returning to works decades after they have sketched them out. A grey area then becomes clear, and acceptable, in the time in which work has been composed. Is the time then an essential property, or is it a property which we cling to so as to

inform our interpretative decisions? We do not need to know the time of composition, or the composer, to realise a work of music but only to secure the causal link to its creation. If we are wrong about the time of composition, or the individual that composed the music, this does not change the work itself but rather how we might perform it. If we collectively decide to refer to it as work *A,* even if that is wrong, that is what that work of music becomes because the works are socially defined and we can never be one hundred percent sure about a work's origins unless we created it.

It would be the task of a whole other thesis to fully develop a philosophical theory of what a musical work is. Here we are concerned with how musicians interact with, and the communication that occurs in realising, these works. That said, it is important to have a working idea of what constitutes a work of music to allow a starting point based for the following discussions which is based upon our experiences as musicians.

Interpretation Framework

To understand the process of realising a score, we must look at the chronology of the events that occur in this type of music making.

Figure 2:

Chronology of music-making process.

Figure 2 shows a traditional view of the linear process which occurs when realising scores. First the act of composition has to occur which produces the score which is denoted by the vertical line in figure 2. The musician(s) must then interpret what the score means. Including determining what notation system has been used, the meaning of performance directions and what instrumentation is appropriate. The musician(s) then rehearse the score during which the

interpretation of the score will continue in two ways: firstly, by following each of the denoted instructions in the notation, and secondly, with each decision that is required to be made which is not answered by the score. Finally, the work is realised in a performance where the musician(s) present the interpretation to an audience.

There are some issues with this traditional view of the process of composition to performance process:

- As outlined at the start of this section, determining one 'true' score is challenging for works of the past. Indeed, works of contemporary composers often find revisions after it has gone through a rehearsal process. Interpreting the score needs to start before any rehearsal, to ensure that we know which instruments are required and how they are to be played, but continues throughout the process. In reality the score of a work of music becomes more of a working document that guides the performer. This claim is supported by the presence of numerous editions of some pieces which may present the work in different ways. It is also supported through the way that musicians use the score. In both case studies, and in almost all the score-based music making I have seen, musicians continually add pencil markings to the score to reinforce interpretation decisions, to insert fingering or to add reminders. Every conductor that has worked from a hired score will have found markings from its previous user. Some of the markings may be useful and help shape an interpretation, or to quicken problem solving; others may be nonsensical.

- Interpreting the score continues throughout the rehearsal process and the performance. We continually have to adjust the sound that we are producing, in relation to the score[27] when realising a work of music. This is even more complicated in ensemble settings where a musician adjusts their sound not only in relation to the score and the performance environment but also to the other musicians in the group. One could argue that this process continues beyond these points when recorded works are analysed with reference to the score.

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[27] See the role of the musician under the new communication model in this chapter.

- Multiple performances of a work may occur, with rehearsals in between. Players may change in an ensemble and the interpretative decisions may therefore change or indeed influences on performers may change their mind about interpretative decisions they have made.

Even with these criticisms in mind, the prevailing chronology of interpreting a score is represented in figure 2, with the order of the main processes detailed; we need to be mindful that after these processes have begun they continue into the next part of the process and that we can return to earlier parts of the process.

Figure 3:
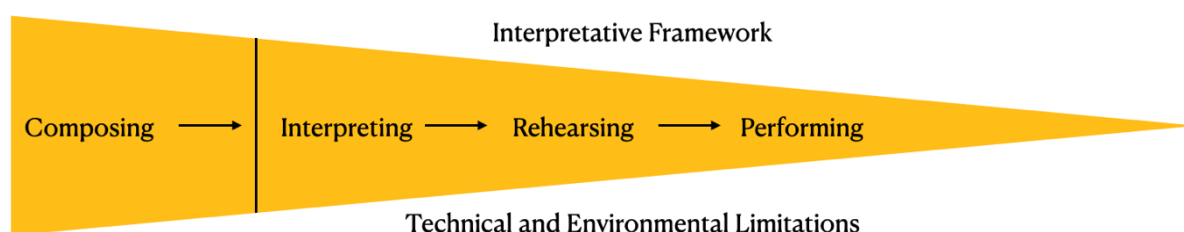
Interpretation Narrowing with Interpretative Framework and Limitations.

Figure 3 shows the chronological process that was presented in figure 2 with the addition of an interpretative framework and technical and environmental limitations which contribute to the narrowing interpretation.

The Interpretative frame work refers to the stylistic and permissible interpretations of the score as defined by the player(s). Each musician will have a philosophical approach to what is permissible in interpreting a score. This will range from very free interpretations, which favour personal expression, to strict systems of interpretation, which obey the score at all costs and attempt to project knowledge of the stylistic intentions that the composer may have had; such as found in the authentic performance movement. These two examples are the extremes on each end of the scale, from score, or composer, first to freedom in personal expression. This gradient, or

philosophical interpretative framework, will also be used by listeners when interpreting music. There is also here a requirement for ensembles to consider the duty that they have to their audience, what their expectations are and what will be permissible to them; as well as to each other. The philosophical framework is developed through a rehearsal process and group formation perhaps through many projects. In the Alcina case study this was, for the most part, led by the conductor to ensure that the orchestra could successfully accompany the opera cast. However, there were particular examples of the ensemble negotiating elements of the interpretation for themselves, the most obvious being the double dotted rhythm in the overture. Through rehearsing the ensemble collectively negotiated to double dot single dotted rhythms without verbal discussion. This rhythmic interpretation comes from the performance convention that is followed in most recordings of the work and is a stylistic feature of the period. Ensembles do not begin a rehearsal with an extended discussion of their philosophical beliefs about how to realise a score or very often involve protracted musicological discussions. The process of interpretation is a more organic process which is primarily honed through repetition in rehearsal and occasionally supported by verbal discussions.

In addition to the philosophical aspects of the framework, in an ensemble each member will have to negotiate their philosophical framework against that of other members of the ensemble at the same time as developing agreement around how to realise the sore. This will undoubtedly be filtered through the leadership structures within an ensemble. The framework, which is created through rehearsals is developed through trail and error; playing and discussion. This is what we saw in both the Alcina and Polaris case studies. The interpretation was narrowed through the rehearsals, in terms of tempo, dynamics and articulation, and this was negotiated between ensemble members. The groups did not display that they operate in a fully democratic way in achieving this but rather stronger players, or those in leadership positions through group structure or due their musical role at the time, would be followed by other players in the group.

Technical limitations represent the individual and collective limitations an ensemble may find in being able to play the score. This was seen in the Alcina case study with the timing of the flute solos and in the Polaris case study with the conversation around the tempo marking in the score and the limitation of playing the harp at speed. Hellaby defines this point neatly when introducing

the sonic moderator element of his interpretative tower: *'This individual quality may be derived from the fact that a player's dynamic and articulative capacity is routed in technique. Because technique is so intimately connected with physique, each performer's engagement with this informant is, to some extent at least, anatomically predetermined'* (Hellaby, J 2009: 45). The dynamics, articulation and tempo that a soloist or ensemble can achieve are to some extent predetermined by a player's physiology, but also to their developing technique, which you could argue develops continually in all musicians as well as through familiarity with a piece. Within an ensemble context, each member will bring a different set of capabilities and experience. As well as providing the individual sonic qualities of an ensemble these same features also form a group's limitations. The interpretation negotiated by an ensemble may require a move away from an ideal interpretation to enable all members of the ensemble to accurately play together. An amateur orchestra attempting very technically demanding works may take the interpretative decision to perform under and ideal tempo to ensure accuracy, or indeed the opposite and forego accuracy. There will inevitably be a friction between the philosophical framework and the technical capabilities with the limitations often defining what philosophical frameworks are realistic. Our limitations as humans and the limitations of our instrument will all contribute to how we interpret a score. This was clearly an approached used in the Polaris case study where the early rehearsal time was intentionally under the marked tempo. The way in which the accompagnato section of the *Kitchen Scene* was approached is also further evidence of limiting interpretative freedom, namely of the singers here, to help facilitate togetherness with less experienced orchestral players operating under a limited amount of rehearsal time.

The environmental limitation is concerned with how performers use the acoustic that they are in. Performing in the booming acoustic of a cathedral may require an ensemble to change interpretative decisions in terms of tempo or articulation, not only to allow the audience to hear the piece clearly but also to allow the players in to work together effectively as they are having to listen to each other too which can be challenging in some acoustics. Again the opposite may happen, with an ensemble opting to stick to rehearsed elements of their interpretation at the expense of the overall effect of the work.

The interpretative framework and the limitations all interact with each other and help to narrow the parameters of what the performer(s) intend; these are represented by the narrowing triangle shape. The interpretation is continually negotiated between the musician(s), their instrument(s) and the environment. For ensemble performance, this negotiating has to be achieved collectively and between each of the players organically in real time.

Figure 4:
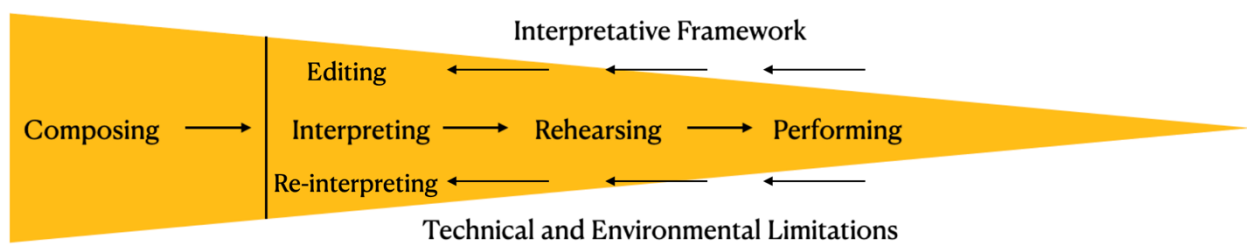
Interpretation Narrowing with Interpretative Framework and Limitations and arrows.

The diagram above suggests that the narrowing will occur continually which is not necessarily true. Each decision that is taken can be reversed, the score can be edited by the performer and there work re-interpreted. During the rehearsal process of the Polaris ensemble, it is clear that although interpretative decisions seem to have been made early on in the process, later on these may alter either due to mistakes or being subsumed by a subsequent interpretative decision. Negotiating and deciding, and renegotiating and deciding, these interpretative decisions is what is most exciting about realising scores. There is always something new to be found, even in the playing of a piece over many years. This is particularly special in an ensemble where there is the possibility to explore the many different ways in which a piece can be performed with each member bringing their own voice to that process.

Completeness of Works and Rehearsals

Having critiqued the prevailing models of musical communication in the second chapter of this thesis, it was concluded that each development of the Tagg model (1999), of transmitting and receiving, to include feedback and two-way communication was a strong improvement. However, the later models (Hargreaves et. al 2005., Inskip and MacFarlane 2007) still require further development in the following areas: ensuring the models cover musical rehearsals as well as performance, making the multi-channel nature and multiple roles per human involved clearer so that the model can account for ensemble performance, and a consideration of the 'non-musical' communication that is central to enabling music making and in its reception. The models also need to consider the unique experience that each person involved in music making will have due to their differing location within the environment where the music is occurring.

There is a prevailing habit in the field of musical communication, and in the ontology of musical works, to centre research and resulting models solely on music performance. For ontology this is, perhaps, more forgivable as philosophers and musicians alike are keen to investigate the properties of the musical work as a whole and within this address question of meaning. For this, it can be argued that initially it is necessary to consider the work as a whole, particularly when considering the communication of meaning from composer to listener through score-based performances and the relational nature of score directions within a score. It is also understandable that the focus on performance arises in the communication models for the same reason; we are more comfortable dealing with the musical work as a whole as this completeness gives us insight to each complete piece and the relational meanings within a work. However, focusing solely on performance means that we would have to conclude that rehearsals are meaningless and that it is not necessary for the models we create to cover this part of the musical process. It ties us to the western art tradition of music presentation of an art object in the concert hall as the starting place for investigating all music. The omission of rehearsals from previous models fails to recognise the importance of the rehearsal process. We need to fully consider whether rehearsals, and non-formal musicking, can fairly be dismissed in this way and therefore comfortably reside outside the philosophical and communicative investigations and models. Completely dismissing rehearsals, and music that is not formally being presented as a work through performance, cannot be a

sensible approach and does not match our experience as musicians. The distinction is less black and white in the move from rehearsal to performance than the current models would suggest and most musicians would agree that interpreting a work of music is an ongoing process which is never truly finished.

Beethoven's *Symphony No. 5. Op. 67* composed for full orchestra, between 1804 and 1808, has been one of the central tenants of the musical canon for over two hundred years. Our current knowledge of the work, and what constitutes completeness in performance has become clear over time. For a complete performance it would be hard to find a musician, or philosopher, who would not require a full orchestra to play the four movements of the score, with the instrumentation prescribed paying particular attention to the performance directions throughout. This would be the expectation of the concert goer. Completeness here stems not only from the score but from its successive performances and begins to neatly fit the philosophical approaches toward musical ontology and what we seem to require for communication models. The data collected in both case studies showed that the process of music making is not focused around the complete art work. Both rehearsals took sections of each piece and repeated them to narrow the interpretation. The Alcina performances omitted certain arias for the purpose of shortening the opera and to allow the storyline to be clearer. There are many instances where a performance occurs but it is not of an entire work: overtures to operas paired with symphonic works in concerts or certain movements from orchestral suites or choral works performed in isolation from the rest. The material being worked on through the rehearsal process and presented in performance does not necessarily need to be the full notated work.

Firstly, let us consider the less 'formal' performances where the work concept fits less comfortably than in the classical tradition and the idea of completeness within the is harder to navigate and compare these to the completeness we derive from *Symphony No. 5.*

Bye Bye Blackbird, was published by Ray Henderson in 1924 and became a popular standard of the 1920's. The first recording was by Sam Lanin's Dance Orchestra in 1926. This recording realises the first edition of the score most closely, using the scored small dance band and performing in the key of G major. The next recording of this piece that is widely known was also in

1926 by Gene Austin. This performance features Gene Austin singing, accompanied by piano and solo violin, in a three minute up tempo presentation of the piece. The introduction is amended to be shorter in this recording and the instrumentation change begins to move away from the original score. The piece remained a popular standard and was a regular number for Miles Davis and his band in 1958. In the recording of Miles Davis playing in Newport in 1958, the piece has again changed, not only in terms of instrumentation, but there is no singer present and extensive passages of improvisation. Because of its genre, permission is granted for adaptations to be made to the song in the three performances outlined above. Sam Lanin's Dance Orchestra's realisation the piece is closest to the score, using the correct instrumentation and having the singer performing the lyrics. Within the genre context of Miles Davis as a jazz musician, there is the expectation of prolonged improvisation over the chord pattern, with regular returns to the head punctuating each soloists exemplification. What needs questioning here is whether the later two pieces are less complete. It would be easy to apply the western art score centric approach here and dismiss the later two performances as incomplete and an arrangement of the original. However, the context of the composition needs taking into account here. Written with the intention of being a popular standard, the composer would have expected the piece to be performed in different keys, to suit the soloist, and to utilise the instrumentation available. The context of composition and performance here makes each of the performances a realisation of the work, with completeness not being driven by the score, but rather in a wholeness of performance. Within this genre it is acceptable to add and remove some elements of the original composition so long as the recognisability is acceptable to those performing and recovering the piece then completeness can remain.

John Cage's output as a composer and philosopher challenges many of our preconceived ideas about musical ontology and constituent parts of a work of music. His composite *4' 33* is renowned for having rests fill every bar of the score and one page turn during the performance. Completeness in the performance of this piece is only in the conventions of the concert hall that surround it, rather than in any sounds or music produced by the performer, the work here lies in the intention of the performer.

Secondly, let us consider possible interactions within rehearsals and how they could affect our view of current communication models.

It would be hard to find a music student who does not have experience of walking down hallways with practice rooms, each containing musicians rehearsing for projects, exams or simply for fun. All musicians have spent many hours outside these rooms awaiting their own rehearsal time, talking with friends and quickly eating before ensemble rehearsals. It would be hard to find a music student, or graduate who has not encountered a pianist in these rooms playing Beethoven's *Sonata Pathetique*, or the *Moonlight Sonata*. The interaction in this music department hallway is far from the formal presentation, and pressure, of the concert hall or end of term exam. However, many of the communicative processes are still present here; albeit separated by a wall and a door. The formal presentation rules of a polished performance with the behavioural expectations of both musician(s) (transmitter) and audience (receiver) are largely suspended. Although this interaction here may not include a full and complete presentation of the score, the exchange is still musical communication. Whether the rehearsal includes repetition of tricky sections to secure fingering or polish dynamics, or a full run of the entire piece, there is music being played and music being heard. Completeness is not necessary for musical communication no matter how helpful philosophers may find it for their classification of a musical work's objectivity. Here there is communication from the rehearsing musician to the hallway dweller and there is a clear musical exchange which includes a relation to the score.

The second case study in this thesis presents a further consideration for ensemble rehearsals, and perhaps also performance. In the Polaris case study one of the sopranos was missing at the first rehearsal. The communication is of course changed, as nothing is communicated to, or from, the missing soprano until the following rehearsals. This rehearsal differs greatly from the ensemble's intended presentation of the work as the balance and timbre changes with the addition of the soprano's voice on her returns. Having musicians missing from a rehearsal is a common feature of rehearsals, particularly more so for amateur performance, but sometimes professional. A full run at the end of a rehearsal with a missing player could have the completeness that most philosophers would want, in terms of realisation of the score, but an incompleteness in the sound and the intended interpretation. We should also consider at this

stage how much a missing singer in a formal performance would take away from the completeness of the piece. Here, the argument for incompleteness in terms of musical meaning could be strong, especially if numbers were denoted by the score, or a part is missing. However, the formal performance for the communication model, and the exchanges involved are there. This idea of completeness could extend beyond the musicians involved, especially when considering site specific pieces such as the works of Gabrieli which were designed to use antiphony from separate spaces in St Mark's Basilica, Venice.

We should at this stage also consider the musicians in the rehearsals room. A singer working with a teacher or accompanist is also engaging in musical communication inside the rehearsal room. An important distinction that current models fail to account for is that each human involved in music making has to be engaged in the communication in more than one of the defined roles. Each singer in the Polaris case study would be included in current models as musicians (transmitter). These distinctions of the different roles, musician, listener, composer, are helpful not only because they are how we talk about the rules within music making but also because they help us to segment the differing parts of the creative process of music making. They also, without fuller consideration, present a weakness, of not considering that one human could be each of these roles at once, or the need in some music makings for musicians to take on at least two of these roles. This is best explored again through two examples. Firstly, a solo pianist playing at home. We shall leave aside the previous questions of completeness and imagine that this pianist is playing an entire piece, exactly as one would in a more formal performance. In this instant, and arguably in the formal one too, the pianist can foremost be categorised as the musician. However, can we truly say that it is possible to play a piece without also listening to it? For all instrumentalists it is vital to hear what we are playing, our active listening during rehearsals and performances is what allows us to developed and amend our sound. If we do not listen to the sound we produce, how can we be sure that we are presenting a crescendo or that we are playing in tune with ourselves. The duality of roles here is clear. The second example to consider would be an ensemble rehearsal, is it possible to play in an ensemble without listening to the other musicians? Surely not actively listening would mean that we would be unable to coordinate timings and all the interpretative elements discussed in the case studies: balance, tempo, phrase endings or articulation. Musicians have to be continually actively listening, whether playing solo or

in an ensemble. Without the active listening, we reduce the production of music to a mechanical output that is missing Scruton's tertiary object of sound.

The necessary duality of the musician and listener roles are missing in previous commentaries as they are rooted in the prevailing focus on the concert hall and imagined roles of where people are located within it. This is a common feature of musicology focusing on the western art tradition that needs to be untangled and continually challenged. The separation of composer also comes from this traditional bias. In the western art tradition it is most common that the composer is not present at rehearsals and performances as many of the canonic works, that seem to be the selling point for most concert halls, are by composers that have been dead for some time. However, in other music making, particularly the music of other cultures where music is more rooted in aural traditions, the composer is often one, or all, of the musicians involved. Here, the separation of composer as the starting place for the transmitter models becomes blurred into possibly being a role assumed by those presenting the music. A jazz musician freely improvising at home would assume all three of these defined roles; musicain, listener, composer.

It is clear that the completeness of pieces, presented in their entirety with all forces denoted in the score, is not necessary for musical communication to occur. We can listen to five minutes of music in a practice room corridor and we have participated in musical communication. The wholeness of works and forces are only more central to the communication of meaning of works as a whole and even this is now a weakened argument. Therefore, a successful model of musical communication needs to relinquish the obsession with formal, concert hall, western art tradition of presentation and include rehearsals, and all music making, as communicative. The distinction of different roles are useful, particularly to those of us who engage in classical music making, however, we need to be clear that there can be multiple roles for each human involved, as well as ensuring that the model clearly provides for multiple musicians.

