



The Musical Body: Gesture, Representation and Ergonomics in Musical Performance

22-24 April 2009, Senate House, University of London and
Royal College of Music



A conference organised by the IMR in association with the Open University, Durham University and the Orpheus Instituut, Gent, University of Sussex, the Royal College of Music and the IMR Music & Science Group

PROGRAMME

Wednesday 22 April

12pm Registration and Lunch (Room NG14)

1.45pm Welcome (Room NG14)

2 – 3.45pm

I(a) Theatricality/Opera (Room N336) Chair: Katharine Ellis	I(b) Embodied Cognition (Room NG16) Chair: Martin Clayton
Kordula Knaus (The University of Graz), The Iconography of Operatic Travesty Traditions and Characters	Deniz Peters, Gerhard Eckel (University of Music and Dramatic Arts Graz), Researching Embodiment in Musical Experience: The 'Embodied Generative Music' Project
Jelena Novak (University of Amsterdam), Reinventing the Body After Opera: Music, Representation and Post-History of the Body	Bryony Buck, Jennifer MacRitchie, Lukasz Piwek (University of Glasgow), Perceptual Recognition of Embodied Musical Structure
Lecture-recital Mary E. Larew (University of York), Medieval Art in Modern Performance	Adam Parkinson (Newcastle University), Embodied Listening and Interface Design

3.45 – 4.15pm Tea (Room NG14)

4.15/4.50 – 6.00pm

2(a) Music and Health I (Room N336) Chair: Jane Ginsborg	2(b) Conducting (Room NG16) Chair: Clemens Wöllner	2(c) Theoretical Approaches (Room NG15) Chair: Deniz Peters
<p>4.15pm Aaron Williamon (Royal College of Music), <i>The Healthy Musical Body: An Investigation of Wellbeing, Fitness, Injury and Health-Promoting Behaviours among Conservatoire Students</i></p> <p>Koos Jap van Zweiten, K.P. Schmidt, G.J. Bex, P.L. Lippens (University of Hasselt), W. Duyvendak (Virga Jesse Hospital, Hasselt), R. Medaer (University of Hasselt), <i>Some Factors Contributing to the Stabilisation of Normal Human Fingers</i></p> <p>Sarah Schmalenberger (University of St Thomas, St Paul, Minnesota), <i>Beyond Breast Cancer: Musician Survivors Transforming Illness and Injury</i></p>	<p>4.50pm Holly Mathieson (University of Otago, New Zealand), <i>Mesmeric Gestures</i></p> <p>Leslie Anne Lewis (Berkhamsted), <i>'Soundpainting' and 'Conduction': An Opportunity to Explore the Boundaries of the Modern Conductor's Role</i></p>	<p>4.15pm Obed Ben-Tal (Uxbridge), <i>Defining Gestures for Music</i></p> <p>Alexander Refsum Jensenius (University of Oslo), <i>An Overview of Methods for Visualising Music-Related Movements in Time</i></p> <p>Alicia Peñalba Acitores (University of Valladolid), <i>Different Implications of the Body in Music Performance: Acoustic Instruments, Hyperinstruments and Alternate Controllers</i></p>

6.10 – 7.20pm **Keynote Address** (Room N336) Chair: Antony Pitts
 Rolf-Inge Godøy (University of Oslo), *Sound, Movement, Key-Frames and Inter-Frames*

Thursday 23 April

8.45am Late registration (Room NG14)

