Embodied Knowledge:
The Case of Ensemble Performance

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Abstract

Ensemble performance requires interaction to a degree rarely found outside of music. Current research on ensembles has increasingly focused on the communicative properties of performers' physical gestures. However, this approach presupposes that communication underlies most ensemble interaction, disregarding the wealth of non-communicative interaction which may occur. In examining this topic, I have formulated three questions:

- How do musicians interact and share information with each other while performing?
- To what extent does the musical content being performed affect the ways it has to be physically created by musicians?
- How does the physical relationship between the performer and their instrument relate to communicative and interactive processes of ensemble performance?

I argue that musicians' physical motions could not only be influenced by musical content but also be required for effective performance. These motions may be interpreted as meaningful by observers and co-performers. My research applies rehearsal observation and reflective practice within the framework of action research, allowing me to collaborate with Birmingham Conservatoire's Boult Quartet (a postgraduate string quartet) and The Supergroup (an improvising ensemble of doctoral students) in examining the complexities of ensemble performance through an understanding of its phenomenologies, contributing to current cross-disciplinary research on embodied knowledge.

For Russ

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Musical Examples

All musical examples taken from S. Barber (1939) *String Quartet No. 1, Op. 11*. New York: G. Schirmer, Inc.

Video Examples

The attached DVD contains all video examples referred to within this text. These videos fall into two categories. The first draws from rehearsal footage of the Boult Quartet, taken from September 20–23, 2010 at Birmingham Conservatoire. I observed these rehearsals after they had taken place, and was not present in the room other than to turn the camcorder on and off. The members of the Boult Quartet have elected to remain anonymous within this thesis. The second category of video is from a live performance of The Supergroup, an ensemble comprising:

- Seán Clancy, alto saxophone and melodica
- Roberto Alonso Trillo, violin
- Sebastiano Dessanay, double bass
- Tychonas Michailidis, live electronics, and
- Murphy McCaleb, bass trombone.

The concert took place on 17 January, 2011, in Birmingham Conservatoire's Recital Hall. The Supergroup performed an entirely-improvised piece entitled *Waltz of the Tearing Tears*. I performed in the ensemble, reviewing the footage after the concert finished.

Video examples from these two sources are used intermittently within this text. Therefore, the videos on the attached DVD are organised in terms of the thesis chapters with which they correspond. Quotations of verbal comments made by musicians while being filmed which do not appear on the DVD are referenced in terms of the rehearsal they took place within, with times in accordance with the raw video footage. The contents of the DVD are as follows:

1. Chapter Two
    1. Boult Quartet. Discussion of Samuel Barber, *String Quartet No. 1, Op. 11.* Movement III, bars 41–46.
    2. Boult Quartet. First rehearsal of Samuel Barber, *String Quartet No. 1, Op. 11.* Movement II, bars 35–40.

Preface

Chamber music performance can be magic. Those playing share a connectedness and intimacy which surpasses many other social interactions. Individual musicians' interpretations build upon each other to create an aesthetic whole which may be much greater than the sum of its parts. Unexpectedness and spontaneity can spark the most exciting performances, pushing the ensemble members to the boundaries of their technical and creative abilities. It is difficult for any of the musicians to say where the performance will go: the unforeseen creative result may often be the most fulfilling one.

To play chamber music, especially with those skilled in its art, is a joy. I have been lucky enough to be able to spend the majority of my musical career involved in some form of ensemble performance. As a bass trombonist, I have been called upon to play in everything from Renaissance ensembles and brass quintets to funk bands and liturgical groups. The more opportunities I have to perform with such ensembles, the more I realise that it is not only the music which enchants me. Participation in small ensemble performance is exciting because of the level of interaction it requires. While pursuing a postgraduate degree in chamber music at the University of Michigan, I became increasingly aware of the intricacies inherent in ensemble interaction. My love for small ensemble performance and my efforts to become the best chamber musician I could be thus provided the impetus behind my current doctoral programme of study.

The initial intent for this doctoral programme of study was to classify both the gestures being used within ensemble performance and the prominent social roles which may be exhibited. I attempted to make musical practice fit within existing theories of social interaction, interpreting it as if it were purely a psychological or sociological phenomenon. As my work progressed, discrepancies

arose between what I was reading and my experiences as a musician. Superficially, it appeared that the application of psychological and sociological theories was a fruitful approach to explaining ensemble interaction. Further critique, however, increasingly called attention to fundamental questions which remained unanswered. Musical experience itself became the best tool for practical research. Applied research from other fields, I realised, was a means to an end, not an end in itself. This allowed me to subsequently focus my attention on identifying the processes inherent within ensemble performance. Out of my musical practice, new theoretical propositions could be formed, resulting in the thesis as it stands today.

As will be discussed recurrently throughout this text, the impact of practical musical knowledge should not be underestimated within musicological performance studies. The application of this knowledge to existing theories of performance provides an invaluable critical tool by which these theories may be tested. In a similar fashion, academic research into performance may inform musicians' understanding of how ensembles function, encouraging the development of new pedagogical methods. It is from this perspective that this thesis is written: not only to expand upon the propositional knowledge generated from academic research into musical performance, but to provide theoretical underpinnings to the procedural knowledge used every day by performers. By extension, the conclusions arrived at through the application of non-musical academic fields may yield a positive impact when applied back upon the concerns of those fields.

I have only been able to write this thesis through the continued support and assistance from a large network of colleagues, friends and family. Whilst I cannot name them all without adding another chapter to this thesis, I would like to recognise a few of those people so important to me. Rest assured, absence of a written name does not mean they are absent from my thoughts.

My advisory panel has been exemplary throughout my degree. In particular, Prof. Peter Johnson has been instrumental in encouraging me to turn a critical and imaginative eye to life: my practice, my research and my beliefs. My time with him has shown me that researching music does not take away its magic—increased understanding only emphasises its status as an object of fascination and wonder. Conversations with Prof. John Sparrow instigated a dramatic shift in perspective toward the beginning of my degree, reminding me of the wealth of knowledge which can be found within practice itself. Ensuring that I do not abuse 'the Queen's English', Dr. Carrie Churnside has never turned down a request to proofread my work, even when she is on sabbatical. In addition, Dr. Liz Garnett has provided valuable critique in my preparation of multiple conference papers.

I would not have been able to conduct my research without being at an institution which was willing to let me observe and participate in as many musical ensembles as I could physically attend. The faculty and students at Birmingham Conservatoire have enthusiastically cooperated with me throughout my degree, creating a warm, welcoming environment. After being forewarned that my doctorate would be one of the loneliest times of my life, I have been pleasantly surprised to find that the opposite is true. I would like to thank two particular ensembles for their extensive collaboration. First, the Boult Quartet, the senior student quartet at Birmingham Conservatoire during my first two years, has graciously allowed themselves to be video-recorded by me on multiple occasions. The arguments presented throughout this thesis would not be possible if not for the excerpts from their rehearsals which permeate the text. Second, my doctoral colleagues in The Supergroup—Seán Clancy, Roberto Alonso Trillo, Sebastiano Dessanay and Tychonas Michailidis—have provided critique and inspiration to the topics discussed throughout this thesis. Along with Joanna Szalewska-Pineau and Carolina Noguera-Palau, they have been an integral part of my doctoral experience, and I wish them all the best in the completion of their degrees and their assuredly successful careers. Finally, I cannot help but thank Liz Reeve, the administrative lynchpin that holds the Conservatoire's research department together.

With respect to my life inside and outside of my doctorate, I would like to thank my parents, Barbara and David McCaleb. Even after I decided to move halfway around the world, they continually support me in every endeavour. Clare Bailey has been by my side day in and day out, even while she has been fighting her own doctoral battle. I would not be on the career path I am on now if it were not for Dr. Karen Fournier and Dr. James Bicigo. They recognised my interests and aptitude before even I had thought about pursuing a doctorate, and I am grateful for their constant encouragement and insight. Last (but certainly not least), I would like to thank Dr. Laura Walters for not only her proofreading skills, but her immeasurable advice on successfully conducting a doctorate while living four thousand miles from home.

JMM

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Chapter One:

A Question of Ensemble

Introduction

As the rehearsal begins, the members of my low brass trio go about their individual business of preparation. I blow air and a few random notes through my bass trombone, the French horn player oils a particularly aggravating valve, and the tenor trombonist pulls her case alongside her chair so as to have tools such as metronomes and tuners at hand. Upon deciding which piece we will work on (a transcription of a trio sonata by Arcangelo Corelli), we further determine the movement to play. We agree to run through it first, to give us an idea of the overall state of readiness of the movement for performance. After tuning, we settle into our performing positions: the horn player and I put our instruments to our lips and make eye contact while the tenor trombonist sits up and keeps an eye on her part. With a quiet, steady breath, we begin to play. My part, the lowest, creates a moving line against the more sedate horn. I bob slightly with the larger pulse and try to give a sense of line that matches the longer phrases in the other part. The trombonist joins us, her preparatory breath feeling more like a continuation of previous events than the first notes of her part. Against the lingering notes above me, I constantly try to gauge my tuning, matching up every interval so that none draw attention to themselves. Gradually, the upper two musicians expand their tone qualities, their original *piano* blossoming into a weightier sound. Just as they try to stay consistent harmonically, I focus on solid time-keeping, as my moving line underpins all of my fellow musicians' parts. Dissonances become a joy, and we begin to make the most of their resolutions. I can tell that the hornist and the trombonist, whose parts balance between unison, dissonance, and resolution, are constantly adjusting their intonation to the sounds around them. Occasionally, we

land on a chord that resonates not only our instruments, but our bodies as well—one of the great pleasures of acoustic performance. We near the end of the short movement, feeling the momentum of the piece decrease. Easing into the last few chords, my physical bobbing increases slightly as my quavers lengthen. Arriving at the final chord, we relax and feel the movement dissipate into the space around us. With an almost imperceptible nod, we end our last notes, keeping our instruments up for a moment until it feels as if the piece has properly finished.

This narrative, drawn from a typical rehearsal, highlights processes that continually take place through the act of ensemble performance. In this context, musical performance does not necessitate a non-performing audience, simply the communal act of producing music. The example chosen to start this thesis might have come from any number of rehearsals or performances by any number of ensembles and illustrates the types of thoughts, concerns and experiences of an ensemble musician in the Western classical tradition. As a bass trombonist who has focused on chamber music performance, my understanding of what it means to create music with other people is filled with such memories and experiences. Playing music together is not a single activity, but encompasses a spectrum of processes, ranging from the more quantifiable temporal synchronisation and adjustment of intonation to the more elusive coordination of dynamics, phrasing and interpretation. These processes, dealing with specific musical variables, are all necessary in the creation of a cohesive musical performance, and are unique to performing music within an ensemble.

Even though musicians have actively engaged in ensemble performance as long as musical performance has been in existence and, to this day, are still able to teach successive musicians best practice when involved in ensembles, theoretical knowledge of the procedural underpinnings of small ensemble interaction is incomplete. Recent academic research on ensemble interaction approaches the topic from a primarily sociological stance. This work is beneficial in that it allows researchers to frame this topic within established concepts pertaining to interpersonal and group dynamics. That said, the uniqueness of musical groups among other collections of people is

recognised by psychologists Vivienne Young and Andrew Colman, who describe ensembles as 'an unusual kind of social group whose mode of interaction involves a degree of intimacy and subtlety possibly not equalled by any other kind of group' (Young and Colman, 1979: 12). Given the idiosyncratic nature of the interaction which takes place in musical ensembles, previous research on the processes associated with group performance takes the form of the pursuit of a framework or paradigm from another field that can be best applied within a musical context. This quest has given rise to a host of possibilities, with inspiration drawn from the fields of psychology,[1] sociology,[2] conversation studies and linguistics,[3] neurology and cognitive studies,[4] and even ergonomics.[5] However, as will be seen, this body of literature is inadequate as the primary source of understanding musical ensembles, particularly because insufficient attention is given to the practical knowledge performers have acquired through experience within ensembles themselves.

Regardless of its apparent suitability, the plethora of interdisciplinary sources upon which such research is drawn is primarily concerned with verbal interaction between group members. Research on the balance of activities during rehearsal has noted that chamber groups tend to spend the majority of their rehearsal time playing rather than engaging in verbal discussion.[6] The emphasis that musicians give to non-verbal communication suggests that research into ensemble interaction should accordingly investigate the processes which may occur within the act of performance. The mechanisms for determining musical variables such as tempo, dynamics, intonation, phrasing and interpretation must therefore emerge during this form of social musicking. Whilst these mechanisms exist within a single musician during solo performance, ensemble

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[1] Blank and Davidson, 2007; Garnett, 2009; and Ginsborg et al., 2006.

[2] Davidson, 1997; Davidson and Good, 2002; Ford and Davidson, 2003; King, 2006a; King, 2006b; King and Ginsborg, 2011; Murnighan and Conlon, 1991; Seddon and Biasutti, 2009; and Young and Colman, 1979.

[3] Davidson and King, 2004; Davidson, 2005; Sawyer, 2005; and Williamon and Davidson, 2002.

[4] Garnett, 2009; Manduell and Wing, 2007; and Tovstiga et al., 2004.

[5] Davidson, 2005.

[6] Blum, 1987; Williamon and Davidson, 2002; Tovstiga et al., 2004; Blank and Davidson, 2007; and Seddon and Biasutti, 2009.

performance necessitates the simultaneous consideration of these variables between multiple individuals. Therefore, I may pose the first of three research questions:

I. *How do musicians interact and share information with each other while performing?*

This thesis explores the process of musical (performative) interaction—that which occurs during the act of ensemble performance. Even though the conclusions reached through the discussions found in this text may be valid in relation to non-Western musical traditions, complexities easily arise from attempts to generalise across multiple cultures and musical heritages. Therefore, this thesis is limited to discussing ensemble interaction within the context of Western art music. In order to comprehensively address the first research question, it is necessary to identify and highlight what actually happens during ensemble musical performance. Reflection upon the rehearsal scenario depicted above shows that the primary activity occurring during instrumental performance is the operation of a musical instrument.[7] This fundamental element has previously only been the focus of pedagogical materials specific to each instrument or family of instruments. That being said, recent research on performance has started to investigate the cognitive frameworks underlying actions taken by musicians in the process of operating their instruments with the intent of quantifying and categorising physical gestures used during performance (Godøy and Leman, 2010). From a practical perspective, however, it may be more important to identify how musical content itself may affect the ways in which performers have to interact with their instruments, rather than to create a gestural typology. An understanding of the relationships between musical content played and performative actions taken is necessary in order to comprehend the practical processes posed in the first research question. As musicians *do* interact and find some way of expressing to

[7] In the context of vocal performance, the voice naturally serves as a musical instrument, as it has its own idiosyncratic operation distinct from that of speech.

each other variables about the music being played, a second research question must follow, concerning the phenomenological experience of individual musicians:

> II. *To what extent does the musical content being performed affect the ways it has to be physically created by musicians?*

Consequently, the third research question combines elements of the first two:

> III. *How does the physical relationship between the performer and their instrument relate to communicative and interactive processes of ensemble performance?*

By isolating the ways that individual musicians act during performance, this thesis focuses on the processes by which ensembles interact through the act of playing music itself, rather than through verbal discussion. Therefore, it provides the basis upon which the complex mechanisms of ensemble performance may be understood in a way that is not dependent upon the limited and sometimes questionable paradigm of verbal communication. As these research questions are contingent upon an examination of the intimate relationship between a musician and his or her instrument, the tacit understanding that musicians have of this interconnection must be acknowledged. The process of revealing propositional knowledge from within embedded procedural knowledge is further problematised by the methodological issues pertaining to capturing and comprehending human experience. This thesis addresses these concerns through the applied use of reflective practice, as described later in this chapter.

The three research questions detailed above provide a framework around which this thesis is organised. Chapter Two examines the modes of communication which have been identified within ensemble interaction as well as how leadership may function in this highly specialised social context. Through this discussion, previous sociological models that have been applied to musicological

research are critiqued, in addition to more fundamental concepts such as inter-performer communication in music. Progressing to the second research question, Chapter Three focuses upon the ways in which musicians interact with their instruments, particularly considering how these interactions may be affected by the performer's musical intentions. This discussion requires an examination of the phenomenology of instrumental performance, and critiques the cognitive mental models that have been applied in previous research. Increasingly, critical examination of performance will stress that performance requires unique forms of knowledge intrinsically tied to the experience of making music. From this perspective, Chapter Four expands the focus of the previous chapter to consider the experience of the performer from within the context of an ensemble. Drawing upon the conclusions found in the previous chapters, I examine how musicians' individual performances may exert influences on that of their fellow ensemble members. After addressing the three primary research questions of the thesis, further threads of discussion arising from the previous chapters will be examined in a fifth and final chapter. In particular, this chapter will demonstrate the ways in which the proposals found throughout this thesis may inform the wider sphere of research on performative musical knowledge. Similarly, the final chapter will include speculation upon the applicability of the musicological research I have conducted on the non-musicological fields which have been drawn upon throughout the thesis.

The present introductory chapter begins with an overview of the methods drawn upon in previous research on ensemble interaction. This includes brief reviews of the literature and associated academic fields that have been used to establish the current state of affairs in ensemble research in Western art music. It must be noted that this introductory chapter will not provide an exhaustive review of background literature; in-depth assessment of these materials will be presented throughout this thesis. In light of the research questions posed at the beginning of this chapter, appraisal of the methods drawn upon in ensemble research prompts a re-examination of the kind of knowledge under consideration when engaging in performance studies. After clarifying the ways in which contrasting forms of knowledge will be examined within this thesis, an alternative

methodological approach is presented, which may more suitably address not only the research questions posed above but also any epistemological concerns which may arise. This methodological approach will be evaluated in the concluding chapter of this thesis in a critique of its efficacy and applicability to research on musical performance.

Investigating ensemble performance

A favourite theoretical approach amongst musicologists when researching interaction within ensemble performance has been to consider physical gesture as a form of communication. Given this tacit assumption, empirical musicological research has utilised a variety of applied methodologies, each emphasising a slightly different aspect of communication within ensembles. Many of these methodologies borrow heavily from those developed in the social sciences, including observation, interviews and surveys, analysis of practitioner literature, and laboratory experiments. Application of these methods to musicological research has illustrated, to varying degrees, the significant differences that distinguish musical ensembles from other social groups. Critical assessment of these methods reveals the benefits they can provide in encouraging understanding of musical interaction, as well as highlighting aspects of musical performance which evade traditional sociological inquiry. Arising from this critique is a discussion of the modes of knowledge involved in research upon skilled practice. It is only through a firm grasp of the knowledge which is to be investigated within this thesis that an appropriate and effective methodological framework may be devised.

One of the primary methods used in sociological and anthropological research on musical ensembles has been observation. Its most apparent benefits incorporate the documentation of the actions of ensemble members in their entirety and, in the case of video recording, a prolonged period for their analysis and review. That being said, there are three particular limits to the

knowledge gained through the use of observational methods. Firstly, by its nature, this method clearly delineates between those under scrutiny and those conducting research. Whilst an observer may be able to see and hear what is going on within an ensemble, there is no way for them to fully experience what is going on from within the ensemble at that given time: they are outside of the ensemble, looking in. Secondly, the conclusions arrived at through observation cannot be easily generalised or directly applied to other specific cases. Individuals' personal and mechanical idiosyncrasies are not necessarily indicative of common human attributes—a point emphasised by Mario Wiesendanger in his research on motor control in violin performance (Wiesendanger et al., 2006: 112). Thirdly, the interactions between co-musicians can often be too subtle or quick to be noticed strictly through outside observation. Motion capture may assuage this issue through the technical identification of all of the movements taking place in performance, although the ability to detect movements in performance is secondary to understanding their meaning or gauging their significance.

Unlike observation, interviews and surveys allow researchers to analyse the interactions of ensembles through the experiences of the participating musicians. The personalised accounts exposed through interviews may provide insight into the unique processes that occur while playing in ensembles. Surveys yield information from even larger pools of practitioners, increasing the credibility of any generalisations arising from the resulting conclusions. However, whilst they draw directly upon the knowledge of performers themselves, both of these methods have two limitations: timescale and critical rigour. Due to the amount of time necessary for participant response (especially in the case of surveys), these methods are often conducted in situations so far removed from the act of rehearsal and performance that they are forced to gloss over important details. The rehearsal narrative given at the beginning of this chapter provides an example of this problem—even though I am able to generalise attributes from many rehearsals into a cohesive amalgam, I am not able to remember the entirety of my experience from a single event, let alone in a level of detail sufficient for academic research. In terms of critical rigour, the questions used within surveys often

need to be broad enough to elicit responses from a variety of participants. Whilst a large response rate is desirable when conducting surveys, the disadvantage to this approach is that it may result in a study is that is unable to engage with precise aspects of performance. Without completely discounting the information gained from interviews and surveys, a lack of specificity reduces their practical applicability.

Similar to the benefits which emerge from the use of interviews and surveys, the primary advantage of drawing upon practitioner literature in ensemble research is that it allows access to perspectives which are normally restricted to those embedded within the practice of performance. In addition, the topics under discussion are specifically chosen by the performers themselves. Whilst insightful, this literature has historically been oriented toward a populist (rather than academic) readership, primarily detailing the social elements involved in being a professional musician. This is not to say that a lack of scientific rigour discounts the usefulness of this resource. Liz Garnett, in her work on choral conducting, suggests that:

> the anecdotal assertions from the practitioner literature […] arguably present a greater theoretical robustness than the empirical studies that critique them, in that they represent conclusions drawn from a range of experiences, even if that process of abstraction is unsystematic and/or under-documented.
>
> (Garnett, 2009: 28)

Given this defence, it is worth considering the broad applicability of this literature, even though particular areas may have to be re-examined in a more critical manner. Likewise, practitioner literature may provide a foil against which to measure the conclusions which emerge from academic research.

Whereas surveys and practitioner literature may provide general information regarding ensemble interaction, specific aspects of this phenomenon may be closely examined within laboratory experiments and case studies. By isolating variables and limiting the fields of inquiry to restricted situations, experiments and case studies are able to provide the scientific rigour to support general theories presented by practitioners. Advances in computer technology such as the increased

accessibility of motion capture allow for heightened precision and technical analysis of the ways that performers operate, both alone and within ensemble settings. Even with these benefits, however, there are two main drawbacks to this clinical work. First, experiments and case studies may lack the spontaneity and authenticity of uninhibited musical interaction. The construction of an artificial context may not adequately reveal how ensembles interact on a daily basis. Second, the sheer amount of data produced does not necessarily presuppose the development of applicable conclusions. Whilst experiments and case studies are useful tools, critical reception of the data is necessary in order to both relate conclusions to practitioners' experiences and to situate them in terms of larger theories.

Lineages of knowledge

Given the methodologies currently used in the field of ensemble research, to what extent are they suited to addressing the research questions posed in this thesis? In order to understand how musicians interact and share information with each other, the first research question, a thorough review of current musicological literature on ensemble interaction is necessary. This review entails exploration of the modes of communication present within ensembles, identified by Frederick Seddon as verbal and non-verbal (Seddon, 2005). These modes of communication provide the structure around which current theories of ensemble interaction may be presented. With regard to non-verbal communication, current research by Alexander Jensenius and others has identified four categories of gestures which may be made during the act of performance: sound-producing, sound-facilitating, sound-accompanying and communicative (Jensenius et al., 2010: 23). Communicative gestures, one focus of this thesis, have been interpreted primarily through the use of two interpretative models. The first approach, reliant upon a linguistic model of communication, prioritises the identification and categorisation of physical gestures in a semantic manner.[8] Therefore, conclusions regarding performers' gestures have arisen in part from research into

[8] Clarke and Davidson, 1998; Davidson, 2001; and Davidson, 2005.

gestures used during speech,[9] and have been primarily oriented toward communicative signalling between the performer and the audience (Davidson, 2005; Windsor, 2011). The second approach avoids linguistic parallels, proposing that musicians' gestures in performance are not grounded in semantics. Instead, gestures may serve as indications of interior mental states (Elsdon, 2006). Researchers using both of these theoretical models of communication arrive at their conclusions through the observation of video-recorded performances. As will become evident, this corpus of research rarely examines the effects performers' gestures may have on their fellow musicians—and when it does, it proposes a similar relationship to that between performer and audience. However, the interaction between ensemble musicians is fundamentally different to that between performer and audience in that co-performers need to coordinate and execute technical actions in order to perform effectively. Coordination of these actions requires some form of implicit or explicit transfer of knowledge (Tovstiga et al., 2004: 9).

Adequate consideration of the first research question requires more than simply an appraisal of the physical gestures that may be used in performance. In addition, it is necessary to examine the ways in which leadership may operate within ensembles. This area of research has exclusively approached the question of musical leadership through applied sociological models of leadership such as those developed by business theorist James Burns (1978). Recalling that ensembles interact both verbally and non-verbally, it is useful to differentiate this body of literature in terms of these categories. Research on leadership articulated verbally operates from the premise that musical leadership operates outside of the act of performance, considering musical ensembles as merely a variant of other goal-oriented groups.[10] Contrary to this approach is research on leadership through physical gesture.[11] This approach addresses how leadership may be exhibited within the act of performance itself. Whilst the two theoretical models are concerned with the expression of

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[9] Ekman and Friesen, 1969 and McNeill and Duncan, 2000.

[10] Young and Colman, 1979 and Murnighan and Conlon, 1991.

[11] Goodman, 2002; Manduell and Wing, 2007; Williamon and Davidson, 2002; Davidson and King, 2004; and King and Ginsborg, 2011.

leadership within two different contexts, both approaches focus on identifying leadership patterns among ensemble members, ascribing traditional (non-music specific) group roles to musicians. Given the sociological predisposition inherent in this area of inquiry, it follows that this research is dependent upon observation, interviews and surveys of practitioner literature.

In addition to surveying the processes by which information is communicated between ensemble members and musical leadership may be exerted, the first research question requires an investigation into the characteristics of the information being shared in an ensemble. Through the overview of literature found in Chapter Two, however, it will become apparent that this collected body of research fails to address concerns both over the content being communicated between co-performers and the appropriateness of a communicative paradigm as the basis for understanding ensemble interaction. Even though an examination and application of Lakoff and Johnson's concept of metaphor provides the foundation upon which the relationship of music to the human mind may be understood, further investigation of the act of performance itself is necessary (Lakoff and Johnson, 1980). Whilst this research has found parallels in musical analysis,[12] there has yet to be an extensive investigation of the use of metaphor in understanding the phenomenon of performance. Similarly, research on interaction within musical ensembles has extensively focused on the paradigm of communication, drawing upon both its process of encoding, transmitting, and decoding information and its associated linguistic terms. With continued references to 'non-verbal communication' (King and Ginsborg, 2011), 'communicative gestures' (Dahl et al., 2010), 'modes of communication' (Seddon and Biasutti, 2009) and 'visual communication' (Kokotsaki, 2007), among others, this body of research perpetuates the tacit assumption that musical performers operate in a manner similar to those involved in conversation. However, use of this paradigm encourages a framework of understanding that is rooted not in musical performance but in social interaction. The use of a communicative paradigm for ensemble interaction will be critiqued throughout Chapter Two, allowing for the establishment of a new paradigm based on the act of performance itself.

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[12] Saslaw, 1996; Zbikowski, 2008; and Zbikowski, 2009.

The second research question, identifying the direct physical relationship between musician and instrument, prompts an investigation into how humans create and experience musical phenomena through the medium of performance. Whilst the term 'phenomena' may be defined primarily as the object of one's perception, in the case of performance I use it to refer to a musical act involving both intention and realisation. The distinction between one's personal intentions and the intentions as perceived by external observers is of great importance when considering how individuals interact within ensembles; consequently, the concept of attributed intention will be considered later in the thesis in relation to the third research question. There has been little research on the phenomenology of individual performance to date other than neurological studies on how music engages with the human brain (Altenmüller et al., 2006). Whilst this thesis will call upon some neurological research, it will not be the primary focus. Rather, an understanding of the phenomenon of performance from the perspective and experience of a performing musician will motivate discussion. This is not to say that neurological studies do not have an impact upon musicological research; however, from the frame of reference of an active musician, such medical research has not thus far been expressed in such a way as to affect the practice of performance.[13] Therefore, this discussion will investigate the aspects of sensory experience engaged specifically during musical performance that can be identified by the performer themselves. This work emerges from the application of case studies and experiments conducted by cognitive theorists and experimental philosophers.[14] After establishing the general processes by which musicians are able to create sound on their instruments, it is then necessary to consider how that fundamental ability may develop into the advanced, fluent form of embodied knowledge which characterises skilled musical performance. An understanding of this development requires both a review of the acquisition of skill in musical performance as well as a review of pedagogical literature.[15]

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[13] In other words, whilst it may be objectively interesting to understand what part of the brain is activated during performance, there has yet to be a way to effectively relate this information to my practical activities as a musician.

[14] Elsner and Hommel, 2001; Hoffmann et al., 2004; and Tomasello et al., 2005.

[15] Barry and Hallam, 2002; Keller and Koch, 2008; Pecenka and Keller, 2009; and Halmrast et al., 2010.

The third research question, that concerning the possible effects the relationship between musician and instrument can have on the social dynamics of ensemble performance, has not been explicitly researched to date. Temporal synchronisation was extensively explored as early as the late 1970s through the analysis of spectrograms and their associated sound recordings (Rasch, 1979). However, coordination of other musical variables such as dynamics, expression and interpretation have remained peripheral to this area of study. Through investigation of the first two research questions, discussion of interpretative coordination may be approached in a manner rooted directly in the act of performance. Even though such coordination has been briefly mentioned by Goodman (2002) and Williamon and Davidson (2002), the sort of interpretative information that is shared between performers and how that knowledge transfer takes place has not yet been identified. Given the balance of research conducted thus far, less attention will be paid to the process of temporal synchronisation than to the shared understanding of other musical variables. Likewise, from my perspective as a performer, the admittedly important act of coordinating tempi among my fellow musicians does not have as large an impact on the resulting performance as the collaboration of interpretative ideas. An understanding of interpretative coordination should encourage clarification of the processes inherent in the temporal synchronisation, whereas the opposite may not necessarily be true.

To comprehensively approach the third research question and create a new framework for understanding ensemble interaction, it is necessary to consider how the phenomenon of individual performance may be altered within an ensemble context. Primarily, this requires exploration of how inference may function within musical performance. In this manner, the previous discussion on the subject of intention may be extended, except now focusing on how musical intention may be attributed to fellow performers. In addition, psychological research on humans' ability to deduce information through visual observation (conducted through the use of laboratory experiments) provides the background necessary to comprehend advanced inferential processes.[16] From this

[16] Runeson and Frykholm, 1981 and 1983.

perspective, research on the continuous adaptation which occurs in improvised ensembles may be applied to chamber groups.[17] This research is rooted in both observation of performances and interviews with skilled musicians, highlighting some of the general processes which may occur within musical interaction.

Modes of knowledge

Permeating the lineages of research and the associated methods described above is an issue which complicates the application of interdisciplinary research to performance studies. Considering musical performance as a skilled practice, the form of knowledge involved is of a fundamentally different nature to that which is created through academic research. The knowledge generated by researchers and by practitioners has been categorised by management theorist John Heron as Mode 1 and Mode 2 knowledge, categories which extend the distinction between propositional and procedural knowledge made by Gilbert Ryle (Heron, 1999 citing Ryle, 1949). Difficulties arise when attempts are made to transition between these two modes. Not only are these modes of knowledge articulated in different manners—Mode 1 through language, Mode 2 through action—but they are created by different entities. In the case of performance studies, the two modes of knowledge correlate directly to the two parties involved in empirical musicological research: academic musicologists generally create and deal with Mode 1 knowledge, whilst practitioners create and deal with Mode 2 knowledge. In addition to creating separate forms of knowledge, both groups have unique methods of knowledge retention and dissemination: empirical researchers collate their findings into academic prose, but performers disseminate their accumulation of knowledge through both written and aural means (pedagogically and through the act of performance itself). As Roland Barthes commented in the late 1970s, 'we are still, and more than ever, a civilization of writing, writing and speech continuing to be the full terms of the informational structure' (Barthes, 1977: 38). Through the latter half of the twentieth century, however, there has been an increasing

[17] Tovstiga et al., 2004; Sawyer, 2005; and Kokotsaki, 2007.

recognition of the value of non-linguistic knowledge structures within academia. Even though the distinction between Mode 1 and Mode 2 knowledge is accepted in other sociological fields, particularly occupational psychology, recognition of and critical distinction between these two modes of knowledge has yet to gain significant traction within musicological research on performance.

Due to the division between those groups which deal exclusively with primarily procedural or propositional knowledge, their relationship is often described in terms of insiders and outsiders. This division, a common source of debate amongst the anthropological academic community during the twentieth century, is known as the distinction between emic (insider) and etic (outsider) (Harris, 1976: 330). Insiders are those who are within the system being studied, actively creating Mode 2 knowledge as a by-product of what they are actually doing. Outsiders, on the other hand, are those who are positioned externally to those being studied, either physically, socially or culturally, thereby engaging more directly with Mode 1 knowledge. The combination of the differing forms of knowledge created and contrary physical, social or cultural positioning can result in isolating the two groups from each other. In order for research on musical performance to be useful and applicable to both the academic and practicing communities, it is vital that such research avoids (or, at the very least, acknowledges) an insider/outsider dichotomy.

Reflecting upon the methods discussed in the previous section, methodologies which utilise interviews, surveys and practitioner literature draw upon Mode 2 knowledge in ways which minimise the tension normally felt between insiders and outsiders. However, none of these methods is able to provide conclusions which are usefully applicable to both groups. In his research on gestural studies in performance, Marc Leman proposes a pluralistic approach to methodology which, whilst motivated by the complexity of gestural studies, may allow for integration of these two modes of knowledge. He writes that:

> the study of gestures cannot be reduced to merely objective measurements of sounds and body movements, nor to simply descriptions of personal experiences and interpretations thereof. […] The concept of gesture is too complex to be understood from one single methodological perspective, even when considered purely from the viewpoint of an empirical approach (leaving hermeneutics aside).
>
> (Leman, 2010: 149)

This suggests that a blocking together of approaches would be most effective, drawing on both informed observation and critical, 'real-world' practice. The following section explores what an amalgamated methodological approach to ensemble research might entail, allowing for the development of the methods used within this thesis.

Considering action research

In order to build upon the strengths of the previously discussed methods, a unifying framework is needed to tie together and orientate associated research.[18] Otherwise, any attempt at a holistic approach to ensemble research will succumb to fragmentation or an over-abundance of raw data. I propose that action research, a methodological approach developed through the fields of occupational psychology and sociology, could provide a structure within which to utilise the standard methods of empirical musicological research. The rationale for drawing upon this methodology can be found not only in the procedural organisation of action research, but also in its underlying philosophical ideas.

Action research is a sociological methodology that allows the people being studied to become part of the knowledge-creation process. Mary Brydon-Miller explains that the methodology goes 'beyond the notion that theory can inform practice, to a recognition that theory can and should be generated through practice' (Brydon-Miller et al., 2003: 15). This ideology often has ethical

[18] Material from the following discussion has developed from a presentation I gave at the Royal Musical Association Study Day: Collaborations in Practice Led Research at the University of Leeds (October 2010).

implications in that it allows the possibility of both socially responsible and socially oriented problem-solving (*Ibid.*: 13). Rather than conducting research for the sake of pure academic inquiry, the underlying tenets of action research reveal cooperative intention on the part of the researchers and practitioners, both in terms of the work conducted and the results concluded.

From a structural standpoint, the process of action research can be described as a cycle of action and reflection. Within that basic framework is enough flexibility to allow specific variations to be developed in order to meet contextual requirements. This adaptability has enabled action research to be applied to a variety of fields, including organisation development, anthropology, education, economics, psychology, sociology and management (*Ibid.*: 12). Stephen Kemmis provides one possible example for an action research methodology, tailoring the framework towards a more sociological or management-based study (Kemmis, 1982). He divides the cycle of action and reflection into four stages:

> 1. To develop a *plan* of action to improve what is already happening.
> 2. To *act* to implement the plan.
> 3. To *observe* the effects of action in the context in which it occurs.
> 4. To *reflect* on these effects as a basis for further planning, subsequent action and so on, through a succession of cycles.
>
> (Kemmis, 1982: 7; my emphasis)

The core process occurring is the constant, parallel evolution of both action and critical examination: every stage gives rise to the following. Throughout literature on action research this system is often therefore described not simply as a cycle but as a spiral—the repetition of similar processes on continuously evolving material.

Through its applicability to many fields, action research is accordingly flexible in the kind of personnel needed to conduct it. Whilst there are many variations, each concerned with a different balance between insider and outsider, two appear to be particularly applicable when considering musicological research: participatory action research and reflective practice. The first combines the specialised theoretical knowledge of academic researchers with the applied expertise of practitioners

through the two parties working directly in conjunction with each other (Herr and Anderson, 2005: 9). The primary benefit of this approach is that both groups are able to draw on their specific forms of knowledge and resources to address a single issue. Due to this cooperation, this form of action research has been heavily utilised in social and economic development projects as well as research on education. Participatory action research, however, requires a moderated balance of input between the two participants. Otherwise, the method may succumb to a transformation into either standard empirical research or an entirely non-rigorous pursuit.

The second variation of action research that lends itself to musical inquiry is reflective practice. Proposed by Donald Schön, it encourages practitioners to develop the ability to critically examine their own actions (Schön, 1983). Through this process, they can not only become better at their craft but also document the process by which they expand their specific field of knowledge. Whilst this option is certainly attractive, it does require that the practitioner take it upon themselves to rigorously practise critical inquiry. In his book *The Reflective Practitioner* (1983), Schön examines instances of reflective practice in action, presenting examples of occupations in which it works (architecture, psychoanalysis) and does not work (city planning). Even in professions most suited for application of reflective practice, however, the primary obstacle to development in the field is that of dissemination: 'because of the differences in feel for media, language, and repertoire, the art of one practice tends to be opaque to the practitioners of another' (*Ibid.*: 271). Conclusions drawn from research conducted in this manner need to be demonstrated or clarified in mediums accessible to their colleagues. Furthermore, in order for the insights gained to be shared in other fields, they need to be explained in such a way as to enter the parlance of general academia at the very minimum. Otherwise, any advances made by such a practitioner would not be understandable or applicable to anyone outside of his or her specific field.