The reciprocal feedback model outlined by Hargreaves et. al. (2005) helps resolve the issues in the original Tagg model of the single route of communication from composer to the listener through the musicians. However, there is a further development required here. A successful model of musical communication needs to consider the flow of communication not only being to and

from musicians, composer and listeners, but also between listeners. Small made huge leaps forward in our understanding of music making and the roles involved in his seminal text *Musicking* (1998). Although this has become a widely read text listed on most undergraduate courses, his holistic approach to the understanding of music making is often forgotten in more focused music studies. Small's approach to the audience role in music making centres audience members as more active participants than in previous writings. He outlines the role of the audience in the concert hall as willing passive in their relation to the performers (Small, C 1998: 19-29) but also highlights their role of actively listening, compared with concerts that Mozart attended. This makes the roles the audience active in the process of music making through listening through passivity, as well as performative through the lens of their behaviour of wanting 'to see and be seen' in the concert hall (Small, C 1998: 23)[28]. In an audience with multiple members, it is hard to conceive that they do not communicate, no matter how restrictive the conventions of the particular performance is. Exchanges can be from increased passivity to non verbal interactions or where appropriate verbal communication. When we consider current music performances, such as a chart topping artist who fill stadiums night after night, we can take this role further when the performative actions of the audience can become the performance. The most famous example of this would be the call and response between the audience and Freddie Mercury performing with Queen a Live Aid 1985. The knowledge that your audience members are communicating will inevitably feedback to the musicians on stage, further reinforcing the reciprocal approach that Hargreaves et. al and MacFarlane et. al. propose in their models. This further complicates the complex group dynamics that will be in play in any performance.

We can go further than these performative conclusions with a consideration of current physiological and philosophical writings about music. Any listener to music, whether it be to a CD or live, requires active participation from the listener. To come to this conclusion it is useful to review the line of argument that Scruton develops when defining the objectivity of music (Scruton, R 2009: 21-32) where he defines music as a tertiary object of sound. The primary object is vibration, the secondary object is sound and the tertiary object is the hearing of that sound as

[28] Small highlights the role of the audience wanting to be seen in the foyer of the concert hall, what he calls the transitional space. However, this performative demonstration of social and economic power continues in throughout the whole performance. Those that push to the front of a crowd at a festival or buy the best seats in the concert hall are doing this to interact more closely with the centre of the physical space where the music is being played but always at the same time they are demonstrating their power.

music. This theory is covered in more detail in the Musical Works chapter. The most important aspect to take from Scruton's line of argument here is that there is a requirement of neural processing of vibrations to make them sounds, and then imagination required to make them musical sounds. The brain uses imagination, and therefore creativity, to hear music; meaning that every listener is an active and creative participant otherwise that person is simply hearing noise, not music. Small's theories about the active audience member should now include their creative role in listening. The creativity involved here can be linked back Edgar Varese's definition of music as 'organised sound' (Goldman, R 1961: 133-134); with the organiser being the creative process through actively listening to sounds as music which in turn give us the ability to categorise sounds and sometimes separate them from their source[29].

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[29] Scruton develops the idea of organised sound further when defining musical objectivity. He focuses on the philosophical stages of objectivity in relation where the musical sound exists. More could be made here of the neural processes, and creativity, required to achieve these separations. Although musical sounds can be detached from their source when ascertaining relationships between pitch and rhythm, the location of the sound to the listener, its source, still has influence over Scruton's tertiary object.

The Combined Model

The intention for the models, and discussions, presented so far has always been that they can combine to provide one simple and accessible model of the complex nature of ensembles realising works.

Figure 5:
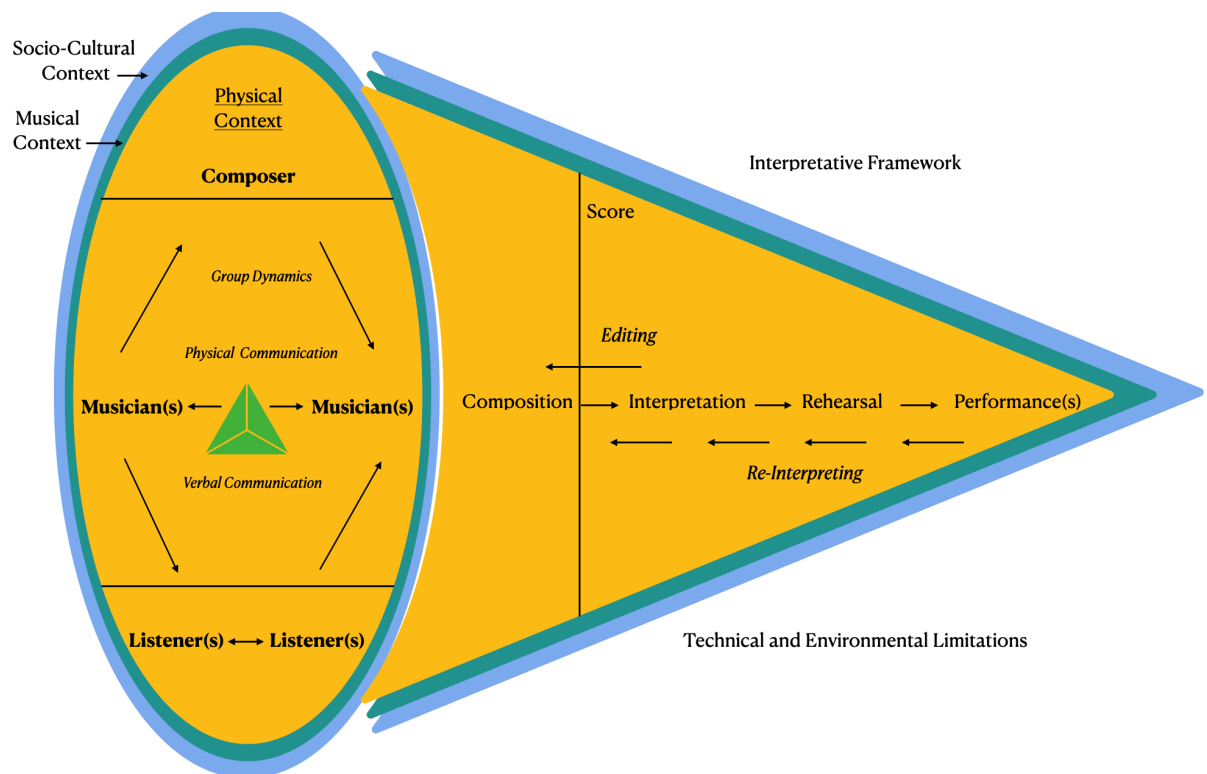
The Combined Model.

Figure 5 shows the final model, combining the context layers with roles of Figure 2 with the Interpretative Framework of Figures 3 and 4. The model should be taken with consideration of the arguments previously made about works of music.

All of the context circles remain represented by the same colours as before and surround the entire model, including the interpretative framework. The roles within physical Context are all humans with acting agency and interplaying collectively and individually. As elaborated on before, these roles are not mutually exclusive and the arrows gesture toward the flow of communication

through and around the musical work being instantiated, represented by the green triangle as before. Arrows denote the intra-musician, as wells the listener and composer, communication.

THE CODE

At this stage, it is important to return to the codes that were developed through the case studies to unpick how these underpin the elements of combined model.

Figure 6:
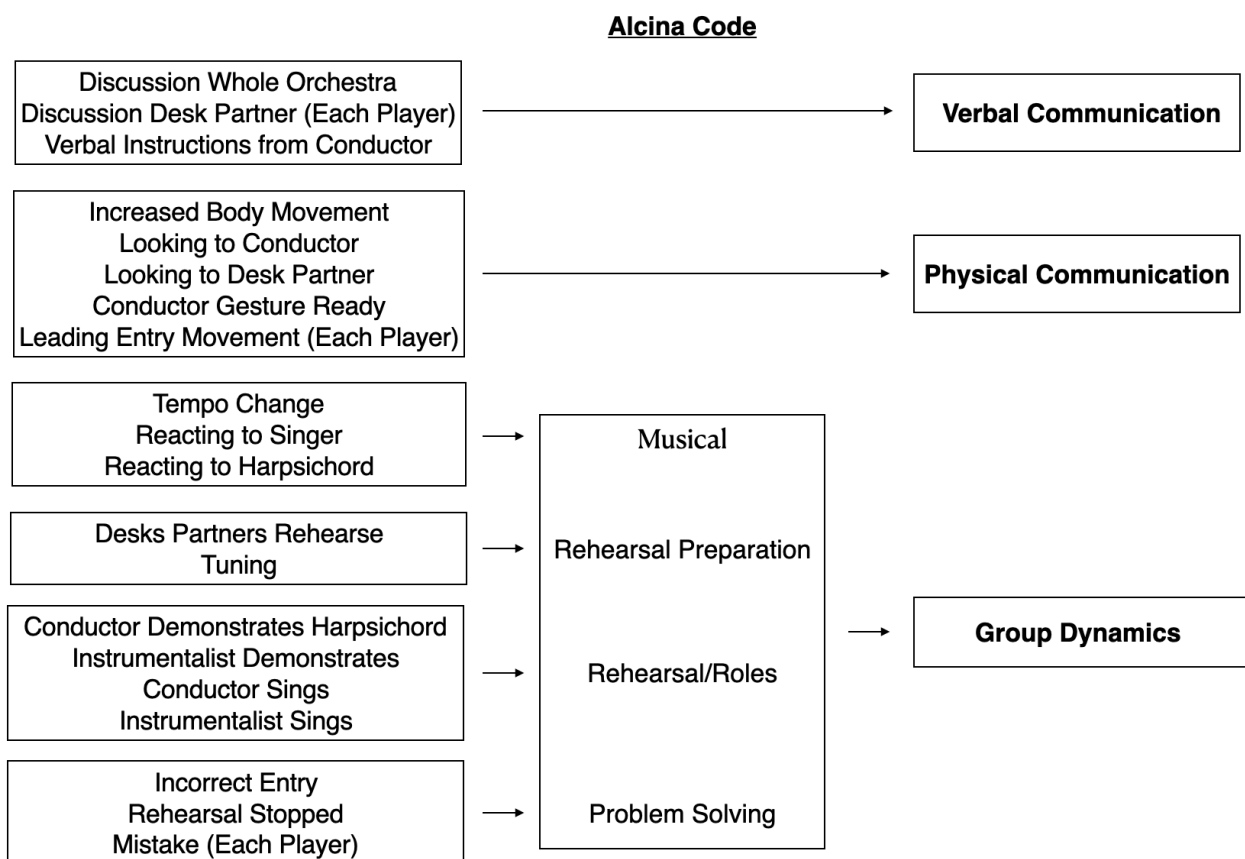
Alcina Case Study Code - Category Mapping.

Figure 7:
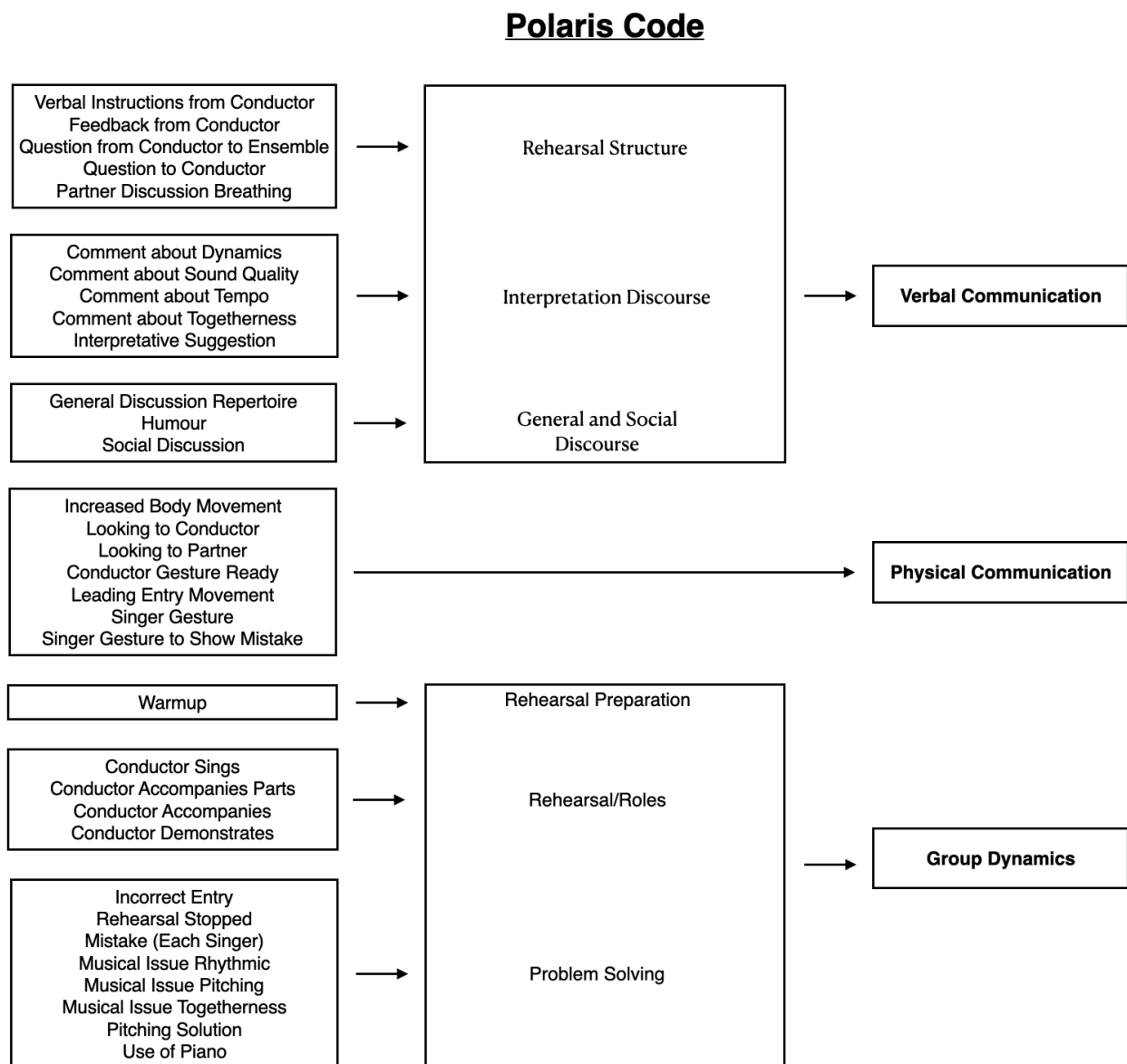
Polaris Code

Polaris Case Study Code - Category Mapping.

Figures 6 and 7 show the codes from each case study on the lefthand side. Elements of the code which were originally duplicated for every ensemble member have been grouped here for ease of reading. As the diagrams moves to the right, it shows their category groupings and finally the three main categories: Verbal Communication, Physical Communication and Group Dynamics. These have been placed on the physical context circle of the combined model as they represent the modes of communication that occurred in the case studies.

Let us take each category in turn:

VERBAL COMMUNICATION

Verbal Communication was a major feature of both case studies. The code is more detailed for the Polaris case study which is a result of the process of coding the script and analysing the discourse for its meaning; with a particular focus on interpretation. The code groups neatly into three categories: rehearsal structure, interpretation discourse and general and social discourse. It was clear that the main function of verbal communication for both rehearsals was to structure the rehearsal. In the first Alcina rehearsal, the majority of the verbal communication used was to enable the ensemble to navigate their way through the score and to know what area was being rehearsed next. This was the same for the Polaris case study, where verbal communication's main function was to direct the group on what to rehearse next. The focus on rehearsal structure underpins the observations made earlier on the importance of repetition in the rehearsal process. The second sub-category in verbal communication is interpretation discourse. This is a result of more detailed discourse analysis in the Polaris case study, which drove further musicological investigations in the data analysis process. The interpretation category is a result of a more developed code from the second case study but it is also a reflection of the workings of the smaller more collaborative ensemble. The final sub-category of verbal communication is general and social discourse which includes discussions about future rehearsals and repertoire. It also includes purely social discussion not related to music-making which highlights the social aspect of music-making.

PHYSICAL COMMUNICATION

This category was the most static between the case studies and through developing the code. Although not listed in the diagrams above, it is worth considering how these may be grouped in sub-categories: Embodiment (increased body movement), Eye Contact (looking to conductor, looking to partner), Gesture (conductor gesture ready, leading entry movement, singer gesture, singer gesture mistake). Although increased body movement can become gesture, leading entry movement being the main example of this, this part of the code was for when players exhibited

increased movement but not in a way that was specifically gestural. Eye contact is vital for observing physically communicated cues, but it is also indicative of searching for a physical cue and is therefore communicative by its presence. Gestures are physical movements that relate to a specific moment; most of these centred around the upbeat to an entry.

GROUP DYNAMICS

There are three main sub-categories under group dynamics: Preparation, Roles, and Problem Solving. Preparation is a specific and small part of the rehearsal and performance process where tuning and vocal warm-ups occur. It denotes the start of the rehearsal or performance and is preceded by social conversation. Roles highlight the hierarchy in each ensemble. The code here stems most predominantly from the conductor role where each director demonstrates or accompanies the ensemble as part of leading the rehearsal process. Accompanying here is an interesting tool that the conductor's use. They shift between playing singers parts or the instrumental parts based on how secure the ensemble is in that part of the piece. The use of singing or demonstrating lines on instruments in both case studies went hand in hand with verbal communication as a wider musical conversation, underpinned by repetition and physical communication. The roles are primarily centred on the physical context in the combined model and represent the musician role as well as the listening role. Problem solving was a significant part of the rehearsal process in both case studies; more so at the start. This aspect of the code developed in the second case study to denote what type of problem was being solved (pitching, rhythmic, togetherness). The use of piano in the second case study was a helpful tool for problem solving and this was highlighted by the majority of the consort's rehearsal being unaccompanied. All of the elements of the Group Dynamics category represent the ensembles methods for achieving correctness; the main focus of the rehearsal process particularly early on. The decision to categorise these under Group Dynamics is due to the fact that they are all closely governed by the dynamics and hierarchy of the ensembles. Most of these aspects of the rehearsal process are included in the righthand side of the model but the governing principle of group dynamics is layered within the physical context, as it is there that it governs behaviour. It could also be argued that the verbal and physical communication are also governed by group dynamics, however,

these are such vital elements of music-making that it would be a mistake not to have them appear in the combined model.

CATEGORY SATURATION

An important aspect of Grounded Theory is that the categories that have been developed reach data saturation before use in a theory. With the field work of this thesis only engaging with two ensembles it could be a concern that saturation would not be possible. Aldiabat et. al. suggest that 'code saturation in Grounded Theory could be reached at nine interviews, when researchers 'heard it all,' whereas meaning saturation could be reached between 16-24 interviews, when researchers 'understand it all" (Aldiabat et.al. 2018: 248). The majority of studies using Grounded Theory centre around collecting and analysing interview data so determining how the number of case studies that would result in data saturation here needs more consideration than purely numbers. The case studies included thirteen (ten part orchestra, two deputising and conductor) and six (conductor, four singer and harpist) participants respectively. The amount of video footage in the first case study is around twelve hours for the first case study and four hours for the second case study. It is also arguable that this is a study with more information power. 'Studies with more information power need a smaller sample size because of the amount of information the sample holds. They assume that qualitative researcher can achieve higher information power if they address the following aspects that affect information power: (a) narrow the study aim, (b) include a sample specificity that is dense (i.e., the participants have a broad knowledge and experiential base), (c) apply theory (include the theoretical background of the study), strengthen dialogue (enhance the quality of the interview data), and vividly describe their analysis strategy' (Aldiabat et.al. 2018: 248). (a) The aim of this study was to investigate the communication in ensemble music-making through analysing the rehearsal process and performances. Centering the analysis around communication and interpretation narrows the focus of the study. (b) the two case studies include a high number of participants and, although there is a range of expertise and ability in both case studies, the majority had a broad knowledge and experience of ensemble music-making. (c) theoretical background to the study was extensive and evidenced through the first two chapters of the thesis. Although the code did change and develop in the second case study, the

categories remained the same. There is enough data saturation for theorising the model although further studies to test it could be useful.

Returning to the Research Questions

HOW DOES AN ENSEMBLE COMMUNICATE DURING A DEVELOPING INTERPRETATION OF A SCORE?

This main research questions are largely answered by the combined model which contains the features of the process of realising a score, the interpretative framework, and the communication required for this process which is subsumed within the roles and group dynamics. The research shows us that ensembles primarily use verbal communication to structure the rehearsal process but also to suggest interpretative ideas and as general social discourse. The main feature of rehearsals is repetition of musical material, which is facilitated by verbal communication and assisted by physical communication. The result is a narrowing interpretation being presented with each repetition. Although this process is not completely linear, as the ensembles focus changes, it is continual and strong features such as dynamics, articulation and togetherness become engrained.

WHAT ARE THE MODES OF COMMUNICATION?

There are two main modes of communication that are present in the code verbal and non-verbal:

WHAT IS THE ROLE OF VERBAL COMMUNICATION IN ENSEMBLE REHEARSALS?

Verbal communication is used to structure the rehearsal process and at times to make interpretative suggestions. It facilitates the repetition that is central to narrowing an interpretation as a group. There is also general discourse which highlights the social nature of ensembles.

HOW DO ENSEMBLE MUSICIANS COMMUNICATE NON-VERBALLY?

Non-verbal communication is used in rehearsals and in performance to improve the ensemble's ability to play together as well as to recognise and navigate mistakes. Non-verbal communication stems from our embodied response to music, some of which becomes a communicative

extension and becomes gesture. These physical cues from breathing or lifting a bow (embodied) to leading entry movements and hand gestures of mistakes (gestures) are paired with eye contact which both projects expectation and observes gestures. These non-verbal modes of communication help the ensemble to play together and are governed by the group dynamics in the ensemble.