9 – 10.45am

3(a) Communication and Interaction (Room N336) Chair: Nicholas Till	3(b) Pedagogy I (Room NG16) Chair: Christine Beckett	3(c) Music and Health 2 (Room NG15) Chair: Katharine Ellis
<p>Bennett Hogg (Newcastle University), Culture, Consciousness, and the Body: The Notion of Embodied Consciousness as a Site of Cultural Mediation in Thinking about Musical Free Improvisation</p> <p>Nikki Moran (University of Edinburgh), Music, Bodies and Relationships: An Ethnographic Contribution to Embodiment Studies</p> <p>Lawrence Zbikowski (University of Chicago), Music, Movement and Embodied Knowledge</p>	<p>Galina Crothers (Birmingham Conservatoire), Confidence as a Basis for Physical Freedom in Musical Performance</p> <p>John-Bede Pauley (Durham University), Singing with the Ear: The Tomatis Method and the Singer’s Formant</p> <p>Marion Long (Bedford), An Exploration of an Entrainment Strategy on Children’s Reading Behaviour</p>	<p>Patricia Holmes, Emma Redding, Claire Mera-Nelson (Trinity Laban Conservatoire for Music and Dance), Dance and Music Science: Optimising Performance Potential</p> <p>Clemens Wöllner (Royal Northern College of Music), Rouwen Cañal-Bruland (University of Amsterdam), Perceiving the Movements of Others: A Research Technique for Studies in Music and Sport Psychology</p> <p>Crissman Taylor (Utrecht Conservatory), Violinist in Balance</p>

10.45 – 11.15am Coffee (Room NG14)

11.15am – 12.25pm

<p>4(a) Performance and Gesture I (Room N336) Chair: Martin Clayton</p>	<p>4(b) Pedagogy 2 (Room NG16) Chair: Christine Beckett</p>
<p>Chia-Fen Wu, Dirk Moelants, Marc Leman (Ghent University), Interacting with the Public: A Comparison of Concert and Rehearsal Performance Using Sound, Video and Movement Recordings</p>	<p>Jane Ginsborg (Royal Northern College of Music), Roger Chaffin (University of Connecticut), Beating Time: The Development of a Singer's Mental Representations Using Kinaesthetic Learning</p>
<p>Charles Wiffen (Bath Spa University), Waving or Drowning? The Use of Gesture as a Compensatory Tool within Practice and Performance</p>	<p>Cristine MacKie (Royal Holloway, University of London), Enhancing the Memory: A Mind/Body Approach</p>

12.25 – 2.15pm

Lunch (Room NG14) and travel to **Royal College of Music**



The Recital Hall is located in the 1965 building on the 1st floor. Access is by the main College entrance on Prince Consort Road. Disabled access is via a lift from a rear entrance to the College.

Lecture-recitals

Chair: Mieko Kanno

- 2.15 – 3pm** Darla Crispin (Royal College of Music),
Schoenbergian Soundings: The Role of the Performer in
Understanding Arnold Schoenberg's Keyboard Music
- 3 – 3.45pm** Elena Esteban Muñoz (Complutense University of Madrid),
Gestures in Live Performance: A Resource to Consolidate Musical
Memory
- 4 – 4.45pm** George Kennaway (University of Leeds), 'Noble and easy attitudes'
or a Violent Embrace? Towards Carnality in 19th-Century Cello
Performance
- 4.45 – 5.15pm** **Tea**
- 5.15 – 6.45pm** **Keynote Address in Association with the Grove Forum,
Royal College of Music**
Chair: Aaron Williamon
Nicola Dibben (University of Sheffield), Consuming Musical Bodies:
Star Image and Song Personality in Vocal Performance
- 6.45 – 7.30pm** **Lecture-performance**
Chair: Mieko Kanno
Franziska Schroeder, Imogene Newland (Queen's University,
Belfast), MOVE – a Bodily Performance of
Stockhausen's *Tierkreis*
- 8.15pm** **Optional Conference Dinner**

Friday 24 April

8.45am Late registration (Room NG14)

9 – 10.10am

5(a) Ergonomics (Instrumental) 1 (Room N336) Chair: Mieko Kanno	5(b) Iconography 1 (Room NG16) Chair: Nicholas Till
Anthony Gritten (Middlesex University), Why is Ergonomics Useful for Performing? Dimitrios Vlachos (University of Edinburgh), Ergonomics of Musical Instrument Controls: A Case Study of the Organ	Sarah Robinson (Newcastle University), Loud Blasts, Puffing Cheeks and Heaving Chests: Distortions of Femininity in Female Wind Players of the Early Modern Period Lucía Díaz Marroquín (Complutense University of Madrid), <i>De humani corporis fabrica</i>