The issues surrounding the dissemination and applicability of Mode 2 knowledge to other fields can be identified as one of the strongest motivating factors for using action research. Kathryn Herr and Gary Anderson remark that 'we cannot escape the basic problems of knowledge

generation by elevating practitioners' accounts of practice to a privileged status. That is why collaborative and participatory forms of research among insiders and outsiders hold so much promise' (Herr and Anderson, 2005: 53). Using practitioner literature is not enough: there needs to be an understanding of the full implications of that literature—comprehension from the practitioner's point of view—in order to make full use of this resource. Overcoming this issue of perspective and enculturated knowledge is of primary concern when considering the use of action research methodologies within musicological performance studies, and will be addressed further in this thesis with regards to the nature of the knowledge regularly exercised by skilled musicians.

In consideration of these methodological processes, I propose that the spiral of action and reflection could serve both to acknowledge and utilise the insider/outsider dichotomy in empirical musicological research. Rather than conducting research on musicians and the way they interact with each other, this new mixed methodology would allow for research by and with musicians. As Hilary Huang explains, 'action research with practitioners always includes practitioners as partners in the work of knowledge creation' (Huang, 2010: 95). The knowledge created should therefore be applicable to both practising musicians and academic researchers; accessible and useful to both Mode 1 and Mode 2 formats. Acknowledging the merits and epistemological issues surrounding empirical methods such as observation, interviews, literature review and case studies when applied to ensemble research, I propose that their benefits may be maximised through their utilisation within the larger structure of action research. Drawing upon both participatory action research and reflective practice, it is possible to construct a new methodology tailored specifically for inquiry into ensemble interaction. In this model, the locus of critical reflection shifts subtly back and forth between performer and researcher (if they are two separate entities) as the spiral progresses. The actions of both sides are designed to directly influence the other in a symbiotic relationship (See Figure 1.1 for a diagram of this proposed model).

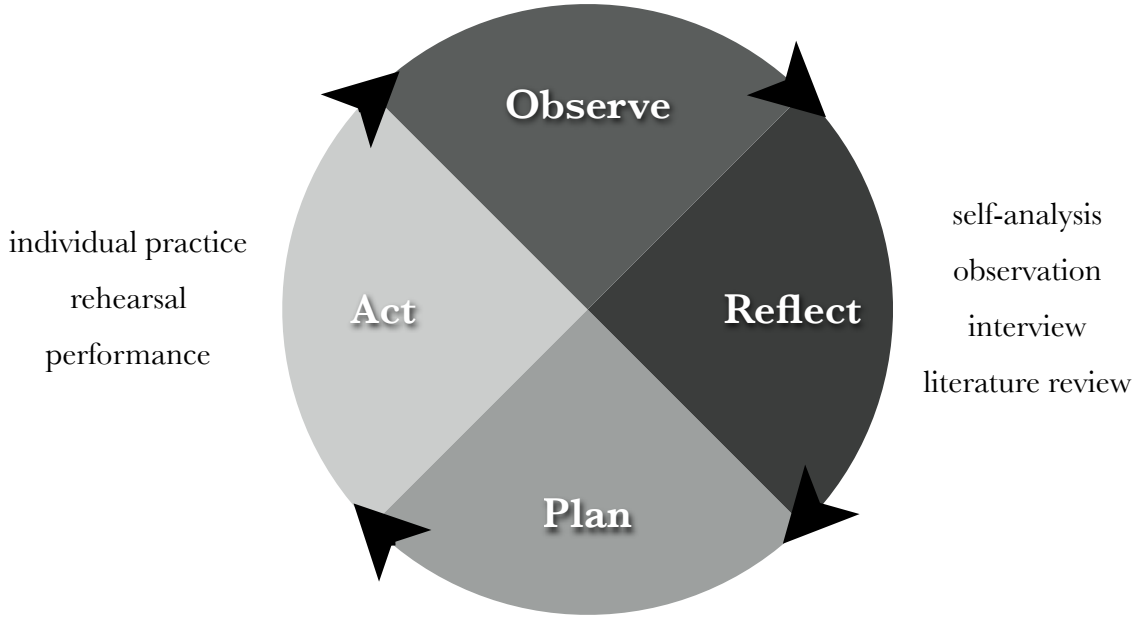

Figure 1.1 - The cycle of action and reflection, modelled after Kemmis (1982).

In this model, the performer acts as a reflective practitioner throughout their normal musical activities. Their behaviour motivates the action side of the spiral, encompassing the planning and acting stages in Kemmis's model of action research. Both musician and researcher initially plan which aspect of musical interaction will be under consideration. This allows for any necessary preparation to find an optimal environment in which to conduct the research: not necessarily to create an artificial situation, but to identify what 'naturally occurring' musical situation might allow for ideal examination of the subject under inquiry. From there, the musician acts and simultaneously observes, participating in their ensemble as they would normally. In a sense, this requires them to temporarily 'forget' that they are acting in the role of a researcher and allow their musical training to motivate their actions. Cognitive distance from a performance as it is happening may discourage (or, to a certain extent, prevent) musicians from acting intuitively, the activity which is itself being researched.

At this point in this proposed process the role of the musician and the researcher overlap. Comprehensive external observation is possible through the differing perspectives available to each participant. Whilst this appears most feasible when considering a participatory action research

scenario—in which the musician and researcher are two different people—the use of video recording provides the opportunity for a single reflective practitioner to take advantage of multiple perspectives. In addition, musicians could benefit from maintaining in-depth journals of their experiences, providing they have time to do so effectively. Even though both video-recorded observation and journal writing would undeniably only be able to capture *post hoc* reflection, their importance in capturing the performer's perspective would be invaluable.

The reflection stage of this amalgamated form of action research relies most heavily upon the skills and background of the empirical musicologist. Based on the information gleaned from observation, the researcher will then able to draw on a consortium of methods, including interviews with co-performers, case studies and surveys of associated literature, drawn from both academic and practitioner perspectives. It is important to note that the inspiration and direction of this subsequent research is a direct outgrowth of the actions of the musician. In this manner, all of the empirical research conducted is grounded in practice.

Such reflection has the potential to yield a variety of outcomes. The most positivistic (although presumably most rare) consequence would be to arrive at a straightforward conclusion to the questions at hand. More likely, however, is that the research would not arrive at any direct conclusions, but instead instigate further cycles of action and reflection. In part due to its emphasis on Mode 2 knowledge, action research embraces the creation of knowledge in a non-linear fashion. Mary Brydon-Miller describes this development of knowledge as a form of relinquishing control over the exact course of subjects, encouraging what she calls 'messes' (Brydon-Miller et al., 2003: 21). This continuous expansion of knowledge provides two additional outcomes. First, the clarification of concepts and contexts through experience requires the modification of subsequent planning and acting stages to more clearly observe the item of inquiry. Second, the cycle of action and reflection may foster new avenues of inquiry that might not have been originally considered for investigation.

Within this thesis, I will serve as a reflective practitioner, assuming the combined roles of researcher and musician. Practical application of this model in this manner is dependent both upon my personal background and the context within which my research is conducted. I am an actively performing bass trombonist, involved in a variety of ensembles. During my time at Birmingham Conservatoire I have participated in small brass ensembles, trombone choirs, contemporary music ensembles, jazz bands, brass bands, wind bands and symphony orchestras. In addition, I have been a part of The Supergroup, a mixed improvised ensemble consisting of other doctoral researchers at the Conservatoire. At the University of Alaska and the University of Michigan, the institutions at which I have previously studied, I focused on ensemble performance, going so far as to receive a masters degree in chamber music while simultaneously pursuing a masters degree in trombone performance. In addition to my activities as a performer, I have been able to engage with ensembles as an external researcher. While at Birmingham Conservatoire I have been in a position not only to participate within ensembles but also to observe a variety of others throughout rehearsals, workshops, and performances. In particular, I have been able to extensively video-record the Boult Quartet, the Conservatoire's most senior postgraduate string quartet. Their input, described below, has been extremely valuable.

In addition to practical musical experience I have been involved in critical musicological scholarship in both my postgraduate and doctoral degree programmes. Of particular interest has been the application of non-musical research to musicological theories and situations in an attempt to critique or reconcile specific topics regarding musical knowledge. This has provided me with a background in sociological research, as well as a critical approach to academic research in general. The combination of both practical and academic experience enables me to be in an ideal position to serve as reflective practitioner within this thesis. Recalling the intentions outlined in the preface to this thesis, this text should not only expand upon the propositional knowledge generated from academic research of musical performance, but allow for theoretical modelling of the procedural knowledge used every day by performers.

The methods used within this thesis embed observational and interview-based qualitative research within the framework of action research. When considering the spiral of activity compromising action research methodologies, the practice side of the spiral consists of my own individual musical practice, ensemble rehearsal and performance. The reflection side of the spiral consequently consists of observation, informal interviews with other performers, literature reviews and self-analysis.

Over the course of a year and a half I have played in a collection of ensembles for a variety of durations. Long-term placements within ensembles have extended over one to three months, and included participation in a brass band, symphony orchestras and contemporary groups such as Interrobang and The Supergroup. Short-term placements generally focused on the preparation of a single concert, and included jazz ensemble performances and recordings, brass dectet performances and involvement with professional contemporary music group Decibel. Singular involvement involved one-off placement within reading orchestras and substituting for other musicians around the Conservatoire on an *ad hoc* basis. All of these interactions provided valuable material and experience upon which I could reflect and draw conclusions while still simultaneously maintaining my role as an active performer.

This practical involvement within ensembles themselves was paralleled through the employment of some of the empirical methodologies discussed previously. In working with the Boult Quartet, I observed their rehearsals from a first play-through to a polished performance of Samuel Barber's *String Quartet No. 1, Op. 11* (1939). The rehearsals were video-recorded over the span of four days, providing an instance of concentrated preparation of a single work. Similarly, several rehearsals and performances given by The Supergroup were recorded, allowing for critique and analysis of myself within the environment of a small ensemble. In addition, the members of The Supergroup have participated in semi-open interviews, allowing me to introduce them to and engage them with the process of critical reflection. Whilst analysis of the Boult Quartet will be woven throughout this thesis, the improvisation found within performances by The Supergroup will

be examined in detail in Chapter Five. The members of these two ensembles have granted their permission to use their likeness and any rehearsal discussion within this thesis, ensuring that my work conforms with standard research guidelines.

Underlying my own practice and collaboration with the Boult Quartet and The Supergroup has been an extensive review of literature from a variety of fields. This research has developed directly from my experiences participating with and observing these ensembles. As will become apparent throughout this thesis, the academic elements of this research are able to be critiqued from a practical perspective due to my ongoing activity as a musician. In this manner, practice informs my reception of academic research, which in turn encourages me to reflect on my practice in new and enlightening ways.

At the intersection between practical research and academic research lies my reflective journal. Expanding critical examination of my own musical practice to encompass the entire research project has allowed me to develop conclusions directly in tandem with the myriad of methodologies drawn upon. Emphasising the cyclical aspect of action research, the journal presents a vital link in the feedback loop of action and reflection co-influencing each other. In effect, what originally started as research on musical performance has evolved into research upon research on musical performance—an aspect of what Schön refers to as reflective research (Schön, 1983: 309). Whilst the journal was never meant for public use, nearly all of the ideas therein have been reformulated into formal arguments.

Conclusion

Given the extensive discussion of methodological considerations presented in this chapter, it is now possible to turn attention to the research questions posed at the beginning of the thesis. Critical evaluation of current musicological research on ensemble performance, applied non-musicological research, and the experiences pervading the rest of the cycle of action and reflection are necessary due to the different forms of knowledge under consideration. Through the

investigation of these research questions, deeper epistemological questions may arise, progressing beyond issues surrounding the identification of gestures or how ensembles interact. As will become apparent, involvement in the phenomenon of ensemble performance may engage musicians in levels of embodied knowledge previously unexplored through propositional or procedural means. This ostensibly hypothetical proposition is reified through exploration of the research questions posed above. Thus, this thesis constitutes an in-depth examination of a specific kind of Mode 2 knowledge—performative musical knowledge—through the lens of ensemble performance.

Chapter Two:

Beyond Communication

Introduction

In Chapter One I identified three research questions, the first of which considering how musicians interact and share information with each other while performing. More appropriately, this query may be regarded as two separate sub-questions: how do musicians interact while performing? And how do musicians share information while performing? Whilst closely related, the processes of interaction within a group and the dissemination of information are intrinsically different, each process requiring individual consideration. Understanding of the second sub-question—how musicians share information—necessarily predicates any exploration of how ensembles interact. Consequently, in order to address this second point, the content of the information disseminated needs to be determined. Reflecting upon the narrative presented at the beginning of Chapter One, it can be assumed that the information communicated throughout a musical ensemble must, in some way, pertain to the variables of the musical performance itself: tempo, dynamics, intonation, phrasing and interpretation. Ensemble performance within Western art music requires some if not all of these variables to be coordinated amongst those performing. Attention to these elements is necessary in order to produce a cohesive and compelling performance—one which, some may argue, 'communicates' effectively to the audience. Therein lies the importance of ensemble collaboration. Regardless of whether or not the musicians are able to 'communicate' something to an audience in the same way a storyteller could, ensemble performance is gauged by the extent to which the participants are able to coordinate (temporally, harmonically, expressively, aesthetically,

etc.).[1] Consequently, this chapter will focus on determining the ways in which co-performers are able to communicate these variables with each other.

Frederick Seddon, through application of research conducted by education theorist Roslyn Arnold, identifies two modes of communication which may exist within musical ensembles: verbal and non-verbal (Seddon, 2005: 47).[2] Although many researchers have noted that musical rehearsals are broken down into time spent performing and time spent talking, Seddon is the first to consider these two activities in terms of the kind of communication that takes place within them. However, these activities are not balanced either in terms of the amount of time devoted to them or the range of actions which constitute them. As remarked previously, several studies have shown that small ensembles tend to spend the majority of rehearsal time playing rather than talking.[3] From my experience observing the Boult Quartet and participating in The Supergroup, I can attest to the disproportionately large amount of time spent in the act of performance during rehearsal. With regard to the kind of activities taking place within each category, even though verbal communication has been concretely identified within the realm of human interaction, non-verbal communication, at best, has only been identified as communication through exchanges that are not verbal. This classification has grouped together a large collection of seemingly disparate processes, described by Seddon as including 'body language, facial expression, eye contact, musical cues and gesticulations' (*Ibid.*: 54). Even though ensuing musicological research has focused on only one or two of these non-verbal activities in turn, the 'non-verbal' classification remains common.[4]

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[1] For example, a negative newspaper review of a concert by the Tokyo String Quartet referred to 'disturbing miscalculations of pitch […], ensemble (a shaky pianissimo conclusion to the Tchaikovsky's third movement, and some disagreements in the quick figures of the finale) and style' (Bargreen, 1998).

[2] Whilst Seddon originally mentions a third mode, musical communication, this concept is only passingly delved into through the rest of his 2005 article.

[3] Blum, 1987; Williamon and Davidson, 2002; Tovstiga et al., 2004; Blank and Davidson, 2007; and Seddon and Biasutti, 2009.

[4] Ford and Davidson, 2003; Tovstiga et al., 2004; Ginsborg et al., 2006; King, 2006b; Blank and Davidson, 2007; and Broughton and Stevens, 2007, among others.

Bearing in mind the mixed use of verbal and non-verbal communication in ensemble interaction, this chapter will explore the primary models of communication currently used in the field of performance studies. These models claim to encompass not only the processes within ensemble interaction, but also the relationships between composer, performer and audience—a distinction whose implications may not have been fully realised in subsequent research. Closer examination of these models reveals that they do not adequately account for the complexity of ensemble interactions, thereby requiring an in-depth exploration of the processes by which leadership operates within ensembles. After analysing several examples of a professional-level string quartet (the paradigmatic ensemble within Western art music) in action, however, several issues arise regarding how information is actually communicated to ensemble members, and the role leadership may or may not play in the sharing of information. More importantly, however, the ensuing discussions will critique the appropriateness of the communicative paradigm which underlies current theories of ensemble interaction. It will become increasingly evident that musicological research on ensembles has been based upon certain assumptions about the similarity between musical ensembles and other social groups—similarities which, I shall show, are easily exaggerated. This discussion will motivate a shift of critical focus from the group to the individual, prompting an investigation of the phenomenology of the solitary performing musician. As will become evident, it is only through an understanding of the phenomenology of solo performance that a new paradigm of ensemble interaction may be proposed.

Models of Communication

The first section of this chapter will examine the ways in which communication has been modelled thus far in performance studies. Drawing heavily upon sociological and psychological literature, this research attempts to find parallels between social and musical interaction. The first

model to be discussed focuses on the application of linguistic models of communication to the processes which occur in co-performer interaction. The second model, on the other hand, draws influence not from linguistics *per se*, but instead from gestural studies. Critical examination of each model from the perspective of a reflective performing musician will highlight areas in which the appropriateness of application of non-musical theories may be questioned.

In their research on expressivity in solo piano performance, Eric Clarke and Jane Davidson describe the models of performance present at the advent of performance studies as too simplistic, portraying the process 'simply as the flow of information from input through a set of abstract expressive rules to an output effector system' (Clarke and Davidson, 1998: 76). The reality, they go on to say, 'is far more practical and corporeal. The body is not just a source of sensory input and a mechanism for effecting output: it is far more intimately bound up with our whole response to music' (*Ibid.*: 76). Even though the relationship described between the performer's body and expressivity is presented within the context of its subsequent effects on audience reception, this concept implicitly permeates subsequent research on performance, shifting the emphasis of future operative models towards the physical elements of human interaction. Anthony Gritten and Elaine King, in the introduction to their most recent compendium of essays on music and gesture, note that the work presented in the text is 'grounded in the premise that musical gestures are cross-modal and that gestures include non-sounding physical movements as well as those that produce sound' (Gritten and King, 2011: 6). Thus, the musicological study of gesture in performance encompasses a wide range of human experience.

Given that research on interaction within ensembles focuses on musicians' physical gestures, it is necessary to explore the visible elements of performance itself. Performing acoustic music is an inherently physical activity, of which the constituent motions may fulfil any number of functions. Elaine King and Jane Ginsborg, in their research on the relationship between solo vocalists and accompanists within Western art music, comment that bodily gestures function in two manners: 'enabling the performer actually to produce sound, technically realising the notes contained in a

musical score' and 'achieving and conveying an expressive effect' (King and Ginsborg, 2011: 179). Along the same lines, Alexander Jensenius et al. further discriminate between the movements made during performance, dividing them into the following categories:

> - Sound-producing gestures: 'those that effectively produce sound[,] further subdivided into gestures of excitation and modification',
> - Communicative gestures: those 'intended mainly for communication[,] subdivided into performer–performer or performer–perceiver types',
> - Sound-facilitating gestures: those which 'support the sound-producing gestures[,] subdivided into support, phrasing, and entrained gestures', and
> - Sound-accompanying gestures: those 'not involved in the sound production itself, but follow the music. They can be sound-tracing […] or they can mimic the sound-producing gestures'.
>
> (Jensenius et al., 2010: 23)

Whilst previous research on physical motion in performance focuses exclusively on communicative gestures,[5] it is important to note that the classifications proposed by Jensenius incorporates this category as one *independent of* the other aspects of motion in musical performance. Even so, the authors retain the possibility that all actions executed in performance are communicative in some way. In distinguishing communicative gestures from the other categories, the authors propose that:

> all performance movements can be considered a type of communication, but we find it useful to have a separate category for movements that are primarily intended to be communicative. These may be performer–performer or performer–perceiver types of communication, and range from communication in a linguistic sense (emblems) to a more abstract form of communication.
>
> (*Ibid.*: 25)

The authors' last statement about the range of communicative possibilities raises several questions regarding the nature of communication itself, particularly when considering what characteristics are necessary for a form of communication to be considered 'abstract'. Further examination of this topic, however, which will be discussed later in this chapter.

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[5] Clarke and Davidson, 1998; Davidson, 2001; Davidson, 2002; Davidson and King, 2004; Davidson, 2006; Blank and Davidson, 2007; King and Ginsborg, 2011; and Seddon and Biasutti, 2009.

Before continuing, it is important to clarify the terminology used throughout this research. Marc Leman and Rolf Godøy, in the introduction to their anthology *Musical Gestures: Sound, Movement, and Meaning* (2010), describe a gesture as a movement that 'in some way [acts as] a carrier of expression and meaning' (Leman and Godøy, 2010: 5). Whilst any physical motion through space may be considered a movement, a gesture is imbued with a certain amount of significance. That significance may be to 'control the musical instrument when playing a melodic figure, to coordinate actions among musicians (conducting gestures), or to impress an audience (for example, moving the head during a solo performance)' (*Ibid.*: 5). Jensenius clarifies this definition, commenting that the term gesture 'does not refer to body movement or expression *per se*, but rather to the intended or perceived meaning of the movement or expression' (Jensenius et al., 2010: 15). The perceiver therefore plays an important role in the determination and reception of gestures.

The linguistic model of communication

The first model of communication to be considered is dependent upon correlating the informational content of physical gestures with that of speech. Building on the corpus of previous research on gesture in non-musical social interaction such as David McNeill's work on gesture in speech,[6] Clarke and Davidson suggest that solo musicians intend that their physical actions carry expressive meaning in performance. They propose that 'gestural repertoires emerge which are associated with specific meanings, and it seems to be the case that performers […] develop specific gestures for particular expressive purposes—a gestural movement repertoire' (Clarke and Davidson, 1998: 80). Even though the emphasis of this statement is on the existence of gestural repertoires, it is important to note the authors' use of the phrase 'specific meanings'. Through this, Clarke and Davidson identify gesture as a type of referential tool. From this perspective, the physical actions of performers themselves become a medium by which meaning (informational or emotional content) can be communicated to an audience. Davidson's next study further explores the idea of physical

[6] For examples of this literature, see McNeill, 2000.

gesture as expression. Drawing on gestural categories proposed by behaviourists Paul Ekman and Wallace Friesen—adaptive, regulatory, and illustrative/emblematic—she attempts to identify them in a filmed performance of Annie Lennox (Davidson, 2001: 242, citing Ekman and Friesen, 1969). Davidson theorises that these gestures provide clues about the meaning of the song being performed, allowing for clarification of the lyrics and the overall narrative being presented to the audience (*Ibid.*: 244). She argues that performers' gestures can and should be used by audiences as another medium of interpretation in addition to the aural aspect of performance, recalling Nicholas Cook's thesis[7] that performance is a multi-media event (Davidson, 2001: 250). This concept raises several issues pertaining to the relationship between gesture and music as well as the substantial problems surrounding the identification of musical meaning.

Throughout her research, Davidson posits that physical gestures in musical performance are both intentionally meaningful and necessary to provide a complete artistic experience for the audience. Whilst the first of these assumptions may hold true for dance, dramatics and musical theatre, its validity in the field of Western classical music is partial at best. Notwithstanding opera and other mixed-media genres, the primary physical manifestation of music is sound (Johnson, 2002). This is evidenced by the presence of a flourishing recording industry whose output is, above all, compact discs and digital audio files.[8] With her conclusion that musical performance is a multi-media event, Davidson implies that if one does not experience one medium of the performance (visual, in particular) one does not fully experience the musical work. In later writings, she tempers this assertion, stating 'of course, performers do not have to be seen in order to be understood, but the significance of visual cues cannot be underestimated' (Davidson, 2005: 234). That said, Davidson's writings continue to assert that audiences can draw upon performers' actions as a primary source of musical meaning and information. The idea that physical gestures are intentionally meaningful to an audience, however, seems more appropriate to theatrical

[7] From Cook, 2000.

[8] Whilst the viability of audio recordings as musical artefacts is still debated, further discussion of this aspect of performance is beyond the scope of this thesis. For more information, see Amanda Bayley's edited volume (2009).

performance than musical. In musical performance (particularly in Western art music), there are many actions that a performer carries out that, although necessary to the production of the music, do not have any bearing on what the audience is intended to perceive. As a bass trombonist, for example, I have to periodically empty excess moisture from my instrument. In order to do so, I have to drastically change the position of the instrument in relation to my body—much more so than I would while playing. However, that action is not intended to carry any significant meaning to the audience. Even if an audience member were reading every movement I make in an effort to discern clues to my overall interpretation of a piece (if that this is what a listener actually does), the only thing that could realistically be signified by the emptying of my spit valve is that my instrument has too much condensation.[9] Audiences familiar with live performance will disregard such actions. One could envision a similar case during a rock concert: when a guitarist presses their foot on the distortion pedal attached to their instrument, that action could only realistically be interpreted as an intermediary act. The motion itself, whilst necessary to the musical performance, is not ostensibly expressive or meaningful. This does not necessarily mean that gestures cannot be used as expressive tools by performers; vocalists from classical and popular music backgrounds, as Davidson's research has shown, are commonly taught to display emotion through facial expression and body language. Rather, there exists a range of gestures that are not intended for audience consumption. This is particularly the case when examining performances involving more than one musician. Although Davidson's research focuses almost exclusively on solo pianists and pop vocalists, these specific situations are not representative of the practices found in Western art or popular music in general.

At a deeper level, Davidson's research evades the problems surrounding notions of meaning in music. Found throughout these two studies and her subsequent research are references to music having 'specific meanings' (Clarke and Davidson, 1998), 'musical 'messages'' (Davidson, 2001), and

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[9] It is not outside of the realm of possibility that a composer may use the motion of emptying a spit valve within a composition, particularly one akin to performance art. That being said, the action would most likely not be interpreted as a meaningful gesture by the audience.

musical communication (Davidson, 2002; Williamon and Davidson, 2002; Davidson, 2006). If such communication exists between a performer and their audience, what is being communicated? Ian Cross addresses this question in his critique of the communication model used in information theory (Cross, 2005: 30). He finds the process of a sender transmitting information to a receiver—who is then required to decode the information—to be unsatisfactory in that 'the meaning or significance of musical behaviour or of a piece of music can rarely be pinned down unambiguously' (*Ibid.*: 30). This ambiguity is somewhat contrary to the way language is assumed to operate in post-enlightenment discourses, where words are taken to function as referents to concepts or ideas. Even the most metaphorical language still references something else, a concept which will be applied to language about music later in this chapter. Whilst the post-structural conception of language developed by philosophers such as Derrida and Foucault identifies it as being inherently self-referential, the reflexive nature of music seems to be of a much higher degree than that of language, resulting in considerably more ambiguity. Kofi Agawu is thus able to argue that music, while similar to language in several ways, does not have a 'more or less fixed lexical meaning' (Agawu, 2009: 25). This sentiment is echoed by Albrecht Schneider, who comments that music can be:

> compared to (natural) languages in respect to grammatical and syntactic categories fairly well. Music differs most, though, from (natural) languages with respect to semantics as music normally is lacking a lexicon of words that denote a certain meaning.
>
> (Schneider, 2010: 79)

Similarly, Peter Kivy remarks in the introduction to his essay 'Music, Language, and Cognition: Which doesn't belong?' that whilst 'music is […] language-like in certain respects, it is not language; it is not a language or part of a language' (Kivy, 2007: 214). Davidson, however, appears to conflate musical and linguistic meaning. In her research on pop musicians Annie Lennox and Robbie Williams, she maintains that physical gestures add a layer of information to that being delivered to the audience through the lyrics of the songs being performed (Davidson, 2002 and 2006). However,

she describes that layer of information as 'musical expression' (Davidson, 2002: 145). What the author describes in these cases, however, is the relationship between the lyrics and the gestures used. This proposal echoes research by psychologists Cassell and McNeill, who propose that storytellers are able to communicate different narrativic levels through the use of gestures (Cassell and McNeill, 1991). Even though Davidson's work may corroborate with this field of psychological research, it does not directly address the relationship between performers' gestures and the musical content itself. Therefore, I would hesitate to describe the information expressed through performers' gestures in this manner as 'musical'.

The gestural model of communication

As opposed to the linguistic model of communication within performance, the gestural model does not attempt to pair gestures with lexical correlates. This is in part due to the emphasis the gestural model of communication places upon instrumental performance. Whilst researchers such as Davidson, King and Ginsborg have been able to apply linguistic models of communication when analysing jazz, pop and classical vocalists,[10] the possibility that physical gestures in performance are intrinsically associated with lyrics is not applicable to instrumental music. It is from this dilemma that a different model, one attempting to avoid the correlation of gestures to lexical meanings, has been presented. Ole Kühl proposes a semiotic approach to understanding the relationship between expression and music in general, writing that whilst 'musical meaning cannot be pinpointed in any specified manner', 'the most important, stable element in a musical semantics is the primary signification from musical phrase to gesture and from musical gesture to emotional content' (Kühl, 2011: 129). This sentiment is reminiscent of Peter Elsdon's work on finding methods by which meaning may be deduced from solo piano performances by Keith Jarrett (Elsdon, 2006). In this research he concentrates on finding a broader understanding of the use of instrumentalists' gestures, rather than pinpointing specific gestures or analogous meanings. Elsdon's conclusions are

[10] See Davidson, 2005; Davidson, 2006; and King and Ginsborg, 2011, respectively.

accordingly broad: 'for the viewer the physical behaviours of the performing body are understood as manifestations of something unseen; to put it differently, bodily gestures are taken to represent interior mental states' (*Ibid.*: 200). This statement, whilst seemingly straightforward, indirectly addresses the audience's perception of authorship. The 'interior mental states' Elsdon refers to are undoubtedly those of the performer, as the performer's actions are being taken as representations of them. Are the performer's mental or emotional states, then, an integral part of the musical work? If so, then many a wedding performance of Pachelbel's *Canon in D* may only express boredom. Revising Elsdon's conclusion to refer to '*perceived* interior mental states' may, therefore, more accurately represent the role of the audience in this process.

Reflecting upon these two models of communication research by Davidson and Elsdon implies that the content being conveyed to the audience is primarily of an emotional nature. Davidson's research in particular has inspired further research into the importance of the visual when gauging perceived emotionality within musicians' performances.[11] However, the relationship between solo performer and audience is markedly different than that found between musicians within an ensemble. Whilst the feedback from an audience does directly affect a musician's unfolding performance, co-performers need to synchronise and execute their parts in such a way as to present a cohesive musical work.[12] The resulting work and the combined simultaneous performances of the musicians involved is what may consequently convey emotional content to an audience. Whilst there are countless ongoing debates as to the nature of musical meaning and its enigmatic relationship to human emotion, this thesis must be limited to the investigation of the informational content which may be disseminated between fellow musicians, particularly in regards to performance variables such as tempo, dynamics, intonation, phrasing and interpretation.

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[11] For the original research, see Davidson, 1993. For an example of ensuing work, refer to Vines et al., 2005.

[12] Lutenist Anthony Rooley proposes that audiences specifically provide feedback in the form of 'energy' to the performer, creating a 'wonderful energy transformation' (Rooley, 1990: 41). Even though he presents this argument informally, the feedback loops Rooley describes do capture an element of performance that may evade empirical research.

Consequently, research on gesture in solo performance is markedly different to that on gesture within ensembles due to the fundamental difference of content with which each is concerned. More recent research, whilst recognising the distinction between these two models of communication, has yet to propose a viable alternative to address the dissemination of information amongst co-performers. Even though Jensenius et al. recognise the difference between these two models of communication in their discussion of communicative gestures, describing them as ranging from 'communication in a linguistic sense (emblems) to a more abstract form of communication' (Jensenius et al., 2010: 25), the authors do not further examine the validity of these models.

Whilst these models may provide the basis for an understanding of the relationship between solo performer and audience, they do not adequately address the kind of information that must be communicated between co-performers. For that reason, it is necessary to re-examine the ways that chamber ensemble performers are able to decide upon and share qualitative musical information. Therefore, the next section will examine the notion of leadership within ensembles in an effort to understand how musical variables are agreed upon and disseminated amongst the ensemble members. Through this process, it will be possible to construct a new model of communication that recognises the unique musical content shared between performers.

The Case of Leadership

Musicological research on ensemble interaction has drawn heavily upon applied research from the fields of psychology and sociology. The first such effort was conducted by social psychologists Vivienne Young and Andrew Colman, in which they describe the inner social workings of string quartets (Young and Colman, 1979). Positioning their work as a preliminary, speculative study, the authors nevertheless present their findings in a prescriptive manner. Two primary themes

emerge from their writing: the effects of conflicting interpretative ideas upon ensembles and the amount of centralised leadership necessary for efficient group function (*Ibid.*: 13, 15). These two topics provide the basis upon which more recent research has addressed ensemble studies. Therefore, the following section will not only explore the potential effects interpretative discrepancies may have within ensembles, but also the enigmatic concept of musical leadership.

In the process of preparing for performance, musicians have to make decisions regarding how they should interpret the music given them, be it in the form of a score, lead sheet, or some other form of internal or external instruction. Arising from the notational gap that occurs when attempting to graphically depict sonic events, these decisions generally deal with matters of style or subjective preference, allowing musicians to choose from a range of theoretically viable alternatives. The rationale for these decisions could be based on a variety of sources, ranging from scholarly research about the musical work, composition, or genre, to intuition and personal preference (Hellaby, 2009). When performers are combined in an ensemble, their personal decisions often come into conflict with each other—conflict that can have profound effects upon the operation of the ensemble itself.

Disagreement in interpretative preferences within string quartets has been further researched by Keith Murnighan and Donald Conlon, who designate the phenomenon as 'the Conflict Paradox' (Murnighan and Conlon, 1991: 170). They describe co-performer interaction within Western art music as a fine balance between gridlocking conflict and cooperative mediocrity. Whilst interpretational conflict encourages the growth of interpersonal tension within groups, it sparks creativity and inspires individual freedom. Cooperation, on the other hand, lessens overall interpersonal tension at the risk of incurring blandness in the resulting performance. After surveying professional British string quartets, the authors conclude that successful ensembles (successful, in this instance, being defined as an assessment of the quartets' concert fees, number of albums and concerts, number of reviews, etc.) tend to embrace conflict, preferring the risk of instability over mediocrity (*Ibid.*: 177).

Use of the term 'conflict', however, might imply a stronger negative connotation than what actually happens within ensemble interaction. For example, when describing his approach to individual interpretational perspectives within the Guarneri String Quartet, violinist Arnold Steinhardt prefers to say that his co-performers 'complement and challenge one another' (Blum, 1987: 5). The positive aspects of challenging situations are further emphasised by Tovstiga et al. in their work with the Carmina Quartet (Tovstiga et al., 2004). Through interviews, workshop-style case studies and observation, the authors conclude that innovation occurs 'in the border region between stability and instability' (*Ibid.*: 10). Whilst musicians acknowledge the tension created by the conflict paradox, they do not necessarily feel encumbered or overly preoccupied with it in daily rehearsal and performance (*Ibid.*: 10). From these observations it becomes evident that the presentation and exploration of possible interpretations serve as integral elements of creative practice within small ensembles.

Murnighan and Conlon's distillation of ensemble interaction into two possible results—unproductive conflict or insipid cooperation—might therefore be an oversimplification of what is, in reality, a nuanced progression between two extremes. Given the active use of members' interpretative ideas, ensembles could instead be considered to be balanced between the unique input provided by individual members and mutually agreed-upon parameters, a situation referred to in psychological literature as team cognition. Psychologists Leslie DeChurch and Jessica Mesmer-Magnus, paraphrasing Kozlowski and Ilgen (2006), define this situation as 'an emergent state that refers to the manner in which knowledge important to team functioning is mentally organized, represented, and distributed within the team, [allowing] team members to anticipate and execute actions' (DeChurch and Mesmer-Magnus, 2010: 33). This organisation is balanced, as ensembles are, between 'knowledge that is distributed among team members (transactive memory)' and 'knowledge that is […] held in common ([a] shared mental model)' (*Ibid.*: 33). Whilst correlating the concept of team cognition to the interaction found within ensembles shows promise, relating these two situations to each other raises more questions than it answers. Most importantly, to directly

apply the conclusions proposed by DeChurch and Mesmer-Magnus, one would have to determine the nature of 'musical knowledge' itself. Successfully relating team cognition to ensemble interaction requires an understanding of how knowledge (from a sociological perspective) and its methods of distribution correlate to musical operation. However, such an interdisciplinary correlation may not prove to be as easy as it might first appear. Recalling the distinction made in Chapter One between propositional and procedural knowledge (Mode 1 and Mode 2, respectively), the nature of musical knowledge itself must be discerned before viable comparisons can be made to other fields. This topic will be addressed within relevant contexts throughout this thesis, and will prove to be vital to constructing a new framework of ensemble interaction. As will be made clear from the discussion that follows, the divide between musical interaction and other forms of social interaction may turn out to be more fundamental than previously considered. Closer examination of the role leadership plays within ensembles will highlight this discrepancy.

The following section first explores the developmental context for leadership: the environmental or circumstantial catalysts which may encourage one or more ensemble members to take a more forward approach to shaping the group's performances. From there, I will examine the different ways in which leadership may be expressed within ensembles. First will be the application of sociological models of leadership in their most direct application to a musical context—those instances where the musicians are not playing their instruments. Somewhat more complex, however, is the task of unravelling how leadership may operate during performance itself.[13] To do so, I will examine the expression of leadership in two other specific manners: its direct expression through physical gesture in performance, as well as the act of leading by example. These discussions raise important questions regarding the nature of the musical content being expressed by performers, and will force us to directly engage with their unique form of Mode 2 knowledge.

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[13] Again, my use of 'performance' refers to situations where musicians are actively engaged in playing a piece of music, with or without a non-performing audience.