WHAT DOES THE DATA TELL US ABOUT GROUP DYNAMICS, LEADERSHIP ROLES AND RELATIONSHIPS BETWEEN INSTRUMENTALISTS?

The case studies tell us that there is a complex ecosystem to each ensemble which operates around a fluid hierarchy. The ensembles clearly operate within predetermined roles, particularly in terms of the director role for navigation of the rehearsal process but also through working in subgroups with desk/section partners or those with similar musical material. The analysis of the entrainment data in the Polaris case study begins to reveal these working groups, particularly through the closeness of the altos. It is clear that each person involved in music-making understands the role of musician, and listener, in flexible and interdependent way.

HOW DOES THE INTERPRETATION DEVELOP?

Both case studies reveal the importance of repetition to the rehearsal process. Each instant in the rehearsal process narrows the interpretation by helping to set the groups expectations and feeling of the music. The starting point for both the case studies is the printed score which is edited at times by the musicians to more accurately notate the interpretation that the ensemble has centred on, such as the removal of quaver beats at the end of phrases in the Polaris case study, and to provide reminders of decisions that have been taken that are beyond that noted in the score, as the Alcina ensemble did for the echo in the Overture.

HOW ARE CHANGES IN INTERPRETATION NEGOTIATED?

Some changes in interpretation are directed by the conductor in each case study and others occur more organically through repetition, such as the double dotting rhythm in the Alcina Overture. All interpretative decisions become features by multiple repetitions of the same passage. It is clear that all of these decisions have their roots in the score and are being governed

by the musician's interpretative framework. This is then moderated by the ensembles technical and environmental limitations. The approach used in the accompagnato section of the Alcina Kitchen Scene demonstrates the conscious dealing of technical and environmental limitations.

DO WE RESPOND TO DIRECTION MORE ACCURATELY IN THE SHORT TERM?

The evidence from the case studies suggests that we do respond to direction in the short term but the extent to which we respond to instructions grows through repetition. This was clear in the Alcina case study in the development of the echo feature in bar 30 and the articulation requested of the violin and bassoon in the No One Has Held Me aria; although this articulation does not get picked up by the second violinist who joined the rehearsal later. The Polaris case study revealed the same process of repetition strengthening verbal instructions in terms of dynamics (comment 2) and togetherness (comments 4 and 9).

DOES THE GROUP ENTRAIN MORE CLOSELY AS THE WORK BECOMES MORE FAMILIAR?

There was clear evidence in the analysis of the Polaris case study that the group entrains more closely when the material became more familiar to the group through successive repetitions. There was also evidence of groupings entraining more closely particularly altos.

HOW DO ENSEMBLES PROBLEM SOLVE IN REHEARSAL AND PERFORMANCE?

Repetition is the main tool for problem solving in rehearsal and is facilitated through verbal communication which has suggestions of solutions and provides the structure of what material to repeat next. The director role is also vital to this process in rehearsal through the use of isolating certain parts to resolve note issues or by accompanying sections and demonstrating lines. In performance the resolution of mistakes has to be done instantly with the music continuing and the ensemble staying together. For resolution of these mistakes, as in the bassoon solo in the Alcina case study, the ensemble has to rely on aural skills and expectation (built up through repetition in rehearsal), as well as eye contact, body movement and conducting gestures. The group also has to decide who to follow for quick resolution of mistakes. In the Alcina case study sometimes this is the conductor gesture and other times more strongly linked to the singer on stage. The Alcina case study also reveals the influence that group dynamics can have on problem solving. The

togetherness of the flutes in My Little Beauty was a problem that never fully resolved and was maintained by both players leading the solution.

Original Contribution

List of this Study's Contributions to the Field:

- Communication Model (Context centred and individuated experiences)

This model puts the piece of music at the centre of the communication model where context (physical and genre) encapsulate the individuated human experience. It displays the traditional roles of musician, composer and listener, but argues that these are not mutually exclusive and that performers have to be listeners. It is centred around the rehearsal process and is developed from empirical evidence and developed using Grounded Theory.

- Interpretation Framework (Limitations and philosophical)

This framework builds on the case study evidence that musical interpretation of scores narrows through repetition in the rehearsal process. It outlines the reasons for this narrowing not only due artistic development, but by considering the limitations, both environmental and technical, and philosophical approach that were evident in the case studies.

- Vocalist Onset Marking Method for Entrainment Analysis ensuring vowel is the onset to allow for detailed beat analysis for singers.

A method for denoting where the beat occurs in singers' onsets has been developed. This is primarily driven by the tradition of placing the vowel on the beat with preceding consonants occurring before the beat and detailed analysis of the types of onset, and therefore beat placement, that singers use.

- Investigation of changes in interpretation in the rehearsal process, and successive performances, of the same group through analysis of audio.

Audio analysis is both through repeated listening to recordings and through the use of the Sonic Visualiser.

- Novel methodology combining approaches bringing together ethnographic research methods of video coding and discourse analysis with musical analysis for holistic investigation into ensemble music making.

- Videos with performer permission granted for analysis and sharing for future research

- Uploaded Data - Zenodo - Videos and analysis files shared for future use in other research projects.

Final Conclusions

The evidence from the case studies revealed the rehearsal process centred around the repetition of the musical work. Three elements from the case studies' codes of communication have been included on this part of the model in italics: verbal communication, physical communication and group dynamics. The reasons for their inclusion here is that the rest of the observed communication in the code can be subsumed into each of these. Physical communication includes all of the non-verbal forms of communication apart from the musical sound; eye contact, gesture, embodiment, swaying, foot tapping etc. It was clear that verbal communication had two aspects during the rehearsals observed. Firstly, it was used to structure the rehearsal both in terms of navigating what section to rehearse next but also more generally to set focus, such as note security, togetherness or dynamics. Secondly, verbal communication was use to indicate interpretative intentions and evaluate the passages rehearsed. The reason for including group dynamics in this part of the model is that it is clear that these govern the behaviour of any group, be it audience or performers, and that the actions of those perceived to be in leadership roles are

likely to be received more strongly. For example, a gesture by the conductor would be more strongly received than the same one gesture from a player.

There are two horizontal lines on physical context to act as a reminder that some roles may reside outside of the physical context. The top denotes this for the composer role who is not always present. The bottom presents the same for the listener role, though the thinking here is to remind us that a listener may not be present during the rehearsal process.

This model presents a contextualised model of musical communication and interpretation. It moves beyond previous models to ensure that all musicking, especially rehearsals, are included. The Reciprocal Feedback Model presented by Hargreaves et. al. made huge strides towards making the flow and modes of communication clearer. Here, this has been furthered simplified by categorising the communication code into the three categories of: physical communication and verbal communication governed by group dynamics. Rather than viewing the communication as a sender receiver model, this model moves beyond this to centre the roles we associate with music-making around the art object itself. Finally, it has the addition of the musical process of realising a score which could be slightly amended to successfully operate for non-score traditions. The intention here is that the challenges made to the role of creativity in music making are reflected in the model and when considered by musicians, that they may unpick their process and philosophical approaches. Musicians should reevaluate the power that the score holds in the classical tradition and balance this against their own will for artistic freedom with consideration of their ethical responsibilities to audiences, composers and fellow musicians. The model does not directly attempt to deal with codified meaning through the musical work. However, understanding and meaning are always going to derive from context and knowledge which are firmly represented. The combination of the models adds strength to understanding of musical meaning by recognising the individual humans involved in the music making and their differentiated experiences.

Ensemble music-making resides within a complex, interdependent ecosystem. It requires those involved in making the music to operate sensitively and creatively with each other. It is clear from the literature, and this study, that there are strong traditional processes that occur in rehearsals

223

and performances in the process of realising a score which are rooted in communication. The question that should follow here is: with furthered understanding of these processes, how can musicians work together more effectively and with more creative freedom and explore a wider creative output when realising scores?

The field of research, and the combined model, would be developed by further studies. It would be interesting to examine larger groups such as a bigger choir or full orchestra, using the same methods of analysis here to investigate whether the amendments need to be made for a larger musical ecosystem. It would be useful in the first instance to share the model with a wide array of musicians to gain feedback and to assess whether it has an impact on their approach or process when realising a score. To truly work as a model of communication, the model will need to stand up to being tested in non-score based genres to see if the non-score specific parts of the model stand for a more generalised model of ensemble music-making.

As stated in Chapter One, the aims for this research were to: further the understanding of ensemble musicians to underpin my own professional practice, further the field of research by combining methods in a holistic approach and to develop innovative models that can be used by musicians.

This research has streamlined my practice as a conductor and ensemble musician by refocusing my rehearsal strategies toward repetition and finding a the sound desired rather than relying on extensive description. It has also relaxed the pressure to achieve togetherness early on in the rehearsal process, particularly with amateur ensembles, as I now have a stronger expectation of this to improve continually as a group operates together. It has also impacted my philosophy and flexibility in terms of interpretative decisions. This is primarily due to the philosophical considerations that are made in this thesis but also with the model in mind; where the process of interpreting and reinterpreting is visually demonstrated. Working inter and intra group has always been a responsibility of strong ensemble musicianship for me, however, this research has reinforced this and brought it to the forefront of my mind when leading ensembles. I now regularly find myself explaining, again mainly to amateur ensembles, their part's context within groups and

subgroups of the ensemble as determined either by the score or indeed the interpretation being pursued.

The next stage for this research would be to share the two page summary of the model (Appendix 4.1) with musicians and to survey to ascertain the impact that the research has on their approach to ensemble music-making. It then be interesting to use the refined research methods here with larger ensembles operating in multiple genres and in both score based and non-score based traditions.

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Appendices

Appendix 1 - Alcina Case Study

Appendix 2 - Polaris Detailed Analysis

Appendix 3 - Polaris Case Study

Appendix 4 - General

All analysis files and video footage for appendices 1 and 3 have been uploaded onto Zenodo and can be accessed at doi: 10.5281/zenodo.4695235

Appendix 1 - Alcina Case Study

Appendix A - Overture

1. Overture Graphs Beat and Bar Length

2. Overture Average Tempo Table

3. Double Dotting Rhythm Table

4. Scores

Appendix B - No One Has Held Me

1. No One Has Held Me Graphs Beat and Bar Length

2. No One Has Held Me Average Tempo Table

3. Scores

Appendix C - My Little Beauty

1. My Little Beauty Graphs Beat and Bar Length

2. My Little Beauty Average Tempo Table

3. Togetherness of Flutes Table

4. Scores

Appendix D - Kitchen Scene

1. Accompagnato Graphs Beat and Bar Length

2. Aria Graphs Beat and Bar Length

3. Aria Average Tempo Table

4. Togetherness Table Accompagnato

5. Scores

Appendix E - But Know, How, My Love

1. But Know, How, My Love Graphs Beat and Bar Length

2. But Now, How, My Love Average Tempo Table

3. Scores

Appendix F Other

Transcript of rehearsals

Libretto in English

Videos

Appendix 2 - Polaris Detailed Analysis

1. Tempo

In this section we will look at whether the tempo changes throughout rehearsing The Darkling Thrush, and investigate reasons why changes occur. Firstly this will be addressed by taking each thematic section (1-3) in turn to analyse the average tempo data created in Sonic Visualiser and exported into tables and graphs in Numbers. Secondly, we will then take each tempo marking in the score, including rallentando, ritardando accelerando and investigate how the rehearsals relate to the score. Finally, we will analyse the discourse and take each mention of tempo as a mini case study to determine whether the group are follow, and continue to follow, the decisions and comments that they make.

The tempo for each instant is set at the start of each instant, separated by verbal discussion, by the conductor either by counting aloud or by conducting gesture.

THEMATIC SECTION 1

Thematic section 1 covers bars 1-34, 56-89 and 150-181. The tempo marking on the score is 155bpm. The following two graphs show the changes in average tempo for these sections:

Figure 1:

PR 1 - 1   PR 1 - 10   PR 1 - 21   PR 1 - 30   PR 1 - 47   PR 2 - 1   PR 2 - 19   PR 2 - 32.2
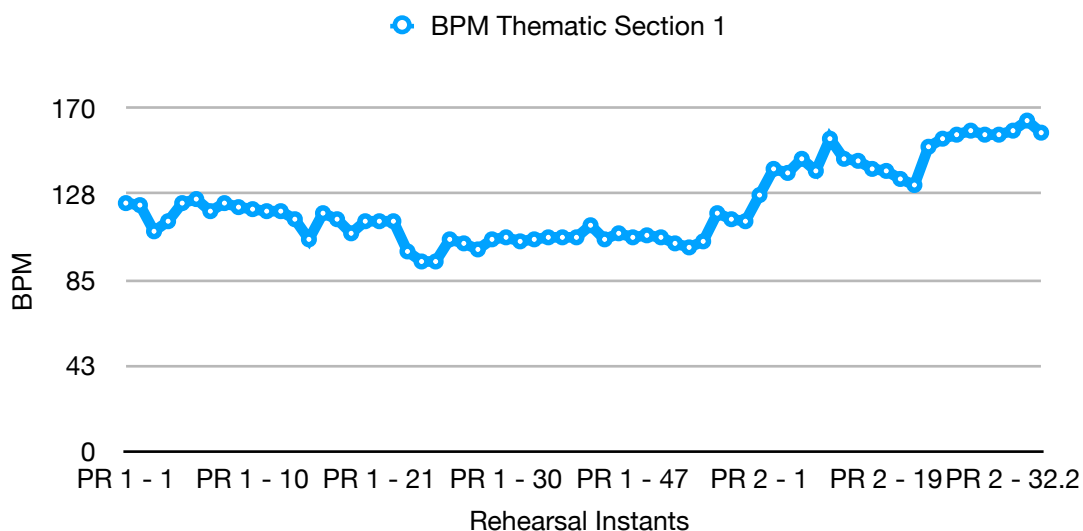
Rehearsal Instants
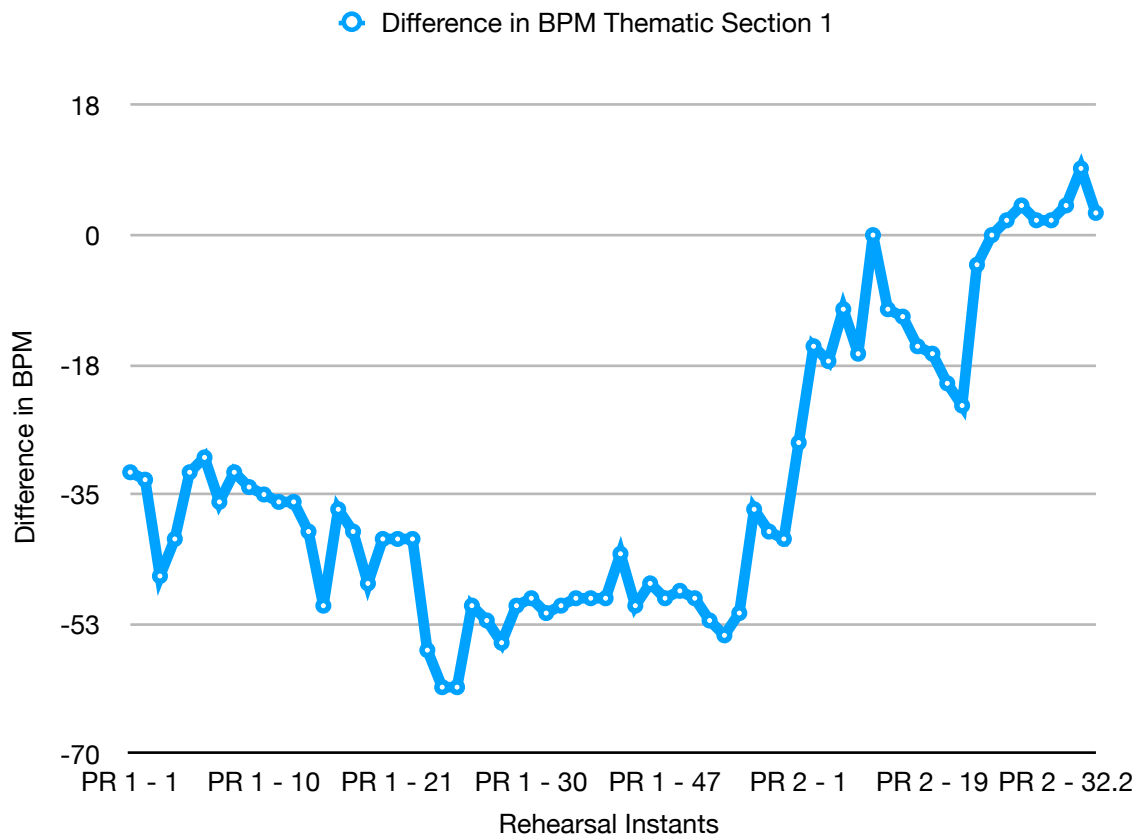
These line charts give a clear view of how the tempo of this section is changing throughout the two rehearsals. Figure 1 shows the beats per minute of each instant of thematic section one that is rehearsed. Figure 2 shows the difference from the score marked tempo of 155bpm. The graphs present similar data, however, the difference BPM graph visually shows more contrast than the raw BPM.

The most significant thing to note from the graphs, is that the tempo taken for the first thematic section in the first rehearsals is significantly slower than that of the second (second rehearsal starts at PR2-1). The tempo starts out under the marked tempo in the score, and remains significantly under tempo for the entirety of the first rehearsal.

In the first rehearsal there are four clear sections:

1. In the first section, the tempo of the instances up to PR1 - 22, shows a tempo averaging around 120bpm ranging from 105bmp to125bpm. Generally the instances are slowing down marginally throughout this section, with four instances being significantly slower than the average of this section: PR1 - 2, PR1 - 4, PR1 - 14 and PR1 - 19.

2. The second section visible from the graph are instances PR1 - 23, PR1 - 24 and PR1 - 25. These are significantly slower than the previous section, being 99bpm, 94bpm and 94bpm respectively.

3. The third section, which immediately follows the second, shows a speeding up of the tempo which remains constant and the least varied of all the sections. It runs from PR1 - 26 through to PR 1 - 57. This sections average tempo is remarkably stable although slightly slower than the first section.

4. The fourth section of the first rehearsal are the last three instances, PR1 - 57, PR1 53.3 and PR58.2. These instances, towards the end of the first rehearsal, are slightly closer to the original tempo chosen at the start of the rehearsal, but still significantly slower than that score directs.

The second rehearsal divides into two clear sections:

1. The first section runs from PR2 - 1 through to PR2 - 21. The tempo here is significantly faster than the first rehearsal averaging around 139bpm. One instant, PR2 - 10, stands out in this section with significantly faster tempo of 155bpm.

2. The second section for the second rehearsal runs from PR2 - 29 though to the last instant, PR2 - 36. This section has an average tempo of 157bpm, significantly faster than the first half of

rehearsal two and much closer to the prescribed tempo in the score. Instant PR2 - 33.3 has the fastest tempo of 164bpm.

It is clear from this analysis that the tempo slows down significantly for instances PR1 - 23, PR1 - 24 and PR1 - 25, and that the tempo then does not recover fully to the tempo set at the start of the rehearsal. It is worth noting at this stage that the first rehearsal was more focused on note learning than the second rehearsal. In her response to the interview questions, the conductor stated that:

'The first rehearsal was less satisfying as an experience as we were checking notes, I hadn't had time to learn the accompaniment to 'The Darkling Thrush' so couldn't provide an adequate accompaniment and the Soprano 1 singer was missing. Nevertheless, it was useful and we all went away knowing what we had to work on individually'.

This explains, in part, why the average tempo in the first rehearsal is slower than the second rehearsal. What it does not explain is why the tempo slows in from PR1 - 23, PR1 - 24 and PR1 - 25 or why the tempo remains slower after this slow down for the majority of the rest of the first rehearsal. The transcript for this section is as follows:

C: Yeah it's coming nicely. I think sometimes when we haven't got a consonant ending we're not finishing our phrases together, like after canopy, so we need to try and look at each other a little bit more and count. Erm, and then there was something awry with the note in that last bit. So let's try and sort that bit out. If I can I just hear your two parts?

    Piano notes

    [23] B83-87 (apart from C)

C: Sings: Death Lament (Cb Sop 2) there so you need a whole major third. Erm… shall I just play it. So..

    Plays Sop part B83-87

C: ok same place.

       Piano notes

       [24] B83-878

C: ok. (Interrupts singing playing Sop 2 part)

1: Oh sorry

       Piano notes

       [25] B83-88

C: That's it, yeah, ok. Let's go back to 'it's crypt' at the top of page 12 and try to be really together as we come off canopy.

       Piano notes

       [26] B75-87

This exchange explains reasons for the tempo change in PR1 - 24 and PR1 - 25. The ensemble encounters pitching issues in instant 23, caused by Singer 1 not correctly pitching the Cb. The next two instants are then deliberately rehearsed under tempo to ensure accuracy of notes from bar 83-86. This is therefore not an interpretative decision to slow down but rather it is a rehearsal technique.