10.20 – 11.30am

6(a) Ergonomics (Instrumental) 2 (Room N336) Chair: Mieko Kanno	6(b) Iconography 2 (Room NG16) Chair: Nicholas Till
Alexandra Balandina (Athens), The Empowerment of the Upper Hand in Tombak Playing and Navid Afghah's Two- Hand Technique Roshan Samtani (Madrid), Embodiment, Ergonomics, and Improvisation: A Study of Flamenco Guitar Technique	Anne-Noëlle Bailly-Bouton (University of Toulouse), Piano Postures at the Beginning of the 19 th Century in France: Consistency Between Instruction and Depiction Zachary Taylor (Aylesbury), Strings of Stone. The Representation of Stringed Instruments and the Techniques of Playing them Based on Sculptured Iconography

11.30am – 12pm Coffee (Room NG14)

12 – 1.10pm **Keynote address** (Room N336) Chair: Nicholas Till
 Richard Leppert (University of Minnesota), Music, Gesture and the Embodiment of the Utopian Imagination

1.10 – 2.15pm **Lunch** (Room NG14)

1.40/2.15 – 4.00pm

7(a) Dance (Room N336) Chair: Cristine MacKie	7(b) (In)visible Gestures (Room NG16) Chair: Alexander Refsum Jensenius
<p>2.15pm Marie Glon (Pantin), Performing Steps or Notes? The Musical Dancing Body in the <i>Danses en chorégraphie</i> (18th Century)</p> <p>Christine Beckett (Concordia University, Montreal), Continuations from Opening Gestures in Drumming and Dance</p> <p>Rupert Till (University of Huddersfield), Dancing to a Different Drum: The Effects of External Temporal Synchronisation of Individuals and Groups, and the Control of Gesture, Entrainment, Entrancement and Possession in Electronic Dance Music</p>	<p>1.40pm Robert J Dow (University of Edinburgh), The Hidden Gesture: The Recorded Gesture and the Performance of Acousmatic Music</p> <p>John Dack (Middlesex University), Playing ‘Virtual’ and ‘Actual’ Instruments</p> <p>Martin Elste (National Institute for Music Research, Berlin), The Interaction of Visual Appearance and of Sound. The Case of the Harpsichordist Wanda Landowska</p> <p>John Robert Ferguson (Newcastle University), Beyond the Record: New Roles for the Live Musician?</p>

4.00 – 4.30pm **Tea** (Room NG14)

4.30 – 6.15pm

8(a) Performance and Gesture 2 (Room N336) Chair: Anthony Gritten	8(b) Ergonomics/Composition (Room NG16) Chair: Lawrence Zbikowski
Laura Leante (Open University), Gesture, Imagery and Meaning in North Indian Classical Music	Karen Jones (Yale University), Brahms's Second Piano Concerto and the Staging of Anti-Virtuosic <i>Virtuosität</i>
Matthew Rodger (Queen's University, Belfast), The Acquisition of Musical Body Movement in Relation to Acquired Skill in Expert Clarinet Performance	Christina Guillaumier (Royal Scottish Academy of Music and Drama), Autobiography in Performance: the Case of Sergei Prokofiev
Eleni Kallimopoulou (University of Macedonia, Greece), Of Bonds and Boundaries: The Embodied Encounter of Two Musical Worlds in a Concert of Greek Music	Jill Halstead (Goldsmiths, University of London), Physio-Sonic: Body Instrument Interactions and Creative Process

6.30pm

Close

ABSTRACTS

Anne-Noëlle Bailly-Bouton (University of Toulouse), Piano Postures at the Beginning of the 19th Century in France: Consistency between Instruction and Depiction

While many portraits of pianists before their instruments are known, it seems that there has been no study about whether they match the description of piano posture in contemporary tutors.