Developmental contexts for leadership

Before exploring the different forms of leadership which may exist within musical ensembles, it is necessary to identify the ways in which individual musicians may assume positions of power. Through this discussion the myriad of contextual conditions upon leadership development will become apparent. In her work with undergraduate music students, Elaine King suggests that fixed, personal tendencies of the individuals within the group predispose certain members towards leadership (King, 2006b). The importance of charisma in the determination of leadership may be found in most (if not all) kinds of social groups, as described in the work of Meredith Belbin (1993). King nonetheless fails to account for three other factors that arguably play a role in the determination of leadership: experiential, contextual and musical. Experiential leadership may emerge from a discrepancy between skill levels and/or experience of musicians, encouraging one musician to assume a pedagogic role. Contextual leadership is based upon the social circumstances of the performance itself: should a performance be at the behest of a particular musician, then that musician may assume a directing role. Musical leadership, on the other hand, may be inspired by the parameters of the music being played.

In addition to charismatic influences on the development of leadership described previously, the impact of musical experience on leadership should not be underestimated. Each member of an ensemble has unique experiences and specialities originating from their own particular backgrounds. In pedagogical situations, where one ensemble member is of a distinctly higher skill level than their co-performers, the correlation between experience and leadership is evident. More experienced musicians are able to fulfil an advisory position due to the wealth of practical knowledge they have assimilated. From this perspective, King's observations of the emergence of student leaders could be based both upon charisma and experience. However, professional ensembles do not tend to have such discrepancies in skill level. In these circumstances, each member's unique musical background or specialist field may be drawn upon instead. For example, issues arising in the rehearsal of a jazz piece by non-jazz musicians might be referred to the member(s) of the ensemble with the most

experience of playing in that style. In this way, performers' individuality may be interpreted as a strength to many ensembles. Likewise, a performer's wealth of experience could be considered not as an assimilated body of knowledge, but rather as musicianship. If the other performers regard one performer to be overtly musical (in the sense that they may encourage the most desirable aesthetic interpretation of a piece, whatever that may be), that performer may subsequently end up in a leadership position. This proposal raises the question of what qualities comprise 'musicality'. Whilst an enigmatic trait to a certain extent, the concept of musicality is commonly used and understood amongst performers. For the purposes of the current discussion, therefore, musicality may be considered to be a referential term denoting ones' possession and utilisation of aesthetically pleasing and creative qualities. Further examination of this topic will occur within Chapter Five.

Social context may also factor into the determination of leadership. Performances, especially by student ensembles, may be motivated by one or two members in particular. In these situations, the members to whom the performance reflects most directly upon may receive a form of veto power. For example, the brass quintet I played in throughout my postgraduate degrees would often perform in members' individual chamber music recitals. The main performer would receive artistic license for the specific piece(s) that had been programmed, as they would be the one most affected by its successful performance. In the case of performances not programmed for concerts featuring a specific ensemble member, this aspect of leadership was nonexistent. Neither the Boult Quartet nor The Supergroup, the two primary ensembles I observed throughout my research at Birmingham Conservatoire, displayed evidence of this form of leadership. As the rehearsals and performances observed were conducted with the intent of fulfilling performance requirements for the entire ensemble, no single musician exhibited socio-contextual leadership. That being said, this form of leadership can also occur in professional contexts, where the public leader of a group (or, alternatively, the artist the other ensemble members play behind) has a form of executive power.

All of the factors discussed above which may encourage the emergence of leaders within musical ensembles could be considered to be performer-centric, arising through the actions and

backgrounds of the individual performers. However, musical context also influences who might have temporary artistic control. This form of leadership determination could be based on either of two factors: specific pieces' orchestration or cultural convention. In the first instance, those who have the melody or primary line are able to direct the ensemble's interpretation due to their musical position.[14] This becomes increasingly apparent when considering the terminology used in rehearsal, particularly among jazz groups. The melody line is often referred to as the 'lead' line, the title implying an associated assumption of power. Likewise, other forms of leadership which emerge from the music being performed may include a secure rhythmic drive from drums or bass.

An example of this form of musical leadership is demonstrated by an extract from a rehearsal by the Boult Quartet. In the third movement of Barber's *String Quartet No. 1*, bars 41–46, the violist has what the quartet agrees to be the melody. After rehearsing the excerpt, she comments that 'it just sounds too stupid to [play my part at the tempo just played] (*violist plays excerpt*)—it feels too fast' (see Video Example 2.1). She expresses her opinion on how the tempo changes indicated in the score should be interpreted based upon what her specific part is doing at that point in time. In doing so, she plays an example of what the resulting melodic line would sound like in that context, isolating the specific musical element in question. Therefore, her interpretation has been informed by her experience of playing that excerpt within the quartet. In this way, the musical context may inspire a musician to encourage the rest of the ensemble to share their interpretation of that musical context itself.

In addition to this transient, music-dependent form of leadership, there is a strong tradition of conventional instrumental relationships within ensemble organisation. Within such standard Western classical ensembles as the string quartet or brass or wind quintet, it is often the case that the first violin, trumpet or flute are respectively given more credence in decision-making processes (Norton, 1925: 15). Whilst these positions do not necessarily grant *carte blanche* authority to the performers in them, they do imply specific responsibilities. This could possibly be seen as an

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[14] Ford and Davidson, 2003: 63; Murnighan and Conlon, 1991: 166; and Tovstiga et al., 2004: 10.

extension of roles in orchestral situations, where such performers would be the principal musician of their instrumental group; for example, it is not uncommon for a leader to decide upon bowing for a *tutti* string section, or the principal trumpet to determine phrasing to be used throughout the brass. Even though the possible correlation between leadership within chamber ensembles and orchestral sections merits further investigation, its applicability lies somewhat outside of the realm of this thesis.

The four situational motivations for leadership development described above (charismatic, experiential, contextual and musical) can arise in various degrees and combinations, based both on the specific circumstances of performance as well as the musicians involved. Given the different ways in which co-performers may assume leadership positions, the balance and stability of roles acquired should have an effect upon ensemble interaction. From my experience in a multitude of unique musical ensembles, I have witnessed flexibility in the balance of power due to circumstance and member composition. On one end of the spectrum is rigid hierarchy: invariable, finite amounts of leadership assumed by specific members. This might be the case, for instance, in a ensemble that is 'fronted' by a well-known musician, or in a pedagogical environment where there is a significant difference between the playing abilities of the ensemble members. Consequently, at the other end of the spectrum is a balanced distribution of power, where all members equally contribute toward to direction of the group. Whereas formal hierarchy could be characterised by its evident leadership, this organisational tactic could be identified as supremely collaborative.

Leadership asserted verbally

Given that ensembles involve varying degrees of conflict and cooperation, a healthy, productive balance may able to be maintained through the assertion of leadership. Musicological research on leadership and group roles within ensembles has drawn extensively from the field of business management. In order to appropriately critique the applied research on leadership that has been conducted on musical groups, however, it is important to compare this body of literature with

its original, non-musicological underpinnings. It is worth noting that this research tends to apply to contexts in which ensembles are not currently playing. However, as mentioned previously, most rehearsal time is devoted to non-linguistic interaction. Drawing from James Burns' seminal work *Leadership* (1978), research within the field of business management has divided leadership into two categories: transactional and transformational (Felfe et al., 2004: 266). Additionally, current research has further identified a third category of leadership, the model of alternating leadership (Andert et al., 2011: 54). Critical examination of these categories and their associated modes of operation will enable comparison to ensemble interaction, allowing for clarity in determining how applicable associated sociological concepts may be to the study of musical interaction.

Transactional leadership encompasses a set of qualities that emphasise a linear, causal method of motivation: good performance on the part of followers begets positive contingent reinforcement, whilst bad performance encourages the opposite. In order to execute this model, transactional leaders 'emphasize goal setting, give instructions, clarify structures and conditions, and take control' (Felfe et al., 2004: 266). Due to the importance of goal achievement, transactional leadership could be considered reactionary: if a certain goal is achieved, then the follower is rewarded. If that goal is not achieved, however, the follower needs to receive further instruction or structure in order to effectively function.

In contrast to transactional leadership, transformational leadership strategies emphasise the personal development of the followers. Rather than critiquing or adjusting the specific actions followers may be required to execute in order to achieve a goal, transformational leaders focus on 'addressing and modifying their subordinates' values and self esteem, [encouraging them to] go beyond egoistic interests' (*Ibid.*: 266). This form of leadership depends on four strategies: idealised influence, inspirational motivation, intellectual stimulation, and individualised consideration (*Ibid.*: 267). As these strategies are follower-centric, actions taken to adhere to them are accordingly idiosyncratic. However, this form of leadership has been critiqued for succumbing to 'leader

glorification', considering the follower as a passive entity who is acted upon rather than a cooperating participant (Andert et al., 2011: 58).

Bearing these two forms of leadership in mind, to what extent have leadership models been drawn upon in musicological research? In her work with undergraduate students, Elaine King describes and categorises the team roles observed within their ensembles at the University of Hull (King, 2006b). This results in what could be considered a charismatic identification of leadership, originally developed by management theorist Meredith Belbin (1993). As happens in any social situation, certain people tend towards leadership roles based on their own personality. 'According to those factors that underlie behaviour,' Belbin writes, 'people may be preeminent in a certain team role' (Belbin, 1993: 32). In ensemble contexts, these leaders emerge through their own charisma and enthusiasm, rather than any strictly musical rationale. The predisposition of leadership allows ensemble members to steer rehearsals in situations where there might not be compelling motivation from other sources. The form of leadership utilised in this circumstance may be described as somewhat more transactional than transformational, as King notes that the leader was generally of higher technical level than the other ensemble members. Whilst she does not venture so far as to identify specific leadership characteristics, King concludes that the establishment of a leader is critical to an ensemble's success (King, 2006b: 279).

Contrary to the theory proposed by King, Mariana Manduell and Alan Wing describe co-performer interaction in professional flamenco ensembles as involving a highly flexible form of leadership:

> There is some form of (shifting) leadership during most of a performance, but as long as ensemble members do not compromise the performance, they have a fair amount of freedom […] Roles change, and it is sometimes difficult to place oneself within the hierarchy of command. Confrontations do occur, as do compromises, but management seems to be more of an 'accommodation' between ensemble members rather than either of the two extremes.
>
> (Manduell and Wing, 2007: 613)

In this model, leadership is considerably more flexible than the transactional or transformational models, with contributions from a variety of participants occurring spontaneously. These contributions prove to be vitally important not only to the immediate performance aesthetic of the ensemble, but also to the individual performers' morale and involvement (c.f. Tovstiga et al., 2004: 10). From a sociological perspective, this flexible form of leadership within ensembles could be considered analogous to the organisational model of alternating leadership. Darlene Andert et al. describe this model as a situation in which group members assume '*ad hoc* leadership positions in an intrepreneurial[15] manner by temporarily and freely [alternating] back to be observers, followers, and so forth' (Andert et al., 2011: 54). This model is dependent upon the presence of leadership behaviour within all group members (*Ibid.*: 55), resulting in a situation where leadership functions become 'distributed across multiple team members rather than arising from a single, formal leader' (Carson et al., 2007: 1217). Whilst Andert uses this framework as a method of reconsidering hierarchy within large corporations, its similarities to the leadership patterns found within musical ensembles are unmistakeable. Given these similarities, it is tempting to correlate alternating leadership and the processes exhibited in musical ensembles. However, neither Andert nor Carson specify what qualities leaders display in this form of social interaction beyond noting that the leadership characteristics found in this model are distinct from characteristics of observers or followers. Therefore, additional comparison to the activities of musicians within ensembles would be purely superficial.

Conflict over the amount of fixed leadership necessary for ensembles originates from a vital difference between the groups the above researchers investigated. Younger ensembles, such as those observed by King, evidently require a different form of leadership from mature ensembles. Undeveloped young musicians may benefit from stricter guidelines within which to productively operate. Fixed hierarchies could effectively mould such nascent groups into functioning units,

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[15] 'Intrepreneur' is a neologism combining the prefix 'intra-' and the noun 'entrepreneur'. Andert et al. describe this kind of business figure as a corporate manager 'with a flair for innovation' (Andert et al., 2011: 54).

allowing young musicians to develop and maintain individual responsibility. Flexible leadership, as exhibited by professional ensembles such as the Carmina and Guarneri Quartets, is able to encourage creativity and innovation without compromising the group's cohesion and productivity (see Tovstiga et al., 2004 and Blum, 1987). That more experienced ensembles do not require formal leadership suggests that the necessity of a distinct hierarchy is more characteristic of less mature ensembles.

Even in circumstances where leadership is strictly defined, the use of interpretative contributions from each constituent member has been determined to be valuable to both group morale and cohesion. Davidson and King, in a pedagogic article prescribing best practices for ensembles, comment that 'it is important that every voice is heard [in rehearsals], or at least […] every individual participant [feels] that he or she can contribute as desired' (Davidson and King, 2004: 107). The importance of considering all constituent members' voices recalls the views expressed throughout sociological literature on group interaction and stability. In an extension of his investigation into social groups, Tom Douglas explains that 'nothing causes people in any organisation to feel redundant quicker than to realize that all the important decisions in their group life are made by others' (Douglas, 1978: 50). Whilst this conclusion is drawn from Douglas's observation of non-musical groups, musicological research has confirmed its applicability to musical ensembles. In his study on the relationship between conductor and orchestra, Yaakov Atik observes that immense stress on the orchestral musicians may come from two sources (Atik, 1994). Firstly, many members of the ensemble have what may be considered a redundant job role. Particularly in the string sections, there may be a dozen or more people playing the exact same part.[16] Secondly, the presence of a conductor may inhibit the feeling of individual creativity, due to the presumed omnipotent directorial position. Atik concludes that such working conditions could result in 'long-term costs in terms of motivation and career aspirations' (*Ibid.*: 22). Based upon these observations,

[16] As a brass player, I am more familiar with a different form of redundancy: that of performing in a concert where I may only play one movement out of several larger orchestral works.

we can conclude that contributions from all constituent members of an ensemble are likely to be necessary for both its creative atmosphere and healthy morale, regardless of its flexibility of leadership.

Leadership through physical gesture

Given that small ensembles may engage in transactional, transformational, and alternating leadership, it is important to recall that verbally-articulated leadership may only play a small part in the larger system of ensemble interaction. Therefore, it is necessary to examine the processes which occur while the musicians are actually playing their instruments. As an outgrowth of the literature reviewed earlier on how performers' gestures may be interpreted by the audience, recent research has concentrated on the study of musicians in ensemble contexts. Beyond dealing with the issues arising from examination of solo performances (the meaning, if any, of gestures and the possibility of gestural repertoires), the interaction between multiple people in a social context has to be taken into consideration. Underlying the sociological concepts of group interaction and leadership that have been discussed previously in this chapter, however, is the basic premise that co-performers need to interact effectively with one another to perform music. The following section will examine the ways in which communicative gestures may encourage efficient and effective group interaction. Several common features have emerged from previous research in this area, falling into three categories: the existence of cueing systems, the use of visual contact, and physical gestures as indication of musical interpretation. Discussion of these topics seldom occur individually, as each plays an important role in the overarching performative interactions of musicians. Examination of each in turn will therefore clarify musicians' unique forms of interaction with each other.

Research on cueing systems could be considered an extension of the study of synchronisation between musicians; in other words, an investigation into the practical approaches by which performers maintain the illusion of synchronous actions. Previous studies of synchronicity within musical ensembles have primarily focused on the timing and coordination of sonic events.

Building on the pioneering work of Rudolf Rasch (see Rasch, 1979 and 1988), researchers such as King, Manduell and Wing have increasingly dealt with the social aspect of synchronisation. Elaine King explores possible ways that synchrony might be achieved through co-performer interaction, concluding that through the processes of 'hunting' and 'cooperating' ensembles are able to maintain the 'illusion of perfect ensemble' (Goodman, 2002: 155). Manduell and Wing approach the issue from a different standpoint, proposing that members of a musical ensemble act more like components of a connected network than individuals (Manduell and Wing, 2007). Valuable as it has been, this research on synchronisation has been limited to investigating the coordination of sonic events within time, to the exclusion of other qualities of those events such as volume, timbre, articulation, expression and so on. This view is incomplete, as these other qualities play a large role in determining the cohesiveness of a musical ensemble. From my experience playing with small ensembles (and even with larger band and orchestral sections), the difficulties arising from unmatched timbre or articulation often rival those which result from unstable tempi. Beyond the research thus far discussed, however, little more is explicitly specified about cues themselves other than that they exist, and that they occur at entrances, exits, and other structurally important points in the music (Williamon and Davidson, 2002). This lack of specificity could be the result of the variety of ways musicians interact with their particular kind of instrument, an area which has not been explicitly studied outside of pedagogical literature. Musicians' physical actions are necessarily affected by the instrument they play, just as athletes move differently depending on which sport they are engaged and their specific physiology. Therefore, even though cues may contain common features, there may not be a single formula for understanding how they are created. Although superficial physical characteristics may be different, they may serve as caricatures for shared musical concepts of starting and stopping together.

Whilst it is accepted that cues are both actively used in small ensemble interaction and are intentionally carried out to benefit ensemble coordination, questions arise in consideration of who is meant to see and gain information from them. Davidson and King, in their pedagogically-oriented

article on ensemble rehearsal, maintain that conscious gestures should be used in order to establish 'an effective three-way communication between [the performer], the ensemble, and the audience' (Davidson and King, 2004: 113). However, Manduell and Wing remind us that ensemble performance requires certain gestures that will be noticeable to co-performers, yet are intended to be invisible to the audience:

> The focal performer [of a flamenco group], who has the primary responsibility for cueing, must ensure during the performance that the cues are subtle enough not to attract (distract) audience attention yet are obvious enough to the ensemble to be recognized during the performance despite other distractions.
>
> (Manduell and Wing, 2007: 611)

This subtle balance has also been addressed in performance literature. In an interview with David Blum, violinist Arnold Steinhardt comments that even though cues are necessary in non-conducted ensembles, 'it's important not to allow our gestures to distract from the line of the music. Whether we like it or not, the audience takes in the visual aspect as part of the experience' (Blum, 1987: 10). This statement suggests that different forms of perception are being used by the audience and co-performers, raising the possibility that certain gestures are appropriate for specific intended receivers. From my experience within musical groups, there is a tacit understanding that cues can be 'too big' and overly noticeable. Likewise, excessive tapping of feet, a habit with both visual and aural consequences, is generally frowned upon in current performance practice of classical music. These actions can then become a distraction to the audience, prompting the (probably unrealistic, yet nevertheless present) fear that the audience may become preoccupied with the way the performance looks rather than how it sounds.

Visual contact between performers may be considered to be the more passive counterpart to cueing systems. Whereas discussion of cueing considers musicians as *senders* of information, discussion of visual contact considers musicians instead as *receivers*. The use of visual contact in ensemble situations has long been identified as vitally important to group cohesion throughout the

field's collected body of literature.[17] Within that agreement, however, lies division on exactly what kind of visual contact is beneficial. Aaron Williamon and Jane Davidson stress the importance of direct eye contact, focusing on measuring it throughout observations of piano duos (Williamon and Davidson, 2002). This emphasis continues through the subsequent research conducted by Davidson herself, Elaine King, Luan Ford and Jane Ginsborg.[18] Within this research, however, is also the suggestion that performers should focus less on each others' eyes and more on the rest of their bodies. In their research on eye contact, Williamon and Davidson also remark that 'looking was not simply a result of observing one another's hands, facial expression and so on, but rather a process for sharing ideas' (Williamon and Davidson, 2002: 62). That being said, the authors still conclude that eye contact is of great importance for establishing the relationship through which ideas are shared.[19] On the other hand, David Blum's conversations with the Guarneri Quartet reveal that the long-running ensemble avoided direct eye contact: alternatively, the focus of visual contact was their co-performers' fingers (Blum, 1987: 14). This, alongside research on choral ensembles by Liz Garnett (2009), implies that performers may not necessarily receive information through direct eye contact with their fellow musicians. Instead, inter-performer eye contact may be more important in establishing the quasi-intimate relationship necessary between people in order to perform music. Subsequently, qualitative information about the music itself (and its associated variables of tempo, dynamics, intonation, phrasing and interpretation) may be gleaned from observations of performers' physical gestures, regardless of whether or not they were intentionally communicated.

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[17] Blum, 1987; Davidson and Good, 2002; Williamon and Davidson, 2002; Ford and Davidson, 2003; Tovstiga et al., 2004; and Leman, 2010, among others.

[18] Ford and Davidson, 2003; Davidson and King, 2004; and King and Ginsborg, 2011.

[19] The content of the ideas being shared is never explicitly stated, although the authors comment that 'the observed [torso] swaying could represent the global level in a hierarchy of expressive gestural information, with the hands providing a local indicator' (Williamon and Davidson, 2002: 64). Upon reflection, however, this description does not clarify what information is being shared, other than that it is gestural in nature.

Not dissimilar to the way gesture is used in non-musical interaction, the body language utilised by performers may be able to provide insight into their intended musical expression and character. In their work with pianists, Williamon and Davidson argue that the human body is the 'physical centre for expressive information' (Williamon and Davidson, 2002: 44). King and Ginsborg, paraphrasing one aspect of Davidson's position, propose that singers' characters can be expressed through their gestures (King and Ginsborg, 2011: 180). Similar to the ways in which people eventually may understand and correctly interpret their friends' and relatives' body language, musicians' awareness of their co-performers' idiosyncratic movements becomes heightened over prolonged periods of time. Therefore, as performers work together, they become attuned to each others' body language and ways of approaching their musical instruments (Blum, 1987: 14)—in other words, their sound-producing, sound-facilitating and communicative gestures. Just as individual gestures may be intentionally used to achieve a certain goal (as is the case with cues), so body language can be manipulated. There is, however, an important distinction in what is being conveyed through each. Whilst cues address the question of *when* to play, body language may address the question of *how* to play. Elaine King alludes to this concept in relation to conducting:

> The conductor communicates much more than just a beat, for the members of an orchestra might read visual signals about expression through a conductor's entire body language in the same way that the co-performers of a string quartet might project interpretative ideas by watching each other's physical movements.
>
> (Goodman, 2002: 159)

Likewise, Williamon and Davidson briefly mention gesture as a source of information about performance intention (Williamon and Davidson, 2002: 55). Subsequent literature, however, has tended to focus on the effect of gesture and body language on coordination of timing, rather than coordination of interpretation.[20] Similarly, this research has focused on the generation of a taxonomy of gestures rather than investigation into the ways in which those gestures may disseminate qualitative musical information. Whilst this literature confirms that there is some form

[20] Ford and Davidson, 2003; Davidson and King, 2004; and Manduell and Wing, 2007.

of leadership taking place through cues, eye contact and body language, it simply affirms its existence without examining any underlying processes.

Leadership by example

Reflecting upon the ways in which leadership may be verbally articulated, it is possible to consider ways in which similar processes may occur during the act of playing. Building on the conclusions gleaned from the previous discussion on leadership through physical gesture, this next section will re-examine the models of transactional and transformational leadership from this perspective, highlighting how performers may be able to influence each other simply by performing in a certain manner. As discussed previously, the model of alternating leadership pertains more directly to the amount of leadership each member of a group expresses over time, rather than specific characteristics, and therefore cannot be applied in the same manner as transactional or transformational leadership patterns.

Within the context of unconducted musical ensembles, are any of the processes utilised by transactional leaders present?[21] The act of 'goal setting' becomes ambiguous, primarily due to the problem of defining what a musical goal is. Theoretically, the goal of an ensemble would presumably be to produce a successful performance (whatever may be contextually appraised as 'successful'). However, is it possible to set goals within the activity of playing music itself? Both tempo and volume can be 'set' by performers, encouraging their co-performers to attain or maintain such target parameters. These parameters may extend from such basic variables of tempo and volume to more abstract concepts such as playing in a musical or communicative manner. These criteria are known and understood by members of the ensemble, even if their specific qualities are difficult to articulate verbally. By performing within these parameters, musicians are able to effectively lead by example, 'clarifying structures and conditions'. The additional transactional leadership act of 'giving instructions' could be interpreted in a similar manner: one

[21] For consideration of this question in terms of conducted ensembles, see Atik, 1994.

musician may instruct their fellow musicians on how to perform a certain passage through the act of playing itself. Within the act of ensemble performance, such a musician is able to effectively 'take control', regulating how the resulting music should sound. John Sloboda alludes to this process, albeit within the context of solo performance, when he writes that 'expressive techniques are passed from one musician to another by demonstration' (Sloboda, 1985: 88). From my experience within ensembles, these actions are able to take place through the act of performance, without necessitating verbal dialogue. It is important to note, additionally, that these interpretations of transactional leadership elements are not necessarily what they would be in a traditional business environment: the achievement/reward system does not exist while playing, unless one considers the achievement of a specific 'successful' performance as its own reward. Thus, whilst there are elements of transactional leadership which can be found in ensemble interaction, there is not a direct, one-to-one correlation between this form of leadership in the context of business and musical performance.

Correlation of transformational leadership to the activities found within ensemble performance presents a unique set of difficulties in that the associated actions are less task-specific than those of transactional leadership. For example, 'idealised influence' is exerted through a leader acting as a role model, in both a technical (performative) and moral sense (Felfe et al., 2004: 267). In this manner, a musician may lead through their own practice and dedication to their craft. 'Inspirational motivation', on the other hand, deals more with long-term, optimistic goal setting (*Ibid.*: 267). Whilst this action may occur within musical ensembles outside of performance, it may not be as evident while the performers are actually playing their instruments. It is not uncommon to refer to a specific performer's manner of playing as inspirational. Rather than embodying characteristics that other musicians may want to emulate, this style of playing pertains more to the ethos and ideology of performance itself. Consequently, defining specific attributes of inspirational performance is highly personal. For example, my concept of an inspiring performance would entail a deep and passionate investment in the music being played. Someone else may hold extreme technical proficiency in high regard, whilst another may prioritise discipline and restraint. More

important than understanding the specific qualities which encompass inspirational performance, however, is realising that confrontation with inspirational performance while engaged in the act of playing may encourage other musicians (who recognise that performance as being inspirational) to focus on developing their own level of playing. In such a manner, musicians may be inspired by their fellow performers within the act of playing music. This does not mean that those musicians recognised as inspiring are actively concentrating on exuding that trait: rather, that it may be more of a side-effect of their heightened musical capabilities. Whilst musicians may be inspirational through the act of performance, several other qualities associated with Felfe's description of transformational leaders do not apply as easily. The concept of 'intellectual stimulation' is tenuous when related to musical performance. Even though the associated use of 'questioning assumptions' and 'reframing problems' (*Ibid.*: 267) is common during spoken portions of rehearsal, it is difficult to conceive of a equivalent in performance. Likewise, even though 'individualised consideration' may occur within the context of ensemble performance, its intent is markedly different. Felfe's description of 'individualised consideration' as 'the acceptance of individual differences concerning varying needs of autonomy, encouragement, responsibility, or even structure and instructions' (*Ibid.*: 267) holds more in common with the way teachers might operate in pedagogical environments than colleagues would in performance. Within ensemble interaction, the 'individualised consideration' that occurs is directed towards the individual sonic output of each musician. From there, co-performers' actions can be adjusted accordingly. Overall, although some musicians may be considered to be inspiring to their peers, other aspects of transformational leadership do not appear to exist in the act of performance, except in pedagogical situations.

It is interesting to note that this approach to applying sociological models of leadership to ensemble contexts implicitly calls attention to an aspect of musical interaction not explicitly focused upon in current musicological literature. Recalling Seddon's description of non-verbal communication as including 'body language, facial expression, eye contact, musical cues and gesticulations' (Seddon, 2005: 54), it is curious to note that only one activity mentioned is non-

visual. Similarly, George Tovstiga remarks that communication within a string quartet is primarily nonverbal, occurring 'through collective, inner sensing within the quartet, and through musical-acoustical or visible cues' (Tovstiga et al., 2004: 9). That being said, there is no further explanation of what may account for 'musical-acoustical' cues. Williamon and Davidson fall into a similar web of assumptions when they comment on the 'acoustical information exchange' which occurs within ensemble performance without any clarification (Williamon and Davidson, 2002: 59). Given the distinctly auditory nature of music, it is somewhat surprising that more research has not explicitly considered the role aural input plays in performance. Hypothetically, it could be presumed that a correspondingly large amount of qualitative information about the music being performed is communicated aurally—an assumption which is propagated by Tovstiga, Williamon and Davidson. However, there is no further examination of the nature of this acoustic information. As the primary output of a musical performance is sound, any additional acoustic information would have to be subtle enough so as to not attract attention away from the music itself. Should the performers add extra-musical sounds to the soundscape of the piece (that presumably were not intended by the composer to be included), the performance may not be considered to be of high quality. Granted, live performance is filled with 'non-musical' sounds—sounds which audiences are trained to accept (and, to a certain extent, ignore) as part of the performance. These sounds may be considered as primarily the incidental sounds of instrumental operation: the click of keys, the sound of breathing, and so on. In both vocal and wind instrument performance, the breath preceding note generation is recognised to be pedagogically important (Snell, 1997; Gaunt, 2007). As a brass player, I have been trained to both listen for and give a preparatory rhythmic breath before I play. To paraphrase countless brass instructors' recommendations to student ensembles, 'if you breathe together, you will play together.'

Even though the discussion thus far has focused on the 'non-musical' sounds which occur within musical performance, it is important to remember the amount of exposure musicians have to musical sound itself. Whilst certainly a much larger topic than may be considered in this thesis, the

extent of professional musicians' aural acuity should not be disregarded. That musicians acquire sophisticated manners of listening through experience is not a new proposition (Pecenka and Keller, 2009: 285). The concept that increased familiarity with a subject increases the amount of discrimination possible is not uncommon outside of music. Likewise, it is important to remember that aural input received by musicians does not occur in isolation. Recalling that the experience of musical performance is a multimodal phenomena, the sounds generated through that performance are necessarily accompanied by other sensory input. When playing in an ensemble, the music created by my fellow performers is inextricably linked to their actions—it cannot happen without any impetus. Therefore, the relationship between sound-producing gestures and the resulting musical output may prove to be vitally important to the dissemination of musical information within an ensemble. Before fully substantiating that claim, however, it is necessary to critically examine the relationship of sound-producing gestures to the music which is being played: the second research question, and subject of the next chapter.

Out of the previous discussions on the models of communication and leadership which have been applied to small ensemble interaction, we are still left with several large questions. Recalling the original thesis question—how do musicians interact and share information with each other while performing?—even though we have examined several ways in which musicians interact, little progress has been made in terms of identifying how musicians share information with each other. Before turning our attention to this enigmatic question, however, it is useful to reconsider what conclusions can be deduced thus far. First, neither linguistic nor gestural models of communication adequately address the relationship which exists between co-performers within an ensemble. Likewise, they do not consider the specific kinds of qualitative musical content which needs to be shared in such a relationship. Second, the leadership found within small ensembles is highly circumstantial, and may emerge through any number of developmental contexts. Third, whilst existing models of leadership may appear to outwardly correspond with the processes that transpire in ensemble interaction, we have not thus far identified *how* leadership actually works in musical

groups. I propose that this is primarily due to our inability to describe the nature of the knowledge content which is being transferred between co-performers. Beyond these conclusions, however, many furthers questions arise, falling into two main categories. First, what qualifies as communication within the act of ensemble performance? Does explicit communication (similar to that which exists verbally) exist at all? Given the scenario of 'leading by example', how are the designated performance parameters such as tempo, volume, and style received and interpreted by their co-performers? Second, how do performers shift between leading and following? Are such shifts intentional? How are they able to achieve a fluidity of ensemble role without verbal interaction? These questions prompt a closer investigation of the act of performance itself: particularly the ways in which performers may send or receive information (if that is the appropriate description for this activity). Through an understanding of this process, we will then be able to approach how this musical information may affect performers' activity within ensembles.

Problematising Communication

Although some progress has been made thus far in determining how ensemble members may coordinate their actions and share qualitative information about the music being performed, such research has been unable to do more than identify the non-verbal elements which factor into ensemble interaction. As a result, this identification process has not successfully been able to be condensed into a framework by which interaction itself may be understood. I propose that, in this situation, musicologists have not been asking the critical questions needed to unpick this aspect of musical performance. This, in turn, may be a result of focusing on propositional, Mode 1 knowledge rather than procedural, Mode 2 knowledge. As we have seen throughout this chapter, implicit within musicological research on ensemble interaction is a reliance on the paradigm of communication, drawing upon both its process of encoding, transmitting, and decoding information

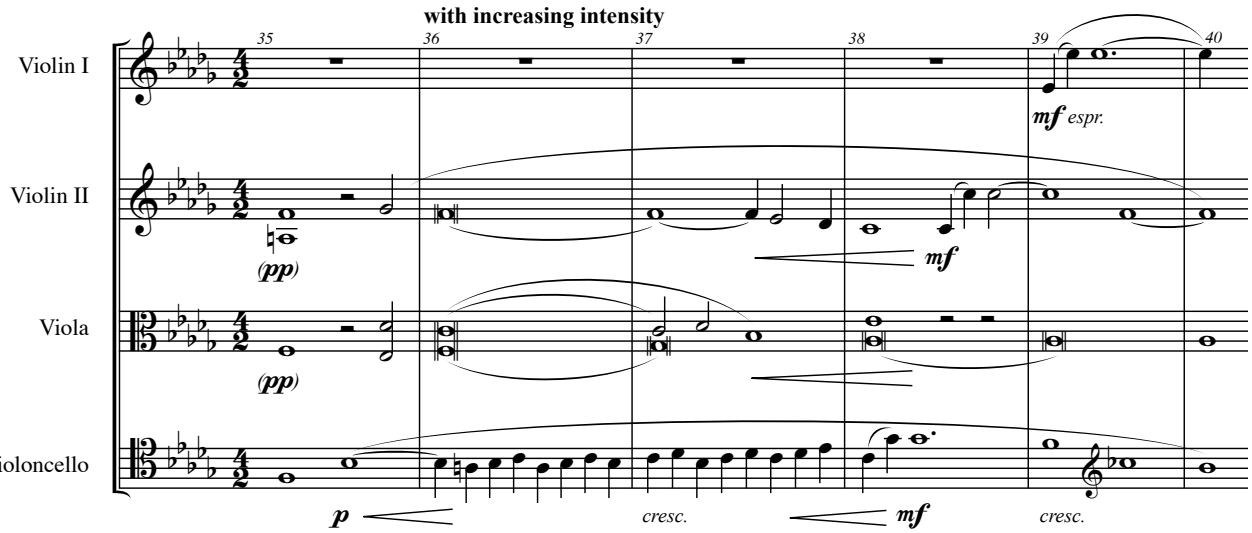
and its associated linguistic terms. With continual references to 'non-verbal communication' (King and Ginsborg, 2011), 'communicative gestures' (Dahl et al., 2010), 'modes of communication' (Seddon and Biasutti, 2009), and 'visual communication' (Kokotsaki, 2007), among others, this body of research perpetuates the tacit assumption that musical performers operate in a manner similar to those involved in conversation. This communicative process is analogous to that of a telephone or postal service (Garnett, 2010), where information is packaged into a medium, transmitted to an audience, and unpackaged from that medium by the audience. In other words, information is 'pushed' from one person to another. This model of communication assumes intentional action on behalf of the sender. However, use of this paradigm within a musicological context encourages a framework of understanding that is rooted not in musical performance but in social interaction. As a result of this, reliance upon a paradigm of communication may predispose researchers towards one particular frame of thought, preventing them from engaging with the underlying critical questions at hand. It is therefore necessary to further explore the assumptions propagated by application of this paradigm to musical contexts.

Case study: the Boult Quartet in rehearsal

In order to critique the paradigm of communication as a grounding for ensemble interaction, it is useful to begin by considering its direct application to a real-world situation.[22] Observation of a professional-level ensemble in action will provide a context against which this paradigm may be tested. Rather than utilising a sociological manner of observation—one in which I would generate Mode 1 knowledge—I will approach this case study from the perspective of a fellow musician, drawing upon the Mode 2 knowledge I have accumulated through similar experiences. This may prove to be a useful vantage-point in addressing the fundamental question of

[22] Material from the following discussion has developed from presentations I have given at the Royal Musical Association Postgraduate Students' Conference at the University of Manchester (January 2011), the Performa'11 Conference on Performance Studies at the University of Aveiro, Portugal (May 2011), and the CMPCP Performance Studies Network International Conference at the University of Cambridge (July 2011).

whether or not communication (as is understood in a linguistic manner) is actually occurring. The following two videos, taken from a rehearsal by Birmingham Conservatoire's Boult Quartet, provide a litmus test against which this communicative paradigm may be critiqued. These are first and second play-throughs of a short excerpt from the second movement of Samuel Barber's *String Quartet No. 1, Op. 11* (see Musical Example 2.1 for the corresponding excerpt from the score).



Musical Example 2.1 - Samuel Barber, *String Quartet No. 1, Op. 11*. Movement II, bars 35–40.

The excerpt contains a single, small musical idea that is that is picked up by three of the four instruments over two bars. Subsequently, the peak of the cello melody in the fourth bar is emphasised and expanded upon by the second and first violins (see Video Example 2.2).

In this first rehearsal, the cellist plays his melody subtly, without much of a *crescendo* until the third bar of the except. There, he dramatically increases both intensity and volume. Accordingly, his smooth and even bowings in the first three bars give way to larger bow-strokes at the peak of his melody. The second violinist and violist play their supporting material at an equal volume, with the violinist's moving line at the end of the third bar gradually emerging. His subsequent rising octave continues the cellist's line, until the first violinist propels the melody even higher. The violist's

performance remains unassuming both aurally and visually, in contrast to the larger motions used by the two violinists on their ascending octaves. In this play-through, the cellist clearly emphasises the growth of his line from *p* to *mf*. Both the second and the first violinist similarly 'lean into' their rising crotchet lines. Observing the way the musicians are interacting, it is apparent that the quartet members recognise that the cellist has the main line and perform accordingly.