The instruction that then follows is about ensuring the phrase ending is together. What is interesting here is that the following instant, PR1 -26 is significantly faster again, with no discussion about resuming the tempo. The conductor sets the tempo at a faster speed because the notation issue has been resolved through the slower rehearsing. We then enter the second section visible from the graph, in which the tempo remains remarkably unvaried but markedly slower than the average of the first section. This could be an indication that rehearsing under tempo has a continuing effect on the rehearsal. It would be reasonable to propose that the ensemble may assume that they have returned to the previous stable tempo as there is no discussion of keeping the tempo purposefully slower. It could also be that the conductor has not yet deemed the notes to be secure enough to return to the original tempo. There is certainly a lasting impact from the slowing of tempo in these instants that then continues for the rest of the

rehearsal. The conductor's instruction to focus on being together at the end of phrases may be another reason for the group taking a slightly slower tempo for this section of the rehearsal.

The final section includes PR1 - 57, PR1 - 57.3 and PR1 - 58.2, which have tempos of 118bpm, 115bm and 114bpm respectively. These instants are significantly faster than the previous stable section three of the first rehearsal. However, the tempos are slightly slower than that used in the first section of the graph, which averages 120bpm. The difference of BPM here is marginal when looking at the average, but less so when considering the range in section one of 105bpm -125bpm. Relating these instances back to the rehearsal, it is clear that these three instances represent the attempt at the first full run through of the piece:

[56] B204-end

C: Yeah so, I think we should run the whole thing but before we do are there any corners that you want to do again? Any bits you want played?

1: Only the obvious bit but I think I'm not gonna just do it

C: Alright ok. I will… Im sorry its been such a crazy week I haven't had time to look at it, so I'll put something of the harp part in, probably one hand at a time, hopefully with the right flats, just so we can see how the whole thing hangs together a little bit. so…

Plays B1

C: oops D natural isn't it

[57] B1-

1: Sorry (after singing A natural - piano corrects)

144 (Piano only in the instrumental joins between vocal sections)

C: Sorry, I'll lead in with those two harp bars before you come in.

[58] B139 -

C: sorry! (after playing Ab at B147)

- 212

C: Good ok,. so we've kind of covered the ground and I suggest we leave it there today.

It is clear that the tempo of the whole piece is taken under speed in the first rehearsal. In the run-through at the end, which runs from PR1 - 57 through to PR1 -58.3, the tempo is consistently around 40bpm slower than marked in the score, with the difference ranging from -42bmp to -38bpm. This shows that in the run the transition from the 3/4 meter, where the conductor says that it should be felt as one in bar, transitions equally to the quaver equals quaver 6/8 meter, which has a feeling of two in a bar. In this run the thirds thematic section, PR1 - 57.5 and PR1 - 58, are under the engraved BPM by 35bpm and 60bpm respectively. These instances represent the passage of music that separates the full run due to mistakes in the section half of the third thematic section. The slower tempo here in the PR1 - 58 shows that, again, the ensemble are slowing down to ensure correct notes in this first rehearsal.

The first section of the second rehearsal has a significantly faster tempo than the first rehearsal. This may be a reflection of the increased security of notes through the ensemble members practice. It may also have been influenced by the ensemble listening to the Sibelius file of the piece. Listening to the piece was instructed in the first rehearsal by the conductor and referred to by her in her interview questions.

PR2 - 10 stands out in this sections as significantly faster, at 155bpm, exactly matching what is engraved in the score for the first time. The discussion surrounding this instant is a follows:

     [9] B43- 67(C sings accompaniment join between vocal sections)

C: Ok let's just watch the tuning of that. Can you just play that please… ***Mics On***

3: Plays sop line on piano B63-66

C: Ok let's go from G

        [10] B63-66

3: Sorry..

4: Sorry I was singing 'feathers'

E: laughs

C: Interesting image

There is no mention of a will to speed up in the rehearsal here. Considering that the number of bars i this instant are so small, it would be sensible to disregard the faster tempo here as an anomaly.

In the second section of the second rehearsal, PR2 - 29 to PR2 - 36 the tempo is significantly faster again. The tempo is stable throughout this section with a slight increase throughout. The difference from the marked BPM here ranges from -4 to 9, showing that the tempo has settled much closer to the engraved BPM than the rest of the rehearsals. It is clear from the graph that something changes at PR2 - 29. The transcript for this section is as follows:

C: Do you need to tune or anything?

H: Erm.. let's just hope for the best. lets just give it a whirl

C: What would you prefer at the beginning? I'm thinking of it as one in bar. Do you want two bars of one or just one?

H: Erm… just one is fine

C: Ok

       [29] B1-

H: sorry (B57) sorry (B156)

          - 159

C: Shall we just do that pick up?

There is no discussion of increasing the tempo here, however, it is the first time that the harpist joins the ensemble, and the full accompaniment is played. It is not clear whether the increase in tempo here is intentional. The singers in ensemble have shifted role at this point away from rehearsing the singers together, to putting the singers together with the harp. This change in focus may be the reason for the tempo now matching much more closely what is prescribed in the score.

The rehearsal continues:

C: Shall we just do that pick up? I think it need to go a little bit faster… (demonstrates speed to

der)

H: Yeah it is on the upper limit of what's actually playable

C: Ok, ok we can talk about what works and what doesn't for you, it's great on Sibelius isn't it it

just…

H: Oh yeah you can do anything on Sibelius

C: Here we go

[30] B150-212

Having reached the tempo marked in the score the conductor here wishes to go 'a little bit faster'.

This is reflected in the average tempo data by the marginal increase in the average BPM. The

change here is slight. This discussion also shows that the tempo here is not only being decided

by the conductor. The exchange above clearly demonstrates that the harpist is limiting the

amount that the tempo increases due to it being 'on the upper limit of what's actually playable'.

So although there is an interpretative will to increase the tempo, beyond that engraved in the

score, the commutation here presents the limitation of the harp in allowing it and the negotiated

result is that the tempo stays remarkably close to what has been prescribed by the composer.

THEMATIC SECTION 2

Thematic section 2 covers bars 35-54, 89-109 and 180-212. The tempo marking on the score is 155bpm for this section. The following two graphs show the changes in average tempo for these sections:

Figure 3:
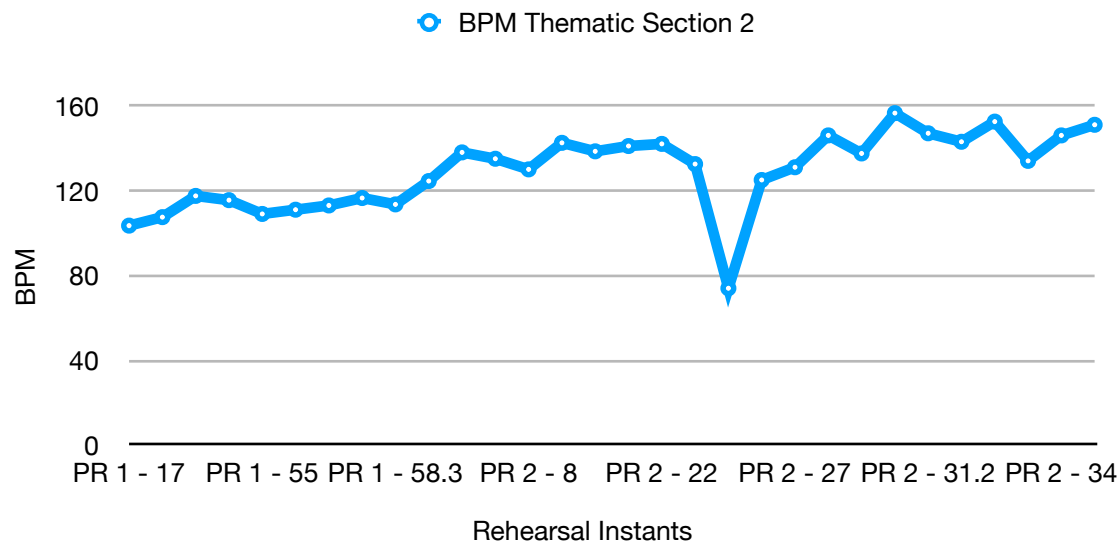
Figure 4:
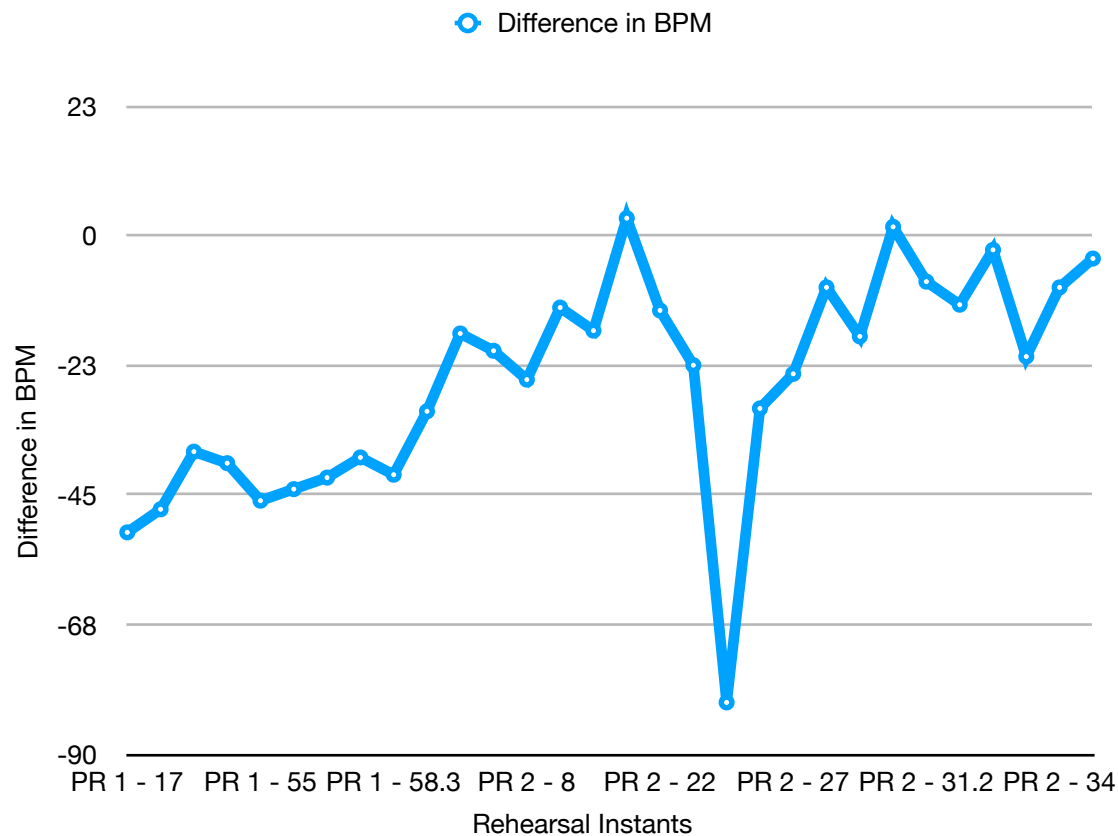
Again, these line charts give a clear view of how the average tempo of this section is changing throughout the two rehearsals. Figure 3 shows the beats per minute of each instant of thematic section two that is rehearsed and Figure 4 shows the difference from the score marked tempo of 155bpm. As this is the 6/8 section calculations have been made in the tables to provide the BPM mathematically from the quaver beat that has been marked in the Sonic Visualiser. The score makes clear at bar 35 that quaver equals quaver in the transition from 3/4 to 6/8, therefore the BPM should still be 155 as engraved at the start of the piece and referred to in the a tempo markings. The bpm has not been changed here to calculate the dotted crochet feel of the 6/8 to allow for easier comparison to the previous 3/4 material. The quaver beat has been marked in Sonic Visualiser and the BPM calculated.

The graphs again shows the first rehearsal being significantly under tempo which will be for the same reasons as discussed for section 1. However, in this section there is a more continual incremental increase in the tempo throughout the first rehearsal starting at 103bpm and rising to 116bpm with the first rehearsal averaging 111bpm. The impact of slowing for note security that seems to have kept the rest of the first thematic material further under tempo in the first rehearsal has not continued to slow the second thematic section. There is less time spent on rehearsing the notes of this sections in the first rehearsal, largely due to the material being easier to sight sing, and the soprano part being much more static (in the first rehearsal the Soprano does not have her partner present).

PR2 - 24 stands out as a much slower run of this material, which is an intentional slowing of the rehearsal speed as outlined in the discussion:

C: Good, ok.

      [22] B180-191 (C speaks quaver rhythm of join between vocal sections)

C: Whoops

4: That was me sorry

C: And we weren't in tune on the octaves any way so we can sort that out

      Piano note

      [23] B187-212 (end)

C: Yep, erm so we'll let it drive to the end. There's just the odd twist and turn in this bit, erm, that's hard to get, shall we just go under speed from V?

       Piano note

C: 1,2 (much slower)

       [24] B187-193

C: Ok, so I think we need to be a little bit shorter and because it's so fast (sings) 'some blessed hope' I think we will have to do 'hop' 'and of' It's the only way to get it shorter at that speed.

So this outlier in the graph is due to intentionally slowing down the tempo to ensure the ensemble is together and that the pitching issues that Singer 4 was experiencing could be resolved. The introduction of the harpist at instant 29, has less impact for the tempo of this thematic section than the previous section. Removing the outlier discussed above, the average tempo for the second rehearsal before the harpist joins is 134bpm, and after is 146, bpm. So again, there is a slight increase in the tempo once the harpist has joined, which will be the for the same reasons as discussed for thematic section one.

THEMATIC SECTION 3

Thematic section 3 covers bars 111-148. There are two tempo markings on the score in this section dotted crochet 92bpm for bars 111-140 and dotted crochet 88bpm for 141-148. The following two graphs show the changes in average tempo for these sections:

Figure 5:
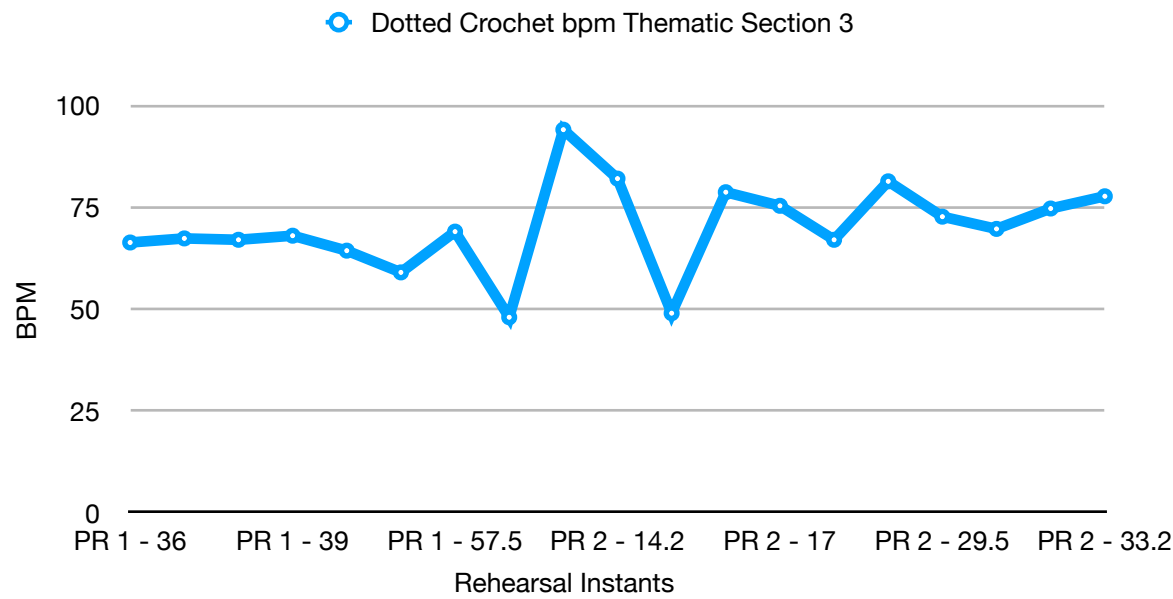
Figure 6:
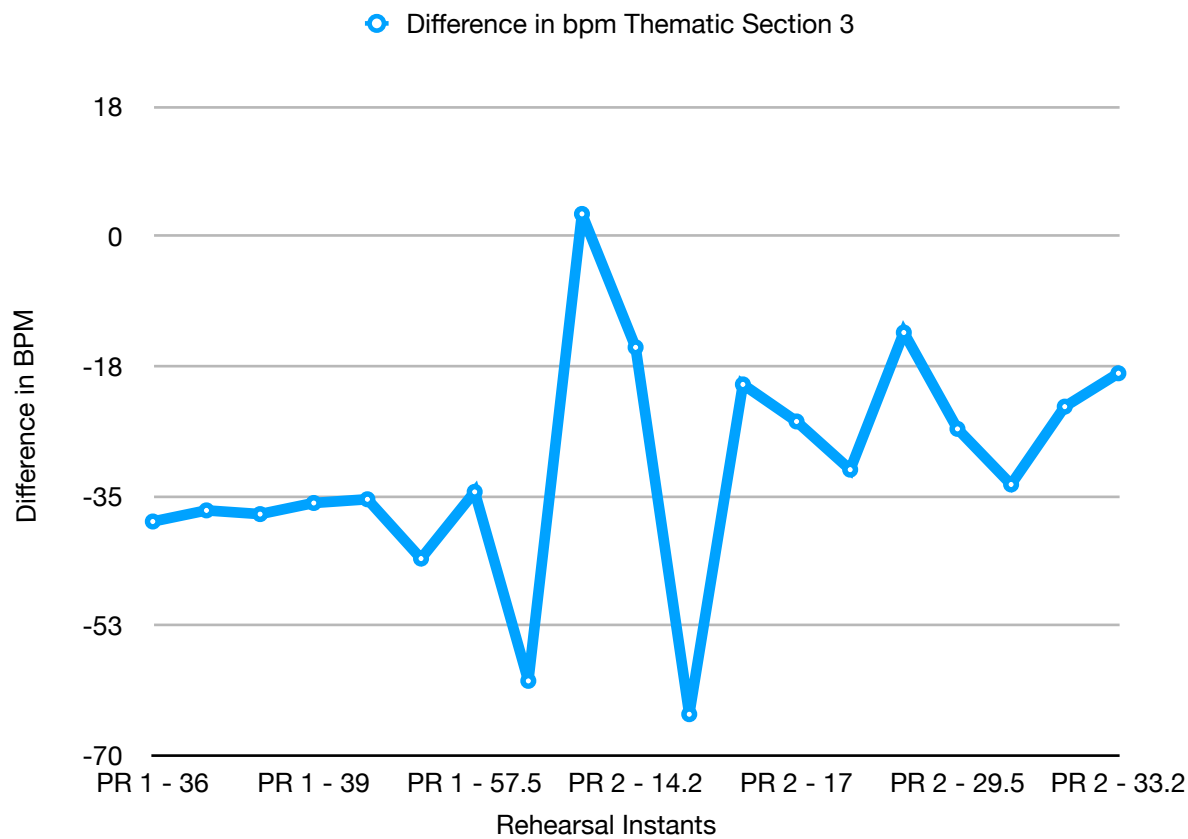
Again, this gives a clear visualisation of the changes in tempo throughout both rehearsals of thematic section three. It is clear from the graph that there are three outliers: PR1 - 58, PR2 - 14 and PR2 - 15. Beyond these it is clear that the graph divides neatly in two between the first and second rehearsal. Again, showing that the tempo of the first rehearsal is slower than that of the second. However, the tempo for this thematic section remains much further under the engraved tempo than the first two thematic sections. In the second rehearsal, section three averages 22bpm under the score directions, when the two outliers are removed. This is significantly more than the first two thematic sections, which achieve, or nearly achieve the prescribed tempo once the harpist joins the rehearsal.

The discussion surrounding PR1 - 58, our first outlier, is as follows:

C: Alright ok. I will… Im sorry its been such a crazy week I advent had time to look at it, so I'lll put something of the harp part in, probably one hand at a time, hopefully with the right flats, just so we can see how the whole thing hangs together a little bit. so

    Plays B1

C: oops D natural isn't it

        [57] B1-

1: Sorry (after singing A natural - piano corrects)

                        144 (Piano only in joins between vocal sections)

C: Sorry I'll lead in with those two harp bars before you come in.

        [58] B139 -

C: sorry! (after playing Ab at B147)

                - 212

The slowing down of the tempo for this instant is most likely due to the conductor's focus on playing the accompaniment on the piano. There are a number of incorrect notes, which are verbally apologised for, and an admission that she has been unable to practice. Slowing down for instant 58 gives her more time to ensure she is playing the correct notes. The fact that this is an

outlier, slower than the rest of the first rehearsal, suggests it is a rehearsing decision not an interpretative one.

PR2 - 14 and PR2 - 14.2, is the first time that the third thematic section material is visited in the second rehearsal. These are the only times that the bpm match what is engraved in the score. This may be reflective of engaging with the Sibelius recording between rehearsals. After instant 14 the section remains significantly under tempo again. There are no discussions about the tempo of this section or described intention to slow the section down either before of afterwards:

[14] B89-142 (C speaks rhythm of quavers in join between vocal parts and first bar of Alto)

C: Good, I just want to do that link, but let's go over this section here, erm mezzo voce so let's make this lighter like the voice is coming from afar.