My research has yielded quite surprising results: on the one hand, we find portraits depicting the different ways of playing the piano-forte at that period and matching the various instructions. On the other hand, some portraits depict attitudes that do not match the instructions found in any of the tutors, showing:

- a non-performing pianist before an instrument,
- pianists playing their instrument in an extravagant way,
- pianists playing their instrument in a way deformed by the painter or sculptor.

Thus, musical iconography is very useful. First, it shows that some of the instructions found in tutors, and which could seem unreal, are actually represented in pictures. Secondly, they prove that the instructions given by the authors of tutors were followed and show a variety of performance practices during that period.

More than that, musical iconography can point to different ways of practising the piano-forte: differences between the *amateur* and the professional performer, but also differences between the private sphere, where the accomplished young lady takes great care of how she plays in society, and the public one, where concert artists play beyond conventions, with passionate gestures, whether or not their behaviour is caricatured by the painter.

Alexandra Balandina (Athens), The Empowerment of the Upper Hand in Tombak Playing and Navid Afghah's Two-Hand Technique

Navid Afghah, one of the best tombak players in contemporary Iran, has developed a breakthrough playing technique called *do-dasti* or *do-sedā-i* (lit. two-hand or two-sound technique), where each hand has much independence of movement in terms of the rhythmic structures, playing techniques and sound impressions.

This paper provides a survey on how Navid Afghah has arrived at his idea of separating the roles of the two hands which is by and large associated with the refinement of the playing technique on the *tombak* in the last few decades, and particularly with the empowerment of the upper hand and the introduction of greater variety of movement configurations for both hands.

Afghah has also developed a new playing style called 'effective playing' (*efectiv budan* or *kārhā-ye efectiv*) performed both in metric and non-metric structures. I will present the characteristics of this playing style—concerning speed, physical endurance, sonority, rhythmic precision, and fluency in motor-execution—and discuss his systematic approach with regards to improving speed, technique and physical strength in *tombak* playing.

I will explore Afghah's ideas in relation to the physicality of performance, his thoughts about 'talented hands' and the interdependence of the physical abilities and cognitive skills in *tombak* performance.

Throughout the presentation I will also provide glimpses of the post-Revolutionary generation of *tombak* players and their infatuation with acquiring, sustaining and developing motor skills.

Thus the overall aim of this paper is to show the importance of developing technical expertise on the *tombak* and its close relation to expressive skills and performance style, as in the case of Navid Afghah.

Christine Beckett (Concordia University, Montreal), Continuations from Opening Gestures in Drumming and Dance

Using a standard paradigm from melody research, we investigated rhythm and movement continuations after drum and dance opening gestures (part of an ongoing series of studies of comparative psychology of the Performing Arts). Participants, 13 percussionists (11 male, mean age 23.5) and 11 dancers (5 male, mean age 23.9), were music or dance students (no double majors) in Concordia Faculty of Fine Arts. Participants observed 6 openers in their own art, 6 in the contrasting art, and improvised 12 continuations. Everyone both danced and drummed. Participants described strategies in end journals. Unlike for melody (which has a restricted number of available notes, further constrained by tonal context), continuations here were highly variable. Two independent judges scored accuracy of the opening gesture, temporal stability, motivic treatment, fluency, musicality, and 'danciness'; and gave overall aesthetic ratings for the improvisations. End journals were analysed for comparisons of reported strategies. Results indicate that while musicians and dancers are capable of improvising in each other's art, all variables were rated lower in the contrasting art. That this should be true of drummers dancing was not surprising (though certain dance openers elicited predictable elements regardless of participants' main art). That it applied to dancers

drumming was somewhat counter-intuitive: dance is a time-based art, dancers take class to drum accompaniment, and conga technique is easy. Strategies reported were technical in the main art and general in the contrasting art. Future research will refine opening gestures and require participants to do multiple, shorter, improvisations from openers. Also, highly-over-learned 2-phrase sequences could be investigated both for behavioural and for neural evidence (by means of ERP and fMRI) for such things as MMN, CPS, and utilisation of motor cortex.