A strict *prima facie* assumption of a communicative paradigm in this situation prompts the following analysis. In this play-through, the cellist has a distinct musical intention—a swell at the peak of his melody—which he wishes to communicate to the rest of the quartet. He encodes this musical phrase into both aural and visual media, resulting in the sound of his cello and the visible motions of his body. Through the process of playing his instrument, the cellist is then able to broadcast this intention to his co-performers, effectively leading by example. Subsequently, the other members of the quartet are then able to receive this multimodal sensory information, decode it, and apply the interpretation to their own performances. In this context, the paradigm does not present any immediate problems, and may be tentatively held as valid. However, observation of a single, 'ideal' situation may not reveal significant detail about the underlying processes in play.

Let us see what happens within the ensemble should the cellist play in a different manner, as occurs the second time this excerpt is rehearsed (see Video Example 2.3). The cellist begins this rehearsal play-through in a similar manner to the previous, but is noticeably caught in the middle of an awkward bowing at the end of the third bar. This prevents him from executing the indicated *crescendo* to the extent that he did previously, resulting in a markedly softer rendition of the rising two-note motif. The second violinist distinctly watches the cellist in the third and fourth bars, witnessing the smaller (if accidental) gestures used. Accordingly, the second violinist adjusts the way that he executes his ascending octave line, playing the figure softer and more unassuming than in the previous take. The first violinist, however, does not alter his playing as much as the second.

In comparison to the first playing of this excerpt, similar communicative analysis of the second play-through results in a different conclusion. The second play-through highlights an aspect

of human activity not explicitly found in the first: unintentionality. The cellist did not necessarily intend to underestimate the amount of bow available for him to use at the peak of his melody. Nevertheless, the fact that he did so provided aural and visual sensory information to the rest of the quartet. Upon receiving this information, they were able to adjust their performances accordingly. Re-examining the paradigm of communication within these circumstances, the stages of transmission and decoding remain intact and function as they have previously. The encoding stage, however, is either incorrectly executed or generates incorrect data (a musical concept which the cellist does not intend to transmit).[23] In light of this, we are left with the following question: is the expression of qualitative information—the process previously described in terms of communication—limited to communicative gestures? In what ways may musicians acquire information about their co-performers' interpretations and performances while they are currently happening? A more fruitful avenue of inquiry than has been undertaken thus far in this chapter, therefore, is to consider how the other musicians were able to infer information from the cellist's actions, regardless of whether they were intentional or unintentional. The addition of intention complicates the communicative paradigm which both the models of communication and leadership are implicitly based upon, as both explicit communication and leadership are, by nature, intentional.[24] Alexander Jensenius questions whether or not an action has to be 'carried out consciously in order to be perceived as a gesture [… allowing for] ambiguous cases where one person may perceive an action as intentional and another person may see it as unintentional' (Jensenius et al., 2010: 18). Thus, the attribution of intention plays a primary role in the process of communication. Literary theorist

[23] It is worth noting that this situation is not unique within the context of ensemble rehearsal. Idiosyncrasy and spontaneousness are commonly encouraged within performance of Western art music. Unexpected changes to performance context (such as the modification of another musician's individual performance) may prove to be the catalyst for such creative alteration of musical interpretation. For further discussion of the role performers' individuality plays in the creation of a performance, see Kivy, 1995: 128.

[24] Whilst is is possible to unintentionally communicate something, the concept has more to do with the breakdown of the communicative paradigm than unintentional expression. As illustrated by the colloquial phrase 'sending the wrong signals', the act of 'sending' may be intentional, but the outcome is not.

Stanley Fish remarks that 'words are intelligible only within the assumption of some context of intentional production, some already-in-place predecision as to what kind of person, with what kind of purposes, in relation to what specific goals in a particular situation is speaking or writing' (Fish, 1989: 295, emphasis removed). In addition, this statement may similarly apply to the interpretation of communicative gestures. What we are left with, then, is a framework by which explicit communication may be understood whilst neglecting other avenues by which information may be transferred between individuals. Questions of the processes by which musicians share information within the act of performance (hence, addressing Mode 2 knowledge) cannot be addressed simply by categorising the gestures being used, as that propositional form of taxonomy will generate data without an underlying rationale. To fully unravel the process by which musical interpretations are shared amongst performers within this context, we must turn our attention away from musical groups themselves and focus on the phenomenon of musical performance itself. It is only through an understanding of that activity from the perspective of Mode 2 knowledge that we may adequately consider the processes found within musical ensemble interaction.

The problem of intention

As the previous example demonstrates, the element of intentionality may significantly alter what originally appears to be a straight forward paradigm of communication. Recognising the enormous complexity surrounding notions of intention and action, this thesis must be limited to touching on the most pertinent associated theories. Similarly, it is vital when discussing intention to distinguish between intention from the perspective of the person who is acting and that which is attributed to an actor by an observer, forms of intention described by Maurice Merleau-Ponty as 'intentionality of act' and 'operative intentionality' (Merleau-Ponty, 1945: xx). Bearing this distinction in mind, the next chapter will investigate intentionality of act in relation to the phenomenology of an individual performer, identifying the processes by which personal intention operates. In order to determine the correlation (if any) between a performer's internal musical ideas

and their subsequent performance, it is necessary to determine the extent to which their consequent actions are intentionally conducted. After establishing a framework for understanding the intentionality of an act within the context of musical performance in Chapter Three, it will then be possible to explore the topic of operative intentionality (intention which is attributed upon one's actions by an observer) in Chapter Four. Reconsidering the above example found in the rehearsal of the Boult Quartet, the other musicians may or may not have attributed intention to the cellist's actions. Regardless, they were able to react to them. Within this ostensibly minor rehearsal event, the musicians are forced to actively gauge not only whether or not their co-performers' actions are intended or accidental, but also how to suitably react within this context. Whilst a brief overview of current philosophic research on intention is imperative in order to consider further the relationship of mental concepts (or perceived mental concepts) to subsequent actions, there still remains an essential aspect of the research question at the beginning of the chapter that remains unanswered: the nature of the information being actively shared by ensemble musicians. Through an understanding of what content is being expressed, we may then progress to examining the role intention may play in ensemble interaction.

A Question of Content

Through this chapter, I have demonstrated how current models of communication (and even the paradigm of communication itself) are unsatisfactory in describing the methods by which musicians interact and share information. The processes by which musicians coordinate musical variables such as tempo, dynamics, intonation, phrasing and interpretation during the act of performance do not behave in the same manner as other social interactions. What has become equally apparent is that the information somehow being shared by musicians falls firmly within the realm of Mode 2 knowledge. Whilst it may be possible to describe characteristics of this information

in a propositional manner (e.g. specific metronome markings and pitches), other linguistic or visual descriptions may merely allude to a musical interpretation. Therefore, it is necessary to examine the nature of this information, including how musicians engage with it both during and outside the act of performance. The remainder of this chapter will attempt to identify the nature of musical thought through an examination of language in rehearsal. From there, it may be possible to develop a more thorough understanding of the phenomenology of musical performance—the underlying structure required to approach the question of how musicians interact.

Musical language, musical thought

When engaged in discussion during rehearsal, performers use technical terminology that is often specific to the realm of music. Even though the words themselves may be frequently used in other fields (technical or otherwise), they may be imbued with an entirely different set of connotative implications when used in a musical context. In the final portion of this chapter, I will briefly investigate how musicians use this language during rehearsal. An understanding of this phenomenon may provide insight into how musicians actually conceive of music itself, bringing us one step closer to unravelling the enigma of Mode 2 musical knowledge.

The terminology utilised within rehearsal may not appear at first glance to be as technical as maybe be found in other fields as it draws upon commonly-used words and phrases. These 'borrowed' words—those not originally for the purpose of musical discourse—serve primarily as descriptors, creating a host of connotative associations through which certain concepts may be more succinctly understood. Through the application of 'non-musical' terminology, elements of music may be expressed in a manner which is more linguistically economical. John Dewey explains that language does not need to correlate directly with a concept, particularly when considering art as a quality of experience rather than an object:

> Not only is it impossible that language should duplicate the infinite variety of individualized qualities that exist, but it is wholly undesirable and unneeded that it should do so. The unique quality of a quality is found in experience itself; it is there and sufficiently there not to need reduplication in language.
>
> (Dewey, 1934: 224)

Thus, language—specifically, metaphoric language—provides the practical means by which people are able to refer to experience. Linguists George Lakoff and Mark Johnson, in their seminal work *Metaphors We Live By* (1980), describe the essence of metaphor as 'understanding and experiencing one kind of thing in terms of another' (Lakoff and Johnson, 1980: 5). They argue that humans necessarily conceive of the world as a web of inter-relationships through which many disparate concepts are understood. The resulting language, whilst economical, is still able to retain a richness of meaning and depth. For example, timbre is often described in musical discourse using terminology normally associated with physical texture. In a rehearsal of the Boult Quartet, the violist comments that the use of a certain hand position on the neck of her instrument will result in a note that is 'not going to be very strong […] It's going to sound fluffy because it's right at the top of the C [string]' (Rehearsal 2, 09:52). Although the term 'fluffy' is certainly not technical, it does encourage a mental association between the way that note will sound in that position and the texture of a soft material. Furthermore, that soft material that the sound is associated with may have other physical properties which may be extrapolated; for example, absence of definite edges or a solid core. The extrapolation of the metaphorical relationships between two concepts is identified by Lakoff and Johnson as a metaphorical entailment: 'a coherent system of metaphorical concepts [combined with] a corresponding coherent system of metaphorical expressions for those concepts' (Lakoff and Johnson, 1980: 9). Consequently, it is not uncommon for tone quality to be described as rough, bright, warm, and so on. Metaphorical entailments afford a wealth of cognitive associations by which the timbres characterised through this terminology may be understood.

In addition to comparing timbre to texture, musical lines may be described in relationship to the kind of movement with which they conjure association. Two rehearsal comments directed

towards the first violinist of the Boult Quartet highlight this association. At one point, the second violinist points out that the first 'suddenly [goes] to a more static line', a melody which contains less variation in pitch and note duration (Rehearsal 2, 22:36). Later, a comment by the cellist creates a stronger cognitive relationship between musical line and motion:

> Cello: '[First Violin], I think you could be more, especially at [rehearsal marking] two… could be a bit more physical. It needs it, it's muscular music, to be honest. I don't think it's any room for poncing—'
>
> Viola: '…muscular music…[laughs]'
>
> Cello: 'It is, though, isn't it? It's not pissing about, is it?' (Rehearsal 2, 1:17:05)

The way in which the cellist describes the first violinist's musical line imbues not only a sense of physical motion, but character as well. Through his description, the cellist calls to mind associations with determination and decisiveness, almost anthropomorphising the line.

Beyond the compelling usage of 'borrowed' terminology within musical rehearsal as qualitative descriptors, the ways in which musicians talk about their relationship to the music itself is revealing. Specific musical units or characteristics are referred to in a variety of ways, particularly in terms of objects, physical qualities or locations (see Table 2.1 for examples of this rehearsal language) [25]. Musicians' performances themselves may be objectified in a similar manner, treated as if they were physical locations. This is further emphasised through the comparison of the musical piece to a landscape, as the violist comments 'Can we […] go from [rehearsal marking] eleven, but slowly, to the end, and then do that a few times, just so I can kind of get the geography of it all' (Rehearsal 2, 28:02).

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[25] The following examples have been taken exclusively from video footage of the second rehearsal I filmed of the Boult Quartet, to illustrate how prevalent such language is within musical practice.

referent	*quality*	*rehearsal example*
object	given	'[You] do have to give [that quaver] to us.' [Cello, 1:11:08] 'So I'll give that bar before [rehearsal marking] seven.' [Cello, 13:59]
	possessed	'At the *Più tranquillo*, […] neither of you have rhythm.' [First Violin, 24:52]
	lost	'I just don't know how I'm going to find [that specific pitch].' [Viola, 07:58]
physical property	size	'I just think, if I make the accent bigger like you were suggesting, it's going to seem… it's going to *feel* like a downbeat.' [Cello, 36:44]
	length	'I feel the rest is too short, to me. It feels too short.' [Second Violin, 40:00]
location		'Where do you come in after the key change?' [Cello, 41:05]
		'We're not coming off the minims together.' [First Violin, 38:18]
		'It feels as though […] these guys are slightly behind me.' [Cello, 1:07:36]

Table 2.1 - Examples of metaphor in rehearsal language.

Examination of this performance-specific language in use allows us to not only understand how musicians verbally agree upon the variables in ensemble performance, but also, more importantly, to glimpse how musicians actively engage with musical interpretation. Lakoff and Johnson describe the process by which humans grasp concepts as 'fundamentally metaphorical in nature' (Lakoff and Johnson, 1980: 3). Therefore, language is a powerful tool when investigating human conceptual systems. The language used by musicians in rehearsal may indicate not only how they have adapted non-technical terminology in order to represent other concepts, but also how they are mentally perceiving those concepts in the first place. Recalling Lakoff and Johnson's definition of metaphor as 'understanding and experiencing one kind of thing in terms of another' (*Ibid.*: 5), metaphor is not only linguistic in nature, but also phenomenological. In later writings, Lakoff and Johnson propose that our experiences interacting with the world in a physical manner creates a form of phenomenological embodiment—the underpinnings by which our minds may create metaphors (Lakoff and Johnson, 1999: 36). They continue that 'the body is not merely somehow involved in conceptualization but is shaping its very nature' (*Ibid.*: 37). Along these lines,

musicians are able to create and use metaphoric language which correlates what may be ostensibly complex musical elements with physical experience. Likewise, these metaphors enable us as humans (looking beyond the musician/non-musician categories) to internally represent such musical concepts. In discussing timbre, Tor Halmrast points out that 'the widespread use of metaphors such as 'grainy,' 'smooth,' 'rough,' […] etc. among both experts and novices is a testimony to the existence of more or less distinct concepts of timbral features in the minds of listeners' (Halmrast et al., 2010: 184). Therefore, the term 'fluffy' does not purely serve as the placeholder for a specific timbre, but it sets in motion the mental imagery by which that timbre is understood.

Use of terminology such as 'mental imagery' is not unfamiliar to practising musicians. To what may this imagery specifically refer? Reflecting upon the previous discussion, mental imagery may not only include internal representations of musical variables (timbre, volume, style, etc.), but also representations of specific characteristics of ensemble performance itself (cohesive entrances and exits, active adjustment of intonation, etc.). Internal mental representations of these musical elements are grounded not only in experience, but in imagination. The language used by performers arises from attempts to verbally represent these musical elements through comparison to other forms of experience. Correspondingly, there is a complex taxonomy of metaphorical categories which may be recognised in rehearsal language. For example, applying categories proposed by Lakoff and Johnson in relation to non-musical metaphors, there may exist

- orientational metaphors ('I'm in the *lower* register of an instrument' or 'Our semiquavers are getting *behind*'),
- ontological metaphors ('Can we play the *soft* section again?' or 'We should play with a much *warmer* sound'),
- action metaphors ('Who has the *moving* line at this point?' or 'It's right after your *flurry* of notes'),

- and metaphors built on complex relationships ('His sound is very *rich*' or 'You're playing very *aggressively* there').[26]

This taxonomy is not codified by any means, as musicians continuously forge new relationships between musical elements and verbal language. It is not uncommon for ensembles to arrive at their own vocabulary directly derived from their collective experiences playing together. The associations made between experience and specific musical elements encourage organic development of language in a manner which may not be easily categorised.

The multimodality of musical phenomena

Just as the use of idiosyncratic language reveals elements of musicians' underlying thought processes, so the contexts within which the language is used provide similar insight. Lakoff and Johnson's definition of metaphor as 'understanding and experiencing one kind of thing in terms of another' does not specify that either the subject or the referent has to be linguistic, a point they raise in subsequent research (Lakoff and Johnson, 1999: 57). Consequently, musical phenomena may not only be understood through the linguistic metaphor of physical motion, but also through physical motion itself. Consider, for example, the following excerpt from a rehearsal by the Boult Quartet.[27] During a break from playing the second movement of Samuel Barber's *String Quartet No. 1*, the cellist remarks 'You know, it is worth, in the future, practising [bars 52–53]. 'Cos, actually, that's one of those things that, in a concert, is going to be a lot harder' (Video Example 2.4, 00:17; see Musical Example 2.2 for the corresponding excerpt from the score).

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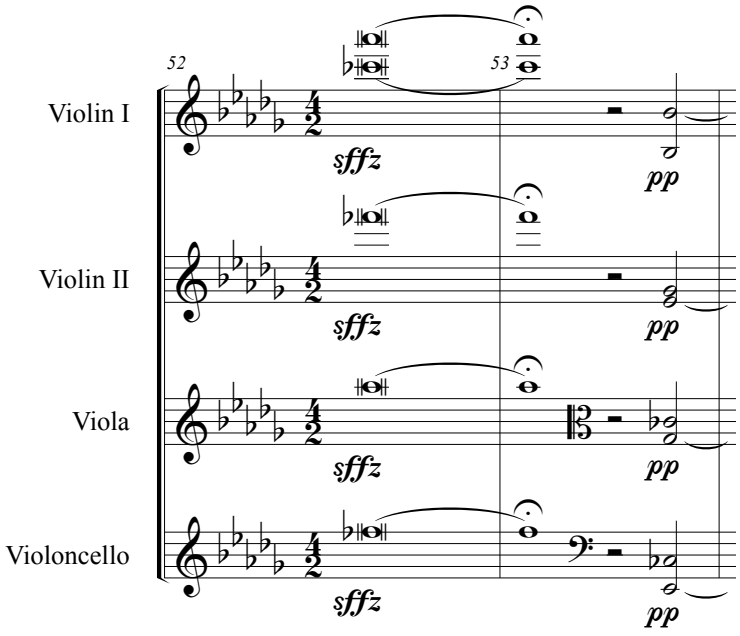
[26] For an examination of these categories in relation to musical analysis, see Saslaw, 1996.

[27] Material from the following discussion is developed from a presentation I gave at the Royal Musical Association Postgraduate Students' Conference at the University of Manchester (January 2011).



Musical Example 2.2 - Samuel Barber, *String Quartet No. 1, Op. 11.* Movement II, bars 52–53.

These two bars arguably contain the most dynamic contrast in the entire string quartet. At the conclusion of a prolonged ascent, the entire quartet plays an extremely loud, sustained chord, followed by a hushed *pianissimo* chorale. On paper, it appears as if the primary contrast is one of dynamic. However, the way in which the cellist describes this excerpt to his fellow performers highlights how nuanced his interpretation is. Rather than describing the perceived contrast using the technical terminology available to him or by physically playing his instrument in illustration, the cellist both vocalises and gesticulates his interpretation (see Video Example 2.4). These different forms of representation provide insight into his musical intention of those two bars, as well as highlight other contrasts that might not be explicit in the score. From an aural standpoint, the cellist's vocalisation illuminates two areas of contrast in his interpretation of this excerpt. The first concerns dynamic: while the first note the cellist sings is not very loud—especially in relationship to the volume of his voice immediately prior—the second note is inaudible. Even though no sound is produced at the second entrance, the cellist's motions inform us as observers that the note still exists. The second contrast is that of timbre. To say that the cellist sings the first note is to use the verb

loosely: the timbre is very raspy and harsh, more like an exhalation of air rather than utilisation of the vocal cords. This characterises that note as being of a more brutal and raw nature, contrasting with the subdued quality of the following section.

The way in which the cellist describes his interpretation of this excerpt highlights an important characteristic of the constituent aspects of musical phenomena (in this case of musical performance, 'musical phenomena' referring to musical acts involving both intention and realisation). Through his representation of these two bars, the cellist illustrates how, for him, sound and bodily movement are integrally related to musical content. Rather than translate his interpretation into language, he simultaneously expresses one 'domain of experience' in terms of two others, recalling the terminology of Lakoff and Johnson (1980: 117). Rolf Godøy writes about the multimodality of experiencing musical phenomena as such:

> The constant shift between perceiving and acting, or between listening and making (or only imagining) gestures, means that music perception is embodied in the sense that it is closely linked with bodily experience […] and that music perception is multimodal in the sense that we perceive music with the help of both visual/kinematic images and effort/dynamics sensations, in addition to the 'pure' sound.
>
> (Godøy, 2010: 105)

By expressing his interpretative intention (or alternatively, his mental image) of this musical excerpt in both visual and aural forms without his instrument, the cellist demonstrates the multimodality of musical phenomena.

Verbal interaction in rehearsals is filled with multimodal exchanges similar to the one just analysed. Musicians may use many multiple alternatives in how they refer to a specific musical excerpt, ranging from purely technical (as if they were describing the written notation) to the purely instrumental (see Table 2.2 for examples of this rehearsal language). These forms of reference may act as placeholders for specific musical excerpts, facilitating rehearsal conversation. At the verbal end of the spectrum, a musician may dictate specific locations in the score or individual notes and rhythms, using explicit linguistic terminology. Performers may alternatively use pronouns or

placeholders, referring to expressive markings or other descriptors in place of a specific bar number or motif. Use of these pronouns may give way to simple descriptions of the musical phrase in question; the most generic linguistic means of referring to a musical excerpt. Beyond these verbal descriptions, simple vocalised passages may serve as placeholders. The accuracy of these vocalisations is not typically highly prioritised, as they act as rather caricatures than strict 'performances'. As long as their representative function is fulfilled, their resemblance to the original musical material is irrelevant. Finally, the need for placeholders may be obviated through instrumental performance of the excerpt itself (as it would appear in performance or abbreviated). That being said, these categories are neither well-defined nor used strictly independently of each other. The use of all of these placeholders is mixed, and may be used interchangeably. For example, after verbally describing an excerpt, it may be played by someone else for clarification. Alternatively, a quick play-through of an excerpt may require further clarification of the score, which may be better suited to technical verbal explanation. Rehearsals teem with these multimodal exchanges, transcribed examples of which may be found in Table 2.2. However, linguistic transcription does not fully convey the manner in which these exchanges operate. Therefore, examples of multimodal comments taken from rehearsals of the Boult Quartet may be found on the attached DVD. The times indicated after each comment refer to their starting point within Video Example 2.5. For the examples of integrated conversation, the times indicated refer to the starting point of the conversations themselves.

mode of representation	*rehearsal example*
linguistic (explicit)	'So… the last quaver of the five/four bar is an upbow.' [First Violin, 00:12] 'I go from a G natural to a G sharp.' [Cello, 00:27]
linguistic (referential)	'So let's just go from there, on the nose, yeah? That high sustained note.' [Cello, 00:43] 'I don't—perhaps, don't do it over the four/four bar and the next three/four bar, don't do any *stringendo* there while we're coming in together, getting off our long B and your little motif; and then you get one bar to get us together and then we can start speeding up again for the last four bars…' [First Violin, 00:57]
vocalised	'So let's just do those, both those [*da da da dee, da dee dee dee*] passages 'cause they're both dog.' [Cello, 01:27] 'No, I think it's not that slow; I don't think it's that slow…[starts singing]…you go like this.' [Second Violin, 01:49] 'I think if it's the last time they play [*dye yupdum*], just count 'one two three [*ba ba baa*]'… that's what I think.' [First Violin, 02:15]
performed	'So, I'll give you [*three bar excerpt of cello line*], 'K? So I'll give that bar before seven.' [Cello, 02:34] 'Do you like that upbow? [*three note figure*] Is that what you went for? [First Violin, 02:46] 'For some reason we got an accent on [*three note figure*]… and it wasn't a small accent.' [Viola, 02:53]
integrated	'So that's likely to be an upbow, I don't mind. [*three note figure*] 'Cos then you have a long—' [First Violin, 03:05] '—On the [*dee da dah*]? OK, yeah?' [Cello] 'Do we have to? Because then I have to start on [*two bar excerpt of viola line*] …' [Viola] 'What's wrong with that? [*three note figure*]' [Cello, 03:23] 'You can't get the separation.' [Viola] 'What, what separation?' [Cello] '[*Da da dah*]' [Viola] 'Is that [*three note figure*]?' [Cello] 'It needs another bowing—' [First Violin] '—To me you can hear [*da dit dah*]: [*three note figure*]—' [Cello] '—But not as clearly as if you hear [*three note figure*], so if you do two bows…' [First Violin] 'No, it's two [bows].' [Second Violin] 'Why don't we do [*two bar excerpt of violin line, with repetition of last phrase*]?' [Second Violin, 03:52] 'To finish up on a—' [First Violin] '—To do the *fortissimo* on an upbow. [*miniature version of excerpt*]' [Second Violin] 'You'll still have the same problem with your longer C, then, do you?' [First Violin] 'Yeah, but still… [*last part of excerpt, repeated*] [Second Violin]

Table 2.2 - The spectrum of musical referents, ranging from the purely linguistic to the performed.

The interchangeable nature of technical terminology, general descriptions, vocalisations and instrumental performance suggests that such exchanges are rooted in the ways in which musical events are mentally conceived rather than being purely placeholders for these musical elements. Metaphor is only able to exist through the utilisation of historical personal experience of both the original musical element and the concept to which it is being compared. As Lakoff and Johnson write, 'no metaphor can ever be comprehended or even adequately represented independently of its experiential basis' (Lakoff and Johnson, 1980: 19). Therefore, in order for these linguistic/vocalised/instrumental placeholders to function within rehearsal language, the musicians involved need to have concrete experience both with musical elements and the physical world with which it is correlated. For example, if a musician were to describe a timbre as brittle, yet none of their fellow musicians knew what that word meant (or had no practical experience with anything of brittle quality), the metaphor would be incompatible with the experiences shared by the performers. Similarly, even if someone may imagine what sonic qualities a brittle timbre might have, they would certainly not be able to imagine that timbre applied to an instrument they had never heard before. As metaphors allow us 'to understand one domain of experience in terms of another', music may be consequently conceived as a domain of experience in itself. However, this proposition raises the question of how to identify such musical experience. If musicians do in fact relate experience in the physical world to experience in music, by extension the 'musical world' must be able to be understood not only in metaphorical terms, but in terms of the music itself. It cannot have a partial existence, only able to be conceived through metaphor. To draw on an overused idiom, regardless of whether a picture is worth a thousand words, that picture does not need to be verbalised in order to be understood: it can be grasped purely through visual terms. Similarly, music does not need to be verbalised in order to be comprehended. That being said, the premise of a musical 'domain of experience' begets a host of entailments, including the propositions that music may serve not only as a mode of interaction but also as a form of knowledge.

This proposition extends the discussion of the modes of knowledge begun in Chapter One. The existence of terminology specific to musical performance creates issues in dissemination comparable to that found in other specialised fields. Donald Schön describes the difficulties of sharing this form of experiential, Mode 2 knowledge found through analysis of practitioners in the sectors of architectural design, psychotherapy, and city planning:

> Because [professional practitioners] have developed a feel for the media and languages of their practices, the individuals we have studied can construct virtual worlds in which to carry out imaginative rehearsal of action. Because of the importance of this feel for media and language, an experienced practitioner cannot convey the art of his practice to a novice merely by describing his procedures, rules, and theories, nor can he enable a novice to think like a seasoned practitioner merely by describing or even demonstrating his ways of thinking. Because of the differences in feel for media, language, and repertoire, the art of one practice tends to be opaque to the practitioners of another.
>
> (Schön, 1983: 271)

Similarly, the opacity of rehearsal vocabulary is a result of the 'feel' that musicians have for the 'media and languages of their practices'. As mentioned previously, this vocabulary evolves in an organic manner, based upon the individual experiences of musicians rather than a collective codification. Even though this may appear to present difficulties when musicians interact together, it is important to recall that the language used in rehearsal is secondary to the music itself. In verbal discussion, performers look for metaphors to describe what is already understood as a musical element. Musical experience (both as a performer and a listener) is vital to interpreting and creating rehearsal language. The resistance musical elements give to 'translation' into other modes of discourse may also be seen in the notational gap which arises when attempting to graphically notate sonic events. Whilst notation provides a way in which musicians may visually share the instructions to create sonic events, reading that notation requires a depth of musical experience in order to correlate it with specific musical elements.

Given the insights gleaned from the above investigation into the nature of rehearsal language, it appears that research into musical performance is required to engage with Mode 2

knowledge. Not to acknowledge the fundamental difference between propositional and practical knowledge would result in a collection of observations and categories of terminology and processes without an underlying rationale; the essential concerns regarding the creation and dissemination of knowledge would remain inaccessible. There is a fluidity to Mode 2 knowledge which neither depends on classifications nor is limited to categories or formulae. It would be impossible to create an encyclopaedia of this knowledge, as it only is able to work through imprecision and idiosyncrasy. As we turn our attention to the phenomenology of musical performance, it will be necessary to proceed with the awareness that we are clearly dealing with a world of Mode 2 knowledge.

Conclusion

Through the critique conducted within this chapter, I have repeatedly found that research which applies sociological models of communication and leadership to ensemble interaction is flawed and incomplete. Whilst there is a wealth of possible models and theories which may be applied to ensemble interaction, a fundamental understanding of the phenomenology of performance is absent. When compared with practical experience (which theoretically should be the litmus test for a field called 'performance studies'), the research available does not sufficiently account for the complexity inherent in musical practice. That being said, the previous discussions do afford four primary conclusions which may aid in resolving the research questions posed in this thesis. Evaluation of each of these conclusions in turn will provide the basis upon which a new paradigm of understanding ensemble interaction may be explored.

First, attempts at categorising the gestures used during ensemble performance have neglected to identify how the gestures are used and what those gestures might signify to musicians. The umbrella classification of 'communicative gesture', commonly used within gestural research,

has not been qualified in terms of what information is being communicated. Additionally, there is a lack of consensus (or, in most cases, critical discussion) over what format that information may take. Research which applies non-musicological theories of interaction to musical contexts appears to forget that the circumstances under consideration are intrinsically different from linguistic or social contexts. Therefore, it is necessary to investigate what sort of information is in play during performance, and through what channels it may flow.

Second, whilst leadership is a common topic within ensemble research, there is little understanding of how musicians may exert leadership while performing. Similarly, even though current research on the subject has classified the possible roles which may be present in ensembles, the processes by which ensemble members assume those roles have not been identified. Bearing this in mind, the way in which leadership within musical ensembles operates shows similarities to the business management model of alternating leadership. In order to substantiate this claim, however, it is necessary to comprehensively understand the experience of ensemble performance—a phenomenon that I would argue has more in common with solo musical performance than with non-musical social interaction.

Third, prior research on ensemble interaction has tacitly presumed that musicians *need* to explicitly communicate in order to share information. This assumption originates from the paradigm of communication which underlies most (if not all) research on co-performer interaction. As I have discussed, the communicative paradigm fails to explain the full range of interaction which occurs within ensembles. This is particularly the case when considering the effects of ostensibly unintentional (or not explicitly intentional) actions during performance. Through review of video-taped rehearsals, I have shown that it is possible for unintentional actions to create the impression of successful communication. However, this circumstance appears to be an example of inference rather than explicit communication. This example is not unique within the context of ensemble performance, and engenders the impulsive, idiosyncratic creativity which is recognised to be aesthetically pleasing in musical performance regardless of the genre. Given the inadequacy of the

communicative paradigm to account for more than the 'ideal' contexts of ensemble interaction (if it is truly able to do so), a different approach is needed.

Fourth, musical phenomena are multimodal experiences, able to be understood by musicians through a variety of unique and flexible metaphors. As an extension of Lakoff and Johnson's proposal that metaphors 'allow us to understand one domain of experience in terms of another', I propose that musical thinking may be a mode of thought in itself. Therefore, when musicians participate in the act of ensemble performance, they actively draw upon a specific form of musical Mode 2 knowledge. Recognising the formidable philosophical and epistemological implications of this claim, validation of this proposal requires further reflective practice upon the phenomenology of musical performance in both solo and ensemble contexts.

These conclusions and their proposed remedies clearly require additional critical review. The first step toward clarification of the ways in which musicians engage with musical concepts within the act of performance is to examine the phenomenology of individual performance itself. Consequently, the next chapter will explore the second research question of this thesis: given that the performer affects the music being played, to what extent does the inverse apply? The interaction between musician and instrument is a fundamental element of performance, yet has received little critical review outside of the realm of pedagogy. A thorough understanding of the experience of performance should provide the concepts essential to creating a new framework for understanding the myriad of ways in which ensembles interact and, ultimately, make music together.

Chapter Three:

The Process of Performance

Introduction

Reflecting upon the ways in which ensemble interaction has been examined thus far, it may be proposed that musicians are somehow able to articulate qualitative musical information regarding variables such as tempo, dynamics, intonation, phrasing and interpretation to their fellow musicians without engaging in intentional communication. In view of this proposal, the next step in this investigation is to examine the phenomenon of musical performance itself in an effort to determine where the qualitative information articulated by musicians may originate. The effect of individual musicians' performances on their co-performers would not be so important but for the underlying fact that both musicians and their performances are idiosyncratic. In recent years, the relevance of the individuality of performers to the resulting musical work has been increasingly emphasised. In his seminal book *Authenticities* (1995), Peter Kivy proposes that musical performance should be considered a different species of artwork than the 'performanceless work' (Kivy, 1995: 279), a form of art which utilises the performer more as an arranger than as a messenger (*Ibid.*: 283). The recognition of performance as a unique and identifiable art form has prompted recent research on the methods by which musicians construct personal interpretations (Hellaby, 2009) and the extent that audiences may be able to identify differences between them (Gingras et al., 2008). Whilst there remain specific aspects of the construction and expression of individual interpretation in performance that require further academic exploration, it is accepted that musicians' decisions within performance directly impact the resulting musical work.

It is from this standpoint that we may consider the second research question of the thesis: To what extent does the musical content being performed affect the ways it has to be physically created by musicians? Given that the performer affects the music being played, in what ways may the inverse apply? This chapter explores this question by first delving into the psychology of intention, examining the process by which musical intention is aurally realised. In order to understand this process, it is necessary to consider psychological research on goal representation, both in simple and complex actions. This will subsequently include a discussion on the role that internal mental representations play throughout the learning process and in expert performance. The learning processes found in musical pedagogy include not only the cultivation of this form of mental representation, but also the training of musicians' bodies to carry out complex motions precisely and effectively. This discussion recalls the distinction made between Mode 1 and Mode 2 knowledge in the previous chapters of this thesis, examining how this practical knowledge is both assimilated into and embodied within the performer. It is from this perspective that it becomes possible to fully examine the effect musical intentions have upon the resulting physical motions necessary when engaged in instrumental performance. A thorough understanding of the phenomenon of musical performance in this manner will provide the basis for a more holistic view of the ways in which performers' physical actions may be classified and interpreted by their fellow musicians.

Intention and action in musical performance

In order to analyse the constituent aspects of the act of musical performance, it is necessary to establish the origins of the underlying processes by which performers' musical intentions are physically manifested as sound. As this chapter is more concerned with the processes by which individual musicians think that they interact with their instruments, the ensuing discussions will accordingly focus on personal intention—that which pertains to individuals' mental objectives when

performing actions. Musicians' personal intentions, however, is only one aspect of the phenomenology of performance. Chamber ensembles incorporate the actions and intentions of multiple musicians simultaneously, raising further questions of how intentions may be attributed to or shared among more than one person. The distinction between personal and attributed intention is particularly important in light of questions of unintentionality. Whilst there is an inherent disparity between what others may perceive to be intended and what actually is intended, the lack of intention does not negate the fact that an action occurred. Hence, even when the process from intention to resulting action is not fully complete, the action itself will inevitably remain. That being said, the question of how intentions may be attributed to or shared amongst ensemble members may only be fully addressed through an understanding of personal intention, and therefore must be relegated to Chapter Four.

From intention to action

Cognitive theorist Michael Tomasello defines personal intention as 'a plan of action [an] organism chooses and commits itself to in pursuit of a goal, [including] both a means (action plan) as well as a goal' (Tomasello et al., 2005: 2). These means and goals exist within a hierarchical structure in which subsidiary intentions may be nested within overarching intentions (Powers, 1974). This hierarchy may be considered almost recursive in nature in that the means to achieve a certain goal is, on a lower level, a goal itself. Tomasello, commenting upon the embedded nature of multiple intentions, remarks that:

> in general, what is a goal when viewed from beneath is a means when viewed from above. Starting at any given level, moving up to more general goals explains *why* a person has a particular goal […] Moving down the hierarchy to more specific action plans specifies *how* a goal is achieved in terms of intentional actions.
>
> (Tomasello et al., 2005: 3)

For the purposes of this thesis, personal intention may be considered to take one of three forms: intention for the future, intention of action, and intentional action. The last two have particular

relevance to musical performance. Recalling the metaphoric nature of rehearsal terminology, I propose that the basis of musical intention within performance is the decision to aurally manifest specific musical elements. Note that this form of musical intention is bound to the context of performance itself. It is certainly conceivable for other personal intentions to exist, such as the desire to win an audition or to effectively provide an example within the context of teaching (as has been discussed in the previous chapter). These personal intentions, however, may be better classified as developmental or pedagogical rather than strictly musical. Therefore, for the purposes of this thesis, a performer's musical intention is the collection of qualities or characteristics they intend to embody within their musical output. As will be discussed further within this chapter, this intentions may include both conscious and unconscious components residing at various levels of Tomasello's recursive levels of intention.

The first of these two forms of intention, the intention with which a musician acts, may itself be understood on various levels of detail. The most general form of this intention, presumably, would be simply to perform on an instrument. However, the mere act of creating a performance is not usually sufficient for trained musicians; it is not enough for the performance to merely exist, but it needs to exhibit certain qualities or characteristics. Therefore, the intention with which a musician acts may be understood as the desire to perform in a certain manner. Considering performance as the creation of aural output (at its very least), intention of action in this manner pertains to the specific musical parameters that make that aural output aesthetically desirable. This may include the intention to perform something in a certain historical style, the intention to imitate a certain performer (co-performer or otherwise), the intention to be utterly unique, the intention to precisely execute the notated score, and so on.[1] These intentions of action are not mutually exclusive, as they may simply describe different aspects of a performance: expressing one intention may not

[1] On the most fundamental level, this form of intention may be considered the intention to play certain pitches and rhythms. However, this intention may be considered rudimentary when discussing musicians who are beyond the formative stages of learning to play their instrument.

necessarily negate another. For example, the desire to imitate another performer does not mean that a musician has to forsake all of the aspects that make their performance individual and unique. From a musical perspective, intention of action may be considered comparable to performative interpretation, and develops in a similar manner. Individual performative interpretation has been described by Julian Hellaby as emerging from nine 'informants': era (style), authorship (score), genre, topic, topical mode, characterizer, tempo, duration manipulator, and sonic moderator (Hellaby, 2009: 30). To varying degrees, these contextual factors may influence the parameters which musicians decide to express or adhere to in their performances. Whilst this thesis will not dwell on the creation of an interpretation at this point, it is important to recognise interpretation as a form of intention, in that it serves as the set of characteristics which a musician desires a performance to embody.