3: ok

2: (yawns)

C: and then obviously when we get up to O we can sing fully again. Erm, it's just making sure that everything is very smooth and very rhythmically. (Demonstrating quaver movement) der, der, der, der, der, der, for the sopranos and we're all totally together. So let's go from L. Erm, shall we just get a fresh C

3: Er… (Plays C on Piano)

C: So we just imagine this… der, der, der, der, der, der (Harp)

       [15] B114-138

C: Yes, the rhythm was pretty much correct I think it was just the word stress when awe get to 'evensong' so even though we're bringing out the syncopation we don't want an emphasis on 'ven'. Let's go from 'In a full hearted' I think the rest, I felt worked better than before? Yeah?

E: Yeah

C: (hums starting note)

       [16] B130-138

C: How did that feel? Yeah let's try it once more…

       [17] B130 -

C: Think that worked better…

       - B148

C: Yeah so I think we can be more unanimous with pitch, and massive rit. there. Erm, lets try again from your entry (gesture to sops), which I think worked very well… 'An aged thrush'..

       Piano note

       [18] B140-181 (C speaks rhythm of join, 3 plays F for pithing note)

There is feedback from the conductor here that the ensemble needs to be more together in feeling the quaver pulse throughout this section. However, the reason for the slowing of tempo is unclear. The fact that it remains under tempo for the successive instances of the third thematic section suggests that the slower tempo could be becoming an unintentional feature of the groups interpretation.

The ensemble discusses this tempo towards the end of the rehearsal:

       [32 B111-212

C: Yeah, and I think leave your last chord there

H: Yeah

C: Did those speeds work for you?

H: Yeah that's fine

C: The only one, I need to check it with a metronome, I have a feeling at L maybe I started that, it's nice to sing at that speed, but then it feels as if when we get to 20, then we'd be slowing it up way too much, erm…

3: (Gesturing to phone) Do you want to try it or something?

C: Yeah please. 92

3: We'll find out soon

C: Thank you

3: (Plays metronome on phone) Oh no sorry they're quavers

1: *laughs*

3: Hold on… Stop, stop it! (Metronome changes pace)

C: *Sings quaver pulse harp part to der and sings from B113 with metronome. Harp joins in B115 -117* Ok so probably just a smidgin faster than what we were doing. Ok, we can sort that, erm… Any particular corners, that would be useful to for you Emily, to do with us?

Here, the conductor recognises that the tempo is under that which is engraved and checks with a metronome. Unfortunately, this thematic material is not visited again during the rehearsals captured. It would be interesting to track whether the section remained under tempo when the piece was performed. Clearly the conductor wanted to sing the first half of the third thematic section under tempo but then found the second half too slow, correcting the tempo retrospectively in its context.

2. Score Tempo Directions Analysis

The table below shows all of the tempo markings in The Darkling Thrush:

Figure 7:

Score Tempo Directions

Bar	BPM/a tempo	Poco rit.	Poco accel.	Pause	Poco rall.	Molto Rit	Time Signature
1	155						3/4
7		7-9					3/4
9	a tempo						3/4
35							6/8
50			50-54				6/8
55				55			6/8
56				56			6/8
57							3/4
62		62-63					3/4
90							6/8
105					105-109		6/8
109				109			6/8
110				110			6/8
111	Dotted Crochet = 92						6/8
139		139-40					6/8
141	Poco meno mosso Dotted Crochet = 88						6/8
145						145-148	6/8
148				148			6/8
149				149			6/8
150	155						3/4
156		156-157					3/4
180	Poco più mosso Dotted Crochet =108						6/8
208			208-212				

Having analysed the average BPM, we have so far paid particular attention to the tempo taken in each instant of rehearsing the piece. In this section we will further investigate tempo to ascertain whether the performance directions engraved in the score are being enacted by the ensemble, and how these are negotiated.

First of all, as before, it will be useful to group these performance into their thematic sections. Thematic Section 1 - the engraved poco rit. in the two bars preceding the entry of the ensemble at the start, and when this material is repeated bars: 7-9, 62-63 and 156-157

Thematic Section 2 - the poco accel. marked in the last four bars, 50-54 and 208-212, and the poco rall, engraved for the same thematic material at bars 105-109

Thematic Section 3 -the marked poco rit from the bpm marking 92 to 88 in bars 139-140, and the engraved molto rit. at bars 145-148 at the end of this section.

The analysis of tempo was undertaken by creating line graphs in Numbers. The data for these were populated by marking each beat in Sonic Visualiser, exporting the annotation layer time instants into numbers, and then resusing the time instant from the previous. This gives us a line graph which displays the length of each beat and enables us to see the increasing and decreasing of the tempo as well as its stability through the section being rehearsed. The graphs were analysed to ascertain what, if any, tempo change occurred at the points where the score prescribed.

THEMATIC SECTION 1: POCO RIT.

The poco rit being examined here occurs in bars: 7-9, 62-63 and 156-157. This thematic section begins with an eight bar harp introduction, which is played on piano by the Conductor in the first rehearsal. The last two bars of the introduction is where the poco rit is marked and the singers enter on the third beat of the last bar. Section 1* is rescored a major third higher, but the rhythmic and melodic material is the same. The table below shows the results from analysing this section:

Figure 8:

Thematic Section 1 Poco Rit.

	Bar	Poco Rit	A Tempo	Notes	Transcript	Video
PR1 - 1	1-32	None		No Rit	First run of piece	No eye contact, focus on scores
PR 1 - 57	1-32	Slight	Slight a tempo		Full run end of R1	C accompanying on Piano
PR1 - 57.3	56-89	Slight	a tempo not faster		Full run end of R1	C accompanying on Piano
PR1 - 58.2	150-187	Clear	Clear a tempo		C Playing Piano from 144	C accompanying on Piano
PR2 - 29	1-34	None		No Rit	First Run R2 with Harp	C beats until B5
PR2 - 29.3	56-89	Slight	a tempo not faster		First Run R2 with Harp	C beats until singers enter
PR2 - 29.6	150-160	Slight	Clear a tempo	Proceeding bars slow tempo	First Run R2 with Harp	Note issues in Harp RH. Rehearsal Stopped
PR2 - 30	150-181	Clear	a tempo not faster	Slows into sung section	Follows Harp Tempo Limit Discussion	C beats until singers enter
PR2 - 31	1-34	Slight	a tempo not faster	Slows into sung section		C beats until B5
PR2 - 31.3	56-89	Slight	a tempo not faster	Slows into sung section		C beats until B63. Harp mistakes precede this.
PR2 - 32.2	150-182	None		No Rit - tempo setting	Needs to go tiny bit faster' C	C camera fail

Here we can see that throughout the first rehearsal the poco rit becomes more evident. It is worth noting here that the conductor is playing the piano for these sections. She then stops playing when the singers have entered, playing the accompaniment joins between sung sections, so that the ensemble can run the piece. The conductor admits in the first rehearsal that she hasn't had time time practice the accompaniment and therefore the tempo analysis that has been done in the first rehearsal is from the conductor playing a skeleton version of the accompaniment, rather than the full notated version.

The second rehearsal, in which all of the instances are accompanied by the harp, shows evidence of the poco rit in all instances apart from the first and last. It is interesting to note here that the conductor sets the tempo for PR2 - 29 but then stops beating at bar 5. This means that the poco rit that was established in the first rehearsal, although engraved in the score, is not communicated to the harpist. The conductor then corrects this when this thematic section repeats during the same run, by clearly beating until the singers have entered. This particular instant is complicated by the fact that there are mistakes in the harp right hand part during the first half of the introduction, which make the harpist visibly more stressed. Discussions later in the rehearsal highlight that the speed of the piece is at the fastest end of what is playable on the harp.

As well as focusing on this poco rit and how it occurs in successive thematic sections, it is also worth considering how its presence changes in each instant of the same bars being rehearsed. Bars 7-9 are covered in four instances. The first in each rehearsal, PR1 - 1 and PR2 - 29, do not have a poco rit. These are both the first time that the accompanist, pianist or harpist, plays the introduction to the piece. In both second instants, PR1 - 57 and PR2 - 31, there is stronger evidence of a poco rit which could suggest that the familiarity with the material is allowing for the performance directions to be followed more closely, particularly where the repeats of the thematic section have had the poco rit driven by the conductor. It is worth noting here that in the last instant of the poco rit at bar 7-9, the conductor has returned to setting the tempo in the first five bars, not driving the poco rit, yet the harpist still ensure that it occurs.

Bars 62-63 shows a slight poco rit each time that it occurs in the rehearsal. The notes are identical to the first section of the piece, so again we could suggest that the familiarity here for the

accompanist each time is allowing for focus on the performance directions. Again in the earlier instant of the second rehearsal, the conductor is enforcing the poco rit but beating until the singers enter and in the later instant she is setting the tempo and then not beating the poco rit, yet it is still occurring.

Bars 156-157, features a poco rit in each rehearsal apart from the last instant, PR2 - 32. Here the instant is preceded by a discussion about the tempo:

C: Yeah, I think this bit, that might have been me, I think that needs to be a tiny bit faster. Shall I give two dotted crochets in there?
H: Yep
C: Ok let's try from there

        [32 B111-212]

Although the poco rit had become a feature for these bars throughout the rehearsals, it seems, in this last instant that it is left out at the expense of the conductor wanting the tempo to be faster. As we saw when we examined the average tempo, the tempo of the piece increases significantly when the harpist joins the ensemble, reflecting the performance speed that the group are aiming for, but it also continues to increase, despite the discussions with the harpist saying that it as fast as it can go. Here, it could be suggested that the will for the piece to be faster means that the conductor is driving the tempo and therefore not observing the poco rit.

So far we have looked at whether the last two bars slow down at the end of each introduction. However, the second feature of the poco rit is the engraved a tempo. Instances PR1 - 58.2 and PR2 - 29.6 are the only two in which we can see a clear a tempo being achieved. There is no discussion about this poco rit in the rehearsals, and although the conductor varies where she beats until in the introduction to this section, she does not beat once the singers have entered, which is the same bar as the a tempo. All of the other instances that feature the poco rit show a slowing down of the tempo into the sung section, rather than the engraved slowing for two bars an a tempo. It would be interesting to have captured the performance of this piece, or more of the

later rehearsals so that we could know the interpretation that is presented and whether a tempo

became a feature in this last section, or indeed in the previous ones.

THEMATIC SECTION 2: POCO ACCEL.

The poco accelerando being examined here occurs at bars 50-54 and 208-212. It concludes the second thematic section the first and third time that it happens. The poco accel. is marked over the last four bars of this section, which features the choir singing a Bb major chord shifting from first to second inversion in section one and a static Eb in octaves in the third. Both are accompanied by quaver passages in the harp part.

Figure 9:

Thematic Section 2 Poco Accel.

	Bar	To end?	Poco Acell	Transcript notes	Video Notes
PR1 - 17	34-53	Yes	Slight	take off last quaver'	C beats from 51
PR1 - 18	34-54	Yes	Slight	Accel highlighted by 1 before 18.	C beats from 51
PR1 - 53	187-210	No	None	Then we get this harp part building up and accel - not ref this accel.	C stops rehearsal by talking
PR1 - 56	203-211	No	None		C doesn't beat but gestures cut off
PR1 - 57.2	34-55	Yes	None		C doesn't beat but gestures cut off
PR1 - 58.3	180-212	Yes	Clear		C plays piano from 208
PR2 - 6.2	34-52	No	None	Note issues	C beats from 50
PR2 - 7	42-52	No	Slight	Poco accel. in two	C beats from 51
PR2 - 8	49-53	No	Slight		C beats from 51
PR2 - 9	42-54	Yes	Slight		C beats from 51
PR2 - 23	187-212	Yes	Slight		C beats from 51
PR2 - 27	187-212	Yes	Slight		C beats from 51
PR2 - 29.2	34-53	Yes	Clear	First Run with Harp	C beats from 51
PR2 - 30.2	180-212	Yes	Slight	First Run with Harp	C beats from 208
PR2 - 31.2	34-54	Yes	Slight	Follows Harp Tempo limit Conversation.	C beats from 51
PR2 - 31.3	180-212	Yes	Slight	Follows Harp Tempo limit Converstation	C video angle fail
PR2 - 34	195-210	No	Clear	C - 'Lost it's drive to end	C video angle fail
PR2 - 35	195-212	Yes	Clear		C video angle fail

Figure 9 shows a table summarising the analysis of the poco accel in bars 50-54 and 208-212. We can see that in the first rehearsal there is a slight accel in PR1 - 17 and PR1 - 18, this is driven by the conductor beating to the end of the section. It may also be reinforced by singer 1 highlighting the accel in the discussion before PR1 - 18:

C: As of its changing to two in a bar. Erm… So lets go from the tangled bind stems

　　　　Notes given on Piano.

　　　　[17] B34-54

C: and I think we can take that quaver off and put the S on the quaver.

1: and the accel.

C: Yes. We'll put that in this time

1: I don't know if I got my… er the key signature's throwing me it's really weird, ah maybe I did get it.

3: It sounded nice

1: I think I was supposed to sing a minor third and I didn't

C: Where?

1: at 47

C demonstrates part.

1: Oh I did sing it, yeah I did sing it right

C: Ok let's try it again, it will be a little bit faster eventually but we'll keep it like that for now.

　　　　C sings pitching notes

　　　　[18] B34-54

Interestingly, the highlighting of the accel here by singer 1, and the response from the conductor that 'we'll put that in this time' suggests that the ensemble didn't think that they were doing the accel in PR1 - 17. However the evidence of poco accel in both 17 and 18 are very similar.

PR1 - 53, PR1 - 56 and PR1 - 57.2 do not include the ensemble reaching the end of the section and the rehearsal is stoped by the conductor by talking and with a cut off gesture respectively. Neither feature the conductor beating the bars where the poco accel is marked. This is clearly where the ensemble is focusing on the notation rather than signing through these sections. PR1 - 58.3 shows the clearest accelerando, which is due to the conductor accompanying the choir on piano and therefore being able to drive the poco accel.

In the second rehearsal the poco accel becomes a secure feature. The only instant where there is no evidence of a tempo change here is PR2 - 6.2, the reason here being that the end of the section is not reached due to note issues. Throughout the instances of this poco accel the conductor beats from either bar 50 or 51 to lead the accel. Although the extent of the poco accel varies a little it is secure.

THEMATIC SECTION 2: POCO RALL.

The poco rall being examined here is marked from bar 105 to 109. This is the same section of the thematic material we have just examined with the poco accel. The rall here prepares the listener for the following section which is marked at a slower tempo and consists of the third thematic material previous discussed.

Figure 10:

Thematic Section 2 Poco Rall.

	Bar	Poco Rall.	Transcript	Video
PR1 - 34	89-109	None	two in bar.	C beats whole section Note issues S1
PR1 - 35	89-109	None		C beats whole section
PR1 - 57.4	89-109	Clear	Run with piano	
PR2 -13.2	89-108	None	Note issues	No beating C singing wrong part
PR2 - 14	89-109	None	Repeated for note security	C only gestures cut off
PR2 - 29.4	89-109	Slight	First run with harp	C beats from 107
PR2 - 31.4	89-109	Clear	Second run with harp	C angle camera fail
PR2 - 33	97-110	Clear	Follows metronome discussion	C angle camera fail

We can see from the table above that both rehearsals divide into two clear sections: first not showing a poco rall and then showing one.

PR1 - 34 exhibits the ensemble correcting note issues from S1 who did not expect a note change on the page turn. PR1 - 35 follows this correcting the note. For both instances, the conductor beats by the side of her chair through the whole section and then makes the cut off gesture clear to the group. The rall is first present in PR1 - 57.4 where the ensemble do their first run of the entire piece, accompanied by piano. Here the clear rall is driven by the conductor at the piano.

The second rehearsal takes a similar pattern to the first, although this time the mistake is in the conductor reading the wrong part on the page turn in PR2 - 13.2. PR2 - 14 is then repeating this section for note security. Both of these instances feature no beating from the conductor, with only a cut off gesture in the second. Here the conductor's focus is on her role as a singer, rather than conductor, and the need to secure her notes for this section.

The next instant is when the harp has joined the rehearsal, during the first run through. This time the conductor begins to beat two bars into the poco rall at bar 107. Event though she therefore shapes the poco rall in the last two bars, it is clear that the harpist starts this of her own volition.

The camera facing the conductor fails towards the end of this rehearsal and unfortunately we cannot see where the conductor starts beating in the subsequent instances. We can however see that there is a clear poco rall and from the other camera angle, that the harpist glances to the conductor; suggesting that her beating the rall continues as in the previous runs.

THEMATIC SECTION 3: POCO RIT.

The final tempo performance director engraved the score that we will investigate is the poco rit marked from bar 139 to 140. This is in the transition between the two halves of the third thematic section where the tempo shifts from dotted crochet equals 92 to dotted crochet equals 88.

Figure 11:

Thematic Section 3 Poco Rit

	Bar	Poco Rit	Tempo Change	Notes	Video
PR1 - 57.5	110-144	Clear	Clear		C accompanies on piano
PR2 - 14.2	112-142	Clear	Clear		C beats and speaks rhythm of quavers
PR2 - 17	130-149	None	Slight	Slows at 145	C beats and says 'Think that worked better'
PR2 - 29.5	111-149	Clear	Clear		C conducts 140 harp slows 139
PR2 - 32	111-149	Slight	Slight	C- 'Not to much rit'	C angle camera fail
PR2 - 33.2	111-149	Clear	Slight		C angle camera fail

The table above shows the analysis of the poco rit in bars 139-140. This is the first engraved tempo direction that is present in every instant. It varies in how clear it is for two reasons. Firstly, before the harp joins the second rehearsal, the conductor speaks 'I think that worked better' as feedback on the preceding section, and although she beats a slight rit it is not as marked as the ones before or immediately after it. Secondly, once the harp has joined there is a discussion about this poco rit:

C: Yeah, ok. And then I think, where was it… going into page 20 not too much rit, going from what Anthony said

H: Right ok, yeah

C: We don't slow up quite as much there…

H: Ok

C: … and then we've got somewhere to go at 21 where we slow down there. But I think you two (sops) picked up the tempo anyway when we got to 'an aged thrush' so that's fine.

This discussion accurately reflects what the analysis tells us, that in instant PR2 - 29.5 the rit here is not fully controlled by the conductor. Here the harp begins a rit as marked at bar 139 but the conductor only begins beating at 140. The discussion above highlights that this meant the poco rit slowed the tempo too much in this section. Unfortunately the conductor camera fail towards

the end of this section again means we cannot see what the conductor beats in the last two instances.

3. Comment About Tempo Analysis

Having coded the transcript in Nvivo to include the 'comment about tempo' node, we are are able to see that there are 26 references which comment on the tempo. From this we can take each mention of tempo and investigate the impact this discourse has on the interpretation, making reference to the analysis of tempo already discussed.

Figure 12:

Transcript Comment About Tempo Node

Ref	Comment	Description
1	C- It's quaver equals quaver but the meter feel in two	Discussing the transition into 6/8 at bar 35
2	C - as though its changing to two in a bar	Discussing the transition into 6/8 at bar 35
3	1. and the accel	Stated after instant PR1 - 17. Marked accel. bars 50-54
4	C - it will be a a little bit faster eventually	Just before PR1 - 18. Referring main tempo
5	C- so go back to a feeling of two in a bar	6/8 section when repeated
6	C - So slightly slower than the beginning again but some similar rhythmic patterns	Before PR1 - 36
7	C - Ok good, then we have some new material. Again a little slower	Before PR1 - 40 Referring to tempo change at 141 to 88 bpm.
8	C - That's it, massive rit. there	After PR1 - 41 referring to rit at b145-149
9	C - Good and then we get this harp part building up with a bit on accel.	Mistakenly talking about 180-185
10	C - I'll beat from bar 5 with one in a bar	Beating at the start
11	C - Ok shall we pick up the pulse	After PR2 - 1
12	C - we've got to get this pulse more er… joined up and together	After PR2 - 2
13	C - So I still think one in bar until the end of 34 and then when we hit D feel the two in a bar	After PR2 - 5
14	C - Once we get to the poco accel, I'll go into two so we can get it together with the harp	Before PR2 - 7 Accel, B.50-54
15	C - So I think we can be more unanimous with pitch and massive rit. there	After PR2 - 17 Rit bar 145-149
16	C - If you can do those accents, Alexa, after T, without making them sound rushed	Referring to accents before T. S1
17	C - I'm going into two to help us get the tempo to the end.	Before PR2 - 22
18	C - Yep, erm, so we'll let it drive to the end…. shall we just go underspeed from V.	Before PR2 -24. Section then rehearsed under tempo
19	4 - Just changes in speed, that's all	Before PR2 - 28. Referring to tempo change poco rit. 139-14
20	C - I think it needs to go a little bit faster. H - Yeah its on the upper limit of what's actually playable	After PR2 - 29.
21	H - Just sort of check the speeds. But yeah that is fast, on the harp its pretty fast….	After PR2 - 30
22	C - going into page 20, not too much rit. going from what Anthony said	After PR2 - 30. Referring to rit. at bar 139-140
23	C - Is that ok?	Tempo when run following discussion. PR2 - 31

Ref	Comment	Description
24	C - Yeah, I think this bit, that might have been me, I think that needs to be tiny bit faster.	Tempo at meno mosso bar 110.
25	C - Did those speeds work for you? H - Yeah that's fine.	After PR2 - 32
26	C - The only one, I need to check with a metronome, I have a feeling at L, maybe I started that, it's nice to sing at that speed, but then it feels as if when we get to 20, then we'd be slowing it up way too much…	Metronome check of tempo dotted crochet equals 92 at bar 110. After PR2 - 32

Figure 12 shows the references to tempo in the transcript of both rehearsals and an explanation of the rehearsal instant or bar that they are referring to.