Oded Ben-Tal (Uxbridge), Defining Gestures for Music

Despite the widespread use of the term gesture in writings about music, the term is not defined in most musical dictionaries. Moreover, as this paper shows, the term is employed to denote widely varying musical phenomena. With the intention of clarifying muddled discourse, a narrower focus on musical objects that are close analogies of physical gestures serves as a starting point. Like physical gestures, musical ones are perceived as short, unified, expressive events. We argue that these *expressive unit gestures*, linking the dynamics of the music with expressive potential, can contribute to an experiential account of music. To enable such an account this paper proposes to adopt methods developed for the study of human gestures. Two such approaches will be explored. The first is inspired by the HamNoSys notation for sign language. The HamNoSys describes the hand gestures of sign language by systematically profiling the actions involved (e.g. hand shapes, movement types, etc.). By analogy a musical gesture can be described through its auditory properties such as accent patterns, pitch contour, register, and so forth. One advantage of such a system is the possibility of defining measures for similarity and distance within the system. A second approach relates qualities of motion in gestures to expressive communication. Qualities such as fluidity, power, quantity of movement, and overall extent have auditory analogies that can be applied to the study of the role gestures play in music.

Bryony Buck, Jennifer MacRitchie, Lukasz Piwek (University of Glasgow), Perceptual Recognition of Embodied Musical Structure

A performing musician's interpretation can be seen as an integration of the structural information and the emotive character of the piece (Shaffer, 1995). Recently, several studies have investigated whether a performer conveys aspects of the music visually to the audience by means of gestural expression (Davidson, 1993). To date, the majority of embodiment studies have focused on the emotional expression conveyed during a performance.

The authors focus instead on the structural element of performance gestures (following on from Vines et al) investigating whether specific expressive movements may be attributed to particular compositional structures. A two-tiered experiment will be used

to ascertain whether this structural content, namely phrase structure, is recognised through perceptual observation.

Initially nine performances of two selected Chopin preludes, that are comparable in musical structure and complexity, are recorded using the VICON 3-D motion capture system. Subsequently they are presented to observers with musical knowledge who are asked to determine where phrase endings occur. Performances are initially presented in visual-only mode with a planned follow-up experiment involving all three modalities: audio, visual, and audio-visual.

The motion capture analysis will reveal any recurrent physical gestures for each performer corresponding to structural phrasing. Taking individual differences into consideration, these gestures may vary with performer. To accommodate this, the two selected Chopin preludes are: Prelude Op.28 No.7, used as control as it has very rigid structure and definitive rhythmically identical phrasing; and the test prelude, Op.28 No.6 which begins to depart from this rigidity whilst maintaining a similarly identifiable phrase structure and therefore may be used to compare gestural movements at phrase endings. It is proposed that gestures will be effectively recognised as conveying structural information to the observers.

These hypotheses are developed based on structural analyses of the preludes themselves and discussed in terms of embodied musical structure and perceptual gesture recognition.

Darla Crispin (Royal College of Music), Schoenbergian Soundings: The Role of the Performer in Understanding Arnold Schoenberg's Keyboard Music

It is a well-entrenched tenet of the 'Werktreue' tradition of instrumental performance that the executant should function only as a catalyst to the communicative process, conveying the composer's score to those receiving it whilst attempting, supposedly, to minimise personal mediation. Within evolving approaches to research-in-and-through musical practice, such a model becomes unsatisfactory, since it does not consider the performer within a holistic interpretative framework.

In this paper, through both argument and performance of examples, I shall outline the considerable philosophical, mental and physical challenges to pianists attempting to re-read the *Drei Klavierstücke Opus 11* of Arnold Schoenberg in ways that truly address problems of their historicity. These include the paradoxes inherent in dealing with a musical language that begins to immolate itself—the communication of the historical move from what Theodor Adorno called the 'brittle utopias' of this music's precursors to its own fragmented rhetoric which, nevertheless, must be represented by the performer as 'whole and entire'. Perhaps even more fundamentally, they entail the contradictions involved in the performer's act of positive creative will versus the music's process of self-negation.