Given the relationship between intention of action and musical interpretation, by what means may a specific interpretation be executed? It is one thing to intend to play a piece with a certain set of characteristics, yet quite a different one to actually do so. Out of this distinction rises the difference between intention of action and intentional action. Whereas intention of action pertains to the end product of an action, intentional action encompasses the range of subsidiary actions called for within the process of executing the larger action; ancillary actions which may be performed either consciously or unconsciously. Considering the difference between these two concepts, the following discussion will necessarily focus on the relationship between mind and body, drawing upon the branch of cognitive research specifically pertaining to how humans execute intended actions.

The process by which intentional action occurs has been concluded to be generalisable across a range of human activities, extending from button pressing to more complex actions such as sports (see Kunde et al., 2004). For the purposes of the present discussion, it is not the actions themselves which are important, but rather their subsequent results, referred to within psychological

literature as action effects.[2] Experimental psychologists Birgit Elsner and Bernhard Hommel propose that these action effects should be considered to be the motivating factors behind actions themselves, writing that 'intentional action requires, and is actually controlled by, some anticipatory [mental] representation of the intended and expected action effects' (Elsner and Hommel, 2001: 229). The cognitive presence of these action effects is vital to voluntary action (*Ibid.*: 230). Thus, one can only truly intend to execute a purposeful action if they know what that action may result in. Although the specific parameters may be flexible, there needs to be a mental correlate to both the intended action and its outcome. In the case of experimentation during individual practice, the intention may be considered to be related more to the process than the product. Hence, a musician may intentionally experiment with their instrument's methods of sound production yet not intend to create the resulting sound. Once they attempted to replicate that sound, the actions required to do so would then become intentional. Given this, it is important to also remember that the progression from action to outcome is never completely guaranteed. Whilst there is a direct (albeit not necessarily one-to-one) relationship between intention of action and its required intentional actions, these required intentional actions may result in multiple outcomes. Musical performance provides a context within which intentional actions could be considered to be entirely subservient to the intention of action (the goal, to use Tomasello's terminology). However, even though the actions necessary to playing an instrument are undertaken primarily for the sake of the resulting sounds, these actions may indirectly achieve other outcomes. Recalling the conclusions Davidson and others have arrived at regarding the importance of visual elements of performance to audience perception, the performers' actions may serve multiple purposes. Even though the intentional actions may be executed with the intention of creating music, they may indirectly fulfil other subsidiary objectives, such as dramatic expression or explicit communication between co-performers. This point is worth

[2] See Elsner and Hommell, 2001; Kunde et al., 2004; and Schack and Tenenbaum, 2004 for discussion of action effects within psychological literature.

bearing in mind throughout the discussions leading to the formulation of a new framework of ensemble interaction.

As an extension of their research on action effects, Elsner and Hommel propose that the causal relationship between intentional actions and the effects of those actions is distinct from that assumed in most associative learning theories. Rather than creating mental associations between cause and effect in the direction it was acquired (considered temporally, cause before effect), they claim that 'whenever a stimulus follows a movement in time, the representations of the two events will be associated such that reperceiving the stimulus will tend to activate the movement. Hence, we assume [and have demonstrated] backward conditioning' (*Ibid.*: 239). The proposed concept of 'backward conditioning' has been confirmed and identified in subsequent literature as the ideomotor principle. Joachim Hoffmann writes that the ideomotor principle assumes that 'the anticipation, the mere idea of the desired effects, calls forth those motor activations that have previously been experienced as producing the desired effects' (Hoffmann et al., 2004: 347). Originally developed in the nineteenth century, this approach to understanding intentional action was discarded by the behavioural researchers of the early twentieth century, only to gain a resurgence of interest in the past few decades (*Ibid.*: 347). Within the field of cognitive psychology, the ideomotor principle contributes to the overarching theory that internal representation is a necessary part of the human perceptual-cognitive control system (Schack and Tenenbaum, 2004: 343). The following discussion will explore how the ideomotor principle may provide an explanation for intentional actions, both in musical and non-musical contexts.

The ideomotor principle in action

As examples of the ideomotor principle, consider the following two theoretical scenarios. Within the context of the present discussion, the specific actions undertaken are minor compared to the relationship of those actions to their intentions:

1. A child throws a ball to her brother, who is standing ten feet away from her. After catching it, he throws the ball back to her. She successfully catches the ball.
2. A trombonist is playing in an orchestra. After playing his first note at a *forte* dynamic, the conductor asks him to play it softer. The trombonist subsequently plays his first note at a *piano* dynamic.

Whilst different in a variety of ways, both circumstances provide examples of actions which, when manipulated, may produce markedly different outcomes. Application of the ideomotor principle to these short scenarios illuminates some of the physical and cognitive processes taking place. In the first scenario, it may be assumed that the children's goal in throwing the ball is not simply to articulate their anatomy in a particular way, but with the intent of enabling their sibling to catch the ball. When applied to this scenario, the ideomotor principle allows us to assume that the implicitly children understand that in order to achieve a given effect, they need to execute an appropriate action. Through the accumulation of experience moving objects through space, the nature of gravity, and the physical qualities of the ball being thrown, this reverse causal relationship can become increasingly nuanced. Altering the events of the first scenario, the boy will have to use markedly different physical actions to throw the ball should he move further away from his sister. Whilst the action of throwing a ball maintains some similarities regardless of the distance with which is thrown, physical changes are necessary to compensate for different action effects. Therefore, specific characteristics of intention modify the actions that are needed to achieve the intended result.

Now consider the second scenario, involving the orchestral trombonist. Playing the instrument at *forte* and *piano* both require common elements: moving air through the instrument, maintaining a certain embouchure, keeping the slide at a precise length and so on. However, as the volume of sound produced is directly related to the amount of vibration through the instrument, each dynamic requires that the trombonist interact with his instrument in a very specific physical

manner. Even though the difference in physical approaches required to play at various dynamic ranges is nuanced, it is by no means negligible. All it takes is a small change in air speed for a *piano* to erupt into a *forte*, as any wind player stifling a laugh will know. All acoustic instrumental families depend upon subtle physical interactions in order to produce the wealth of musical sounds common in Western art music (Dahl, 2006: 129 and Windsor, 2011: 46). The relationship between movement and sound is ingrained in the act of playing an acoustic instrument, for, as Thomas Jerde comments in his article on hand movements in instrumental performance, 'it is hardly surprising that one can predict a horn player is going to play something louder because she takes a large breath' (Jerde et al., 2006: 82). However, I propose that this relationship, whilst admittedly obvious, plays a significant role in the phenomenology of performance. A reverse causal relationship similar to the one at play with the children throwing the ball exists when musicians play their instruments; implicit understanding of this relationship allows intention to determine action.

The accumulated ecological understanding which moderates this implicit relationship between action and effect falls firmly within the realm of Mode 2 knowledge. The children do not need to propositionally understand or communicate how they know how to throw a ball varying distances, yet they do so innately. Consider if one were trying to teach this skill to a robot or some other entity entirely reliant upon Mode 1 knowledge. Although it may execute the action correctly, the robot would need to base its motions on accurate measurements of distance, weight, wind speed and so on. Calculating the forces required to move the ball through space is purely a mathematical endeavour, and would be simple should these variables be measured. However, the robot would never be able to convert the experience of throwing the ball into the same rich Mode 2 knowledge the children utilise. Likewise, it would be irrelevant to the children what the exact distance between them would be; they would simply throw the ball. Should it miss, they could adjust their actions with each subsequent repetition. Moreover, the children's minds may be optimised to function in this manner. Sverker Runeson and Gunilla Frykholm propose that 'evolutionary pressure has been on achievement, not on the kinematic detail of how we achieve. Therefore our motor system need not

deal in movements as such—only in actions' (Runeson and Frykholm, 1983: 593). Therefore, even once the children have arrived at the exact combination of muscle movements necessary to throw the ball to a precise location, it is unnecessary for them to be cognisant of those muscle movements. Instead, they are concerned with the ball going to the location they want it to, and that the action of doing so feels a certain way.[3] This does not mean that the children are always unaware of their muscle movements; only that these individual movements do not have to be actively concentrated upon in order to occur.

The same principle holds for the case of the orchestral trombonist. In musical performance, the action effect primarily takes some form of sonic output. Whilst this statement may appear trivial, it highlights an important point which may be lost when applying cognitive studies on intentional action to performance studies. Sofia Dahl comments that the effectiveness of musicians' actions when operating their instruments is continuously gauged in terms of the sounds the instrument produces, rather than the movements themselves (Dahl et al., 2010: 37). Similarly, Marc Leman comments that skilled performance involves the instrument being handled 'as an extended body part', allowing the musician to focus on the aural output of their actions rather than the actions themselves (Leman, 2010: 130). Thus, a performer's action effect itself may be considered not only to be what I have previously called musical intention, but as the musical result itself. Therefore, the intention to create a musical performance which embodies certain characteristics or qualities will directly influence the manner in which a performer physically operates their instrument. This is made possible through an understanding of the mechanics by which individual performance functions, derived from musicians' extensive experience of performing on and listening to their instrument. I propose that engagement with this form of understanding within the act of

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[3] In their writing, Runeson and Frykholm go on to propose that it may actually be impossible for the brain to operate in such a compartmentalised, controlling manner, saying that 'there cannot be […] a motor program or a central controller instructing the myriad muscles in detail as to what they should do at each movement, simply because the magnitude of such a task would exhaust the capacity of any conceivable controlling device, brain or computer' (Runeson and Frykholm, 1983: 593).

performance qualifies as a form of thinking. Some performers may not agree with the proposition that they 'think' while they play. However, I would argue that this objection is more semantic than anything else. In this case, 'thinking' is not necessarily the same conscious thought that is associated with Mode 1 knowledge; likewise, it is not characterised by the ability to be linguistically expressed, nor should it have to be. Rather, my use of the term 'thinking' is merely one of the ways to describe active engagement with knowledge, conscious or otherwise.[4]

Even though this analysis may appear to be an oversimplification of the complexities of playing an acoustic instrument, I propose that the dynamic physical relationship between performer and instrument I have described holds true for more subtle circumstances. Production of unique timbres, articulations and other expressive features still relies on an intuitive understanding of the way in which the performer's body and instrument interact. The underlying rationale behind this model is heavily rooted in the processes inherent in individual practice and the development of instrumental technique. The following video examples, taken from both performances and rehearsal, highlight the effect musical intentions may have on the relationship between performer and instrument. The examples discussed will progress from the most basic of causal relationships between action and sound to increasingly complex correlations.

The first video example under scrutiny is taken from an improvised performance by The Supergroup.[5] At the beginning of the performance the bassist, Sebastiano Dessanay, interacts with his instrument in three distinct manners: he draws the bow across the strings in a traditional manner of performance, he plucks the strings, and he strikes the back of the instrument's body with his hand (see Video Example 3.1). The fact that each of these techniques produces different musical results is hardly surprising; as many a contemporary performer knows, the search for 'non-traditional' techniques of instrumental sound production is ever ongoing. On a very basic level, however, they illustrate that the performer's sound-producing gestures directly correlate with the

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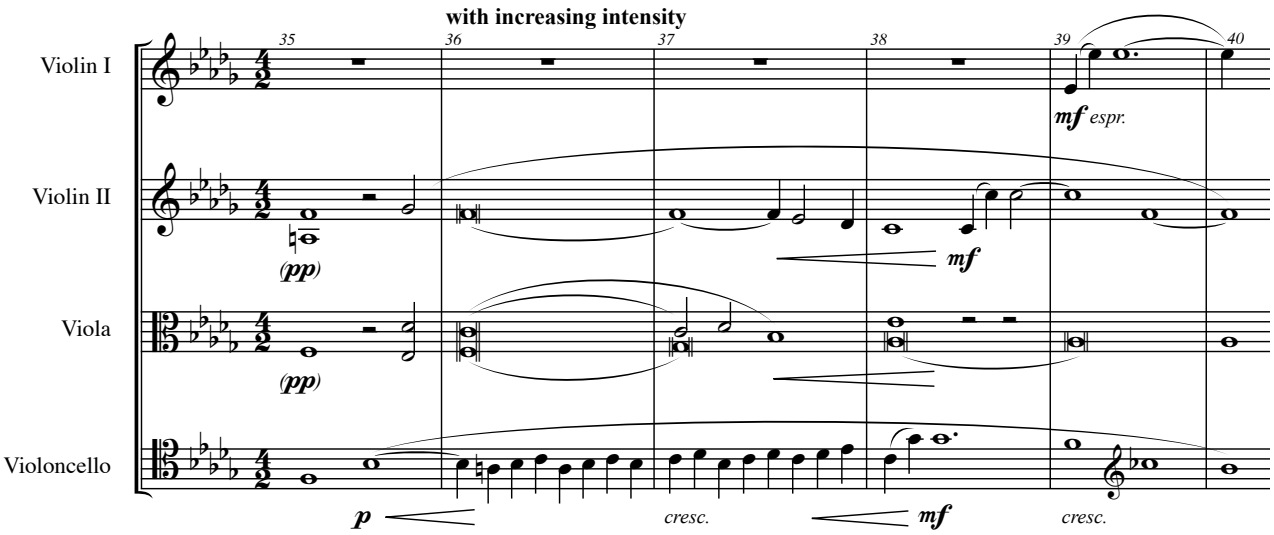
[4] I would like to express thanks to Christopher Redgate for insightful discussion on this topic.

[5] *Improv.*, Birmingham Conservatoire, 19 January 2011: 'Waltz of the Tearing Tears'.

resulting musical output, recalling the four categories of physical gestures made during performance presented by Jensenius. Sofia Dahl similarly describes how 'distinct sound properties' are directly related to specific movements used in the playing of instruments (Dahl et al., 2010: 46). Therefore, it may be proposed that in this video example the type of sound-producing gestures executed may be directly associated with a specific type of sonic output.

Given the relationship between the type of sound-producing gesture and type of sonic output, what may be extrapolated about qualitative aspects of gestures and their resulting sonic outputs? If a specific characteristic of a sound-producing gesture is changed, yet the overall structure remains the same, how will the music created be affected? The following video example focuses on the increase of dynamics across several instruments. This video, taken from a rehearsal of the second movement of Samuel Barber's *String Quartet No. 1*, was analysed in the previous chapter with regard to the communicative paradigm. The present analysis will instead be concerned with the performers' interactions with their instruments instead of with their fellow musicians (see Musical Example 3.1 for the corresponding excerpt from the score).[6] As the piece progresses, the quartet performs the notated *crescendo* (see Video Example 3.2).

[6] Material from the following discussion has developed from a presentation I gave at the Performa'11 Conference on Performance Studies at the University of Aveiro, Portugal (May 2011).

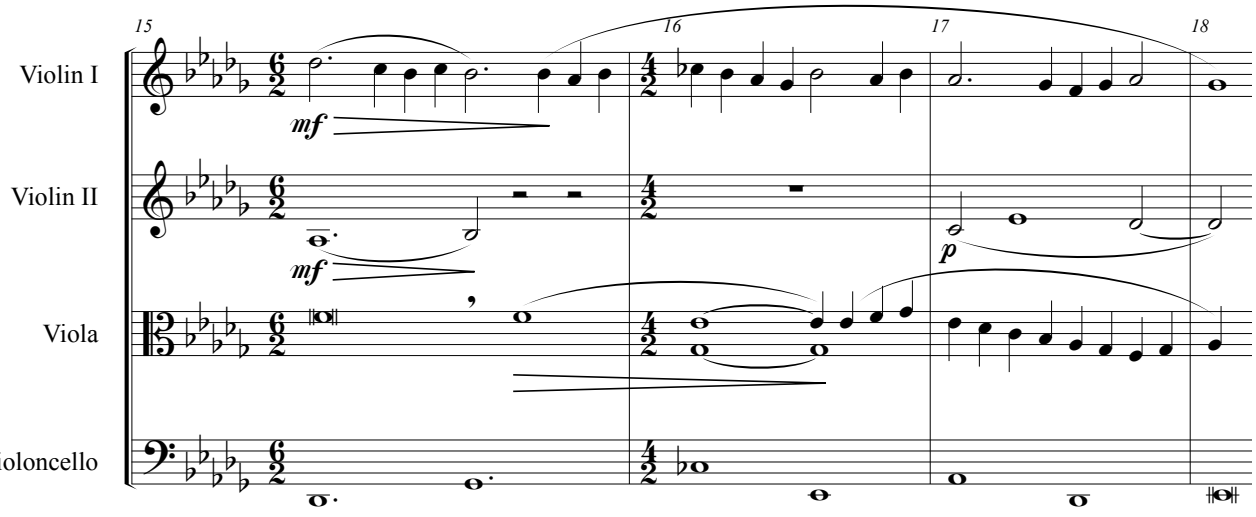


Musical Example 3.1 - Samuel Barber, *String Quartet No. 1, Op. 11*. Movement II, bars 35–40.

The *crescendo* throughout this excerpt results in a marked increase in movement by the cellist and violinists, particularly on their ascending two-note motif. Even though the *crescendo* is indicated in their parts, the performers' physical movement (intentional or unintentional) exists whether or not the players are true to the score. Recognition of a dynamic relationship between musician and instrument provides one possible explanation for why the violinists' and cellist's motions increase toward the end of this video example. Execution of louder volume requires that performers' bows move at a faster rate across the strings of their instruments, necessitating faster bodily movement. Having developed extensive experience playing stringed instruments, the performers of the Boult Quartet understand the relationship between action and sonic output, and are able to consequently adjust their actions to play at a certain dynamic. Whilst this example only considers the effect of physical motion on volume, the possibility exists that more qualitative aspects of performance, such as articulation or expressive modification of timing, are similarly related to physical input.[7]

[7] Additional support for this conclusion may be found in pedagogical literature. For example, Edward Kleinhammer's *The Art of Trombone Playing* (1963) and Scott Whitener's *A Complete Guide to Brass* (1997) describe in detail the physical elements necessary to produce certain articulations and tone qualities on brass instruments.

Extending the conclusions from the previous discussion, the next video example will allow for investigation of whether even more nuanced musical elements than a change of dynamics or pitch may motivate changes in performers' sound-producing gestures. Consider the following performance example (see Musical Example 3.2 for the corresponding excerpt from the score).[8] Specifically under scrutiny is the way the violist interacts with her instrument changes while playing different musical content.



Musical Example 3.2 - Samuel Barber, *String Quartet No. 1, Op. 11*. Movement II, bars 15–18.

Observing the performance, the violist's movements at the beginning of the excerpt are slow and measured (see Video Example 3.3). However, on the third beat of bar 16, her physical motions noticeably change. At the beginning of her moving crotchet line, she applies more bow pressure in a faster motion. This results in diagonal bodily movement from the lower right to the upper left side of the performer. Due to the stillness of the musical line around it, this motion appears distinct and may even seem slightly out of place.

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[8] Material from the following discussion has developed from a presentations I have given at the Royal Musical Association Postgraduate Students' Conference at the University of Manchester (January 2011) and the Performa'11 Conference on Performance Studies at the University of Aveiro, Portugal (May 2011).

Analysis of the score from the perspective of someone performing one of the parts may highlight the factors which may have motivated the violist's change in motion. As opposed to the previous example, however, the change in musical output does not appear to be overtly tied to a change of musical instruction. In fact, cursory examination of the viola part shows that there is a written *decrescendo* before the moving crotchet line. Strict application of the conclusions of the previous example prompt the assumption that as the viola line gets softer, the motions necessary to play the line may diminish accordingly. However, the opposite actions occur. What may motivate the violist to change musical intentions so dramatically from what is indicated within the score? Within the context of the movement, the crotchet line serves as a counter-melody, pulling the viola part away from its previous accompanimental role. Through performing the counter-melody with such sensitivity and awareness, the violist illustrates her recognition of the musical roles at play within this movement. Whether the effect of becoming more prominent derives from analysis of the score, from prior discussion, or was a spur-of-the-moment decision, it is most likely that the violist engaged in a form of *knowing-in-action*. Donald Schön describes this form of knowledge as appearing 'in much of the spontaneous behavior of skillful practice' in a manner that 'does not stem from a prior intellectual operation' (Schön, 1983: 51). If this is the case, the past experiences of the violist, both as a listener and as a performer, allow her to make informed decisions regarding her musical intention in performance. Considering musical performance as a form of skilful practice, complete with its own form of knowing-in-action, suggests that musicians' decisions are informed not only by 'intellectual' (i.e. propositional) influences such as score-based analysis, but also experience in the act of performance itself. This experience may include highly individual aspects of performance, such as knowledge of how a certain instrument responds in a specific register, or broader elements, including conventions of orchestration such as melody, countermelody and accompaniment.

It is important to note that within all of the examples discussed thus far, the physical changes made by the performers to reflect differing musical intentions are all observable. The differences in action that take place may differ radically in terms of proportion and extent; Sebastiano turning his

bass around is certainly more noticeable than the Boult Quartet violist's slight adjustment of torso movement. Even so, the musicians' physical changes and their aural effects can be perceived by external observers. Naturally, changes made within a musician cannot be directly observed. I would be hard-pressed to be able to tell from visual inspection whether a fellow trombonist was placing their tongue at the back of their teeth or at the roof of their mouth. However, once they had performed with that specific articulation, the effect of that physical change would be evident aurally.

It appears that the observable changes of musicians' actions while performing may provide insight into how their musical intentions have changed as well. Interpretation of these changes, however, requires experiential knowledge on the part of the observer, a topic which will be critically examined in the next chapter. For the purposes of the current discussion, however, it is useful to consider a circumstance where the causal relationship may be most evident to an observer: the beginning of a musical phrase. At this point in a performance, musicians are still in the preparatory stages of action, priming themselves to operate their instruments. This involves not only the anticipatory mental representation of specific action effects, but also the physical actions needed to position their bodies such that they can execute subsequent action. For example, in order to play a wind instrument, air needs to pass through the instrument. In order to exhale air through the instrument, the performer needs to inhale before playing. Their preparatory breath is subsequently influenced by a combination of the performer's action-effect representation and procedural knowledge of how to operate their instrument; i.e. in order to execute X action effect, Y and Z physical actions need to occur. The physiological adjustments required before physical action occurs have been referenced in the literature on kinematics as preadjustments. Sverker Runeson and Gunilla Frykholm, when discussing the case of a person carrying a heavy box, remark that 'to be efficient, postural adjustments must often be undertaken before a new activity is begun. Hence, postural preadjustments, tuned to the intended action, are characteristic constituents of animal activity' (Runeson and Frykholm, 1983: 590). Therefore, considered purely from an individual performer's perspective (temporarily disregarding ensemble playing), these preparatory actions allow

the musician to be in the best possible position to execute their musical intentions. The effect that preparatory actions (beats, breaths, up-bows or otherwise) have on the resulting sonic output has been expounded in both pedagogical and anecdotal literature. Michael Tree, violist with the Guarneri Quartet, comments in conversation with David Blum that the preparatory gesture 'should always be at one with the spirit of the music, whatever it may be. […] When a movement starts lyrically, the preparatory beat should often seem more a continuation than a beginning' (Blum, 1987: 13). Similarly, Mine Dogantan-Dack argues that 'it is not the exquisite phrasing that follows the [singer's] breath, but the breath that follows the singer's (embodied) mental conception of the musical phrase' (Dogantan-Dack, 2006: 461). In addition, pedagogic accounts from my own education stress the importance of breathing in the spirit with which I intend to play. Whilst preparatory actions have the potential to affect co-performers, the present discussion will be limited to the effect that preparatory actions have on the individual performers themselves. Their capacity to effect ensemble interaction may circumvent the traditional avenues of communication discussed in the previous chapter, and will be examined further in this thesis.

It is worth noting that as the relationship between musician and instrument becomes more complex, it increasingly resists expression within the discourse of Mode 1 knowledge. A basic causal association between action and effect in music, such as that observed in the example where Sebastiano played his bass in three different manners, may be easily indicated linguistically. Written scores are often littered with performance directions to interact with an instrument in a certain manner, a trend that has increased throughout the twentieth century.[9] However, use of a linguistic method of indicating more complex associations between the performer and their instrument—which may subsequently result in timbral or interpretative changes in the resulting music—fails for

[9] For example, string players are familiar with techniques such as *pizzicato* and *sul ponticello*, brass players with *con sordino*, and so on. Extended techniques have become increasingly common and varied throughout the twentieth century, ranging from Mahler's indications to raise the bell of a brass or woodwind instrument above a performer's music stand (*mit aufgehobenem Schalltrichter*) to Crespo's indication that a trombonist rapidly move their slide in and out its entire length (*Schnelle Zugbewegung von der 1. zur 7. Position unabhängig der Tonhöhe*).

two reasons.[10] First, whilst there are undoubtedly common techniques used when playing instruments, details of these techniques quickly become idiosyncratic. Even though the ways I and my fellow trombonists play the trombone are similar, differences in our physiology necessitate that we interact with the instrument in a slightly different manner. This is the case even with performers who were taught by the same instructor or in the same pedagogical ideology. Sofia Dahl writes that 'since the combination [of movement] possibilities [in performance] are so numerous, it is likely that many different movement strategies can result in the same sound event' (Dahl et al., 2010: 37). Therefore, a notated performance instruction that directs the performer to operate their instrument in a highly specific, subtle manner may have inconsistent musical results across a variety of performers. Second, whilst musical aspects such as tempo, form, articulation and volume may be easily represented graphically, other elements such as timbre, character and expression resist representation in a non-aural format. Consider score indications such as *maestoso*, *affettuoso* and *con fuoco*—descriptors which, whilst common, are not quantifiable elements of a performance to the same degree that tempo, form, articulation and volume may be identified. As was discussed in relation to rehearsal language in the previous chapter, the terminology used to describe these musical elements is forced to rely upon metaphor to convey the effect, rather than the action. Consequently, performance instructions which allude to the complex relationship between performer and instrument in order to create a specific musical characteristic may be forced to rely on metaphoric language.

The presence of descriptive text within scores implicitly attests to the boundary between Mode 1 and Mode 2 knowledge. Instead of describing how the performer should interact with their instrument, such as an indication to turn a bass around and strike its back with a hand, it is more effective to describe what the resulting music should sound like. From there, the performer is able to

[10] This critique does not extend to situations where musical performance is conceived as a matter of theatre. In such circumstances, linguistic description of performers' actions may arguably be the best way for the score/instructions to be notated.

determine (consciously or unconsciously) the best method by which that sound may be achieved. In the case of written notation, the distinction between propositional and procedural knowledge is not abstract. It would be overwhelming to have to play a score filled with technical descriptions of how to play a piece of music. Current notation depends on the use of verbal and graphic metaphors and symbols whose effective interpretation is bound to performers' experiential knowledge. In this way, the boundary between Mode 1 and Mode 2 knowledge is made concrete through the profound effects it actively has upon the ways in which both musical notation and practice itself evolves.

The examples discussed throughout the first half of this chapter demonstrate the inherent causality not only between action and effect in instrumental performance, but more importantly the intimate relationship between intention, action and effect. The intention to create a certain musical effect—be it a different timbre, volume, expressive interpretation and so on—necessarily alters the actions needed to physically produce that effect. That being said, the dynamic relationship between musician and instrument I propose in this chapter may not be explicitly understood by performers. More importantly, given its reliance upon Mode 2 knowledge, this relationship may not have to be understood in a propositional manner at all. In the next section of this chapter, I will investigate how comprehension of the dynamic relationship between musician and instrument may become a form of embodied knowledge, retained in such a manner that it does not have to be consciously recognised to be effectively used. This will require a critical look at both the process of individual practice as well as pedagogic approaches to instrumental learning. From there, I will be able to tentatively identify the constituent aspects of embodied knowledge in solo performance.

Developing embodied knowledge

As has been discussed in the previous section, skilled solo performance necessitates the tacit understanding of the relationship between musical intention, action and resulting sonic effect.[11] Most commonly, development of this tacit understanding is not through a process of trial and error (as if someone were creating or discovering an instrument in a social vacuum), but rather through a combination of external instruction and individual practice. These processes augment and structure the experience of learning to play an instrument in such a manner as to encourage the acquisition of procedural knowledge. This knowledge precludes the use of musical intentions which are embodied in the sense that they are 'actually part of, or [make] use of, the sensorimotor system of our brains' (Lakoff and Johnson, 1999: 20, emphasis removed). Lakoff and Johnson's definition of embodiment reifies what may be considered abstract internal representations of musical elements. However, as will become more apparent, the process of musical performance is inherently physical and experiential—hence, embodied. This section will investigate how the processes of instrumental pedagogy and individual practice are able to develop Mode 2 knowledge in performers through entirely separate means.

Blending modes of knowledge: instrumental pedagogy

The utilisation and development of action-effect representations have been implicitly stressed in pedagogic approaches to instrumental instruction. On a basic level, these mental correlates to sonic events include fundamental relationships between pitches and rhythms: the structural elements which underly Western art music. Whilst these structural elements also provide the basis for a host of methods by which music may be propositionally analysed (c.f. Lerdahl and

[11] This portion of the chapter is necessarily limited to focusing on the establishment of instrumental technique rather than the acquisition of fundamental musical skills such as aural acuity and temporal awareness. For further information on these subjects in relation to child development, see Shuter-Dyson and Gabriel, 1981.

Jackendoff, 1983), the importance of being able to mentally 'hear' what one intends to play is affirmed by examination of undergraduate programmes of study, which often include at least two years of aural skills training. Through specific training to recognise increasingly complex pitch relationships and rhythms, aural skills classes are designed to cultivate finely-tuned mental imagery —imagery which plays a large role in conceiving nuanced musical intentions. Across the broad spectrum of ideological approaches to instrumental pedagogy, it is worth noting that external instruction requires a blend of Mode 1 and Mode 2 knowledge. Recalling Donald Schön's proposal that skilled practice cannot be conveyed to a novice 'merely by describing [the art's] procedures, rules and theories', nor can the novice 'think like a seasoned practitioner merely [through descriptions or demonstrations of expert] ways of thinking', lack of experience within the 'media and language of their practices' creates a barrier to understanding (Schön, 1983: 271). In the context of instrumental instruction, aspects of the experience of performance need to be described propositionally, through the use of Mode 1 knowledge. At the earlier stages of instruction, it is necessary for students to explicitly know *how* to operate their instrument. The instructor is then able to critique how the students are playing and correct any discrepancies. As students accumulate experience, they will accordingly acquire Mode 2 knowledge. Beyond the increasingly intimate implicit understanding of the relationship between action and effect in instrumental operation, this form of knowledge includes most importantly the ability for self-critique—not only skill in recognising what is aesthetically desirable, but in reconciling any disparities between their musical intention and the resulting sonic output. Through supporting each other in this manner, Mode 1 and Mode 2 knowledge are not mutually exclusive: which is the cart and which the horse depends entirely on the circumstances.

Even while an instructor is conveying propositional knowledge to his or her student, he or she is also actively engaging the student in the practice of talking about music. As mentioned in the previous chapter, language used within rehearsal develops out of the experience of both playing and listening to music. Similarly, the teacher—enculturated into the 'media and language of [musical]

practice'—is not only representing musical elements through metaphor, but by doing so is actively encouraging the student's musical imagination. Through the development of new, idiomatic metaphors for musical elements, the teacher is able to train the student not only in the ability to play his or her instrument, but in the ability to create suitable linguistic correlates to what he or she is imagining or hearing. Therefore, musical instruction includes not only the propositional knowledge necessary to the physical production of sound on an instrument (knowing *how* to use the instrument), but also the ability to engage in multi-modal musical discourse. Whilst the scope of this thesis must be limited to a brief discussion on the relationship between Mode 1 and Mode 2 knowledge within instrumental pedagogy, it is hoped that the ensuing conclusions may inspire a thorough critique of how modes of knowledge are handled within musical teaching techniques.

Ever-increasing intimacy: individual practice

Individual practice is the means by which fluency on a given instrument is achieved, an essential element of the acquisition of musical skill (Barry and Hallam, 2002: 152).[12] Through the use of resources such as technical exercises (scales, arpeggios, articulation and phrasing studies, etc.), études (e.g. lyrical or character studies) and specific musical excerpts from solo, ensemble, or orchestral literature, various nuances of instrumental performance are refined. The impetus for this incessant struggle for perfection can be found in the underlying motive for performance in general —not only to produce sound, but to manifest a performer's musical intentions. In a sense, therefore, practising serves to increase one's musical ability to fluently and accurately articulate the qualities which characterise a specific musical intention. Practice is described by Nancy Barry and Susan Hallam as the means by which musicians 'enable complex physical, cognitive, and musical skills to be performed fluently with relatively little conscious control, freeing cognitive processing capacity

[12] For the purposes of this thesis, I include the voice as an instrument. Whilst acknowledging the differences between instrumental and vocal performance in terms of both strategy and process, the similarities shared in terms of overall methods of pedagogical development and the acquisition of skill are enough to treat them as the same for the current discussion.

for higher order processing' (*Ibid.*: 155). Thus, both deficiencies in or inordinate concentration on playing technique may hinder the effectiveness of what the musician is trying to aurally present.[13] This process of sensory response and behaviour modification has been described by Tor Halmrast et al. as both an auditory-motor feedback loop and a motor-haptic feedback loop (Halmrast et al., 2010: 207; c.f. Cadoz and Wanderley, 2000, Palmer, 2006 and Zatorre et al., 2007). These feedback loops are vital to the learning process, in that they establish the relationship between physical action and sonic effect.

From a technical standpoint, practising allows for increased familiarity in the causal effect between the way an instrument is operated and the resulting aural output. Peter Keller and Iring Koch demonstrate that increased experience playing an instrument 'may promote proficiency at action-effect anticipation by improving one's ability to engage in auditory imagery' (Keller and Koch, 2008: 282). Likewise, further research has shown that 'auditory imagery ability improves with increasing musical experience' (Pecenka and Keller, 2009: 285). The feedback from the instrument to the performer allows the performer to produce more accurate auditory imagery, which in turn allows for more specific goals to be set during performance. After learning the difference between what it felt to play *fortissimo* and *piano* in my own musical development, I was able to apply that causal relationship in more nuanced ways. This eventually allowed for a wide spectrum of dynamics to be at my disposal in performance. Likewise, I was only able to attain proficiency over musical elements such as articulation, expression, intonation and so on through prolonged experience with my bass trombone in a variety of performance situations. Thus, as experience with an instrument grows, the relationship the performer has both with it and with the music being played becomes increasingly intimate.

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[13] A phrase anonymously passed around through one music department I attended was 'Analysis causes paralysis', alluding both to the crippling effects of not being 'in the moment' while performing and to the mysticism which may often surround the acquisition of an expert skill. Of course, analysis (be it theoretical, performative, historical and so on) may be useful in preparation for performance. This phrase was more likely referring to the kind of propositional analysis which may also remove a musician 'from the moment', disrupting a flow state.

Similarly, individual practice allows performers to become familiar with the idiosyncrasies of their particular instrument. Within each instrument, variations in construction and sound production create opportunities for performers to draw out a myriad of timbres, tones, and volumes. It is not uncommon for musicians to comment on the playing characteristics of a new instrument, using terminology not dissimilar to that used during rehearsal (e.g. 'this trombone has a very bright sound', 'I love how cleanly this mouthpiece lets me articulate', or 'the heaviness of that horn creates a rather velvety sound'). Likewise, musicians may refer to differences between makes and models of instruments in terms of how they 'feel' to play as much as how they sound. In this circumstance, what may be being expressed when a musician plays an instrument that 'feels' different is that the performer's learned understanding of the physical causation between action (instrument operation) and effect (sound produced) does not transfer completely to a new instrument. Although general trends will be the same—they should be able to create some sounds on the instrument—the nuanced relationship between the performer and the instrument will have to be established in order for them to be fully comfortable. Looking beyond the qualitative differences between makes of instruments, each specific instrument itself contains unique, individual nuances to tone production. Tor Halmrast describes this phenomenon in regard to percussion in the following manner:

> Some points [on a percussion instrument] have a high impedance for higher frequencies and react very strongly to lower ones, some points are driven easily for higher frequencies and not so good for lower ones. In terms of gestures, this entails a different reaction of the body of the percussion instrument to the striking mallet or stick.
>
> (Halmrast et al., 2010: 205)

Whilst the generalised use of the term 'gesture' understates the relationship between physical motion and sound produced, this statement corroborates with the proposed model of performer–instrument interaction detailed thus far in the chapter.