A number of the references refer to the meter feeling either two or one in a bar. These particularly reference the change in feeling when moving from 3/4 to 6/8. References: 1, 2, 5, 10, 13, 14, and 17, refer to this. These discussion are often at the start of sections, and clearly earlier on in the rehearsal process. They are used to convey not only the feeling of the meter but also the expectation that the ensemble should have to the beating of the meter. The metre change is where the piece changes from its first thematic section to its second. We can see from the average tempo graphs (figures 5-8), particularly the graphs showing the difference from the engraved BPM, that the change in tempo throughout the rehearsals does not follow the same trajectory for the first and second thematic sections. Thematic section one see a continual slowing through rehearsal one, while thematic section two's pace increases. In rehearsal two, the tempo of thematic section one increases and goes just above the engraved tempo, whereas thematic section two only achieves the engraved tempo once and remains under tempo for the rest of the rehearsal. Mathematically, if the metre change is presented as notated in the score, the graphs should follow the same correlation. The quaver equals quaver marking instructs the ensemble to remain at the same quaver pulse but it is clear that this is not being achieved by the group despite the discussions.

There are also a number of references that comment on the tempo directions in the score. Direct references to Rit. or Accel. are made in references: 3, 8, 9, 14, 15 and 22. In this set we can also

include references 17 and 18 where the conductor talks about driving to the end of the piece. Here she is both talking about maintaining the tempo, and the accelerando marked at the end. The data shows that theses sections get faster throughout the remainder of the rehearsal and that the accelerando at the end is clear apart from in the last instant, as discussed before. The most interesting reference in the set is reference 9. Here the conductor is talking about an accelerando in bars 180-185. The tempo marking here is poco pui mosso dotted crochet equals 108. So the engraving in the score is directing the ensemble to quicken the pace instantly here. However, the conductor describes these bars as an accelerando. Having undertaken the same graph analysis as used for determining the engraved tempo changes (Appendix 3.A.1), it is clear from the three instances, PR1 - 58.3, PR2 - 30.2 and PR2 - 32.3, that there is no accelerando in these bars. Perhaps this is mistaken use of word to describe the suddenly faster tempo that starts at bar 180.

References 6 and 7 are both commentary on the new material in thematic section three being approached for the first time and reflect the engraved tempo. Reference 19 also mentions this section and is Singer 4 expressing need to rehearse the changes in speed in this section. Later there is a more in-depth discussion about the tempos of thematic section three, reference 26:

C: The only one, I need to check it with a metronome, I have a feeling at L maybe I started that, it's nice to sing at that speed, but then it feels as if when we get to 20, then we'd be slowing it up way too much, erm…

3: (Gesturing to phone) Do you want to try it or something?

C: Yeah please. 92

3: We'll find out soon

C: Thank you

3: (Plays metronome on phone) Oh no sorry they're quavers

1: *laughs*

3: Hold on… Stop, stop it! (Metronome changes pace)

C: *Sings quaver pulse harp part to der and sings from B113 with metronome. Harp joins in B115 -117* Ok so probably just a smidgin faster than what we were doing. Ok, we can sort that

275

Here we see in full the discussion which is already evidenced in the average tempo section earlier in the chapter. The tempo that the third thematic section its taken at is significantly under the tempo prescribed throughout the rehearsals. There is only one instant where these bars are covered again in the rehearsal, PR2 - 32.2. Here, the tempo remains under tempo by 19bpm, similar to what it had been before. Having noticed the difference from the score and having a clear intention to follow this by checking with a metronome, it would suggest that the conductor intends to follow this up at the next rehearsal.

References 11 and 12 highlight the ensembles difficulty in establishing the tempo at the start of the first rehearsals; PR2 - 1 and PR2 -2. As we analysed before, there is a significant increase in the tempo from the first to the second rehearsal, and then throughout the second rehearsal. The conductor tries to establish a tempo closer to that which is prescribed in the score, than was achieved in the first rehearsal, but in the first two instances the ensemble slows this down.

C: I'm going to try and do as little piano as I want to sing for now. So I'll beat from bar 5 with one in bar

    [1] B5-10 (C sings RH piano line from B5)

C: Ok shall we pick up the pulse so its… (start from B5 again singing Piano RH)

    [2] B5-21

C: erm… we've got to get this pulse a bit more er… joined and together. Particularly these pick ups are rather late as well. There's this feel of one in a bar (spoken in time) '1,2,3,1 spectre great and winter's dregs.' Let's go from your first entry. (Hums starting note)

    Piano note

C: 1,2,3,1

    [3] B8-B32.

During PR2 - 1 the conductor sings the right-hand of the harp part from bar 5 and beats time; she stops beating at bar 9 when the sopranos first enter. There is little eye contact from the ensemble and the tempo steadily slows. In PR2 - 2, the conductor tries to lead the tempo more clearly by continuing to beat time until the altos, and therefore herself, enter at bar 14. Again the tempo slows, but not as dramatically as during PR2 - 1. A further attempt is made, PR2 - 3, where the

276

tempo remains steady. The conductor reinforces the beating of the unaccompanied bars before the singers enter by clicking. She continues to beat until the altos enter as in PR2 - 2. In addition to this she subdivides the beat of one in bar that she is gesturing by counting '1, 2, 3, 1' before the singers enter. Here, the conductor feels the need to add audible cues to her beating as well as subdividing the crochet beats for the ensemble to achieve the tempo.

4. Comment About Dynamics Analysis

The table below shows the references from the Comment about Dynamics node. Analysis of the dynamics was undertaken by reading the score, along with reading the Sonic Visualiser file, whilst listening to the recording. In addition to using the camera microphone that picked up the whole ensemble in a more balanced way, the individual microphone files were also listened to and read in Sonic Visualiser. This was conducted for the file which the reference refers to and the subsequent file or run. General comments are then made on further instances where analysis has been undertaken.

Figure 13:

Comment about dynamics

Ref	Transcript	Note
1	C - Ok so really just for a chance for us to read the notes again and partly to let us have a think about endings and dynamics, let's do that section again	After PR1 - 10. Referring to run of first section
2	C - Yeah, I think we need much more diminuendo there.	After PR1 - 13. Referring to engraved Dim. B29-33.
3	C - …and we'll try and get the dynamic contrast this time, starting a bit lower	Before PR1 - 35. Referring to con forza forte marking at B97 and mf at 89
4	1 - It's going to be difficult to keep Alexes and I singing those high notes quiet	After PR1 - 35
5	C - I know we need to get these notes secure but we can probably start thinking about dynamics a bit more as well.	Before PR1 - 50. B165-181
6	C - Good I just want to do that link, but lets go over this sections here, erm, mezzo voce so lets make this lighter like the voice is coming from afar.	After PR2 - 14. Referring to mezzo voce engraved at B114.
7	C - and then obviously when we get up to O we can sing more fully again	After PR2 - 14. Referring to voce normale mf engraved at B130
8	C - Yeah, and we need more dim. there…	After PR2 - 20. Referring to dim engraved at B178-181
9	H - Yeah, another run and try and get the dynamics in….	After PR2 - 30.
10	C - My only thing was that now we have the accompaniment, we do need to sing up a little bit	Before PR2 - 31
11	C - Ah, there's somewhere where Ellie has gliss. and a crecsendo and diminuendo	After PR2 - 35. Referring to B164
12	C - Then I think, I think we can all get more contrast there for the mezzo forte, that we can sort.	After PR2 - 36. Referring to engraved mf B168

These references can be neatly grouped into three sets: general reminder, score based and balance.

GENERAL REMINDER

References 1, 5 and 9 are general reminders of dynamics. These are not linked to specific engraved dynamics in the score, or additional dynamics requested by the conductor. They are general reminders before a section is run that the focus of the ensemble should now move away from focusing on the notes and towards the dynamics. Interestingly, each of these references to dynamics occur just before the ensemble run a section, or the whole piece. The general request for more focus on dynamics here was investigated first of all by listening to the camera microphone in Sonic Visualiser.

1. It is clear from listening to and reading the Sonic Visualiser file that although the starkness of the dynamics in this section do not improve dramatically, the shape of the dynamics reflect what is notated more accurately in PR1 - 11 than in PR1 - 10. In the first of these instants the engraved diminuendo in bar 19 is actually performed as a crescendo. This is reversed to being a diminuendo in the second instant. Overall the long engraved crescendo from bar 21-24 is clearer in the second instant, as is the diminuendo in bar 29-32. When listening to each of the singers files in turn, it is clear that the best improvement in dynamic contrast, and accuracy, comes from the conductor. There is marked improvement in both the alto singers but little from singer 1, who is still having trouble pitching notes at the end of this section, meaning she sounds more timid and wavering. There is definite improvement in the sharing of the dynamics, largely due to the conductor, but little improvement in the overall contrast.

5. The second general request for more dynamic contrast again comes from the conductor. This is toward the end of the first rehearsal and is covering similar thematic material to 1. later in the piece. Here we compare PR1 - 50 with PR1 - 52. As PR1 - 51 stops after two bars, it has not been analysed. Analysing the whole ensemble shows there is little change in the dynamic contrast following the conductor's request. Although there is much more note security from Singer 1 than in the first section analysed, there is still some tentativeness. Looking at the individual recordings, there is more dynamic contrast and shape in PR1 - 50 from Singer 1 and Singer 3, both being slightly less clear in PR1 - 52. The opposite it true for Singer 4 and the conductor who both have a marked improvement in the contrast and shape of the dynamics matching the score. The

conductor switches to singing the soprano line with Singer 1 in the four penultimate bars of this section to support with note security. Here she is both demonstrating the part and the dynamics to the ensemble.

Another feature that is clear from analysing both of the above sections, is that the ensemble as a whole, and each member, do not perform the marked forte at the end of bar 177. This is an undiscussed interpretation that is present from the start of this material being sung. It is most likely a result of focusing more on the diminuendo that is immediately notated afterwards. However, the volume of the preceding bars should be louder than the third beat of bar 177.

9. The last general comment about dynamics comes from the Harpist before the second run in the second rehearsal. The discussion between PR2 - 29 and PR2 - 30 also contains reference 10 which pertains to balance between the ensemble and the accompanist. Here the files PR2 - 29, PR2 - 30 which represent the first full run, with a dialogue break, are compared with files PR2 - 31 and PR2 - 32, which present the second, and final, run of rehearsal two. The most noticeable difference between these two runs, is the change in balance, which is caused by the harpist playing much more softly, particularly at the start of PR2 - 31. This may be more a result of the balance discussion, reference 10, but it certainly impacts the range of dynamics that the ensemble is then able to use in this run. Analysing with the score, there are a few dynamic features worth noting. Firstly, the crescendo marked in from bar 135 to 137, is not present in either run. Neither is this crescendo present in any of the other files. There is no discussion about this crescendo, and would suggest that this is a interpretative decision that the ensemble has negotiated through singing. Secondly, the marked crescendo at bar 50 to 54, is much stronger in the second run, perhaps reflecting focus on dynamics, but also permitted by the harpist beginning the piece more softly. Thirdly, the diminuendo engraved in bar 105 to 109 is present, but less clear in PR2 - 31. Finally, the crescendo marked in the harp part every two bars in the final section of the piece, bar 182 to 203, is much starker in contrast in the second run that the first. Overall, there is a strong change in the contrast and range of dynamics between these two runs. Much of this may be due to the balance discussion and therefore the softness with which the harpist begins the second run, which increases the range of dynamics.

SCORE BASED

References 2, 3, 6, 7, 8, 11 and 12 are score base discussions. These are about dynamics that are engraved in the score

2. C- 'more dim there' is in reference to the diminuendo marked at bar 29 to 33 at the end of the first section. Here the conductor is encouraging the ensemble to make more contrast from the forte marking at the end of bar 28 to the p marking at the end of bar 32. In PR1 - 13, which precedes the comment, there is a very slight diminuendo in these four bars. During the next instant there is a minimal improvement in the diminuendo with it being slightly clearer in the last two bars. PR1 - 15 does not reach this material as the rehearsal is stopped by the conductor. The material is repeated next in PR1 - 16 where a very clear diminuendo can be heard throughout the four marked bars. This then becomes a stable feature of the interpretation. It is worth noting here, that although the conductor gives the cut off for the end of this phrase, and sometimes beats time, she does not direct the dynamics with her conducting in the rehearsals. Examining the individual recordings shows that the conductor and Singer 3 contribute to the slight diminuendo in PR1 - 13. Here, the conductor presents a slight diminuendo and Singer 3 a slightly clearer diminuendo. In this instant there is no discernible diminuendo from Singers 1 and 2. After the conductor highlights the diminuendo to the group, the material is repeated in PR1 - 14. Each singer presents a stronger diminuendo in this instant, with Singer 3 presenting most clearly. When the material is next repeated during PR1 - 16, Singer 1 and Singer three present a diminuendo similar to that in PR1 - 14. However, both the conductor and Singer 2 present a more terraced dynamic on each syllable change. Although there is the overall effect of a diminuendo it is not performed as cohesively. This could suggest that the Conductor and Singer 3 are following the other two singers here, suddenly quieting on each syllable to balance in with the entire ensemble.

3. Here, the conductor asks for more contrast in the dynamics, particularly referring to the mezzo forte marking in bar 89, and the forte marking with con forza in bar 97. The conductor wants the contrast brought out here and the ensemble to sing less loudly at the start of this section to allow this. In PR 1 - 34 there is little change in dynamic at bar 97. Although this clearly improves in PR1 -35, with a clear strengthening into the con forza section, the start of the passage is at the same

level both times. The ensemble have enacted the instruction for contrast, but not for the lighter start.

6. In the second rehearsal, the conductor is bringing the ensemble's attention to the mezzo voce marked in bar 114, which is also marked mezzo piano. The mezzo voce continues until bar 130, and is reinforced by a mezzo forte marking. In PR2 - 14, the ensemble sings markedly louder at bar 130, but not with the prescribed crescendo and the voices are not singing mezzo voce. In PR2 -15, immediately following this discussion the dynamics are much clearer. The ensemble presents the mezzo voce as well as the crescendo and mezzo forte. Pointing out the mezzo voice here brought the groups attention to all the dynamics in the passage.

7. This is a further reference to the points discussed in 6. with letter O being the marked mezzo forte and voce normale.

8. Bars 177 to 181 feature the same thematic material as discussed in the analysis of reference 2. The four bar diminuendo here is comes down to piano as before. Both PR2 - 20 and PR2 - 21 are remarkably similar in dynamic here so the comment itself is having little effect. What is interesting to note here is the slightly terraced movement of the dynamic that Singer 2 and the conductor presented in PR1 - 14, has now become a feature of the whole group is doing. This means that there is now a slight leaning into the first beat of each bar which makes the diminuendo less smooth.

11. The discussion around the harps gliss with crescendo accompanying the singers engraved diminuendo is less focused on instructing the ensemble and more for checking what is prescribed in the score. The effect of the gliss with a crescendo in bar 164 is present in all of the files where the harp is present. The conductor plans to check the engraved markings with the composer.

12. This references is the comment that cuts the last file of rehearsal off. The conductor is wanting to create contrast for the mezzo forte marked in bar 168. In this short section the mezzo piano preceding the mezzo forte is not very quiet at all. This is something the ensemble intends to sort at the next rehearsal.

BALANCE

There are two discussions about dynamics which refer to balance in the ensemble. We have already discussed reference 10 and its relation to reference 9.

4. Singer 1 voices concern of the ability of her and her partner being able to sing their high notes in this section quietly. The concern is waved on to the next rehearsal by the conductor as her partner is not present at this rehearsal: 'C - We'll cross that bridge when we come to it'. When the material is then covered in the second rehearsal with the other soprano joining, there is no further discussion of balance for this section or issues with the dynamics of the higher notes.

COMMENT ABOUT SOUND QUALITY

There is only one reference to comments about Sound Quality in the transcript:

C - Ok, we could work on our, talking to myself as much as anyone else…
E- laughs
C - On our sound quality on those long held notes.

This dialogue flows PR1 - 35 and is in reference to the tied dotted minims from bar 105 to 109. Although this comment is specifically targeted at the aforementioned bars, it is also a general drive from the conductor for the ensemble to consider its sound and to move away from the focus of note learning.

INTERPRETATIVE SUGGESTION

This node differs from the instructions that are given by the conductor as it is an interpretative suggestion given by members of the ensemble. There is only one of these and it appears after being invited by the conductor in the first rehearsal:

[20] B63-88

C: Ok, because we know these notes already I think we should go back and refine it a little. So we've got another voice other than mine, any suggestions of what we can do there? To enhance it a little bit

1: Things like the accent on canopy could be quite atmospheric

C: hmm

1: Like the text is so unusual that on the first hearing you're not going to get it so it is better to kind of paint it more…

C: Corpse out lent maybe more, more time on the C there. Alright lets try it through for the sake of that. So we'll go from, actually we'll go from Kate's entry.

When answering the survey questions following the two rehearsals the conductor said the following about decision making in the ensemble:

> *'I approach rehearsals with some clear ideas about the pieces and my interpretation of them and so I will often take a clear lead on decisions e.g. phrase breaks. Now that we are working as a consort I am trying more to ask the other singers for their opinions and to encourage them to contribute ideas and mention areas for improvement that they have noticed.*
> *In terms of planning performances and rehearsal schedules, I facilitate group discussion so that we form a plan that is manageable for everybody.'*

Although the invitation is made a couple of times during the rehearsals, the ensemble only provides interpretive suggestions this once. It would be unfair to assume from this that the shift in role that the conductor describes here, from conducting in front of the ensemble and not singing, to the consort approach she mentions, is therefore not being enacted. An analysis purely looking at the dialogue may come to this conclusion, however, in the dynamics analysis above, it is clear that each member of the ensemble is shaping and reshaping the interpretation, as discussed in dynamics reference 8. Therefore the operation of a small consort is, perhaps, less reliant on suggesting changes to the interpretation, but as the singers can all hear each other clearly, these can be negotiated more organically through rehearsing the music.

5. Comment About Togetherness Analysis

The next node to consider from the transcript is comments about togetherness. The table below summarises these:

Figure 14:

Comment about togetherness

Ref	Transcript	Notes
1	C - Partly to let us have a think about endings and dynamics	After PR1 -10.
2	C - And I think we can take that quaver off and pit the S on the quaver	After PR1 - 17 Referring to B54
3	C - I think sometimes when we haven't got a consonant ending we're not finishing our phrases together, like after canopy, so we need to try and look at each other a little bit more and count.	After PR1 - 22. B87
4	C - Try to be really together as we come off canopy	After PR1 - 25 B87
5	C - And again we'll just pull the diphthong and put that on the quaver	After PR1 - 34 B109
6	C - Ok, let's try and tidy that up a little bit, it's just the endings and making sure that they are together.	After PR2 - 3. Referring endings in first section
7	C - Oops, in together	After PR2 - 4. Picking up entry B8
8	C - Yeah, this happened last time. I think we need to lean more into our first note.	After PR2 - 11. Referring to timing of alto entry B69
9	C - Yeah, we're not quite together yet on that 't' just make it absolutely mathematical.	After PR2 - 12. Referring to 't' of leant B71
10	C - It's just making sure everything is very smooth and very rhythmical. (Demonstrates quaver pattern with speech) for the sopranos and we're all totally together.	After PR2 - 14. B89-142
11	C - Yes, the rhythm there was pretty much correct. I think it was just the word stress when we get to 'evensong' so even though we're bringing out the syncopation we don't want an emphasis on 'ven'	After PR2 - 15. Referring to B133.
12	C - Yeah, and we need much more dim. there. Erm, (to altos) if we can just get that bit a little bit more together there just before T?	After PR2 - 20. Referring to the quaver before T B173.

We can categories these references into three groups: phrase endings, entry, togetherness in general and shape.

PHRASE ENDINGS

These references are particularly concerned with achieving togetherness with phrase endings. This includes references 1 through to 6 and references 9.

1. Having focused on correcting the notes in instants PR1 - 1 to PR1 - 10, being the first time that this material is sung, the conductor runs the whole section, bar 9 to 32, with the intention of tidying phrase endings and focusing on dynamics. The table below shows each of the words that are phrase endings in the passage from bar 20 to 32:

Figure 15:

Phrase Ending Analysis Reference 1

PR1 - 10	Word	Singer 1	Singer 2	Singer 3	Conductor	Range
B20b2	Desolate	5.851428571	5.879365079	5.897868480	5.845442176	0.052426304
B24b3	Desolate	12.445895691	12.283356009	12.354331065	12.269931972	0.175963719
B28b2	Day	18.320544217	18.297324263	18.297687074	18.384217687	0.086893424
B33b1	Day	25.465941043	25.635215419	25.497687074	25.420408163	0.214807256
PR1 - 11						
B20b2	Desolate	18.045714285	18.100498866	18.154376417	17.994195011	0.160181406
B24b3	Desolate	24.636984126	24.532426303	24.619682539	24.606689342	0.104557823
B28b2	Day	30.257596371	30.347936507	30.321655328	30.347845804	0.090340136
B33b1	Day	36.062585034	37.922154195	37.983673469	35.616326530	1.921088435

In Sonic Visualiser the speed of the file has been slowed down and the end of the phrase accurately marked to give a time instant. The instants are marked when the vowel sound ceases for non consonant endings, such as 'day'. For the consonant endings the marking is made at the start of the final consonant. Often, when the file is slowed and the visual in Sonic Visualiser is zoomed, there is a gap where the sound ceases between the vowel end and the constant ending.