Since the focal point of such questions is the psycho-physical being of the performer, I will argue that this is the locus from which to attempt to create a unified view of all the elements that contribute to a performance of these works—categorised by Kathleen Coessens as ‘the body (kinaesthetic/physical acts), the instrument, the performance space (sound/acoustics), time (rhythm/metre), notation (semiological and symbolic systems), historicity and roles (composer/performer/listener)’. Considering how all these feed into the ineffable act of making music, may, in turn, help us to develop new, interdisciplinary modes of reading these complex works.

Galina Crothers (Birmingham Conservatoire), Confidence as a Basis for Physical Freedom in Musical Performance

This paper investigates the question of freedom in piano performance as seen by Heinrich Neuhaus (1888-1964), one of the most outstanding pianists, teachers and, perhaps, the most profound thinker regarding the theory of pianism in the twentieth century. He was a creator of the celebrated School of piano performance in Russia. He educated many famous pianists among whom were Svyatoslav Richter and Emil Gilels. One of the most distinguished features of the pianists whom he educated, besides their outstanding artistry, was technical perfection and physical freedom. The question of freedom in performance belongs to the subject of piano technique. When developing his arguments on this subject, Neuhaus focused his attention, firstly, on two elements: the pianist and the piano, as he was convinced that the pianist must understand all the specialities of the keyboard and also fully implement the principle of economy in using his body facilities, conforming his anatomical possibilities of movement to the piano as a musical instrument. Secondly, he strove to improve the intellectual qualities of the pupil, as he was convinced that, the greater the musical confidence, the less the technical insecurity. He also discussed such questions as posture, movement and gesture of the pianist and how it reflects the artist’s personality. Neuhaus conveyed these complex matters in a simple and clear manner. Yet, as his experience proved, his approach was very effective when put into practice. This subject is of especially fundamental importance in educating pianists and performers.

John Dack (Middlesex University), Playing ‘Virtual’ and ‘Actual’ Instruments

Acousmatic music exists only in the form of sounds recorded on a medium such as tape or a computer’s hard-drive. Visual corroboration of source, agent and method of sound excitation can only be suggested and are frequently ambiguous or even unknowable. It would seem paradoxical, therefore, to claim that such a genre might provide insights into traditional notions of the instrumental source and the physical, gestural techniques of performance. My paper will, nevertheless, propose that this is indeed the case. Pierre Schaeffer (1910-1985), the ‘inventor’ of *musique concrète*, was forced to re-evaluate the

status of the instrument and physical causality in his theoretical writings. The recording process removes sounds from their original contexts. In order to compose with them the composer has no choice but to attend to his/her perceptual processes. In addition to the classification and description of sounds, Schaeffer proposed a method for grouping sounds into 'families' or 'genres' based on perceived similarities between them. These common characteristics might be pitch, vibrato and surface texture. However, as Schaefferian genres are not dependent on the material construction of a sound body nor the manner in which it is 'played', they are purely perceptual constructs. Similarly, by means of 'facture' he was able to include explicitly qualitative assessments of sounds 'as if' they had been created by gestural interaction even though their provenance was purely the result of transforming a recorded sound. Consequently, via the concepts of 'timbre', 'registers', 'jeu' and 'facture' Schaeffer was able to re-appropriate many instrumental notions. By means of a detailed analysis of Schaeffer's writings my paper will describe (with sound examples) the implications of these concepts and suggest how the 'virtual' instrument can contribute to an understanding of its 'actual' counterpart and the physical gestures required to play them.