In addition to the benefits of increased fluency in performance, individual practice encourages the development of flexibility in mental focus. When beginning to learn how to play an instrument, basic skills of tone production are necessary before concentrating upon more advanced

musical techniques. As these basic skills are acquired and refined, less attention needs to be paid to them, allowing attention to be focused elsewhere. The process of assimilating smaller actions and skills into larger mental units allows Keller and Koch to describe performance as involving the execution of 'prelearnt sequences of movements on an instrument to produce auditory effects' (Keller and Koch, 2008: 275). Through the acquisition of a skill, the technical components of that skill become subsumed into the process of doing the skill itself. Along the same lines, Jane Davidson describes the ability for a performer to shift their focus through 'large amounts of practice and experience' as the ability to 'play without conscious attention to the thoughts and actions used in the production of the performance' (Davidson, 2002: 144). Marc Leman examines this process further, considering the instrument as 'an extended body part' which allows the performer to 'focus on the goals of the sound-performing gestures rather than having to focus on the execution of the sound-performing gestures on the mediator' (Leman, 2010: 130). The assessment of sound-producing gestures is therefore conducted in reference to the resulting auditory output rather than specific 'characteristics of movement' (Dahl et al., 2010: 37). Recalling the example given earlier of the children playing catch, they are able to judge the merits of each throw by the results of that throw, rather than analysis of the specific motions they conducted in the act of throwing. One might argue, on the other hand, that a professional baseball player would pay close attention to the details of his actions when throwing. However, as in music, I would propose that the athlete is more focused on successfully completing a certain play rather than analysing what his musculature is doing. This is not to say that such scrutiny does not take place in the practice of skilled musicians or athletes, rather that it is more appropriately relegated to the process of individual practice and rehearsal instead of performance. It is important to note that in performance, this reflection may only effectively occur *post hoc*. Recalling Csikszentmihalyi's concept of flow, skilled practice requires a directness and immediacy between intention and effective action—qualities which are achieved through individual practice (Csikszentmihalyi, 1990). However, conscious reflection within a performance may provide cognitive interventions which remove one from a flow state. The balance

of challenge and skill achieved in flow may be disrupted when a musician cognitively removes themselves from their performance situation in order to critique specific elements of that performance. Whilst this disruption of flow may not necessarily cause any issues within the practice room, it may incur negative effects during performance.

As performers develop more proficiency on their instruments, they are able to fine-tune the physical actions needed to operate the instruments (Nirkko and Kristeva, 2006: 189). Effective operation of the instrument is the means by which players are able to express specific musical intentions. However, the relationship between musical intentions and consequent physical motions may not simply be dependent upon the feedback loops developed within personal practice. As we have seen in the previous example of the Boult Quartet's violist, other aspects of performance, such as familiarity with orchestration, ensemble balance and characteristics of repertoire can not only effect the sounds produced by a musician, but also the physical motions needed to aurally manifest them. All of these factors play a role in developing a truly embodied form of Mode 2 knowledge. Through the following clarification of the factors which contribute to the accumulation of embodied knowledge, we will be able to approach the question of ensemble interaction from a perspective that is built upon the performance phenomenology of the individual musician.

Conclusion

The discussions thus far have developed the proposal that musical performance both requires and engenders a unique form of understanding. Emerging from the experience of performance itself, this innate form of understanding may be 'separate from prior intellectual operation' (Schön, 1983: 51). Consequently, it does not have to be consciously recognised to be effectively used. I propose that the knowledge utilised in musical performance is inherently embodied. Strictly speaking, embodied knowledge is that which has developed out of bodily experience (Godøy, 2010:

105). From a non-musical perspective, management theorists Ikujiro Nonaka and Georg von Krogh (expanding upon the work of sociologists such as Maturana and Varela) describe embodied knowledge as 'intuitive, tied to the senses, and escaping any formal analysis through self-introspection' (Nonaka and von Krogh, 2009: 642). As we have seen in the previous investigation of the development of knowledge through individual practice and teaching, it appears appropriate to classify the understanding a musician has regarding the relationship between them and their instrument as emergent from bodily experience.

Given the importance of physical experience in embodied knowledge, what role may 'non-physical' experience play? Is it possible for other elements of experience to inform embodied knowledge? Recall again the third example of the ideomotor principle in action, involving the violist in the Boult Quartet. Through her experience practising and performing, she has accumulated extensive knowledge of the physical interactions she has with her instrument—knowledge which may be incontrovertibly described as embodied. However, this development has not existed in a vacuum. It is necessary to consider her not only as a performer, but as a listener as well. As remarked earlier, her performance is influenced by a variety of sources, not the least of which is her relationship with her instrument. It is only through an understanding of musical elements and conventions such as melody, harmony, orchestration, ensemble balance, characteristics of repertoire, expressive phrasing and so on that her tacit understanding of how her instrument works may be appropriately contextualised. Whilst these musical elements may need be taught to nascent performers through pedagogical use of propositional knowledge, a nuanced understanding of them can only be developed through experience with them in the context of musical works. Therefore, I would argue that embodied musical knowledge is not only rooted in the experience of both performance and listening, but also the tacit understanding of the relationship between the two. Musicians exercising knowledge during a performance may not be explicitly thinking about the process of playing in a propositional manner, but instead thinking in such a way that actively engages their musical intentions, how that idea should fit in with the other musical elements in the

piece (past, present and future), and how it feels to create that musical element with their instruments. Just as Peter Kivy argues that listening to a performance in such a manner as to recognise musical characteristics such as phrasing, inversion, and stretto illustrates how listening is a 'conscious cognitive activity' (Kivy, 2007: 228), I propose that musical performance necessarily involves engagement with a form of knowledge emergent from experience as a listener and performer.

In this chapter, I have endeavoured to identify the most generalisable elements which constitute the phenomenology of solo performance, regardless of the instrument being played. The resulting model integrates the performer's intention to aurally create a specific musical element with their embodied understanding of their instrument's operation. Recalling that the intention to create a certain musical effect necessarily alters the actions needed to physically produce that effect, musicians are able to implicitly understand the dynamic relationship between their musical intentions (action-effect representations) and the processes needed to aurally reproduce the associated musical elements with their instruments. A tacit understanding of the relationship the performer has with their instrument evolves through experience with the instrument itself, as well as within the social contexts of individual practice, instrumental pedagogy, rehearsal and performance. The embodied musical knowledge promoted by this model falls firmly within the realm of Mode 2 knowledge.

It is from this revised perspective of the phenomenology of performance that the influence of embodied knowledge within ensemble performance may be examined. The complexities inherent in aurally manifesting musical intentions are compounded when considered within the context of musical ensembles. There, intentions are necessarily attributed and may be shared amongst multiple people. Likewise, the simultaneous unfolding of numerous diverse performances may provide a catalyst to the development of interpretation. This final research question of this thesis escalates our present understanding of the phenomenology of performance to a higher degree of intricacy, interrogating how the physical relationship between a performer and their

instrument may relate to the communicative and interactive processes of ensemble performance. Critical examination of the constituent elements of ensemble performance will provide the final pieces through which a new paradigm of musical interaction may be proposed.

Chapter Four:

Reaction and Inter-reaction

Introduction

The critical discussions that have taken place throughout this thesis have established two vital points in relation to ensemble interaction within the context of Western art music. First, the application of a communicative paradigm does not sufficiently describe the complex processes by which performers are able to share musical intentions with each other. It is therefore necessary to rethink the underlying framework upon which ensemble interaction is based, with the intention of creating a new framework which does not rely solely on the process of musicians intentionally encoding information. This is not to say that explicit communication does not occur within ensemble interaction, rather that it does not fully account for the richness of interaction present. Second, performers' musical intentions influence, to varying degrees, the ways in which they have to operate their instruments. In musical performance, there is a correlation between intention (interpretation) and action (the process of instrumental performance).[1] The intimate relationship between performers and their instruments that I have demonstrated in the previous chapter has, thus far in this thesis, only been considered within the context of individual performance. Developing from these conclusions, this chapter will consequently focus on the third and final research question: How does the physical relationship between the performer and their instrument

[1] The correlation between intention and action does not mean that musicians are free from making mistakes. Whilst increased fluency on a musical instrument (the ability to consistently execute a musical intention) decreases the likelihood that a performer will make a mistake, performers are not infallible. However, it is beyond the scope of this thesis to investigate why and how mistakes occur in musical performance.

relate to communicative and interactive processes of ensemble performance? Through the application of theories proposed within this thesis, this chapter will provide the context within which a new paradigm of ensemble interaction may be developed.

This chapter will begin by reframing our present understanding of embodied musical knowledge within the context of a larger social system: an unconducted musical ensemble. Discussion thus far has considered embodied knowledge in relationship to, at most, an individual musician's experiences as a performer and listener. Ensemble performance, on the other hand, engages musicians within a much larger sphere of contextual elements with which they interact. The question of how an individual's embodied knowledge may be exercised within an ensemble setting prompts a continuation of the previous chapter's discussion on intention. This discussion, however, involves not only personal intention, but more importantly intention as perceived by external observers and shared by collaborators. It is therefore necessary to explore the attribution of intention by means of inference, a topic which may have multiple implications within the context of this thesis. In combination with current musicological theories regarding the interplay between musicians in improvisatory contexts, it will then be possible to construct a new framework from which to approach ensemble interaction. I will critique this new paradigm in the following chapter, exploring some of the possible ramifications it may have from the perspectives of both musical researchers and practitioners.

Contextualising embodied knowledge

Reflecting upon discussions found in the previous chapter, three primary characteristics encapsulate the nature of embodied knowledge. First, embodied knowledge develops out of bodily experience. This form of knowledge, 'constantly shaped by our experiences', forms the basis of humans' 'instinct, urges, and unconscious reactions' (Jones et al., 2009: 167). Second, and more

specifically, embodied knowledge is intrinsically 'tied to the senses' (Nonaka and von Krogh, 2009: 642). Mental activity alone is not enough to embody a certain element of knowledge; it is necessary that such mental activity accompanies (and may be instigated by) physical action. Third, embodied knowledge is intuitive, 'escaping any formal analysis through self-introspection' (*Ibid.*: 642). Its acquisition and retention is not confined to propositional reflection or expression, therefore placing it firmly under the auspices of Mode 2 knowledge. Considering the case of myself as a bass trombonist, it is possible to create a generalised understanding of what the concept of embodied musical knowledge may encompass in relation to instrumental performance.[2] In light of the three characteristics summarised above, my bodily experience includes a wide variety of musical situations, each of which may impact my musical intentions in slightly different ways. Experiences both as a professional musician and casual listener contribute to my understanding of the mechanics by which music operates, at least within the context of Western art music. It is important to note that these mechanics are not necessarily analytical in nature. Whilst propositional analysis of music certainly contributes to my overall knowledge, it is only through experience seeing, hearing and feeling that propositional knowledge in practice truly becomes embodied—the second characteristic of embodied knowledge described above. In this manner, propositional knowledge is folded into experiential knowledge. Rolf Godøy's proposition that 'music perception is multimodal in the sense that we perceive music with the help of both visual/kinematic images and effort/dynamics sensations, in addition to the 'pure' sound' (Godøy, 2010: 106) may be too simplistic; is musical perception truly additive in this manner? Rather, a musician's experience while performing may be considered multimodal in that it engages multiple senses at once. Physical resonance from the instrument and the sounds occurring from other sources in the performance, visual elements, and naturally the sound itself contribute to haptic, visual and aural feedback to the performer

[2] It is not my intent to limit the scope of embodied musical knowledge simply to instrumental performance. It is conceivable that such Mode 2 knowledge may be manifested in different manners, be it through the act of listening, composing, or dancing. As this thesis focuses on ensemble interaction, I instead mean to leave open the possibility of other aspects of embodied musical knowledge to be explored in further research.

(Michailidis and Bullock, 2011: 227). The understanding I have of the phenomenon of performance is such that it is unable to be directly translated into a linguistic format. Whilst I may be able to (and commonly do) create suitable metaphors with which to articulate specific elements of performance, the experience of performance itself is not able to be fully described in a propositional manner. This is most apparent in the pedagogical approach I use when teaching trombone, which combines Mode 1 descriptions of physical details (such as how the tongue operates during articulation or how hand positions affect operation of the instrument) with metaphors of Mode 2 concepts (such as how I approach the performance of different musical phrases or create my own interpretation).

To what extent may these characteristics of embodied knowledge remain similar when expanding the scope of inquiry from that of a solo performer to an ensemble performer? I propose that the implementation of an individual's embodied knowledge of instrumental performance may encourage the development of procedural knowledge necessary for effective ensemble interaction.[3] In his article about gestural affordances on musical sound, Rolf Godøy suggests that an understanding of the processes underlying instrumental operation, applied to the act of listening, encourages 'ecological' knowledge. This form of knowledge is acquired 'through massive experience of sound-sources in general and musical performances in particular' (Godøy, 2010: 106). However, he describes ecological knowledge not from the perspective of a performer but from the point of view of listeners in general:

> in listening, we see a whole range of relationships between sound and assumed sound-producing gestures, ranging from the immediate and synchronous (and probably hard-wired) coupling of sound-event to action-event, to the more interpretative and holistic coupling of sound-event to action-event, and even to the projection of non-existent action-events into sound-events.
>
> (*Ibid.*:107)

[3] Material from the following discussion is developed from a presentation I gave at the CMPCP Performance Studies Network International Conference at the University of Cambridge (July 2011).

Therefore, when an individual sees and hears a musician performing, that individual is able to make a correlation between the perceived sound-event and action-event. For example, a fundamental association may be made between the action of a trombonist putting the instrument to his or her lips and the ensuing sound. As the individual observing this act gains more experience with both that specific form of musical sound and the action-events necessary to create it, they will then be able to further distinguish a more nuanced relationship between sound and action. For example, beyond identifying an instrument as the source of a sound, a more complex relationship would be to differentiate between instruments (e.g. identifying that it is more likely that the sound of a trombone will be created by a trombonist than by a violinist). Conversely, further experience would allow that individual to identify the instrument which creates a sound purely from a recording of it, without drawing upon any visual information. Knowledge of the correlation between action-event and sound-event is brought into stark relief through parody and comedy in music. Jokes, as noted by Peter Kivy, 'rely on a stock of knowledge or belief, and feeling common to the teller and hearer' (Kivy, 2003: 6). Musical humour is able to subvert listeners' expectations because those expectations (what Godøy refers to as ecological knowledge) commonly exist. Musicians such as Victor Borge and Anna Russell are therefore able to draw upon and manipulate audiences' expectations of how instruments work and the conventions of classical music. Likewise, the comedic elements of Luciano Berio's trombone solo *Sequenza V* (1966) would not be considered comedic should the audience not have sufficient ecological knowledge. In this way, the existence of humour in music demonstrates the existence of some form of musical knowledge.

Godøy's concept of ecological knowledge appears to serve as an extension of the understanding of embodied knowledge explored thus far in this thesis. However, the term 'ecological' may not be the most effective description of this form of knowledge. Used in this manner, 'ecological' implies that such background is innate in the human condition, and recalls the

similarly-labelled approach to perception developed by cognitive psychologist J. J. Gibson.[4] This ecological approach to perception is considered 'direct in the sense of not entailing inference or similar constructive operations on insufficient input data' (Runeson and Frykholm, 1983: 586). However, it is the lack of 'inference or similar constructive operations' that suggests that the term 'ecological' may not be the most suitable descriptor of the form of embodied knowledge which emerges from Godøy's referenced 'massive experiences'. It appears that the knowledge Godøy proposes necessarily precedes the act of inference. Likewise, whilst the ability to correlate a sound to its source may be a hard-wired cognitive function,[5] to what extent can advanced stages of this ability be considered fundamental? Individual experience must play a role in the degree to which this ability is able to be developed. John Dewey proposes that experience is:

> a matter of the interaction of organism with its environment, an environment that is human as well as physical, that includes the materials of tradition and institutions as well as its local surroundings. The organism brings with it through its own structure, native and acquired, forces that play a part in the interaction.
>
> (Dewey, 1934: 256)

Instead of considering such knowledge itself to be instinctive, therefore, it may be more appropriate to consider the innate *potential* of every living organism to 'read' information in its environment and adjust behaviour accordingly. Lakoff and Johnson argue that all neural beings have evolved an ability to categorise as a matter of survival (Lakoff and Johnson, 1999: 17). However, whilst the kind of knowledge that Godøy proposes is an advanced form of categorisation, its complexity and richness arises from an individual's specific experiences. Instead of referring to this developed mode of categorisation as ecological, I propose that Dewey's adjectival usage of 'environmental' more accurately describes this form of knowledge. Rather than existing in the human condition from conception, environmental musical knowledge is developed out of one's experience within certain

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[4] Runeson and Frykholm (1983) provide an overview of this literature which specifically references Gibson's publications of 1950, 1966 and 1979.

[5] For an overview of this subject, see Blauert, 1983.

contextual conditions. Therefore, it may arise from the specific circumstances and events experienced by an individual, prompting them to engage with some form of conscious or subconscious form of inference.

The model of environmental knowledge proposed by Godøy, however, does not address the extent to which the ability to correlate sound-event to action-event may be refined. It is one thing to be able to simply correlate a sound to its origin, and another thing to be able to infer qualitative information about that sound source from its sensory output. Given that expert instrumentalists accumulate a large amount of embodied musical knowledge, how much information could be inferred about the relationship between sound-events and action-events (musicians' physical gestures)? Likewise, what kind of information may actually be inferred? Marcelo Wanderley and Bradley Vines, in their research on how solo clarinettists' movements may affect audience perception, note that:

> The clarinettists' movements, including their facial expressions, postures, breathing and effective gestures, augmented participants' experience in three ways: (1) by reinforcing the information available in sound, (2) by contributing unique information to the overall experience and (3) by conveying the performer's musical interpretation of the score.
>
> (Wanderley and Vines, 2006: 180)

However, this research does not reveal what 'unique information' may be expressed by gestures, nor the relationship between the gestures used and the musical interpretation produced in the performance. In order to address the application of embodied musical knowledge within the context of unconducted ensembles, it is necessary to examine the topic of inference in musical performance. This will extend the previous chapter's discussion of personal intention to the realm of attributed intention, exploring the elements which contribute to one's ability to assume intention on behalf of another's actions. Consequently, this discussion will entail an investigation into the ways in which humans are able to infer information from observed physical motion. From this standpoint, it will then be possible to address how the combination of embodied musical knowledge and inference

may contribute to effective ensemble interaction in a way that is separate to any existing processes of communication.

Inference

The questions posed in the previous section of this chapter all pertain to the overarching issue of inference. Within the context of this thesis, the process of inference may most appropriately be identified as the assumption of the mental or physical state of another person. Specifically, inference of mental states is most closely related to the process of deducing qualities of the external other's personal intentions through observation of the actions they take in executing those intentions. In relation to ensemble performance, this may be considered comparable to the assumption of a performer's musical interpretation while they are engaged in playing music. However, these musical intentions (which, as forms of Mode 2 knowledge, resist linguistic articulation) may only be accessible through the sensory traces which accompany their performance. Therefore, in order to address how personal intentions may be attributed or shared, it is necessary to understand how interior mental states are able to be perceived through external observation. This section of the chapter will consequently focus on three areas. The first discusses how humans are able to infer information about the mental and physical states of an external other through visual and aural observation of that individual in action. An understanding of how humans can assume this information through multi-sensory channels will then provide the basis of a discussion of how intentions may be perceived, attributed and shared. The third area of this section, emergent from the first two areas of investigation, is the application of these cognitive theories to the process of inferring performers' musical intentions. From this perspective I will be able to establish both how musicians are able to infer information from their fellow performers and the content of that information itself.

The kinematic specification of dynamics

Before addressing the complexities which arise when considering the processes of attributing or sharing intentions, it is important to remember that playing an instrument is not purely a mental activity (such as making abstract decisions). The inherent physicality of the action suggests that it may be subject to some of the same underlying processes which govern other bodily actions. Research on kinematics has shown that humans are able to infer a large amount of haptic information purely from visual input.[6] Perceptual researchers Sverker Runeson and Gunilla Frykholm demonstrate that, upon viewing someone picking up and carrying a box, observers were able to accurately gauge the weight of the box (Runeson and Frykholm, 1981: 733). Those watching the individual holding the box could identify how heavy or light the box was simply through the way that the person was forced to interact with the box. Therefore, the authors are able to comment that:

> if information [about relevant dynamic properties] is available in the kinematic pattern, it is also available as higher order properties of the optic array, thus making direct visual perception of dynamic properties possible. […] When objects get involved in events some of their hidden properties are disclosed. Vision is therefore likely to have a role in what is usually taken to be the privileged domain of the haptic sense.
>
> (*Ibid.*: 733)[7]

Within the context of Runeson and Frykholm's experiment, the 'hidden properties' of the box primarily had to do with its weight—something that could not be gauged purely through observation of the box on its own. Thus, the importance of visual observation in the determination

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[6] I would like to express my thanks to Elaine King for bringing research on kinematics to my attention.

[7] In this area of motion research, kinematics focuses on 'displacement, velocity, and acceleration' whilst dynamics pertains to motion from a causal perspective (*Ibid.*: 733).

of objects' physical properties becomes evident when actions occur involving the objects under consideration.[8]

Further research by Runeson and Frykholm identifies the principle that 'movements specify the causal factors of events' as the kinematic specification of dynamics (Runeson and Frykholm, 1983: 585). They explain that this principle is important when examining the process of human perception in that we do not perceive movements as abstract manifestations of physical forces, but rather 'we perceive causal aspects of events' (*Ibid*: 588). Whereas a computer may interpret a person picking up a box in terms of the physical elements of the system, humans focus more on determining the physical elements which explain the causality of the system (e.g., the person had to hold the box in a certain manner *because* the box was heavy). This leads the authors to argue that 'the kinematic pattern of a person in action by mechanical, biological, and motor-control-related necessity is rich in information about both permanent and transient properties of the person and what he or she is in fact doing' (*Ibid.*: 598). Thus Runeson and Frykholm identify 'what a person is actually doing' as one of the six primary qualities which may be expressed through kinematic display (*Ibid.*: 609).

Application of the kinematic specification of dynamics principle to musical performance presents an intriguing approach to answering one of the questions posed in the second chapter of this thesis: how do musicians share information while performing? As discussed in the previous chapter, there is a direct relationship between the ways in which musicians interact with their instruments and the properties of the resultant sonic output. The variety of physical approaches musicians utilise when operating their instruments will often lead to kinematic changes—differences in musicians' motions which may be observable to external viewers. This does not necessarily entail that these kinematic changes will be significant to an arbitrary observer watching the musician.

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[8] The importance of visual observation is not limited to interactions between humans and inanimate objects. In earlier research, Runeson describes how the kinematics of a linear collision between two objects may provide insight about those objects' physical properties to observers (Runeson, 1977).

However, it does mean that the way that performers interact with their instruments may potentially serve as a source of information to onlookers.

To explore this proposal, recall the two examples of the children playing catch and the orchestral trombonist provided in the previous chapter. This time, however, we will consider these examples as if there were an external observer actively watching both situations. In the first scenario, what information may the observer infer from the way that the girl throws the ball? This hypothetical experiment closely mirrors research conducted by Runeson and Frykholm, in which participants are asked to deduce how far an an actor threw a small sandbag upon observation of just the major joints on the actor's body (*Ibid.*: 598). They conclude that the onlookers are able to effectively determine the trajectory and resultant distance of the sandbag without having actually seen the sandbag itself. Reflecting upon the scenario of the children playing catch, it would therefore be possible to determine how far away from each other the children are standing based upon the way that each throws the ball. Likewise, this information may be available to external observers before the ball is actually thrown. As noted in the previous chapter, postural preadjustments play an important role in the preparation for physical activity (cf. *Ibid.*: 590).

Now consider the overly-enthusiastic orchestral trombonist. Due to the nature of the relationship between performer and instrument, the trombonist needs to play his instrument in a certain physical manner in order to produce a *forte* dynamic. This physical approach differs from that which is required to execute softer dynamics particularly in regard to the embouchure, air speed and quantity of air necessary. Extension of Runeson and Frykholm's conclusions regarding postural preadjustments illustrates that differences in kinematic approach are not only observable during the performance of the note itself, but before a single note is actually played. Therefore, the way in which the trombonist prepares to play may provide visual evidence for the resulting sonic output. The prospect of inferring distinct musical effects from physical causes in this manner will be explored in depth later within this chapter.

Whilst at first glance it may appear straightforward to infer basic qualities of sound through observations of performing musicians, there remains the question as to how nuanced the ability to conclude musical characteristics from visual kinematic information may be. It is one thing to infer that a trombonist is going to play because they put their instrument to their lips and quite another to deduce that the resulting musical sound will display certain characteristics. The physical motions required to perform in a specific way and the corresponding aural results are effectively calibrated in similar manners. Even though the kinematic specification of dynamics provides an understanding of the method by which musicians may be able to perceive musical intentions, questions still remain in regard to the implications of attributing or sharing intentions among individuals. The following section will examine how cognitive research on the perception of intention may apply to ensemble research. From this perspective, it is possible to propose a framework by which inference within performance may operate—a concept which will provide the basis for a new paradigm for ensemble interaction.

Shared and attributed intentions

In the previous chapter, discussion of intention focused upon the relationship between an individual's goals and their requisite actions. When examining a single person within the context of a social group, however, critical focus shifts away from whether or not the intention of actions and ensuing actions correctly correspond with each other. Instead, two other themes emerge: the effect of aligning intentions between group members, and the process by which other members of that group may infer intentionality to the individual's actions. These themes address not only how personal intentions may be interpreted by observers, but also the impact that the effects personal intentions may have on those around the individual—essential elements of investigation into the ways in which unconducted musical ensembles operate. After briefly reviewing the constituent aspects of each avenue of inquiry, this section of the chapter will examine how these topics may be applied to musicological research on ensemble performance.

Personal intention, as discussed in the previous chapter, primarily consists of 'a plan of action' carried out 'in pursuit of a goal' (Tomasello et al., 2005: 2). In the context of musical performance, this goal could range from simply producing sound on an instrument to playing in a very specific manner, corresponding to the performer's higher level musical intentions. When placed within an ensemble, however, new goals are incorporated. In her pedagogic book on string quartet performance, Herter Norton writes that 'chamber music is a social enterprise, the nucleus of sympathetic gatherings wherein the players are depending upon each other for the achievement of their common interest' (Norton, 1925: 5). This 'common interest' includes cohesiveness and coordination between the performers, particularly in terms of such variables as timing, intonation and interpretation—important attributes which contribute to what may be contextually appraised as a successful ensemble performance in Western art music. Emergent from the combination of these individual actions and goals is a phenomenon known as shared intentionality. Cognitive scientist Michael Tomasello describes this state as the 'collaborative interactions in which participants have a shared goal (shared commitment) and coordinated action roles for pursuing that shared goal' (Tomasello, 2005: 6; citing Gilbert, 1989, Searle, 1995 and Tuomela, 1995). Placing emphasis on both a 'shared goal' and 'coordinated action roles', this form of intentionality resonates with the view of ensemble interaction proposed within this thesis. Beyond simply recognising this form of intention, Tomasello examines how shared intentionality may affect the process by which individuals work together. Reminiscent of the discussion in Chapter Two about alternating leadership, he proposes that:

> the cognitive representation of the intention also contains both self and other […]. This is necessary because both collaborators must choose their own action plan in the activity in light of (and coordinated with) the other's action plan […]. This requires that each participant cognitively represent both roles of the collaboration in a single representational format—holistically, from a 'bird's-eye view,' as it were—then enabling role reversal and mutual helping.
>
> (Tomasello, 2005: 7)

Therefore, the recognition of shared intentions between collaborating individuals shapes the roles that they assume. Through a constant give-and-take, ensemble members are able to take on varying amounts of leadership in light of the group's overarching goals. Arnold Steinhardt, first violinist with the Guarneri Quartet, refers to this process when he comments that 'most of us would like to have chances to lead in some respects while being content to follow in others. There's a harmonious balance in life when you can slip in and out of roles. Quartet playing provides that kind of variety' (Blum, 1987: 154). The concept of shared intentionality may provide an answer to a question posed in the second chapter of this thesis: how are ensemble performers able to achieve a fluidity of ensemble role without verbal interaction? Through the recognition of shared intention—an intention, as has been discussed in the previous chapter, which is rooted in the interpretation of musical intentions—musicians are able to conceive of the ensemble's goals in a 'single representational format'. The consolidation of goals and necessary actions into a cohesive cognitive unit allows ensemble members to gauge the extent to which their individual actions impact on the end result of the group's performance and modify their role accordingly. Reflecting upon my experience within chamber ensembles, this proposal appears to be accurate. The more I know what else is happening beyond my part within an ensemble, the more effectively I can assess and fulfil my role within the group. The ability to shift roles is based not only on the understanding I have of musical conventions such as melody, harmony and orchestration, but also my evaluation of the current group context: neither of these requires verbal interaction with my fellow musicians. This is similar to an example from the previous chapter, in which the violist of the Boult Quartet emphasises a moving line even though there is no explicit instruction in the score to do so (see Video Example 3.3 for the rehearsal footage and Musical Example 3.2 for the corresponding excerpt from the score). Her change in musical role may be rationalised through both her and her fellow musicians' understanding of the importance her line plays in the overall performance of the piece. Whilst the concept of shared intentionality may provide an answer to the question of how musicians may assume *ad hoc* leadership positions while performing, one primary question needs to

be attended to. Without explicit notification of a performer's musical intentions, how may their fellow musicians determine what those intentions are? Therefore, it is necessary to overview the process by which intention may be perceived by and attributed to individuals.

Recent research on the philosophy of intention extends investigation of attributed intention into the realm of ethics, questioning the moral implications of relating blame to perceived intentional action.[9] Having said that, the interpretation of another person's actions in a positive or negative manner may not be directly applicable to ensemble performance, although it is conceivable that particularly dysfunctional chamber groups may succumb to the deteriorating effects of their members' paranoia and suspicion of each other. On a fundamental level, however, the process of attributing intention is necessary when attempting to infer meaning or significance from others' actions. Stanley Fish argues that 'it is impossible *not* to construe [intention] and therefore impossible to oppose it either to the production or the determination of meaning' (Fish, 1989: 100). This proposal is expanded in a later essay, where he comments that people 'cannot help positing an intention for an utterance if they are in the act of regarding it as meaningful' (*Ibid.*: 116). Therefore, inference of meaning itself requires the assumption that the person being observed is acting intentionally.

Within the context of ensemble performance, attributing intention is most connected to gauging the personal successfulness of an individual's performance—successfulness in the sense of whether or not that performer was able to accurately and effectively manifest their musical intentions. Consider the following scenario, which examines the impact of an ensemble musician playing a wrong note:

The flautist and clarinetist in a traditional Western classical wind quintet are rehearsing a passage in which they are scored in unison octaves. The first time they play through the passage, the two musicians play almost all of the same notes, with the exception of the final pitch; instead of a note one octave lower than the flute's, the clarinetist plays a seventh lower. The second time they

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[9] For an overview and examples of this literature, see Knobe, 2004 and 2006 and Hindriks, 2008.

play the passage, the same thing happens, and the two musicians end their melody on an interval of a seventh rather than an octave.

Given that the quintet members have noticed this discrepancy, they may interpret the event in a variety of ways. If they were to interpret the event as 'meaningful', various levels of intention may be attributed to the clarinetist. Negatively, the quintet members may assume that the clarinetist is unaware of the mistake, as it was repeated without correction. In other words, the musician may be intentionally playing that note, but unintentionally playing incorrectly. In order to rectify the situation, the incorrect note would have to be brought to the attention of the clarinetist. In a positive manner, the quintet members may assume that the clarinetist was intentionally playing the note that was written in the part. The incorrect note may be purely the result of an ill-copied part rather than a playing error. Should the quintet members not assign meaning to the event, however, the issue of intention may not arise at all. Had the note been fixed the second time the passage was played, the other musicians may have passed the occurrence off as accidental, assuming that the clarinetist was aware that the note was incorrect. The playing mistake would consequentially be understood to be unintentional. Similar situations have developed what has become become traditional practice for English cathedral choirs. Should a choir member sing incorrectly and they raise their hand, the director is aware that the singer knows they made a mistake. However, should the chorister sing incorrectly and not raise their hand, this situation lets the director know that they were unaware of the mistake, prompting additional rehearsal on that portion of the piece. Widespread use of this practice suggests how useful the distinction between conscious and unconscious mistakes are for musical directors.

However, these scenarios, whilst useful in giving examples of how musicians may interpret their co-performers' actions, only deal with the repercussions of a missed note. What about situations in which there is not an explicitly 'correct' or 'incorrect' manner of playing? If a musician phrases a melody in a certain manner, adds a different inflection, plays slightly louder or softer, or modifies any other qualitative variables of a performance, their fellow musicians remain in the

position of having to decide whether or not those modifications are intentional and, accordingly, meaningful. The attribution of intention (therefore meaning) may then correlate to the amount and quality of information that musicians can glean from their co-performers' actions. The conclusions drawn from this section will provide the basis upon which we can understand how musicians are able to infer complex musical intentions from their fellow performers during the act of performance.

Inferring musical intentions

As the preceding discussions have shown, humans are able to infer information about others' intentions and goals based on the actions which are used in carrying out those goals. Within the context of musical performance, those intentions may be highly complex combinations of musical attributes which, when combined, constitute what is commonly referred to as a performer's interpretation. As musicians become more skilled (both in terms of instrumental technique and aural acuity), the individual musical intentions which compromise their interpretations have the potential to become increasingly detailed. To what extent may such intricate interpretations be inferred by observers? As explored in the work of Runeson and Frykholm, varying amounts of information may be inferred—not necessarily based upon the actual events being perceived, but upon the background of those carrying out the observation. In the conclusion of their research on the kinematic specification of dynamics, the authors comment that:

> perception requires not only potential information but also corresponding attunements of the perceptual system. Informational specificity is not to be equated with perceptual saliency […] Depending on property concerned and activity observed, person-and-action perception may range from the simple noting of the obvious to requiring the utmost of educated attention.
>
> (Runeson and Frykholm, 1983: 598)

Therefore, the amount of prior experience an observer has with the constituent elements being perceived directly impacts upon the amount of information they may be able to infer through

observation. Beyond Runeson and Frykholm's rudimentary examples of box-lifting and sandbag-throwing, musical performance may be considered a complex action which requires 'the utmost of educated attention' to fully interpret. 'Educated', in these circumstances, does not refer to propositional Mode 1 knowledge. Instead, it is rooted in the experience 'of sound-sources in general and musical performances in particular', to borrow Godøy's terminology, directly correlating to the embodied musical knowledge described previously in the thesis. Colwyn Trevarthen writes that 'our movements communicate what our brains anticipate our bodies will do and how this will feel because others are sensitive to the essential control processes of our movements, which match their own' (Trevarthen et al., 2011: 11). Thus, the greater familiarity a musician has with a certain context (be it a specific instrument, style of playing, ensemble composition, and so on), the more information they should be able to infer through observation of a performance (Jäncke, 2006: 27).

This proposed correlation between embodied and environmental musical knowledge and the amount and kind of information able to be inferred through observation is corroborated in my experience within ensembles. As a bass trombonist, I am able to make nuanced inferences about other trombonists' performances based upon the musical knowledge that I have developed through both my own practice and performance experiences. The conclusions I may arrive at when watching and playing with other trombonists encompass a variety of categories, from predicting the style, quality and volume of sound to be produced based upon a breath to determining how tired or nervous they may be. These conclusions, rooted in my direct experience with my instrument, demonstrate my specific understanding of how to play a trombone (as opposed to other musical instruments). The understanding I have of the way I need to operate my bass trombone in order to achieve certain sounds as well as what happens when things go wrong strongly influences how much meaning I am able to infer from another trombonist's performance.

The extent to which my experience affects the amount of information I may glean from a fellow musician's performance becomes strikingly prominent when I am placed within various ensembles. Within a brass ensemble, I am able to extrapolate a large amount of information

regarding musical variables due to my accumulated understanding of how brass instruments work. That said, I am not normally cognisant of the extent to which this background affects the way I function within an ensemble. However, a contrasting situation illustrates the potential effects of a lack of environmental knowledge. One of the requirements for my Masters of Music in chamber music at the University of Michigan was to organise and perform in a recital consisting of mixed chamber ensembles. Along with a sonata with piano, a low brass trio (described at the beginning of this thesis) and a brass quintet, I chose to programme the concert suite version of Igor Stravinsky's *Histoire du soldat* (1918). The work is scored for a septet of violin, bass, clarinet, bassoon, cornet, trombone and percussion. Although all of the musicians I asked to play in the septet were familiar with mixed-instrumentation performances (particularly with symphonic orchestras and wind bands), the variety of instruments performing together provided unique challenges to ensemble interaction. Likewise, the orchestration of the piece itself often pairs together instruments which may not traditionally share melodic lines. Although each musician was accomplished in their own right (and recognising the difficult nature of Stravinsky's writing), the piece was difficult to put together from an ensemble perspective. Whilst we could often play the correct notes in time with each other, it was apparent that everyone was, to varying degrees, out of their performing 'comfort zone'. As our familiarity increased with both the mechanics of instruments different to our own and the individual performers within the group, the ensemble became accordingly more cohesive and integrated in terms of temporal and pitch coordination and interpretive unification. Even though extensive individual practice assuredly contributed to the development of our final performance, the effect of increased familiarity between the specific performers and the kinds of instruments being played cannot be ignored. It comes as no surprise that extensive experience, be it playing a certain kind of instrument, within a certain type of ensemble, and even with certain musicians themselves has a dramatic effect upon how much meaningful information may be inferred from contexts involving those variables.

It is important to distinguish this form of information as 'meaningful' in order to clarify that it is distinct from a propositional taxonomy or classification of observations. Within this context, 'meaningful' refers to the richness of musical content which may only be alluded to linguistically through the use of metaphor. Inference within the act of performance, informed through embodied environmental knowledge, provides musicians with access to the intentions of their co-performers. This knowledge develops out of musical experience, both as a performer and as a listener. The kinematic specification of dynamics proves vital in establishing the ways in which musicians are able to share information with each other through the act of performance. Upon reflection, however, whilst the metaphor of 'sharing' information is appropriate, the direction of the flow of information needs to be reversed. Rather than performers 'pushing' information to one another, it may be more appropriate to consider them 'pulling' it. Thus, through the process of inference, they would be able to deduce their co-performers' musical intentions from the mere act of performance itself. However, the word 'mere' understates the importance of this conclusion. This model emphasises the richness inherent in the phenomenon of performance; richness in terms of multi-modal sensory experience as well as in forms of knowledge engaged ('pulled') by performer and audience.