The reason for marking the start of the consonant as the end of the phrase is because the gap before the constant, and the length of the consonant itself, can vary in length and it is common practice for consonant ending to be placed at the start of the next beat; where the phrase ends in the written music.

The table above shows that the ensemble ends the first phrase of the PR1 - 10 more together than any of the others. The last phrase in PR1 - 10 is the least together in that instant. The two singers whose endings finish most closely are Singers 2 and 3 in the third phrase ending. The conductor is first to end the phrase in three out of the four phrase endings in PR1 - 10.

In the last phrase ending of PR1 - 11, bar 33 beat 1, the ensemble does not hold the final note for its full length. Singer 1 stops earliest, and immediately lightly coughs to clear her throat. The conductor moves straight from holding the last note into talking, which is then followed by Singers 2 and 3 ending. This instant is therefore an anomaly and not useful for comparing any improvement in phrase endings, as the ensemble do not properly sing to the end of the phrase.

In PR1 - 11, there are two sets of ending that finish remarkably closely, the conductor and Singer 1 in the first phrase ending in bar 20, and the conductor and Singer 2 in the third phrase ending, in bar 28.

The video footage for PR1 - 10 shows the conductor swaying lightly to the feel of one in a bar. There is very little eye contact with the only obvious look to the conductor being from Singer 2 at the end of the run. The conductor makes no gestures.

The video footage for PR1 - 11 again shows the conductor lightly nodding and swaying to the beat of one in a bar. Singers 2 and 3 look to the conductor during bar 24, which is where out second phase ending occurs. Perhaps the improvement in finishing the phrase together here is a result of this eye contact and the conductor leaning to the beat. The other obvious eye contact is again between the conductor and Singer 2 when we get to bar 28. Here, the data shows that Singers 2 and 3, and the conductor are more together than Singer 1.

Measuring overall improvement is a mixed bag here with first phrase ending being less together in the second run, the second phrase ending improving slightly and the third remaining much the same as before.

2. Reference 2 refers to the quaver at the start of bar 54, which is tied from the dotted minim in the previous bar. This reference is an instruction from the conductor which links to her cut off gesture. In the four preceding bars there is an accelerando, which she often beats, and she is highlighting that she wishes the ensemble to come off on the beat, rather than holding the note for an extra quaver.

3.4. It is worth considering references 3 and 4 together as they are a comment on the same word ending. The word 'Canopy' appears twice in this section ending at bar 75 beat 2 and bar 79 beat three. Reference 4 is a reminder to end the word 'canopy' together.

Figure 16:

Phrase Ending Analysis Reference 3.4

PR1 - 22	Word	Singer 1	Singer 2	Singer 3	Conductor	Range
B75b2	Canopy	40.023809523	40.170158730	40.222766439	40.089523809	0.198956916
B79b3	Canopy	47.148480725	46.882925170	47.032018140	47.158911564	0.275986394
B83b2	Lament	52.907324263	52.930975056	52.870385487	52.922176870	0.060589569
B88b1	Lament	60.213242630	60.208095238	60.253061224	60.081360544	0.171700680
PR1 - 26						
B79b3	Canopy	8.086712018	8.087573696	8.045714285	8.125215419	0.079501134
B83b2	Lament	14.225124716	14.160181405	14.216530612	14.233628117	0.073446712
B88b1	Lament	21.706848072	21.964263038	21.954467120	20.044217687	1.920045351
PR1 - 29						
B79b3	Canopy	7.797346938	7.732879818	7.738866213	7.775079365	0.064467120
B83b2	Lament	14.072585034	14.031950113	14.079433106	14.031678004	0.047755102
B88b1	Lament	21.571337868	21.784126984	21.773605442	21.393922902	0.390204082

Here, we can see a clear improvement in finishing the word canopy together between these excerpts. Although there is little clear eye contact among the ensemble during these passages, the improvement may be reinforced by eye contact between Singers 1 and 2, and the conductor at the same time as canopy in PR1 - 26. Interestingly, the group is even more together in PR1 - 29, here there is no discernible eye contact in the video, meaning the togetherness here is being achieve through repetition.

5. Reference 5 is the same score edit that is made in reference 2 when the thematic material repeats this time with a poco rall.

6. Due to the rushed start of the rehearsal and not having access to the room before for the setup of the microphones, these instants aren't captured on the individual microphones so only general comments from the video and listening to the camera microphone under speed is possible. From this we can see that there is very little eye contact given to the conductor, apart from the ensemble watching the upbeat, throughout the run. As before the conductor sways to the one in a bar feel and glances at the ensemble when not reading her score. It is hard to discern any improvement in the endings from the recording. The ensemble is not quite together for word endings in PR2 - 2 or the next run in PR2 - 5. When the track is slowed down, the consonant endings can be heard to arrive at different times in both instants. The togetherness for the non consonant endings is harder to discern but it can clearly be heard that some members of the ensemble are breathing in whilst some are still holding the note.

9. That last phrase ending from the comment about togetherness node, is referring to the 't' of the word 'leant' in bar 71. The Table below shows the analysis of this ending in PR2 - 12, preceding the comment, and PR2 - 13, afterwards:

Figure 17:

Phrase Ending Analysis Reference 9

PR2 - 12	Word	Singer 1	Singer 2	Singer 3	Singer4	Conductor	Range
B71b2	Leant	10.368888888	10.360725623	10.438072562	10.518639455	x	0.157913832
B71b2	Leant	10.924988662	10.945668934	10.976553287	10.988843537	x	0.063854875

Here we can see a tightening of the togetherness on the 't' as requested by the conductor. There is no data for the conductor as her microphone failed. From viewing the video footage we can also see a slight change in the physical communication here. During PR2 - 12 the conductor beats time for the whole instant, whereas, in PR2 - 13 she ceases beating in bar 69 and resume the swaying that she has been doing before. Perhaps the shift from beating to swaying reflects the security that she has with the ensembles togetherness here.

ENTRY

7. Reference 7 is highlighting an issue where the entry at the start of the section is not together. Here the issue is that the group is not full settled in their seats before the short run starts, with Singer 3 having returned from the piano. In the next instant, PR2 - 8, the group is still before the conductor starts, and there is clear eye contact for the pick up with is now together.

SHAPE

8. The conductor is signalling to the rest of the altos that there is a timing issue at their entry in bar 69. This is a difficult entry as the sopranos preceding bar has two dotted crochets, giving a feeling of two in the bar. Above the altos in this bar are also two dotted crochets so there is an element of cross rhythm here. The conductor's suggestion for the solution to the timing issue here is the feeling of being together whilst leaning into this entry.

Figure 18:

Shape Analysis Reference 8 Alto entry, bar 69

PR2 - 11	Word	Singer 2	Singer 3	Range
C	Corpse	9.363265306	9.252834467	0.110430839
O	Corpes	9.386167800	9.340408163	0.045759637
PR2 - 12	C length:	0.022902494	0.087573696	
C	Corpes	7.902040816	7.696235827	0.205804989
O	Corpes	8.000000000	7.828117913	0.171882087
	C length:	0.097959184	0.131882086	

The above table shows a marking both at the start of the 'C', for corpse, and the onset of 'O'. The data shows that the entry is more together in the first instant. It also shows that Singer 3 enters before Singer 1 with the consonant and the vowel. What does increase between the two instants is the length of the consonant before the vowel. This suggests that the leaning the altos are doing here is by bringing the C earlier and making it longer.

11. This togetherness reference is about getting the word stress of 'evensong' correct by ensuring that the 'ven' syllable is not too heavy. Viewing and listening to each of the singer's files in Sonic Visualiser, we can see that the comment here results in the 'e' at the start of 'evensong' being stronger in PR2-16 than PR2 -15.

TOGETHERNESS GENERAL

10. This reference is to PR2 - 14, which runs from bar 89 to 142 and is a non specific request for the ensemble to focus on being more together.

12. This reference is to PR2 - 20, and is directed to the alto's for the bars preceding letter T, bar 173. It is not clear which bars the conductor wishes to be more together here, but perhaps, as the altos have a different rhythm in bar 162, being similar thematic material to reference 8, it could be here. The table below shows the analysis of both the onset of the S of 'such' and the vowel. There is very little change in the togetherness and it is remarkably good in both instants.

Figure 19:

Togetherness Analysis Reference 12, bar 162

PR1 - 20	Word	Singer 2	Singer 3	Range
S	Such	7.000816326	6.963990929	0.036825397
U	Such	7.064671201	7.106598639	0.041927438
PR2 - 21				
S	Such	7.387755102	7.401360544	0.013605442
U	Such	7.506122448	7.537777777	0.031655329

6. Entrainment Analysis

REHEARSAL ONE

The chosen passage occurs four times in the first rehearsal: R1 - 36, R1 - 38, R1 - 39 and R1 - 57. For this rehearsal four lapel microphones were fed into Garage Band to capture each singer. In the tables these are listed P1 - 4, matching the order the ensemble was rehearsing in P1 being the soprano and P4 the conductor.
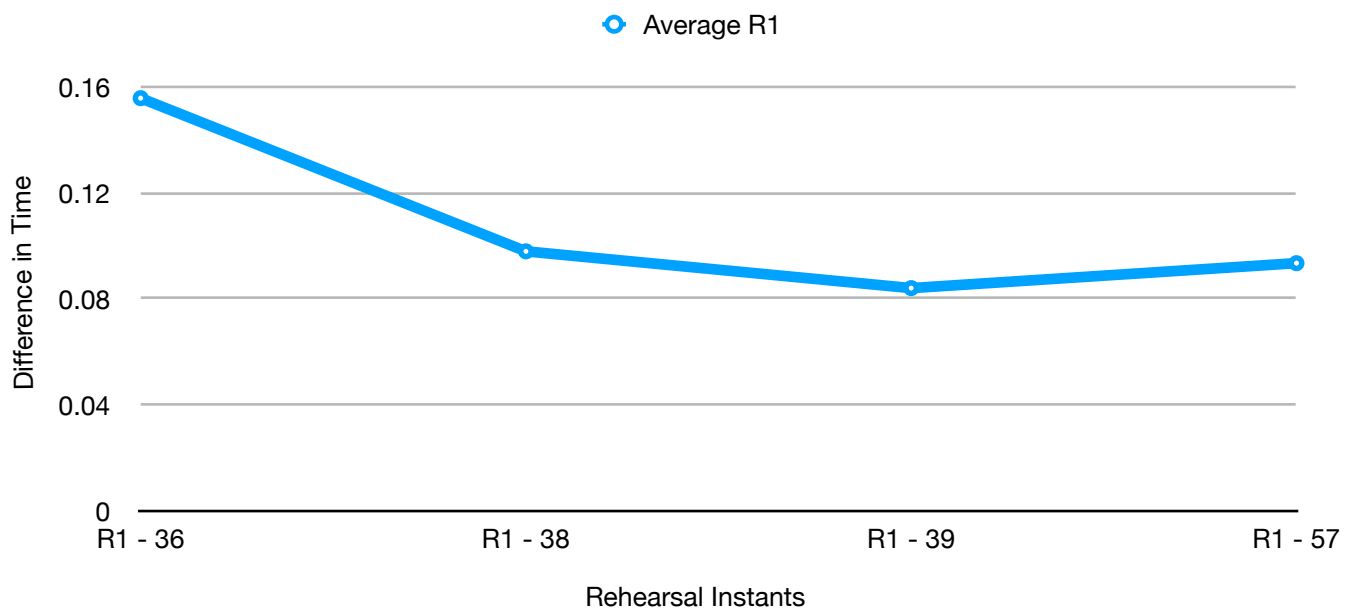
Figure 20:

Figure 20 shows the average difference in time instants, from the range column, taken from the table for each time the passage is sung in the first rehearsal. Although there is limited data, with the passage being rehearsed only four times, there is a clear pattern of the group becoming more closely entrained throughout the rehearsal; with the most marked improvement being when the passage is first repeated. It is important to remember here that the ensemble was still familiarising itself with the material in this rehearsal.
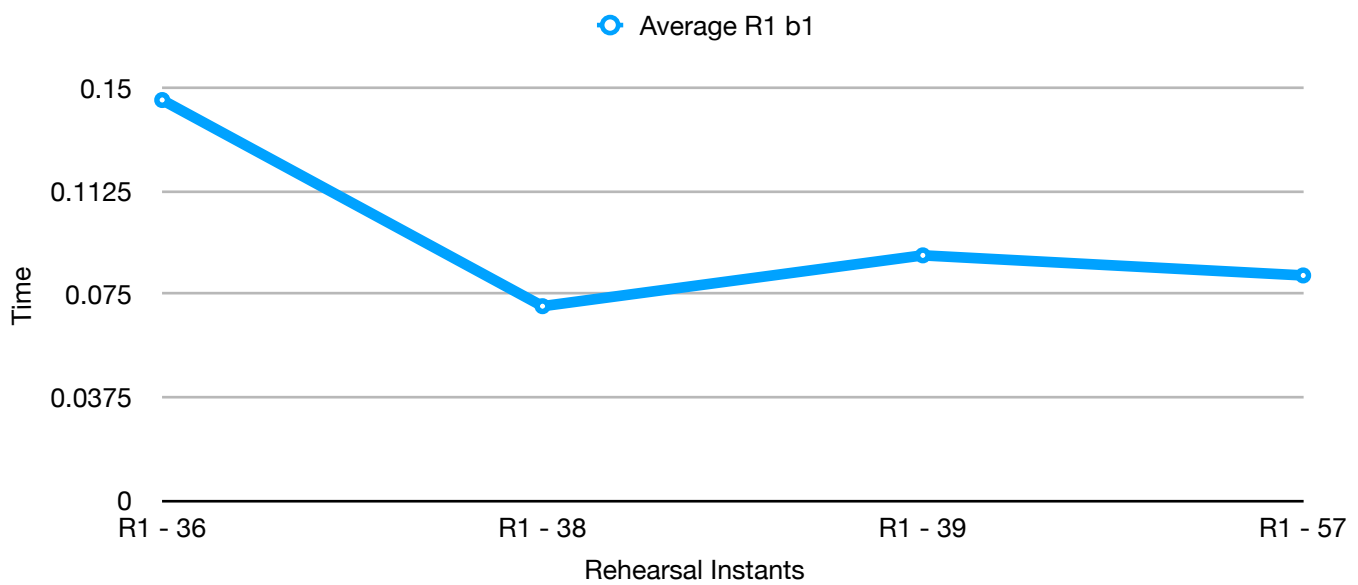
The reason for analysing the first beat of each bar is due to the hypothesis that being the strongest best of the bar, and the absence of the harp reinforcing the quaver beat in the accompaniment in the first rehearsal, there is an expectation that the first beat of each bar would be more together. The expectation also goes further in bars that have more complicated rhythms. This hypothesis has been arrived at by thinking about the rehearsal and learning process and experience of rehearsals where togetherness happens more accurately on stronger beats of the bar, this is particularly true when working with children.

Figure 21 shows the average range for only beat one for each of the instants in rehearsal one. Here we can see a similar trend of the entrainment tightening through the successive instants. However, the third instant, R1 - 39, goes against the previous trend by a small degree. In these four instants the average range for the first beat of the bar is smaller than the overall average by a significant degree, apart from the third instant which bucks this trend.

A glance at the coloured sections of entrainment tables for the first instant of rehearsal one (Appendix 3.A.7) clearly shows a pattern of P2 being the first to onset, and P1 being consistently last; the darker shaded cells are those that occur first and the lighter last. The lateness of the soprano here could be explained due to her singer her part on her own; the only person at this rehearsal singing this passage in the upper octave; her singing at this point in the rehearsal

sounds less confident. P2 is almost always the first onset in R1 - 36. P2 persists as regularly being the first onset throughout the first rehearsal, although it becomes more shared throughout. This could be viewed as a sign of leadership in the group or of the singer rushing. Where the beat actually occurs has not been defined in this table. One could posit that the beat occurs on the average between the onsets of all the singers. However, this would mean that no one is singing on the beat. There could also be the suggestion that the conductor, who is responsible for the tempo setting and leadership of the ensemble, would be singing on the beat. However, the role being performed here by the conductor is the dual role of conductor and singer. As she is not beating continually throughout the rehearsal, it would be fair to conclude that the conductor is acting more as a singer, particular in the centre of passages where beating is regularly omitted. Therefore, although the conductor sets the tempo, the four singers are continually negotiating where the beat is between themselves.

It is worthing noting that there is a slight data gap in instant R1 - 39 for P1. The first three time instants are missing here due to the soprano entering late. The fourth instant is marked here but is quite late. This outlier has little effect on the average that has been derived.

REHEARSAL TWO

The chosen passage occurs in rehearsal two for instants: R2 - 14, R2 - 15, R2 - 16, R2 - 17, R2 -28, R2 - 29, R2 - 31, R2 - 32 and R2 - 33. For this rehearsal the lapel microphones only captured the two alto and two soprano singers. The lapel microphone of the conductor failed and the harp did not have a microphone. This means that there is a slight weakness in the data that has been collected and analysed here, as it does not include the conductor. Although the data will inevitably be slightly skewed, the capturing of the pairs of singers who are patterning on lines and sat next to each other allows for some more detailed analysis of entrainment in this passage. In rehearsal two, the numbering of the microphones, P1-4, are different to the first rehearsal: P1 is the Soprano who was not at the first rehearsal, P4 is the soprano from rehearsal (formerly P1), the altos, previously P2 and P3 are in reverse here, P3 and P2. The inconsistency in the numbering here comes from the lines of the microphones entering into Garageband and the subsequent files produced and numbered from this.
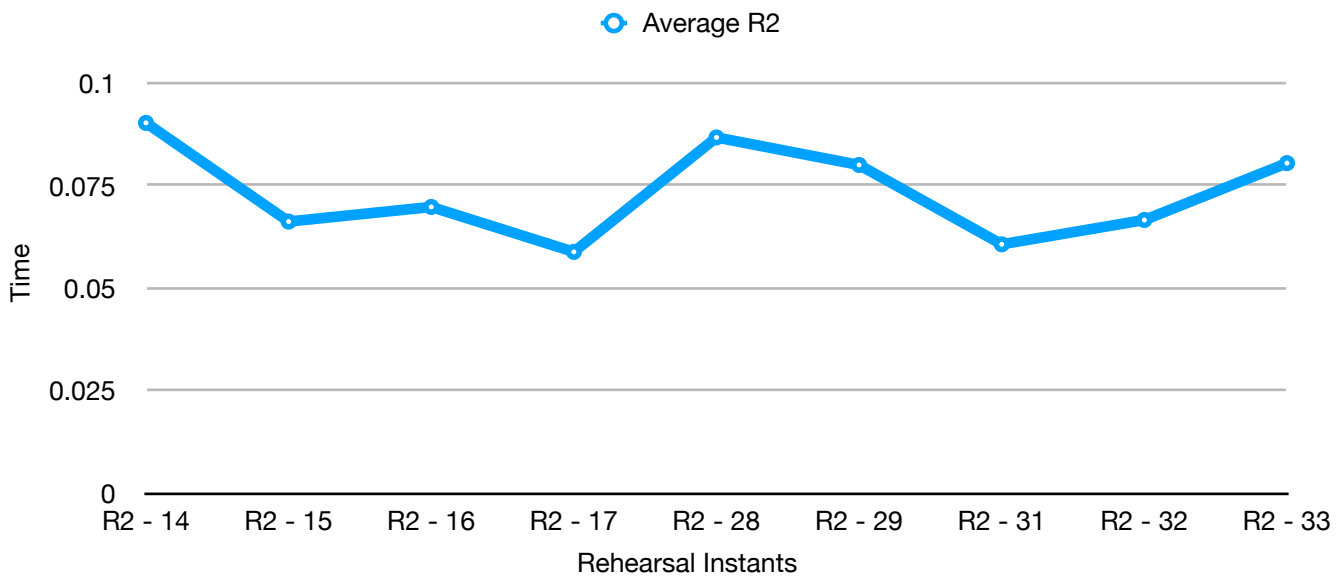
Figure 22 shows the average difference in time instants, from the range column, taken from the table for each time the passage is sung in the second rehearsal. Although the initial four instants follow the trend from the first rehearsal of the entrainment generally tightening, this is lost in R2 - 28 and the last three instants (R2 - 31- 33) show the reverse pattern.
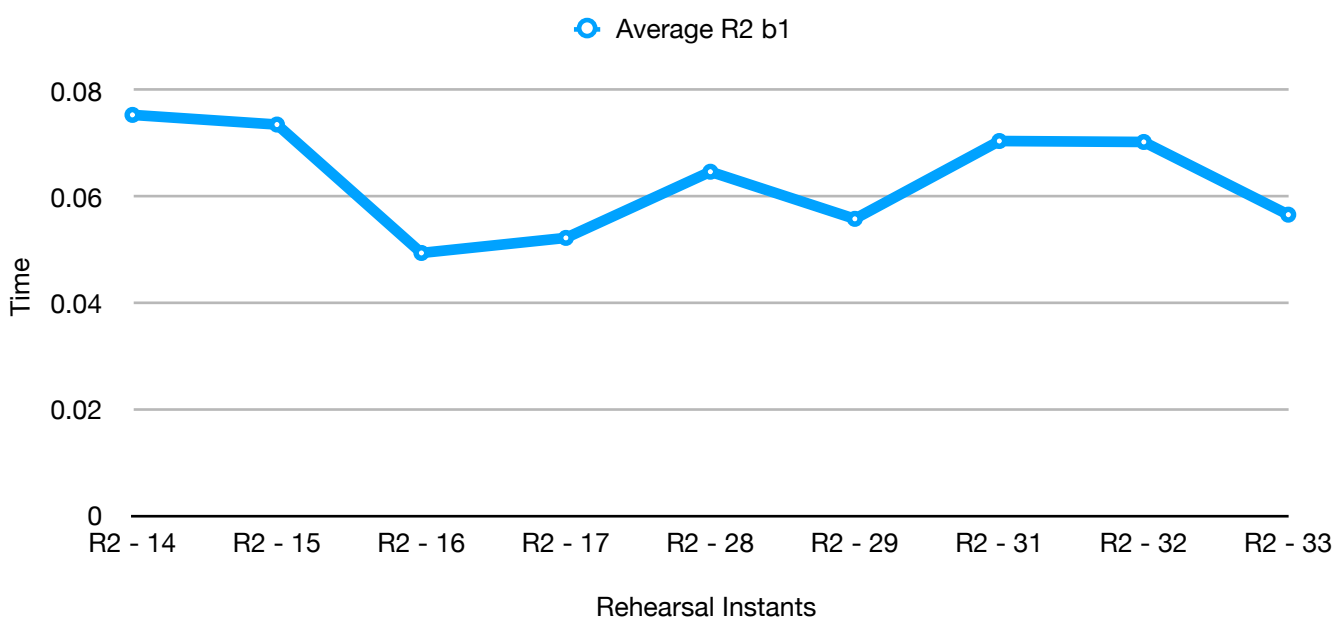
Figure 23:

Figure 23 shows the average difference in instants again, but only for those occurring on the first beat of the bar. We can see that the chart follows a similar trend to the overall average with most of the averages of the first beat being lower than the overall average. This trend is only broken by instants R2 - 15, R2 - 31 and R2 - 32.

Taking a look through the tables and the colouring of the order of the onsets, it is clear that throughout the second rehearsal that there is a pattern of P1 and P2 coming earlier and P3 most often last. The prevalence of P1 and P2 being the first onset, marked in the darker green, becomes less prevalent throughout the rehearsal with the share becoming more even between P1, P2 and P4. Although P3 is consistently later to onset, marked in the lighter green, this trend is broken occasionally by P4 being behind by more. It is worth noting that this is an overview of the data and that this level of analysis does not investigate mathematically to the degree this lateness is, it is purely a pattern.

Rather than generating data to investigate more closely into the order of the onsets and the mathematical degree, the right hand side of the table seeks to examine the comparisons between the different pairings of singers. The table shows the difference in the time instants, first of all between the sopranos (P1 and P4), then the altos (P2 and P3) and finally between the other combinations of pairs of singers. This data enables us to compare the average difference in the time between onsets of the respective pairs and therefore the opportunity to investigate whether those singing the same part, or sat next to each other, are singing together more closely.

It is clear from the tables that the pairs of singers average difference in time of the onset instants is significantly lower than the overall average. This is what one would expect but also eradicates the possibility that a certain singer, or pair of singers, are skewing the overall averages, meaning that this analysis adds an extra level of robustness to the overall data. To test whether the pairings of singers by part or proximity are entraining more closely, the average data for each pairing from each table has been extracted into the table below.

Figure 24:

Average Entrainment R2 Between Singers-1

Instant	Sop	Alto	1 - 2	1 - 3	4 - 2	4 - 3
R2 - 14	0.053039966	0.052632447	0.047594311	0.048808107	0.060960627	0.055127551
R2 - 15	0.045009920	0.041691411	0.032768892	0.029509637	0.048637656	0.036639739
R2 - 16	0.050634921	0.019221939	0.046020408	0.037929422	0.043776927	0.039253118
R2 - 17	0.030415249	0.036346372	0.022916667	0.036085601	0.028700397	0.035066610
R2 - 28	0.051410147	0.042844388	0.060171485	0.039621599	0.054631519	0.022718254
R2 - 29	0.039600340	0.050279195	0.030007086	0.051366213	0.045792234	0.047395125
R2 - 31	0.036799887	0.030150520	0.039805839	0.042345815	0.032110261	0.038862255
R2 - 32	0.031717687	0.030392574	0.045138889	0.040009921	0.039679705	0.038448129
R2 - 33	0.044165249	0.041588719	0.043140590	0.049581916	0.039491213	0.049631519
Total	33	26	30	34	33	33

The averages in difference in time instant for each rehearsal instant of rehearsal two is shown in figure 24. This has then been colour coded, from green to red, to show which pairing is more closely entraining. The total column at the bottom of the table is calculated by numbering each of the averages from 1 to 6, from the closest entraining pair to the furthest, in each of the rehearsal instants. These numbers are then totalled up in each column creating a numerical representation of the order shown through the coloured heat map. We can immediately see from the totals that the pairing that is most consistently entraining closely together is the altos, with a total score of 26. This would seemingly back up the hypothesis that parts entrain more closely. However, this is then contradicted by the score of 33 that the sopranos receive. There are some other factors to consider here, mainly that this is the first rehearsal for Soprano P1 and that through this section the conductor is also singing the alto line, and the data for her is missing. It would be interesting to repeat this analysis with more data to see whether the trend of the alto part entraining more closely. Although the evidence of the parts entraining more closely here is contradicted by the soprano results, it is clear that the altos are and their score is significantly lower than any other parings.

Interestingly, the only other combination that is statistically lower than the rest is between P1 and P2. These singers are on different parts, although singing in octaves here, and opposite ends of the semicircle that the ensemble is arranged in. The score is under the remaining totals by about half as much as the altos are. This would suggest that there is some connection between these singers, but less than between the altos.

The results here would suggest that the analysis of whether parts entrain more closely merits more investigation. For a further study, it would be useful to consider a more robust mathematical procedure to give more precise insight into the degree of difference in time instants between pairings. Any future study would also need to gather more information on the familiarly that the members of the ensemble have, as this is likely to be a significant factor. It would also be interesting to test this hypothesis in larger groups of singers and where the lines in the musical material interacts with each other, rather than being in unison.

It is worth noting that there is one data gap in in rehearsal two, R2 - 14, where the alto does not sing instants 10 through 14 as she is coughing. The average here is not substantially effected by these instants being missed.

7. Further Entrainment Data Analysis

Figures 22 and 23 and their corresponding tables, show that there is some consistency in the first beat of the bar being more together than the average of all the instants. This begins to provide evidence for the hypothesis that the first beat of the bar will be more together as it is the strongest beat.

Figure 25:

Entrainment Average

Instant	Average	b1 Average	Difference
R1 - 36	0.155620886	0.14581139857143	0.00980948742857
R1 - 38	0.097927245	0.070654357	0.027272888
R1 - 39	0.084073129	0.089186913	-0.005113784
R1 - 57	0.093467971	0.081862650	0.011605321
R2 - 14	0.090350057	0.075416262	0.014933795
R2 - 15	0.066245365	0.07359484914285 7	-0.0073494841428 57
R2 - 16	0.069811508	0.0493922901	0.0204192179
R2 - 17	0.058842120	0.052231940	0.006610180
R2 - 28	0.086797052	0.064703596	0.022093456
R2 - 29	0.080070862	0.055821186	0.024249676
R2 - 31	0.060686234	0.07049305771428 5	-0.0098068237142 85
R2 - 32	0.066625567	0.070314221	-0.003688654
R2 - 33	0.080518708	0.056611597	0.023907111
Total	1.091036704	0.95609431752857 2	0.13494238647142 8
Average	0.08392590030769 23	0.07354571673296 71	0.01038018357472 52

Figure 25 show the averages of the difference in time instants from each time the passage is rehearsed. It then shows the average of only the first beat of the bar and then the difference between those averages. The difference in averages ranges from -0.00981s to 0.02727s. It is clear from the averages at the bottom of the table, and only four (31%) of the results being negative,

that there is a trend of the first beat being more together. However, this is not always the case, although, where the first beat is less together, the margin by which it differs is small.

Figure 26:

Note	PR1 - 36	PR1 - 38	PR1 - 39	PR1 - 57	PR2 - 14	PR2 - 15	PR2 - 16	PR2 - 17	PR2 - 28	PR2 - 29	PR2 - 31	PR2 - 32	PR2 - 33	R1	R2	Both
1		X		X	X		X		X	X				2	4	6
2												X		0	1	1
3														0	0	0
4				X					X	X	X		X	1	4	5
5						X								0	1	1
6		X				X								1	1	2
7					X			X						0	2	2
8	X	X						X		X				2	2	4
9										X			X	0	2	2
10					X									0	1	1
11							X							0	1	1
12														0	0	0
13			X	X				X					X	2	2	4
14	X		X		X	X								2	2	4
15	X	X												2	0	2
16	X		X									X		2	1	3

Figure 26 shows all the instants that are marked yellow in the entrainment tables. These are the instants where the difference in the time instant is more than the average plus half of the average. This analysis allows us to examine whether there are any patterns to the notes which are occurring with the widest ranges of time. The reason for calculating this on three quarters of the average, rather than calculating a time in seconds, is that each of the instants has a slightly different tempo.

There are five instants that exhibit a high proportion through this analysis.

1. Note 1 has the highest number across the two rehearsals. This is the first note of the passage and there are a mix of ways in which the instants begin. The passage is initiated by the conductor beating time, the conductor singing or speaking the quaver pulse of the harp part whilst conducting and the Harp accompanies the singers.

2. Note 4 has five instants across the two rehearsals where the difference in the individual time instants are more than the average plus half of the average. This note is the second half of bar 131, letter O, where the singers move down by a semitone on the same vowel sound. First of all, this data should lead us to question how robust the marking of this onset is. There are only two notes where the vowel is continued in the passage, the other being 11. With there being only one instant over both rehearsals for note 11 in figure 33 it would be unlikely that the issue has been with making the instants of continued vowels. It is worth considering here that note 11 is part of a two quaver movement and a tone apart. Therefore the time between the two onsets is much quicker. It is also worth questioning how obvious the accuracy is in this instant. With the ensemble singing with a strong and quite wide vibrato, when the piece is played at tempo it is hard to distinguish that it is not as together as surrounding notes.

3. Note 8 has four instants across the two rehearsals. This note is on the fifth quaver beat of bar 133 and is the most difficult rhythmic timing in the passage; creating a hemiola. The following comments from the conductor about rhythm are said after this passage and demonstrated with the material that precedes it:

C: Ok, we need to sort out these rhythms, so we need to be subduing in our heads. So der der der, der derer (quaver pulse spoken) *Sings atop part for bar 112 'Among' so that those notes come in at exactly the right place.

The pick ups, on the fifth beat after letter N where the conductor is demonstrating, is the same rhythm as note 8. The comment from the conductor here is general, so including the other entries

303

on the fifth beat of the bar but demonstrated with specific reference to bar 112. This notes shows on the table about for the first two times the passage is covered in rehearsal and two further in rehearsal two. It suggests an improvement in rehearsals one, where the problem is lessened. The conductor comments after the PR1 - 38:

C: Yeah, and I think when we get to 'evensong' even though we've got the syncopated rhythm there we don't want to land own our bottom F's… too dramatically.

As the conductor does again raise either point about the rhythmic issues it would suggest that she perceives that there has been some improvement here and on the previous entries on the fifth beat in PR1- 38. However, the comment here is not an affirmation of the correcting of the entry but rather a factual statement about the engraved syncopation and a shaping suggestion for this part of the phrase. Moving on to phrase shaping rather than revisiting rhythmic issues would suggest that the conductor believed there had been enough improvement here. The difference in the onsets for note 8 in PR1 - 36 is 0.255897960 which then tightens in PR1 - 38 to 0.16000000.

4 and 5. Notes 13 and 14 also show four times in figure 33. They only occur together in PR1 -39, the rest not being consecutive. This is the end of the sung part of this section and although there is no tempo marking engraved in the score the end of the phrase is often pulled to place note 16 at the start of bar 157, shaping the end of the phrase. This slight change in tempo is never discussed by the ensemble but rather is convention automatically followed by many groups. The fact that most of the instants, where these notes appear, on the table are in the earlier stages of the rehearsal process would suggest that the group is negotiating, through rehearsing, how the direction of the end of the phrase will be. Although some sections, particularly the start of sections and entries are gestured by the conductor, she does not beat this phrase ending. Instead the group continues to have regular eye contact and individuals move slightly to the two in bar tactus.

Appendix 3 - Polaris Analysis

Appendix A - Analysis Files

1. Tempo Whole Group

2. Rehearsal 1 - Whole Group Sections

3. Rehearsal 1 - Individual Mic Recordings

4. Rehearsal 2 - Whole Group Sections

5. Rehearsal 2 - Individual Mic Recordings

7. Entrainment Analysis

8. Phrase Ending Analysis

9. Togetherness Analysis

Appendix B - Documents A

1. Interview Polaris

2. Interview Questions

3. Annotated Score

4. Program Notes

5. Transcript

Appendix C - Videos and Sound

1. Polaris Tracks

2. Polaris Videos 1

3. Polaris Videos 2

Appendix 4 - General

1. Two Page Summary of Model to share with musicians.

2. Ethical Approval Certificate

1. Two Page Summary of research.

A New Model of Interpretation and Communication for Ensemble Music-Making

Introduction

This model aims to represent how musicians communicate and present an interpretation of a musical score in an ensemble setting. The left hand side maps the roles of those involved in music-making within the contexts that the music occurs. The right hand side shows the process of creating and realising a score where an ensemble develops a narrowing interpretation of a musical work within a set of governing principles.

The Model:
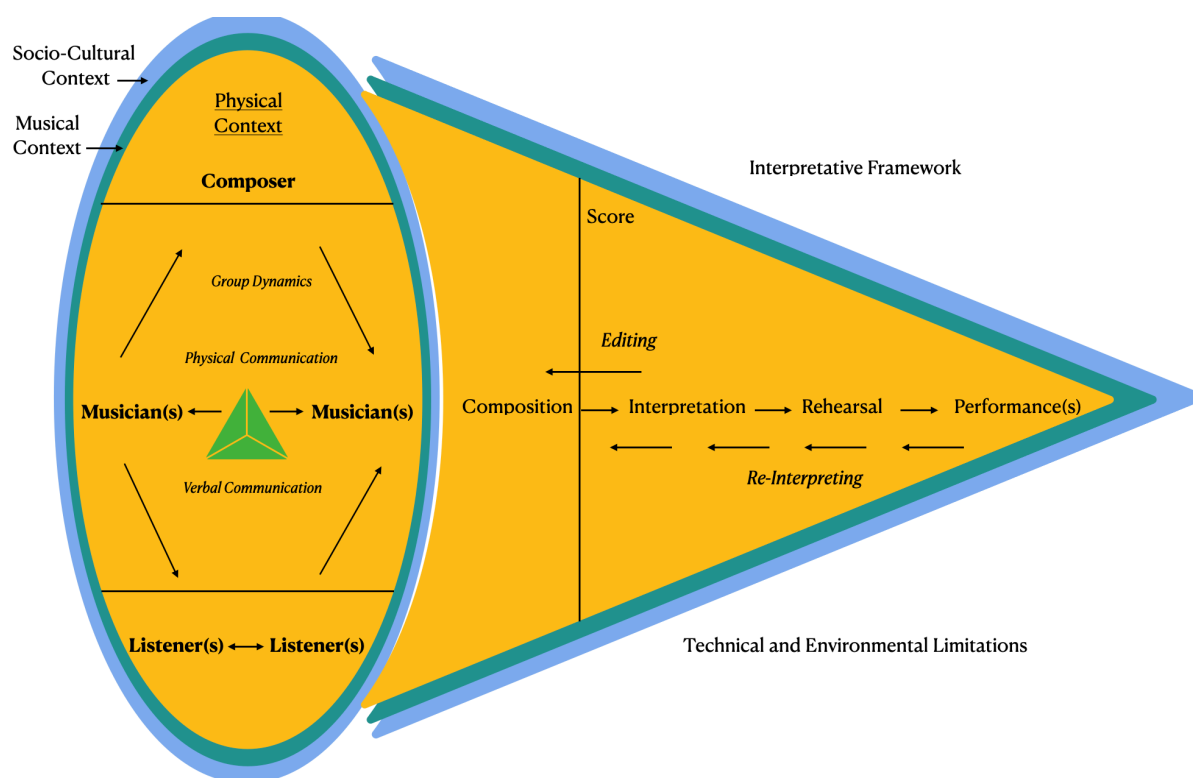
Context

Blue Oval: *Socio-Cultural Context* - Knowledge. This is the knowledge that come from understanding the socio-cultural context of the work and of the time of performance.

Green Oval: *Musical Context* - Creativity. This context recognises the creative nature of both playing and listening to music.

Yellow Oval: *Physical Context* - Environment. The physical context includes not only the place where the music-making occurs (concert hall or rehearsal room) but also where the sound emits to outside these spaces.

Roles

Musician - This role are those involved in the music-making through the manipulation of the sound that is created.

Listener - This is an active role where creativity is required to hear the music as music rather than sound.

Composer - The composer creates the musical score which is the first stage in the creative process

These roles are not mutually exclusive. A performing composer would be undertaking all three roles, a performer would be a musician and listener, and an audience member may be just a listener.

Communication

Research found that there were three main types of communication: *Verbal, Physical and Group Dynamics*.

Verbal Communication primarily creates the structure for repeating music throughout the rehearsal process but also to express some interpretative ideas.

Physical Communication is present in all music-making either as a byproduct of the movement required to create the musical sound or as an extension of this or a signal through gesture.

Group Dynamics govern the communication that is present in terms of who is leading or following both when music-making and problem solving.

Governing principles of interpretation

Interpretative Framework - is our philosophical approach to realisation of scores centred on our beliefs about the appropriateness of disobeying or amending notation.

Environmental Limitations - is how the body, instrument and environment impact the musical sound we make.

Technical Limitations - consider our proficiency with instruments, or voice, which may limit the interpretation that we are able to present.

Process Interpretation

The research demonstrated that the process of interpretation was enabled by ensemble communication and resulted in a narrowing of interpretation decisions throughout rehearsal and performance. Repetition was shown to be the most expedient tool in changing the interpretation which was facilitated by verbal and physical communication. The process of interpretation can move up and down this process of narrowing by changing performance decisions and choosing to edit the score.

Implications for Musicians to Consider

Should we challenge the traditional barriers of freer interpretation of scores?
Should we play more and talk less in rehearsals to streamline the interpretation process?
Can we plan better for performances by considering the environment we will be in?

2. Ethical Review Certificate.

US

UNIVERSITY OF SUSSEX

Social Sciences & Arts C-REC
c-recss@admin.susx.ac.uk

Certificate of Approval	
Reference Number	ER/JP440/4
Title Of Project	Musical Communication and Interpretation in Ensemble Performance (COPY) (COPY) (COPY)
Principal Investigator (PI):	Joe Paxton
Student	Joe Paxton
Collaborators	
Duration Of Approval	1 year
Expected Start Date	01-Sep-2018
Date Of Approval	24-Jul-2018
Approval Expiry Date	31-Aug-2019
Approved By	Ana Pereira
Name of Authorised Signatory	Liz McDonnell
Date	24-Jul-2018

*NB. If the actual project start date is delayed beyond 12 months of the expected start date, this Certificate of Approval will lapse and the project will need to be reviewed again to take account of changed circumstances such as legislation, sponsor requirements and University procedures.

Please note and follow the requirements for approved submissions:

Amendments to protocol
  * Any changes or amendments to approved protocols must be submitted to the C-REC for authorisation prior to implementation.
Feedback regarding the status and conduct of approved projects
  * Any incidents with ethical implications that occur during the implementation of the project must be reported immediately to the Chair of the C-REC.
Feedback regarding any adverse(1) and unexpected events(2)
  * Any adverse (undesirable and unintended) and unexpected events that occur during the implementation of the project must be reported to the Chair of the Social Sciences and Arts C-REC. In the event of a serious adverse event, research must be stopped immediately and the Chair alerted within 24 hours of the occurrence.

Monitoring of Approved studies
The University may undertake periodic monitoring of approved studies. Researchers will be requested to report on the outcomes of research activity in relation to approvals that were granted (full applications and amendments).

Research Standards
Failure to conduct University research in alignment with the Code of Practice for Research may be investigated under the Procedure for the Investigation of Allegations of Misconduct in Research or other appropriate internal mechanisms (3). Any queries can be addressed to the Research Governance Office: rgoffice@sussex.ac.uk

(1) An "adverse event" is one that occurs during the course of a research protocol that either causes physical or psychological harm, or increases the risk of physical or psychological harm, or results in a loss of privacy and/or confidentiality to research participant or others.

(2) An "unexpected event" is an occurrence or situation during the course of a research project that was a) harmful to a participant taking part in the research, or b) increased the probability of harm to participants taking part in the research.

(3) http://www.sussex.ac.uk/staff/research/rqi/policy/research-policy