Runeson and Frykholm's original proposal of the kinematic specification of dynamics emphasises the role vision plays in perception and observation (Runeson and Frykholm, 1981: 733). However, human perception is not limited to sight. In musical performance, aural faculties play a primary role in the contextualisation of experience. Whilst this may seem obvious, given that music is a form of sound, it is important not to discount the role of aural perception in musical performance. For whilst sight provides one avenue by which musicians may infer their co-performers' interpretations, visual input *augments* aural input, not displaces or overrides it. Highly skilled ensemble musicians may choose not to look at each other while playing and still present compelling performances. Even though such musicians are actively disregarding visual input, I would argue that they are still observing their surroundings. The term 'observation', however, has a strong visual connotation. Within the context of musical performance, aural input is elevated to

equal or higher status than the other senses due in part to its role in the final work of art and the immediacy with which it engages the human sensory system.[10] The observation of sound involves not simply its perception, but its identification and consequent attribution of importance, meaning or classification. It is one thing to aurally perceive a musical performance and another to observe the qualities which characterise that performance. Extended experience allows for increased epistemological identification of these qualities—a process which is aided through visual observation. Perception and identification of the visual elements of instrumental performance provide clarification of what is happening or what will soon happen aurally. Within musical ensembles, observation is therefore an amalgamated sensory experience. Depending upon the context, performers may infer information from a variety of sources, shifting between visual and aural input as necessary.

As has been explored within the first two sections of this chapter, the environmental knowledge acquired by musicians is developed through their experience within ensembles themselves, allowing them to 'read' into their contextual environment. To what extent does the ability to create inferences from situational context allow performers to adjust their subsequent behaviour? The next section of this chapter will explore how theories originally developed to explain elements of creative improvisation within ensembles may be applied to more nuanced aspects of musical performance. From there, it will be possible to assemble and critique a new framework of ensemble interaction.

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[10] In his philosophical writings, John Dewey details the interaction between sight and sound, commenting that each provides specific elements to understanding one's environment. The immediacy of sound arises from its ability to physically resonate with the human body, even though its origin is external (Dewey, 1934: 245).

Continuous adaptation

This chapter has thus far addressed how embodied environmental knowledge can contribute to the amount of information members of an ensemble may be able to infer from their fellow musicians' performances. Although this is a key step in understanding how ensembles operate, there remains a further question with regard to the effect of inference. Presuming that chamber musicians are able to infer qualitative musical information from the performances occurring around them, how may this process affect the way that their interpretation of their own part is created? With each action taken within an ensemble, the feel and atmosphere of the group is slightly altered. This subtle shifting of context creates new circumstances within which they make interpretative decisions. Michael Tree, violist with the Guarneri Quartet, describes this flexibility as 'an organic process', in which 'each of [the quartet members is] influenced by constantly fluctuating circumstances. Every movement of our playing is conditioned by what has just occurred or by what we think is about to occur. It remains creative because just about anything can happen' (Blum, 1987: 20). Uniqueness and creativity thus emerge from the transient context created through joint performance.

Continually shifting ensemble conditions are especially apparent when considering the effects the attribution of meaning to action may have, particularly in creating the context within which an appropriate reaction may be determined. Considering a non-musical example, if one person physically collides with another while walking, the attribution of intention may lead to wildly different reactions. Should the second person not attribute intention (and thereby, meaning) to the first, the incident would be interpreted as a mere accident. However, should the second person believe that the first intentionally ran into them, the action could be regarded as a malicious shove. Within ensemble performance, the attribution of intention and meaning upon actions may have a similar effect upon interpretational context. Changes in these interpretational contexts would therefore encourage the musicians to react in different ways. Tomasello similarly remarks that the attribution of intention is necessary to ensuing action, concluding that 'the cognitive representation

of the intention also contains both self and other […]. This is necessary because both collaborators must choose their own action plan in the activity in light of (and coordinated with) the other's action plan' (Tomasello et al., 2005: 7).

In comparison to the communicative paradigm detailed in Chapter Two, the ability to 'read' the environment does not entail any intention to communicate on the part of any external agent. It is important to remember, however, that whilst intention may affect attributed interpretation (the difference, as we have seen, between an accidental push and an ill-intentioned shove), intention does not change the existence of an action. Whether or not either person *meant* to run into the other does not mean that the event did not happen. Recall the example given in Chapter Two of the Boult Quartet's cellist misjudging a bow stroke, thereby performing softer than in a previous play-through. Regardless of his intentions (or lack thereof), the cellist's bowing created a situation to which the other musicians within the ensemble had to react. This section of the chapter will examine the potential role of reaction within ensembles, a process which will provide the final piece of a platform upon which a new framework of ensemble interaction may be assembled.

Attunement

David Soyer, cellist with the Guarneri Quartet, remarks that the key to spontaneous string quartet performance can be found in the 'reactive' nature of the ensemble (Blum, 1987: 20). This sentiment is echoed throughout both practitioner and musicological literature on chamber music. Identifying ensemble interaction as a 'highly complex communicative exchange', George Tovstiga writes that 'all musicians respond and react continually to the audible and visual impulses they are registering around themselves' in performance (Tovstiga et al., 2004: 9). More specifically, Kokotsaki proposes that musicians engage 'in a kind of active listening', which allows them to get involved in 'a process of musical adaptation whereby alternatively musical possibilities [are] considered in an open and flexible manner' (Kokotsaki, 2007: 657). Each new element presented through an individual performer's interpretation provides the possible impetus for subsequent interpretations to be

created. Along these lines, Paul Berliner notes that 'while attending to their own parts—assessing inventive material and selecting elements for development—performers must constantly exercise musical peripheral vision to make similar assessments about neighboring parts as they endeavor to predict their courses' (Berliner, 1994: 364; see also Goodman, 2002: 156). Given these descriptions, it appears appropriate to extend Soyer's phrasing to describe ensemble interaction as both a 'reactive' and 'active' process. However, none of these testaments to the reactive nature of ensemble performance go into further detail as to how this process functions.

Fluidity of ensemble interaction, based upon the descriptions cited above, may be presumed to be the result of several common elements. First, there is an emphasis on information (i.e. 'musical possibilities' and interpretations) flowing in multiple directions, simultaneously to and from performers. This qualitative musical information, whilst constantly being transmitted to the ensemble members, does not have to be consciously semantically encoded, thereby circumventing the process of explicit communication (as described in Chapter Two). Every action and sound made by a musician could be 'read' into by their co-performers, regardless of whether or not they were intentional. Robert Hatten touches on this by specifying gesture as 'any energetic shaping through time *that may be interpreted as significant*' (Hatten, 2006: 1; my emphasis), allowing for the possibility that unintentional or seemingly-inconsequential motions may be interpreted as important. Second, it follows that the exchange of information between performers occurs as a result of aural and visual observation on the part of each individual musician. This takes the form of what Kokotsaki refers to as 'active listening' and the process which Tovstiga notes as musicians registering 'audible and visual impulses […] around themselves'. Third, the interpretative changes which are prompted by constantly evolving musical contexts happen within the act of performance. Therefore, both reflection and action occur simultaneously—a detail noted by Soyer when he writes that 'everyone feels [a lead] at the same time; everyone is thinking towards a central point […] We don't follow each other; we play together. There's a difference in that' (Blum, 1987: 15). I propose that these

common elements may be encapsulated within a process called attunement. Developed out of research on improvisatory jazz groups, Keith Sawyer writes that:

> group musical performance can only work when the performers are closely attuned to each other. They have to monitor the other performer's actions at the same time that they continue their own performance, to be able to quickly hear or see what the other performers are doing, and to be able to respond by altering their own unfolding, ongoing activity.
>
> (Sawyer, 2005: 51)

That being said, it is not enough to simply register what the other performers are doing within an ensemble. Effective attunement requires that the ensemble musicians are able to accurately infer meaningful information from their co-performers. Equally important is the ability to distinguish between accidental and intentional actions. Reaction to said actions may then be modified based upon this differentiation. However, as will be illustrated later in this chapter, the fact that a performance includes accidental characteristics does not mean that it may not encourage interpretative modification on the part of the other performers. Musicians' comprehension of the information inferred from their fellow performers, as discussed above, takes the form of applied environmental knowledge. Thus, the embodied knowledge musicians acquire through the process of learning and practising their instrument, in addition to the knowledge they have assimilated through experiences as a performer and as a listener, play a large role in the ensembles in which they participate. This experience provides the cognitive resources by which they are able to make inferences about forthcoming sound-events based upon the perceived sounds and sound-producing gestures of their co-performers. The assimilation and application of environmental knowledge is alluded to by John Dalley, first violin with the Guarneri Quartet, when he write that there is 'a certain body language that each of [the quartet members] has when he plays. You get to know that about your colleagues and react accordingly. Over the years a great deal of it becomes intuitive' (Blum, 1987: 14). Recalling previous discussions throughout this thesis, Dalley's statement

illustrates how the musical knowledge acquired, embodied and applied through ensemble interaction may encompass even the most idiosyncratic elements of individuals' performance styles.

Attunement provides a method by which musicians' environmental knowledge may be effectively applied to ensemble interaction. Elaine King touches upon this process in an overview of ensemble performance when she writes that 'ensemble performers carry out complex predictions that are intimately bound to reactions gained through feedback' (Goodman, 2002: 154). I would argue that the 'complex predictions' she speaks of necessarily build upon the richness of musicians' experiences, allowing them to infer their co-performers' musical intentions in a way that does not necessitate (and often evades) verbal articulation. The process of performance of music itself thereby provides all the information one needs to effectively deduce a musician's intentions—provided that there is appropriate experience enough to ground that inference.

The paradigm of inter-reaction

It is from this perspective that I am able to propose a new framework for understanding the process by which ensemble performers interact and share information.[11] This new understanding of ensemble interaction draws extensively upon the wealth of Mode 2 knowledge skilled musicians have acquired and, I argue, continually apply through performance. Developed out of the conclusions reached within this thesis, this framework is based not on a paradigm of communication, but a paradigm of reaction. The framework I propose may be condensed into three primary stages: transmitting, inferring and attuning.

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[11] Material from the following discussion is developed from a presentation I gave at the CMPCP Performance Studies Network International Conference at the University of Cambridge (July 2011).

- *Transmitting*: The way in which a performer operates his or her instrument is dynamically related to their musical intention. The variety of nuanced techniques required for instrumental operation demand physical changes which may be discernible to an observer. Therefore, the execution of different musical intentions results in changes to the aural and visual output of a performer, changes which may be noticeable and even meaningful depending upon the experience of those persons perceiving the performance. Whilst this stage has been described within the paradigm of communication presented in Chapter Two, it serves here to encompass all sensory output of the ensemble performers, not simply those which have been deliberately encoded.
- *Inferring*: Through the use of embodied musical knowledge, acquired through extensive experience playing instruments independently, participating within ensembles, observing other performances, and with general musical conventions such as melody, harmony and orchestration, skilled chamber musicians may be able to arrive at informed conclusions of their fellow performers' musical intentions based on the sensory output they perceive. Depending on the degree to which the musician is familiar with both the surrounding instruments being played and the performers themselves, conclusions may range from determining basic sonic properties such as volume and tempo to more nuanced shadings of interpretation and phrasing.
- *Attuning*: Within an ensemble setting, musicians are able to perceive the individual contributions to the performance occurring alongside theirs and draw conclusions about the implications of those contributions. In conjunction with the musical characteristics of these individual performances, chamber musicians are able to apply the inferred interpretations (musical

intentions) of their fellow performers to their own unfolding performance.

Thus, they constantly modify and adjust their interpretation in recognition of the ensemble's overarching, shared intentions.

Due to the cyclical nature of this process, I propose that the paradigm is not only rooted in reaction, but more accurately in inter-reaction. Each action within performance begets another, creating a socio-musical context which is constantly adapting to the constituent members' musical interpretations.[12] Thus, ensemble performance is constantly shaped not only by the individual musicians' interpretations, but their continuously unfolding performances as well. By extension, the process of inter-reaction describes how an ensemble may be able to gain its own collective interpretative momentum—a state which performers refer to as the music 'playing itself'. The illusion of the music taking over the group may arise when musicians are so attuned to one another and the emergent musical performance that the interpretative intention is cognitively distanced from the individual musicians. Instead of single performers alternately leading the ensemble, the balance of creative input and adaptation found in this seemingly magical performative state encourages a sense of cognitive freedom and flexibility. The creation of the ensemble's interpretation is distributed to such an extent that it may feel like the musicians are tapping into something greater than their individual musical intentions. This total involvement in the act of performance is reminiscent of Csikszentmihalyi's concept of flow (1990). Thus, the process of inter-reaction may encourage the development of an ensemble flow state.

Assumption of this framework does not negate the possibility of explicit communication taking place within ensembles. Rather, it removes the element crucial to communication, encoding, from the equation. The three stages of the inter-reactive framework of ensemble interaction do not have to be necessarily predicated by either the intention to communicate or explicit encoding of an

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[12] The framework of inter-reaction appears ostensibly similar to the flow of perception and action proposed by Luke Windsor (2011: 60). However, Windsor's framework is only concerned with an individual performer or listener, and does not go into the detail of how it may be applied within an ensemble.

idea. Therefore, the paradigm accounts for *all* events which may transpire during a performance, rather than simply those which are intended to happen. The ramifications of this aspect of the framework of inter-reaction will be explored further in this chapter, clarifying what actions may be considered to be intentional and unintentional within musical performance.

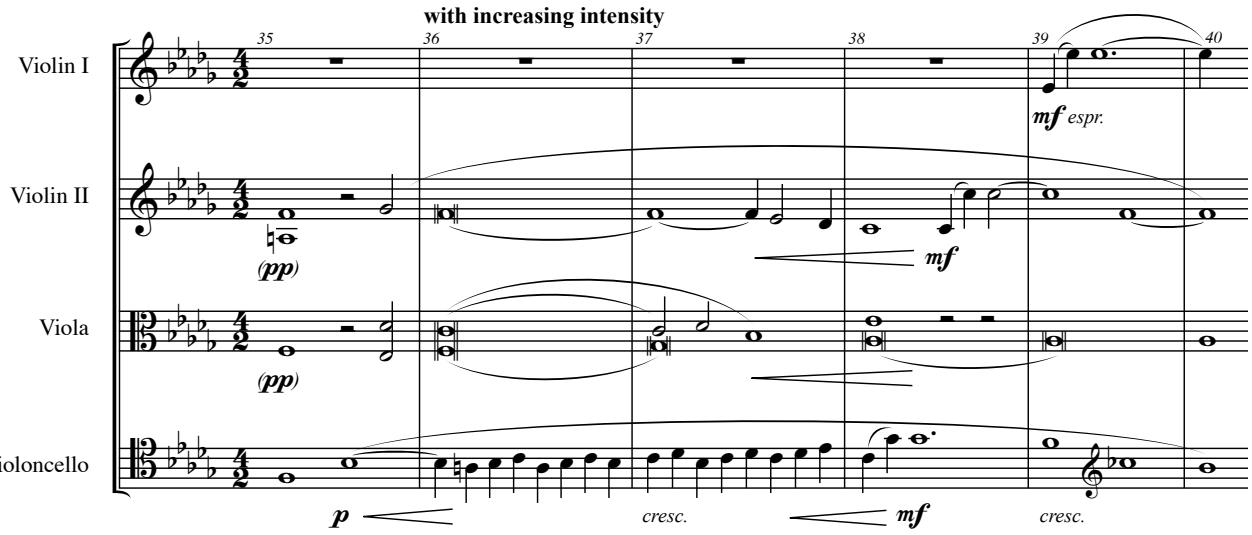
One could argue that the disregard of the original performer's intentions within the framework of inter-reaction is slightly hypocritical, given that the framework so prominently presumes intentional reaction on the part of the other musicians within the ensemble. However, this argument inordinately focuses on the question of identifying the evolution of intention (as a mental concept) between ensemble members rather than the observable effects of those intentions. As stated before, the presence or lack of an intention for an action does not negate the existence of that action. The underlying premise of the framework of inter-reaction is that observable reactions to events within performance may provide insight into musicians' intentions, rather than the other way around. The concept of musical inference, developed out of the assumption of skilled musicians' Mode 2 knowledge, provides the rationale by which the process of attunement works so effectively and immediately.

Whilst the inter-reactive framework appears to be a theoretically appropriate manner to describe the process of ensemble interaction, it is necessary to apply it to specific performance situations in order to confirm its validity. The next section of the chapter will analyse three video examples of the Boult Quartet in rehearsal, including the excerpt which served as a foil to the paradigm of communication in Chapter Two. After examination of these concrete examples, the following chapter will explore the implications of this framework for further research on ensembles, the semantics of performance vocabulary, and the nature of musical knowledge itself.

Revisiting the Boult Quartet in Rehearsal

The first example to be analysed via the framework of inter-reaction is the video of the Boult Quartet rehearsal in which the ensemble plays through an excerpt from the second movement

of Samuel Barber's *String Quartet No. 1, Op. 11* (see Video Example 4.1 for the rehearsal footage and Musical Example 4.1 for the corresponding excerpt from the score).



Musical Example 4.1 - Samuel Barber, *String Quartet No. 1, Op. 11*. Movement II, bars 35–40.

As remarked in the analysis found in Chapter Two, in the second play-through of the excerpt the cellist uses a markedly smaller amount of bow at the end of his melodic line (bar 38) than he has previously. The second violinist reacts to this change of musical circumstance and accordingly plays his rising octave line softer than he has in the first play-through. Analysis of this event via the paradigm of communication does not sufficiently explain this occurrence, in that the vital process of encoding either does not happen or generates incorrect data. Similar analysis of this situation via the paradigm of inter-reaction does not require the cellist's intentions to be considered. Whether or not the cellist intended to underestimate the amount of bow available to him does not matter. However, his doing so created a discrete situation (and accordingly, aural and visual output) to which the second violinist must react. The violinist, upon reception of this information through multimodal sensory channels, is able to infer the resulting musical output of the cellist—a softer, less dramatic phrasing. Note that the focus here is not on what the cellist intends to do, nor on whether

the violinist is able to deduce the cellist's original underlying intentions. The violinist, applying the sensory information he perceived of the cellist's performance, is instead able to react to the actions and resulting sounds he concludes are actually going to happen. Through the process of attunement, therefore, he is then able to adapt his own musical plan to incorporate these new variables inferred from the cellist's performance, subsequently adjusting his own playing approach. In other words, this video provides an example of how ensemble interaction may be considered as a continuous process of empathetic adjustment to simultaneously-occurring performances.

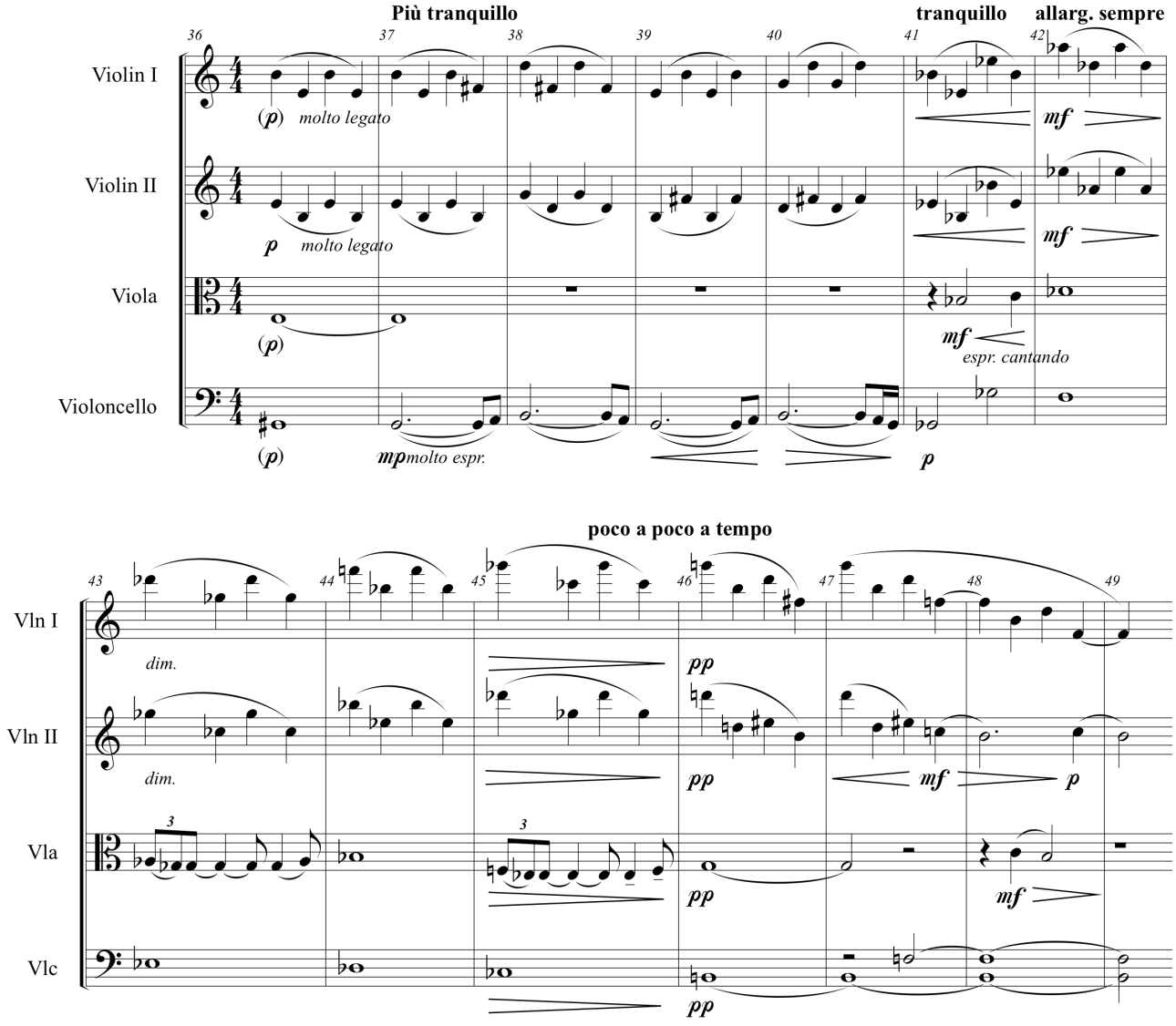
Even though this video was of a rehearsal, such accidents may also happen in live performance, regardless of how prepared or skilled the ensemble members may be. Musicians need to be able to respond and react both to their own 'errors' in addition to those of their colleagues in the ensemble. This may not necessarily result in an unfavourable situation, as adept reactions to unexpected events is a highly-valued aspect of live performance. The temporal essence of music as an art form encourages the idiosyncratic unfolding and evolution of each performance. In David Dubal's collection of interviews with professional concert pianists, several musicians comment on how the act of performance itself sparks interpretative development. Jorge Bolet remarks that 'freedom and spontaneity are what make music-making really interesting' (Dubal, 1985: 79). That spontaneity often occurs in seemingly unconscious situations such as those described by Tamás Vásáry:

> I love the improvisatory element of performance which interacts with my conception of the score. On stage it is life or death, and some very essential parts of you may surface which go beyond the logical, cerebral functions. Only on stage, during high tension, can one find his own truth if one knows how to listen for it.
>
> (*Ibid.*: 323)

Thus, the ability to react to continuously changing circumstances is recognised by practising musicians to be vital not only to the act of ensemble performance, but performance in general.

The framework of inter-reaction may also be applied to situations where one musician assumes a leadership position. Analysis of the following rehearsal excerpt recalls the discussion of

leadership by example found in Chapter Two, demonstrating this process and its effects on the rest of the ensemble. Part-way through the third movement of Barber's *String Quartet*, the violins play an accompanimental *ostinato* figure. With the cello underpinning the ensemble, the viola assumes an expressive melodic line (see Musical Example 4.2 for the corresponding excerpt from the score).



Musical Example 4.2 - Samuel Barber, *String Quartet No. 1, Op. 11.* Movement III, bars 36–49.

The tempo of the section gradually becomes slower, particularly with the *Più tranquillo* marking in bar 37, the *tranquillo* marking in bar 41, and a subsequent *allargando sempre* indicated in bar 42. On

the first day this movement was rehearsed, however, the transitions between tempi had not been firmly established. This video excerpt provides a classic example of how an ensemble's shared interpretation of tempo may be motivated directly by a single musician's performance. At the beginning of the video, the two violins start their accompanimental figure (see Video Example 4.2). The tempo set between themselves and the cellist, whilst not completely together, is fairly consistent. At the end of bar 36, the violins relax on their crotchets in preparation for the viola's entry at the *Più tranquillo*. However, as the violist plays her line, it becomes apparent that her interpretation of the tempo is significantly slower. Prior to this play-through of the excerpt, the quartet had established that the viola line was most important from bars 36 to 46, providing credence for the assumption that the violist would exercise a music-dependent form of leadership. In addition, the violist had previously indicated to the other musicians that the melody had to be played below a certain tempo in order to make sense expressively (see Video Example 2.1, originally discussed in Chapter Two). By the beginning of bar 38, the violins and cello have slowed down accordingly, matching the violist's interpretation. Even more striking, however, is the expressive time taken at the end of bar 45. After misgauging the tempo that would best suit the viola line, the rest of the quartet appears to pay particularly close attention to her performance for the rest of the time that she has the melody. This creates an ensemble context within which they are able to sensitively perform a brief pause between bars 45 and 46.

Application of the framework of inter-reaction to this performance provides one method of understanding the process by which the rhythmic disjunction of the first bars is resolved into a synchronised performance five bars later. In playing her melodic line, the violist asserts her interpretation of how fast the passage should be. This interpretation is transmitted through both aural and visual channels to her fellow performers. Inference, in this context, could not only be the presumption of a certain tempo by the manner in which the violist played her instrument, but also recognition of the way the violist was playing her melody over time. After the initial minim in the viola line, the last quaver of bar 37 provides the rhythmic information necessary to deduce a tempo.

Similarly, the inference stage could also include the quartet members remembering the discussions of tempo which had taken place before this play-through. From the varying amounts and kind of inference occurring around the quartet, they are able to attune to each other. In this circumstance, it could be argued that the violist did considerably less attuning than her fellow musicians. However, this is not necessarily a negative comment; simply, that the manner in which she played her melodic line is recognised by the other musicians to be most appropriate for this situation. As this rehearsal excerpt demonstrates, the process of playing together allows for efficient resolution of interpretative differences amongst the quartet, enabling them to share generalised, common musical intentions.

This video example provides a context in which a form of musical leadership by example may be directly observed. I would argue that the violist was not explicitly 'communicating' her interpretation to the other members of the quartet. However, she did perform in a specific style and tempo whilst deliberately *not* attuning. In doing so, she was able to forcefully shift the ensemble's shared interpretation of how tempo should change within this excerpt. Contrary to her normally responsive playing style, the violist's inflexibility in tempo within this circumstance suggests that she is effectively controlling the interpretation of this part of the piece. Thus, musical leadership by example may be interpreted as a playing approach that emphasises attunement less than interpretative authority.[13]

A third and final example is provided by an instance in which a performer explicitly cues the other musicians within an ensemble. In the first movement of Barber's *String Quartet*, there is a gradual slowing down during a transitory period in the music before the arrival of a new thematic idea. The primary feature of this excerpt is a small, three-note motive which is passed around the quartet, finally ending up in the cello part (see Musical Example 4.3 for the corresponding excerpt from the score).

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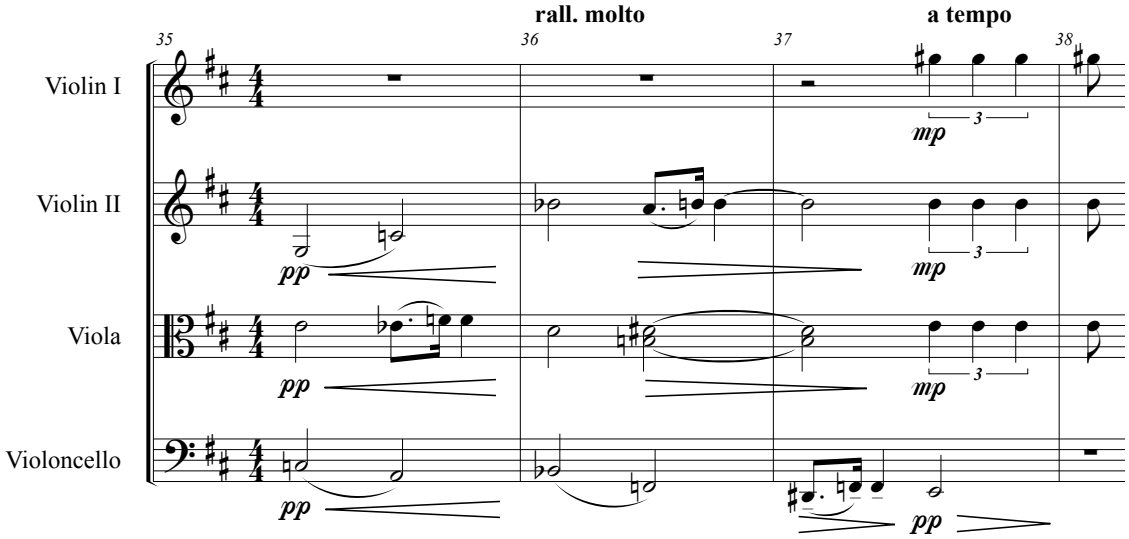
[13] This is not to say that leadership by example is always a positive or effective approach to ensemble performance. If the violist were to be repeatedly insistent on her own interpretation, she may not be perceived as a terribly good chamber musician, regardless of her technical prowess. Chapter Five includes further discussion of how performers' qualities may be perceived within ensembles.



Musical Example 4.3 - Samuel Barber, *String Quartet No. 1, Op. 11.* Movement I, bars 35–38.

The tempo of this excerpt gradually slows down, only to be restored within a matter of beats. Starting with the expressive indication of *tranquillo*, a *rallentando molto* is marked in bar 36. At the introduction of the new theme on the third beat of bar 37, the tempo is picked up again. Observation of the Boult Quartet in rehearsal reveals that ownership of the transition from the *rallentando molto* to the *A tempo* is passed to the person who has the last moving line before the new theme. Thus, whilst the moving line is handed off between performers, the cellist is able to control the final stages of the *rallentando* (see Video Example 4.3). Most noticeably, he slowly nods after playing the final appearance of the three-note motive, a gesture directly observed by the violinists. Subsequently, the quartet is able to cohesively perform the remainder of bar 37 in accordance with Barber's *tutti* orchestration.

In this circumstance, the cellist's nod itself is not directly tied to a sound-producing or sound-accompanying gesture, and may be assumed to serve as a form of intentional communication.

Through their recognition of the nod as a structural indicator within the excerpt[14], the other quartet members attribute meaning to the conducted gesture—regardless of its intention, the nod acted in a communicative manner. Viewed from the perspective of the framework of inter-reaction, the visual information provided by the cellist's nod is first transmitted to the rest of the ensemble. Upon receiving this information, the other musicians are able to infer both intention and meaning to the gesture. It is important to note that the quartet members are able to distinguish this gesture from other physical movements due to their accumulated experience seeing this kind of communicative gesture used by both fellow musicians and conductors. This experience allows them to deduce that the gesture is intended to communicate both temporal and expressive qualities: both the timing of the nod and the manner in which it is executed may be 'read' into to varying degrees. From there, the other musicians are able to consolidate common intentions regarding the timing of the excerpt being played and subsequently modify their joint performance. This enables the quartet to navigate through and perform effectively what may otherwise have been a difficult musical transition. In this way, the framework of inter-reaction is able to account for situations which may be interpreted as dealing with explicit communication between co-performers. However, as has been demonstrated throughout this thesis, these situations comprise only one aspect of the variety of processes which occur within ensemble operation.

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[14] Jane Ginsborg, Roger Chaffin, and George Nicholson explore how shared performance 'cues' such as that demonstrated by the Boult Quartet's cellist may be used as effective tools or landmarks within a piece (Ginsborg et al., 2006). Their research focuses on how these cues may provide the necessary impetus to 'provide the retrieval cues to activate [an] upcoming passage in long-term memory' (*Ibid.*: 189). The role memory plays within ensemble performance, particularly when considered in terms of embodied knowledge, may prove to be a fruitful extension of this research.

Conclusion

Through the development of concepts such as shared and attributed intention, the inference of musical intentions, and attunement, this chapter has provided a platform upon which I have been able to propose a new paradigm for understanding ensemble interaction. The framework of inter-reaction is based upon three key steps: transmitting, inferring and attuning. Individual musicians' performances within ensembles are transmitted through various sensory media to their fellow ensemble members. These sensory media may be regarded as meaningful to those who have sufficient experience with that specific form of instrumental performance. Upon receiving this information, the ensemble members are able to infer the original performer's musical intentions based upon the embodied environmental knowledge they have accumulated through experience as performers and listeners. The ensemble musicians are then able to apply both the inferred musical interpretation and their colleague's impending performance to their own intentions, constantly modifying and shifting their concurrent performances. As each musician's performance unfolds, both it and the actions required to produce it impact upon the ways in which the rest of the ensemble's performance evolves. This framework therefore allows for the creative flexibility and spontaneity which is often prized within ensemble performance in Western art music without completely rejecting the possibility of explicit communication between co-performers.

The examples of ensemble interaction provided in this chapter illustrate the range of experiences which may be accounted for through application of the framework of inter-reaction. Firstly, it may be used to explain how musicians are able to transmit qualitative musical information to their fellow performers even when there is no explicit communication taking place. In such a manner, ensemble musicians are able to effectively 'pull' information from each other's unfolding performances. Secondly, the framework provides a model by which musical leadership through example may be exercised. This process allows a single performer to influence the ensemble's shared musical intentions without them 'conducting' the group or requiring explicit communication.

Thirdly, the framework allows explicit communication to exist as a distinct species of interaction within ensembles. Performers within ensembles *do* communicate with each other through gestural cues and eye contact, but this form of communication is only one aspect of the processes by which ensembles function.

The final chapter of this thesis will look beyond the bounds of ensemble interaction, exploring the extent to which this framework may inform both musicological and non-musicological research. In addition, it will allow for an in-depth critique of the methodologies utilised within this thesis, particularly with regard to the application of reflective practitioning to performance studies. Emergent from these topics, however, is the overarching question of identifying a musical epistemology based not in propositional knowledge, but in the act of performance itself. Whilst admittedly too large a question to be effectively approached within the scope of this thesis, the possibility remains that musical performance engages with the human mind in such a way that it develops and employs a form of embodied knowledge distinct from other intellectual or professional pursuits.

Chapter Five:

Reflecting on Musical Knowledge

Introduction

Musical ensembles provide instances of human interaction which involve 'a degree of intimacy and subtlety possibly not equalled by any other kind of group' (Young and Colman, 1979: 12)—characteristics which have become increasingly apparent throughout this thesis. Accordingly, research into the inner workings of ensembles requires an investigative perspective which accounts for the unique nature of human interaction which they engender. This entails a multidisciplinary approach both in terms of fields drawn upon and methodologies used. The preparation of this thesis has drawn upon an amalgamated research method based upon the overarching methodology of action research. Within this structure, I have applied practice-based and academic methods, drawing upon a variety of musicological, sociological and psychological research. My work has led to a critique of not only current proposed frameworks of ensemble interaction, but also the fundamental assumptions upon which they are based. Through this critique, I have been able to propose a new framework for understanding ensemble interaction based upon a paradigm of inter-reaction. This framework, established in the previous chapter, provides a method by which the interrelationships found within an ensemble may be understood in a way that does not depend on the paradigm of communication.

In the final chapter of this thesis I extend the process of reflection embedded in my methodology in three contrasting directions, accordingly dividing the chapter into three major sections. Firstly, I will reflect upon the research that I have conducted over the course of my doctorate (and, in effect, as long as I have been learning about music). This consists of an evaluation

of how the conclusions arrived at throughout this thesis may be effectively applied to research being conducted in the field of musicology and other fields, particularly gestural studies, pedagogy, epistemology, and management studies. Secondly, I will reflect upon the process that I have undertaken throughout the researching and writing of this thesis. Critical reflective practice is still in the process of gaining traction within the performance research community, particularly in academic contexts. I hope that critical self-appraisal of the methods used within my research (and its overarching methodological ideals) will encourage others to further develop this approach. Thirdly, I will reflect in a more speculative manner about the implications my research may have in relation to larger philosophical questions of musical knowledge. In particular, it has become increasingly apparent that there are many ways that musical thought may be identified, with embodied performative knowledge being only one aspect. Applying the concept of Mode 2 knowledge to musical performance has led to the prospect that musicians may think *in* music as much as or more than they may think *about* music. This proposal prompts a discussion of the nature of musical epistemology, a field of music philosophy which may prove to be more practical than abstract.

Reflecting on Research

As has been demonstrated in the previous chapter, the framework of inter-reaction, along with subsidiary conclusions made throughout this thesis, provides one method of understanding the processes which may occur within ensemble performance. However, the discussions which have taken place in order to construct this analytical framework may also provide insight into other areas of research. This section of the chapter will explore possible ways in which these discussions and the resultant framework may impact further research, both in musicological and non-musicological areas. Given the exploratory nature of these discussions, there will be a considerable number of open-ended questions. Through the proposal of areas which may be impacted by the research

presented in this thesis, I hope to provide starting points for further academic and practice-led investigations.

This section of the chapter examines three such extensions of my research. The first of these explores the extent to which the framework of inter-reaction may apply to improvisatory ensembles, looking beyond the attunement of interpretations to the attunement of larger musical ideas. The second proposed extension moves beyond utilising the framework as an analytical tool, considering how the process of inter-reaction may allow for increased understanding of elements involved in practitioner concepts of musicality. After exploring these two musicological areas, this section of the chapter will conclude with a speculative discussion on how my research, informed by various non-musicological fields, may in turn reflect back upon similar research conducted in those fields. Acknowledging that I am not a management theorist, sociologist or psychologist, I hope that this portion of the chapter will prove useful to interdisciplinary researchers who are interested in non-linguistic social interaction.

Beyond interpretation to creation

The rehearsal examples analysed in the previous chapter show ways in which the framework of inter-reaction may be applied to situations where an ensemble shares the creation of interpretation from a written score. It may be possible, however, to extend the applicability of this framework beyond the modification of interpretation to broader concerns of improvisatory musical creation itself. In order to explore this proposal, it is necessary to apply the framework of inter-reaction to recorded circumstances where there is no score. Through this process, the interplay of emergent musical elements and interpretations may be observed.

In some ways, improvised ensembles may provide a more direct means by which observers can see the impact of performers' interpretations on subsequent musical events. Within improvised contexts, the malleable nature of interpretation is extended to the music's pitches, rhythms and

textures themselves.[1] Therefore, causal effects between musical interpretations may be more evident from the perspective of an audience. The examples to be analysed within this thesis, drawn from an improvised performance setting, are distinctly less subtle than the examples of traditionally scored Western classical music. In addition to the observational research I conducted at Birmingham Conservatoire, I have participated in a variety of ensembles, not the least of which was The Supergroup. Playing entirely improvised music, the group comprised five doctoral candidates at the Conservatoire: Seán Clancy on alto saxophone and melodica, Roberto Alonso Trillo on violin, Sebastiano Dessanay on double bass, Tychonas Michailidis on live electronics, and myself on bass trombone. Seán, Sebastiano and Tychonas are active composers and performers, whilst Roberto and I focus on musicological research. Beyond agreeing on the general shape of the piece before the concert, the content of each piece was improvised, allowing us to explore our interpretative tendencies through the process of performance.

This section will briefly examine two excerpts of a performance by The Supergroup in order to gauge the validity of the framework of inter-reaction to describe processes occurring in improvised ensemble settings.[2] The first excerpt begins with Sebastiano rhythmically striking the front of his bass with two hands, Roberto playing extremely high long notes on his violin, Seán holding softer tone clusters in the background on the melodica, and Tychonas providing underlying dense electronic textures (see Video Example 5.1). As the performance progresses, Roberto leaves the *altissimo* range to play aggressive, double-stopped interjections. Within a matter of seconds, Sebastiano abandons his percussive ostinato in favour of trading double-stopped outbursts with Roberto. Meanwhile, I start playing a muted rhythmic line. Whilst not as active as the one previously played by Sebastiano, it still provides strict time against which other musical events may

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[1] To clarify, the improvised contexts to which I refer are those in which there is no set parts, score or harmonic structure. There may be, however, a rough plan for the shape of the performance, e.g. 'Start loud, then progressively get softer over the course of ten minutes'. However, it is not outside of the realm of possibility that the process of inter-reaction takes place within partially-improvised ensembles, such as jazz ensembles playing from a lead sheet.

[2] *Improv.*, Birmingham Conservatoire, 19 January 2011: 'Waltz of the Tearing Tears'.

be contrasted. Viewed against the framework of inter-reaction, it is possible to see how quickly the musical landscape evolves due to the performances taking place. Upon Roberto's departure from his previous musical intention, he introduces a new texture to the sound of the ensemble. His performance is both audible and visible to the rest of the group, who are able to alter their perception of what the shared intentions of the ensemble is and their concurrent performances to varying degrees. Sebastiano makes the most distinct change, choosing to imitate Roberto's textures in counterpoint. The disappearance of the rhythmic ostinato encourages me to assume that musical role—not necessarily mimicking it, but fulfilling some of its characteristics. Thus, the process of transmitting, inferring and attuning may be seen even in a brief improvised interchange.

The second video example under consideration comes from later in the same performance. Here, we can see how one distinct musical element may change the course of an improvised piece (see Video Example 5.2). At this point in the performance, the musical texture has become increasingly busy and loud. Seán's outbursts on the alto saxophone have emerged from interjections such as those Roberto and Sebastiano played in the previous excerpt. Out of these flurries of notes a sustained *altissimo* line rises, becoming increasingly prominent. As Seán continues holding onto his long notes, Roberto plays higher and higher on his violin, eventually arriving within the same octave as Seán. The collective momentum of the group starts decreasing, and as Seán and Sebastiano fade out, Roberto begins a downward *glissando*. I start whistling the saxophone pitch, providing an echo or an after-effect of the sustained piercing sounds that had happened previously. The framework of inter-reaction may be applied on a larger scale in this circumstance. Seán's *altissimo* lines were transmitted to the rest of the ensemble primarily through aural means. Due to their persistence, the musical intention was recognised as gaining importance by the rest of the ensemble, enough so that Roberto altered his own musical intention to join in. As the moment passed, I was able to react in a different manner. This encouraged the emergence of a new musical element, based on both the pitches previously heard and the direction in which the dynamic was heading. At this scale, the framework of inter-reaction may be considered a form of analysis of the shared intentions of the

ensemble. This proposal mirrors conversations that occurred in rehearsals of The Supergroup. Both Roberto and Seán commented that it is important to sense the 'direction' that the music was going in, texturally, harmonically or expressively. From there, Roberto describes how it is important to be 'a part of what's happening; letting the material you have inside come out […] in a kind of unconscious way' (Rehearsal 1, 17:03). In such a manner, the cause and effect of interpretations upon each other may provide insight into how improvised pieces are created out of the myriad of musical intentions that dwell within musicians.

Roberto's use of the word 'unconscious' raises an important question as to the extent to which the actions involved in ensemble performance may be considered premeditated. For all of their fluidity and spontaneity, would it be accurate to call the actions used during performance, particularly those involved in the process of inter-reaction, unconscious? Given the discussions which have taken place throughout this thesis, I would argue that these actions may exist in an area between consciousness and unconsciousness. On one hand, the practice of skilled musicians such as Roberto and the rest of The Supergroup relies on a large amount of embodied, Mode 2 knowledge. Ensemble performance engages that knowledge *through* the act of playing music. Practical musical knowledge evades traditional (i.e. Mode 1) analysis—a characteristic which may encourage the feeling of it being 'unconscious' or 'intuitive'. On the other hand, skilled musical performance entails the automation of many small actions and processes. Even the complexities inherent in the process of inter-reaction may become subsumed into the overarching activity of playing music. In such a way, the performer may be unaware that they are exercising a form of knowledge. Thus, they succumb to the historical predisposition that knowledge is limited to that which is known propositionally. The distinction between action automated through embodied knowledge and purely unconscious action becomes apparent when considering that what qualifies as a conscious action for one person may be unconscious for another. For an untrained musician, the enormity of the task of playing the correct notes in time, in tune and with a compelling interpretation may be overwhelming. However, the same task in the hands of an experienced musician may appear to be

effortless. Even so, the experienced musician is still cognitively involved in the act of performance. It is through the embodiment and automation of many skills and processes that skilled musicians may perform in such a manner. The embodied musical knowledge exercised, as a form of Mode 2 knowledge, circumvents traditional analysis, and therefore appears to be unconscious.

Whilst the framework of inter-reaction may allow for insight into the ways an improvised performance may develop, it is important to recognise that such analysis cannot (and should not) account for all of the variables at play. The creation of musical intention and interpretation, as has been discussed by Julian Hellaby, emerges from a host of informants (Hellaby, 2009). I propose that within the context of ensemble performance (both improvised and notated), the emergent musical intentions of the other ensemble members may act as another informant. The importance of inter-reaction may vary from group to group, performance to performance, and even bar to bar. However, although the process of inter-reaction may not be prominent in a performer's mind at any given time, it underlies the act of playing within a musical group. All ensemble interaction, to a certain degree, must involve some element of inter-reaction. Otherwise, the resulting performance would simply be multiple simultaneous solo performances, with the illusion of cohesiveness arising out of coincidental similarities between interpretations.

Redefining musicality

Beyond its use as a tool for the analysis of ensemble interaction, the framework of inter-reaction may provide further insight into more general musical qualities themselves. Observation of skilled musicians within ensembles, paired with contemplation of the processes by which musicians inter-react with each other and assume varying amounts of leadership, has enabled me to explore what it means to be a 'musical' ensemble musician. To call someone musical entails that they embody a certain set of characteristics—characteristics which depend on context. Musicality in children often refers to a range of qualities, from 'an infant's predisposition towards melodic contour' and participation in 'rhythmic displays' to the emergence of spontaneous songs (Forrester,

2010: 131–2). Likewise, Susan Hallam has found that the identification of general musical ability across all age groups depends on 'having a sense of rhythm' and 'expressing thoughts and feelings through sound' significantly more than the ability to read music or even being knowledgable about music (Hallam, 2010: 314). This use of the term 'musical' refers to a person's propensity towards music itself. When used in the context of people who are already musicians, calling them or their performances 'musical' has a different connotation. The term may imply that whilst a musician is not necessarily technically proficient, their innate aptitude and expressiveness manages to create an aesthetically-appealing performance. Used in this way, 'musical' may become patronising: superficially complimentary yet subtly demeaning. However, it is not always used in a negative manner. Within ensemble contexts, to call someone musical implies that they blend well with their fellow performers, contributing enough to be creative but not overly so. The opposite would be to call that person a soloist—someone who may be fully proficient and adept in other aspects of performance, but lacking in the abilities necessary to effectively participate within a chamber group. Writing in 1925, but echoing a sentiment widely expressed throughout the musical community even today, the publisher Herter Norton writes that:

> it is well known that the great violinist is not necessarily a good quartet-player: his individualistic vitality, noble that it may be, disrupts the spirit of ensemble music. Even four equally accomplished virtuosi do not constitute a quartet: the *mere* virtuoso remains hopelessly foreign to the style while he who grasps the musical intention has difficulty in subjecting his habits of individuality to the whole.
>
> (Norton, 1925: 11)

Among practising musicians, the concept of being musical within ensembles is often considered intangible and mystical, consisting of characteristics which vary from person to person and context to context. Even though the specific properties entailed in being musical are enigmatic, the word is used commonly without confusion.

The framework of inter-reaction, as well as the performative characteristics it espouses, may provide a functional definition of musicality within the context of ensemble performance. Recalling

the innumerable musicians with whom I have had the pleasure of performing, there are many that I would characterise as being extremely easy to play with. Likewise, there are a contrasting selection that are distinctly hard to play with. Recalling Norton's comment about the possibility of a virtuoso performer who is ill-suited for ensemble performance, a musician may play very musically (i.e. sensitively or expressively) and still not exhibit the characteristics which make them a musical ensemble member. Upon reflection, the performers that I would qualify as good ensemble musicians embody many or all of the qualities which are required to effectively operate within the framework of inter-reaction. Using the three stages of the framework as a guide, the following musical characteristics may be proposed:

- *Transmitting*: In order to consider someone to be a musical ensemble performer, there needs to be a basic amount of instrumental skill and technique. The ability to effectively transmit one's musical intentions through the medium of performance would be a prerequisite for the other characteristics of being a musical ensemble participant (even if those intentions may not always be grasped by observers). Regardless of their aural acuity, sensitivity or creativity, if musicians are unable to successfully articulate their musical intention, they cannot function within an ensemble (and may be called musical in a slightly negative manner).
- *Inferring*: The ability to accurately and quickly determine others' internal musical intentions may be considered one form of sensitive playing. The more easily a musician is able to draw musical inferences from their fellow performers, the less time the ensemble has to spend engaged in explicit communication. This enables the ensemble to focus more on the process of creating interesting and expressive performances than on attaining temporal

or interpretational cohesiveness.[3] Receptiveness to the interpretative ideas of one's colleagues within a musical group may therefore be considered an important trait of a musical ensemble performer.

- *Attuning*: Effective attunement combines the skills and abilities discussed in the previous two stages. In order to attune, a performer needs to not only possess awareness of the shifting conditions within an ensemble, but also the technical and creative skill required to participate in the ensemble's shared intentions. Additionally, this ability includes one's potential to lead by example, should it make sense within the circumstances of the performance. Therefore, to be a musical ensemble performer, one needs to be receptive and ready to change, with one's overarching priority being the creation of a mutually shared intentions.

I propose that the musical abilities outlined above are all vital to being considered a musical ensemble performer. Granted, being musical in this manner is not a quantifiable characteristic, and I would not presume to set such an flexible concept in stone. I hope that this discussion will provide insight into the qualities which I think constitute musicality within the context of chamber ensembles, as well as inspire further critical examination of this concept. Through research on this and other concepts held so firmly within the parlance of performers, it may be possible to understand more clearly the culture of performance in a way which develops out of practice itself.

Beyond performance studies

As has been evident throughout this thesis, research on musical ensembles may be effectively conducted through the interdisciplinary combination of theories and conclusions from both musical

[3] I do not intend to negatively portray explicit communication through this description. As a tool, it serves a valuable purpose in allowing co-performers to express certain kinds of information efficiently and effectively. However, it constitutes only one element of ensemble interaction, and may not be suitable for all kinds of information which may need to be shared between performers.

and non-musical fields. Up to this point, the argument of the thesis has been concerned with the application of non-musical research upon musical contexts. In what ways, however, can current musicological research on performance inform other fields? The final discussion of this section will dwell on possible ways in which this flow of research may be reversed. Out of the variety of topics that have been drawn upon within this thesis, I will briefly consider four such areas which may benefit from reapplication: gestural studies, pedagogy, epistemology, and management studies. I would like to stress that my understanding of these fields is through my understanding as a musician turned academic, and would therefore not presume that my ideas on these topics are new nor significant. However, a fresh perspective, informed by a distinctly different realm of practical experience, may provide insights which otherwise may be inaccessible.

In the beginning of Chapter Two, I identified work by gestural researchers such as David McNeill, Paul Ekman and Wallace Friesen as the basis for musicological research on gestures in solo performance. Through the discussions found in that chapter, however, it has become apparent that analysis of gestures in this manner relies upon a paradigm of communication. Given the arguments I have made throughout this thesis against the sole use of a communicative paradigm in ensemble analysis, to what extent may non-musicological research on gesture be affected by a similar paradigmatic shift? Work conducted at McNeill's Center for Gesture and Speech Research at the University of Chicago has long found that the physical gestures which accompany speech can serve multiple purposes, primarily in the form of cognitive aids for the speaker or the receiver (Cassell and McNeill, 1991). However, the role of inference in the process of inter-reaction may provide insight into how people interpret others' movements, particularly in non-linguistic situations. Recalling that embodied knowledge, by its nature, is built upon experience, personal experience will influence the degree to which someone may effectively 'read' the world around them (Nonaka and von Krogh, 2009). As has been shown in relation to instrumental performance, my experience as a trombonist allows for specific insight into the processes necessary to play the trombone. Likewise, continued exposure not only to a certain kind of instrument but a certain performer will enable me to accrue

an understanding of the range of motions that the performer uses to create certain musical results. Might this principle be applied back to the realm of non-musical social interaction? This proposal recalls Runeson and Frykholm's statement that 'person-and-action perception may [require] the utmost of educated attention' (Runeson and Frykholm, 1983: 598). For example, researchers engaged in work on gestures have accumulated a vast amount of embodied knowledge in regard to perceiving and interpreting others' physical motions. Consequently, they will be able to read further into what they perceive others to be doing, going as far as McNeill and Duncan's recognition of mental growth points (McNeill and Duncan, 2000). Alternatively, those who do not have as much experience with social interaction—or, more conceivably, within a certain culture's idiosyncratic social interaction—will have significantly more difficulty identifying and perceiving specific gestures, let alone attributing meaning to them. As has been demonstrated in my research, the role embodied knowledge plays in the process of inference is by no means negligible. It may be worth, therefore, pursuing further the relationship between embodied knowledge and perception.

As has been detailed throughout this thesis, a common theme of research on ensemble interaction is how leadership operates in a musical setting. In Chapter Two I critiqued the ways in which concepts of leadership, for example those found in the business management literature, have been applied to theories of ensemble interaction. Through the construction and assessment of the framework of inter-reaction, I have identified the model of alternating leadership as the most direct correlate to the processes which occur in ensemble musical performance. As we have seen, particularly in the analysis of the Boult Quartet violist in the previous chapter, chamber musicians do 'temporarily and freely' alternate between being 'observers, followers', and *ad hoc* leaders, to modify Andert's definition of alternating leadership (Andert et al., 2011: 54). However, the underlying methods which enable this shifting of group role have not been explicitly determined. The ways in which musicians within chamber ensembles interact, analysed through the framework of inter-reaction, may provide insight into how alternating leadership might operate in other social situations. In the previous chapter, I noted the importance of shared intentions in terms of the joint

creation and maintenance of an ensemble interpretation. The establishment of interpretation through the act of performance is a constant give-and-take; a lack of flexibility on any one musician's part would result in a performance which is either lacklustre or exhibiting only that one person's interpretation. It follows that the interpretation which emerges through performance may not have been predetermined by any of the ensemble members, but is an amalgamation of the individual musicians' aesthetic preferences and the contextual conditions of the performance itself. In a similar manner, alternating leadership may thrive in circumstances where the overarching goals of a group are identifiable, but not tied to any specific method or subsidiary goals. Therefore, when considering the embedded hierarchy of intention identified by Tomasello (2005: 3), the combination of concrete higher-level intentions and flexible, inter-reactive action plans may encourage the development of alternating leadership. I would not go as far as presuming that such an arrangement has not already been described within the field of business management. Rather, I propose that musical ensembles serve as an example of how successfully such a leadership arrangement may work. Moreover, I would argue that not only are very few ensembles aware of the role shared intentions play in the determination of leadership, but that such Mode 1 knowledge is not necessary in order to effectively collaborate. In this way, chamber ensembles, understood through the framework of inter-reaction, could serve as a foil against which leadership models may be compared.

The difference between Mode 1 and Mode 2 knowledge has been clearly stressed throughout this thesis. Distinguishing between the two identifies both the unique form each takes when exercised in daily life and the differing ways that they may fit into pedagogic approaches. Mode 1 knowledge is generally taught, primarily due to its ability to be reduced to specific, communicable concepts. Mode 2 knowledge, on the other hand, resists not only reduction but also transference to a mode of experience other than in the medium in which it was created. Instrumental pedagogy and individual practice provide concrete examples of the interplay between these two forms of knowledge, as I have described in Chapter Three. Within this section, I intend to speculate further

upon how the process by which musicians acquire the skills necessary to become proficient on their instruments may provide insight into not only the nature of these modes of knowledge in practice, but also the development of reflective practice. Reflecting upon my experiences learning to play the trombone, teaching others to play the instrument, and teaching others how to teach their own trombone students, the balance between these two modes of knowledge constantly shifts throughout the learning process.[4] In the earliest lessons, the teacher is generally more explicit with the student, describing in detail how the instrument should be held, the position of the body, and the kinds of movements that need to take place: classic Mode 1 knowledge which is able to be explicitly verbalised. Guiding the student in this manner, they are also able to provide positive reinforcement when the variables line up and the student achieves a goal, however small. It follows that, as the student becomes increasingly more experienced, they are able to focus less on technical specifications (i.e. action plans) and more on the execution of higher-level intentions. Through this process, the student will unconsciously shift educational emphasis from Mode 1 to Mode 2 knowledge. Paralleling this shift from one mode of knowledge to the other, students may correspondingly require less time engaged in a propositionally pedagogic relationship with their teacher. Implicit throughout the acquisition of instrumental technique is the art of effective self-reflection. Through their critique of the student's performances, the teacher is able to demonstrate the causality inherent in instrumental performance, encouraging the student to 'fix' playing errors on their own. As a student develops, they are able to reflect upon and critique their own performances through individual practice, exhibiting what Argyris and Schön describe as double-loop learning (Argyris and Schön, 1996: 21). Action researcher Kristina Arévalo describes this form of learning as 'not "simply doing things right" but "doing the right things"'; modifying the ways in which the musician solves a particular performance 'problem' rather than simply applying the techniques that have been propositionally taught to them (Arévalo et al., 2010: 32). The more

[4] I do not claim to represent the processes by which all or even most instrumental tutors teach. However, I would argue that the following general characteristics may be found throughout the acquisition of taught skills.

advanced a performer becomes, the more they may be able to critique not only their own performance practices, but also the underlying tenets of instrumental technique itself, displaying triple-loop learning. This specific kind of critical thought is a form of meta-reflective practice, which Schön refers to as moving up a 'ladder of reflection' (Schön, 1987: 114). The lowest rung of the ladder is the activity itself, and each higher rung is reflection on the one immediately previous. Through this reflective process, musicians are able to teach in a manner which is not simply the repetition of propositional concepts, but emergent from direct, practical experience. It appears that the development of musical technique may provide a concrete example of both the influence of Mode 1 and Mode 2 knowledge on pedagogy, but also the development of self-reflection in practice. In this way, the learning of instrumental technique may effectively inform educational and epistemological research.

The research I have conducted would not have been possible if not for the influence of fields outside of musicology. No academic field should be insular, and conclusions from one area may both impact on and be impacted by numerous others. I propose that performance studies itself may similarly inform other non-musicological fields, particularly gestural studies, pedagogy and epistemology, and business management. The examples provided in the previous section are those which I have identified as being the most likely starting points for interdisciplinary research; however, I do not intend to limit such speculation. The next section of this chapter will investigate the effectiveness of the methods used within this thesis, critiquing the amalgam of practitioner and academic techniques proposed in Chapter One. This discussion will extend the proposals which have thus far constituted this final chapter into the realm of methodology, providing a platform upon which musical practice as research may be evaluated.

Reflecting on Reflecting

The evolution of this thesis has depended upon the cyclical nature of action research. The process of action and reflection has continually allowed me to critique and alter my own research practices in conjunction with the themes and conclusions which increasingly became apparent. However, this manner of reflective practice is only now gaining significant traction within musicological research.[5] Therefore, an exploration of my impressions of using these methodologies within my doctorate may be beneficial to fellow researchers and musicians who are interested in drawing upon action research and reflective practice. Likewise, this discourse will enable me to engage in reflective practice on a much larger level than has taken place thus far in the thesis. This section of the chapter will begin with a discussion on the positive and negative aspects of using reflective practice as the methodological impetus for my thesis. From there, I will be able to illustrate the impact this ideological decision has had not only on the conclusions reached, but also on the actual formation of my doctorate itself. These personal accounts will constitute the background necessary for an evaluation of the efficacy of practice as research within performance studies, musicology, and the arts in general.

Critique of methodology

Throughout this thesis, I have engaged in reflective practice on multiple levels. This activity ranges from examining the most fundamental processes of playing a note on my bass trombone to considering how I have personally developed as a musician. The current discussion will endeavour to raise this reflective process to a higher level, assessing the effectiveness of the methodologies used within my doctoral research itself. As will become apparent, the decision to structure my work

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[5] The CMPCP Performance Studies Network International Conference, held at Cambridge in July 2011, provided many examples of practice-led research. However, the majority of musicological conferences taking place within recent history have not featured this methodological approach in such a prominent manner.

around action research has had significant effects not only on the organisation of my research, but also the conclusions I have reached. Consequently, the manner in which I have approached the research questions posed throughout this thesis will inform the direction I wish to take in future research. This section will explore the benefits and challenges which may entail an action research thesis rooted in musical performance. From this perspective, it will be possible to enlarge the breadth of reflection even further, assessing the role of practice as research within the arts.

Unintentionally, the structure of this thesis parallels my own interpretative journey throughout my doctorate. In the beginning, I was enamoured with the thought of both 'cracking the code' of performers' gestures and identifying specific group roles which ensemble musicians assumed. As I reflected further, deeper issues arose in terms of the underlying assumptions these objectives were based on. This required me to rethink the entire paradigm by which instrumental performance within ensembles may be understood. From this perspective, I was able to then build my own framework for not only how I could logically explain the process of ensemble interaction, but also how I as a musician implicitly understood this process to work. The path my research took proved to be the most suitable for explaining my conclusions, resulting in the flow of argument currently used within this thesis.

The original motivation for applying action research within my doctoral programme was to circumvent the problematic divide between Mode 1 and Mode 2 knowledge. Even though I had not consolidated my research questions at this point, I knew that my work had to draw heavily on musicians' experiences within ensembles. An action research approach such as the one described in Chapter One provided access to the practical knowledge required for my work. Beyond this effect, the application of action research resulted in four other distinct benefits. First, I was not only allowed to continue performing through my research, but was actively encouraged to do so. This enabled me to maintain an active presence in the musical life of the Conservatoire, especially during the first two years of my study. Birmingham Conservatoire proved to be an ideal place to conduct this research, given that I was able to participate in a wide variety of performance situations,

including contemporary ensembles, brass ensembles, jazz bands, brass bands, wind bands, symphonic orchestras, improvised ensembles, and solo performances with live electronics. Second, my role as performer-researcher turned out to be a vital element in the development of the argument I present within this thesis. All of the theoretical work I was engaged in was able to be constantly validated against and guided by my musical experience. Additionally, I was able to use the practical knowledge I have acquired as a musician to effectively critique the research that has been taking place within the field of ensemble performance studies. The cycle of action and reflection enabled me to perpetually question my rationale until I had arrived at conclusions that aligned both theoretical understanding and practical experience. Third, the ever-present inquisitive approach enabled me to approach the methods utilised within this thesis in a flexible manner. The process of reaching conclusions would not only affect the way I progressed from one question to the next, but also what the research questions actually ended up being. For example, the problem of categorising ensemble musicians' gestures became secondary to the root concern of whether performers were actively 'pushing' information to each other. In this way, I was able to adapt my methodological approach while I was conducting it, enabling my research to unfold in an organic, creative manner. Fourth, and perhaps most importantly, the steady exposure to the act of playing music prevented the thesis from turning into a non-musical endeavour. Given that my work prominently relies on work conducted in the fields of psychology, sociology and business management (among others), I need to resist the tendency as a researcher to become increasingly enamoured with one of these non-musical areas of research. Such a shift in focus would result in a psychological or sociological study *on* music, a strategy that will inevitably fall back into the realm of Mode 1 knowledge. My position as a practising musician emphasised that all of the work I did, regardless of its source, must be tempered and critiqued through application of my practical knowledge. As Peter Johnson asked me after reviewing a particularly interdisciplinary section of my thesis, 'Where is the music?' If the conclusions which emerge from the research I conduct as a reflective practitioner are not able to be transferred back to musical practice, then I have done little

more than propositional research. Recalling a statement quoted in Chapter One, Mary Brydon-Miller writes that 'action research goes beyond the notion that theory can inform practice, to a recognition that theory can and should be generated through practice' (Brydon-Miller et al., 2003: 15). Importantly, though, she continues further to say that 'theory is really only useful insofar as it is put in the service of a practice focused on achieving positive social change' (*Ibid.*: 15). Therefore, my work as a musical reflective practitioner should be a part of a much larger process of action and reflection, in which my conclusions may continually inform practice.

Even though there were significant benefits as a result of structuring my doctoral programme around action research, this methodological approach proved challenging in one major respect. As beneficial as it was to the development of my research, the flexibility inherent in reflective practice was also a source of tension. Due to its malleable nature, my overarching plan of research shifted every few months during the first half of my course of studies. With each realisation of the importance of one topic over another, the focus of the thesis changed slightly. Consequently, what was originally intended to be an investigation into 'physical gesture as an agent of collaboration and cohesion in small ensembles' (to quote my research proposal) ended up as an exploration of the phenomenology of musical performance, addressing such philosophical topics as the nature of musical knowledge itself. Until I had settled on a stable argument, regular revision inhibited the effective structuring of my doctoral programme into discrete stages (preliminary research–experimentation–writing up). Whilst Brydon-Miller had warned of the occurrence of 'messes' within action research projects, it took a long time to relinquish minute control over the course of my research. In a way, executing my doctoral programme in this manner required a certain amount of trust; trust in my abilities as a reflective practitioner to effectively critique and evaluate the material I encountered, trust in those advising me to make sure I would not veer too far from the bounds of rigorous research, and trust in my sensibilities as a musician to accurately judge which concepts were important and which were irrelevant—a trust mirrored in that which is required for ensemble performance.

Given the benefits and challenges which emerged from the methodological decisions I made throughout my doctoral programme, how well did they allow me to address the research questions at hand? The three primary questions posed throughout this thesis are all rooted in the act of performance itself:

I. How do musicians interact and share information with each other while performing?
II. To what extent does the musical content being performed affect the ways it has to be physically created by musicians?
III. How does the physical relationship between the performer and their instrument relate to communicative and interactive processes of ensemble performance?

Thus, the use of action research allowed for access to the practical knowledge inherent in skilled music-making. This provided me with the context necessary to address larger philosophical questions of musical knowledge, a topic which is often evaded by strictly positivistic methodologies. In addition to the benefits outlined above, this advantage meant that I was able to retain my performer-ness in terms of personal identity, procedural familiarity and intended consequences. Through this approach, I was able to address the research questions in a manner that would contribute to the knowledge of both academics and practitioners. The challenge of having a 'messy' programme, as described earlier, provided a kind of tension not related to my ability to address the questions at hand. For all of the uncertainty of direction involved in the cycle of action and reflection, the end result was much more comprehensive than I would have anticipated, encouraging me to continue my post-doctoral research in this manner.

Musical practice as research

As an extension of the previous discussion on the benefits and drawbacks which may arise through the use of action research, I would like to propose that the cycle of action and reflection is an inherent part of skilled musical practice.[6] Alongside development of the procedural knowledge essential to instrumental performance, skilled musicians are constantly engaged in the process of self-reflection. Although the objectives in place for researchers and musicians may be ostensibly different (those participating in action research aiming to discern knowledge whilst performers are generally aiming to increase their musical skill in some way or another), I would argue that musicians are forever pursuing a specific kind of knowledge through their practice. Recall the model of action research which was described in the first chapter of this thesis:

> 1. To develop a *plan* of action to improve what is already happening.
> 2. To *act* to implement the plan.
> 3. To *observe* the effects of action in the context in which it occurs.
> 4. To *reflect* on these effects as a basis for further planning, subsequent action and so on, through a succession of cycles.
>
> (Kemmis, 1982: 7; my emphasis)

From close experience with innumerable skilled musicians, it is possible to recognise a persistent drive to make oneself and, accordingly, one's musical output better. This may be observed on both small and large scales, ranging from individual practice sessions all the way to career-level activities. When applied to musical practice, the steps outlined by Kemmis are neither discrete nor conscious. The practice room provides the most direct example. There, a musician *plans* to fix a specific technical or expressive problem, which they *enact* by playing through the excerpt. Subsequently, they are able to *observe* the results of their effort through listening, recording, comparing with a metronome or tuner, or receiving external feedback. From that position, they are able to *reflect* upon the effectiveness of their endeavour and adjust their consequent plans. This process, however, is not

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[6] Within this context, I use 'practice' to refer to the application of processes involved in performative musicking and 'individual practice' to refer to the activity of acquiring skill on a musical instrument.

limited to developing the technical facility required for skilled instrumental performance. Recalling the conclusions on individual performance from Chapter Three, the processes inherent in learning to play an instrument, learning to be a musician, and learning to participate in ensembles entail the development of embodied knowledge. A substantial amount of that knowledge, if not all of it, emerges through musical reflective practice.

Through recognition of these similarities, it is not out of the realm of possibility that skilled musicians may be able to 'shift gears', as it were, to become involved with musicological research on performance. Rather than necessarily being either subjects to be observed or even partners in research (considering the ideology behind participatory action research), skilled performers may be able to generate their own conclusions regarding questions of performance, interpretation and more philosophical topics relating to music. Increased practitioner involvement in performance studies may impact the efficacy of this research in two primary ways. First, as I have stressed before, comprehensive understanding of topics central to performance studies are only available through accessing the knowledge created by and for practising musicians. These topics include but are not limited to the ways in which ensembles interact, the creation of interpretation and a performer's voice, the impact of the audience on performance, among many foreseeable others (including those still to be named). Whilst propositional knowledge may be generated about these philosophical concerns of performance, they cannot emerge strictly from positivistic methodologies. Second, emphasis on the ideas emergent from the practitioners' experience enables researchers to ask the questions most pertinent and critical to knowledge utilised in the practice itself. Acknowledging the long-standing discussion about the relationship between performance and analysis (historical, narratological and theoretical), the analysis in question has historically been limited to knowledge *about* music. Reflective practice provides a window onto knowledge *in* music—the tangible, embodied knowledge which is embedded in the act of performative musicking. Hence, the point of this discussion: musical practice itself is the most fundamental way of interacting with and researching this form of art. Christopher Small, in the introduction to his book *Musicking: The*

Meanings of Performing and Listening (1998), writes that music 'is not a thing at all but an activity, something that people do' (Small, 1998: 2). Along these lines, I propose that research on music should be intimately tied to the act of making music, not the act of historical research, of mathematic analysis, or of psychological or narratological profiling. These activities may provide peripheral insight into the context the music may have been written or performed in, the ways in which the sound waves interact, or the ways that a listener may imbue meaning. From experience, however, they do not explicitly change the impact that musicians themselves have on the resulting performance. Even though knowledge through analysis may contribute to the creation of an interpretation, individual intuition and expression still provide the grounding of truly creative, personal performances. Therefore, it is through musical reflective practice that we may achieve further understanding of the nature and beauty of music. This is not to say that all performance research should be conducted through critical reflection; as Lakoff and Johnson remark, 'phenomenological reflection, though valuable in revealing the structure of experience, must be supplemented by empirical research into the cognitive unconscious' (Lakoff and Johnson, 1999: 5). Given the nature of performance studies over the past two decades, however, empirical research vastly outweighs phenomenological reflection—a situation which may be remedied through the involvement of more skilled practitioners into the process of critical reflection.

The final section of this chapter will bring to the forefront what has become a recurring theme throughout this thesis: music as a mode of thought. In Chapter Two I identified that performers constantly apply Mode 2 knowledge within musical practice, a form of knowledge which simultaneously engages with multiple modes of sensory perception. The exploration of the phenomenology of individual performance in Chapter Three illustrates not only the dynamic relationship performers have with their instruments, but also the correlation between intention and effect with regard to aurally manifesting musical interpretation. Combined with the discussion of musicians' abilities to infer qualitative musical variables through observing performances, I was able to construct the framework of inter-reaction in Chapter Four. These conclusions suggest that

performers actively think *in* music, a conjecture which may be substantiated through musical reflective practice.

Reflecting on Musical Knowledge

Throughout this thesis, I have presented arguments on a variety of topics related to performance studies and the epistemology of music. Investigation of the use of physical gesture in ensemble interaction has prompted in-depth discussions on leadership, communication, intention, inference, and the nature of musical knowledge. In the final section of this thesis, I will draw out the primary arguments emergent from these discussions. From these arguments, it will be possible to briefly consider what the proposal of music as a form of Mode 2 knowledge actually entails in terms of academic, musical and pedagogic practice.

Physical gestures used in musical performance are both idiosyncratic and non-semantic. Given that musicians are able to draw inferences from many if not all of the physical motions they observe others making in performance, use of the term 'gesture' to designate a significant physical movement may not identify a concrete action. A performer's motions deemed significant by one observer may not be by another. Hence, efforts to create typology of physical gestures may inevitably be frustrated by the singular, malleable nature of motions read as gesture, resulting in categories which are either too general or too specific to be of practical use to musicians. Similarly, the use of a communicative paradigm for describing how musicians share information presents an incomplete picture of ensemble interaction. Except in the case of explicit cues and other communicative gestures, the movements made whilst playing an instrument emerge through the act of creating music itself. These movements reveal information about performers' individual musical intentions. It is from these naturally occurring movements that ensemble musicians are able to 'pull' qualitative information about their colleagues' musical interpretations. Whilst performers may

explicitly communicate with each other, effectively 'pushing' information, this process happens in addition to the inference which is constantly taking place. Through reception of this information, musicians may consciously or automatically adjust their own performances to the interpretations unfolding around them. I propose that ensemble interaction may be understood in terms of performers transmitting qualitative musical information, inferring musical intentions from performance, and attuning to those intentions: a cohesive framework of processes I have called inter-reaction.

Analysis of ensemble interaction through the framework of inter-reaction has significant effects on how leadership may be understood to operate in unconducted musical groups. Members of such ensembles assume positions of leadership based upon the balance of constantly changing circumstances with shared musical intentions. Whilst there may be other impetuses for developing leadership, including the charisma and experience of individual performers, the music being played and the performance itself play a large role in determining who leads an ensemble. This results in a form of context-dependent alternating leadership. Through inter-reaction, individual contributions to the development of the ensemble's shared intentions may become automated to the extent that it feels to the performers as if the music is 'playing itself'.

This thesis has required an in-depth investigation of the phenomenology of both individual and ensemble performance. Through this analysis, deeper issues of epistemology have emerged. As musical performance is a form of skilled practice, study of it requires some sort of involvement in the practice itself. Whilst critical reflection has its limitations, it is a vital element to understanding the processes inherent in musical performance. The depth of musical experience—both in listening and performance—is exhibited through the colourful and detailed verbal and physical metaphors used to describe it. The ability for metaphor to operate in such a manner presupposes that music is its own unique realm of experience. Experiencing music is different to experiencing pure sound or movement or sight. Through the use of metaphor, we are able to linguistically describe the experience of music in relation to other experiences. When we play music, however, we become

immersed in that experience. Thus, it is possible to think *in* music. The process of inter-reaction depends on the active application of embodied musical knowledge, a form of Mode 2 knowledge which may only be referenced in other realms of experience (e.g. linguistic or visual) through metaphor. The philosopher Andrew Bowie proposed that the early Romantic philosophers were correct in recognising that music can powerfully affect listeners even when there is no direct linguistic correlate available, preventing them from knowing what it 'means' (Bowie, 2007). Bowie is interested in the way early Romantics conceived of music in terms of a different world: one of profound importance, but not contingent upon the physical world. Thus, rather than his text 'seeing the role of philosophy as being to determine the nature of the object 'music'', it 'focuses on the philosophy which is conveyed by music itself', equating musical experience to such a form of higher thinking as a mode of philosophy (*Ibid.*: xi). Arguing that music is a form of philosophy raises a host of questions regarding the necessary properties of philosophic thought; however, had he rephrased his proposal to consider musical engagement as a mode of thinking, he may have been closer to the mark. Participating in musical performance, particularly when creating the performance itself, engages the mind with musical content which resists translation into other formats. That content exists in a realm of experience all of its own, and is the lifeblood of performance. To play music is to *think* in music, to grapple with musical thoughts and create new musical ideas. To play music within an ensemble allows performers to interact with their fellow musicians through a mode of interaction distinct from that found in other social situations: emergent from and immersed in musical thought.

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