Lucía Díaz Marroquín (Complutense University of Madrid), *De humani corporis fabrica*

In the Italian late *Cinquecento* and early *Seicento*, while the newly-created *stile rappresentativo* was being developed in the *accademie* by philosophers and performers, interferences between music, rhetoric, anatomical studies and the visual arts became common practice. As singers started escaping polyphonic anonymity in order to perform their *solo* lines accompanied by instruments playing *continuo*, they had to face the necessity of developing their voices, emotions and the rhetorical means heretofore used to express them to a degree of sophistication never attained before. Early-modern treatises on acting are scarce or non-existent in most of the dramatic traditions which adopted the *stile rappresentativo* and the early *bel canto* style in the first decades of the seventeenth century. In order to reproduce the emotional effect sought by the Italian academics, we may re-create them paying attention to treatises and artworks based on the same anatomical, poetic and philosophical principles which contributed to build up the perception which a performer singing or acting in these centuries could have about his/her body.

The topic of analysing the human *affects* or *passions* as a result of each individual's humoral balance is common-place in anatomical treatises following the precepts taught at the Paduan school and later explored within the *accademie*. Consequently, visual representations of human bodies published in these treatises often bring together the goal of showing pre-scientific representations of muscles and organs and that of depicting the character's emotions. Stripping off the figure's skin with the aid of a knife, or even tearing it off with the figure's own teeth suggest the metaphorical effect of breaking the boundaries between the inner body and the outer world and audiences. In my presentation, I would like to explore this rhetorical *topos* in treatises as diverse as

Andreas Vesalius' *De corporis humani fabrica* (Basel: Joannes Oporinus, 1543), Juan Valverde de Hamusco's *Anatomia del corpo humano* (Rome: Ant. Salamanca and Antonio Lafrery, 1560), Adrian van Spiegel and Giulio Casseri's *De humani corporis fabrica libri decem* (Venice: Evangelista Deuchino, 1627) or Athanasius Kircher's *Musurgia Universalis* (Rome: Francesco Corbelletti, 1650).

Nicola Dibben (University of Sheffield), Consuming Musical Bodies: Star Image and Song Personality in Vocal Performance

Pop singers communicate both a song personality (the character of the song), and a star personality (their image). However, because pop stars are also a site of desire for audiences, they do not simply become the character of the song, but reiterate their bodily reality through their performances. One task for research in popular music performance is to determine how performance communicates these identities.

Live and video performances of European and American pop stars are analysed to highlight the role of two relatively neglected components of pop performance, and some of the methods available for their analysis: first, the virtual sound world of the recording (and amplified sound) and its role in creating psychologically revealing musical expressions, and second, the role of performers' body movements in communicating identities. These are important factors in what is often perceived as, and intended to be, authentic emotional expression: technologies of music production and reception personalise the relationship between artist and public, and, together with the direct address of the audience, construct pop performance as personal expression for private consumption, even when it is a collective experience. The ramifications of this cultural system, and its consequences for performers and audiences are explored.

Robert J Dow (University of Edinburgh), The Hidden Gesture: The Recorded Gesture and the Performance of Acousmatic Music

Although both severed from its pro-phonographic original and lacking any visual cues, recorded sound *per se* is (importantly for the medium) quite capable of portraying a sense of the physical: human action upon and within the apparently concrete. Where other modes of sensual information are absent, the auditor must rely solely on an historical, aural understanding of the world in order to make sense of those materials, forces and environments being portrayed sonically. Whereas both the photographic and to an even greater extent, the cinematic record (at least for the fully sighted) may certainly seem to furnish us quickly with detailed evidence of a singular pro-filmic event, the sound record would appear to offer something descriptively more ambiguous: a range of possibilities are imagined lying between the quite specific and the more generic.

Acousmatic music—music which is concerned with and exploits the hidden nature of its constituent sounds—does not generally limit itself to employing sound material indicative of known sources and causes, such as the traditional and more familiar articulations of the vocal or the instrumental. However, even within its *unknown* sound world there is nevertheless an important implication of the presence of human gesture: communicative human movement. Naturally, the nature of this gestural material is of significant consequence to both the creation and performance of acousmatic music.

This paper first explores the distinctive qualities of human gesture within sound recordings in general and then within this context, it investigates the particular nature of gesture within acousmatic music and the implications this has for its performance.

Martin Elste (National Institute for Music Research, Berlin), The Interaction of Visual Appearance and of Sound. The Case of the Harpsichordist Wanda Landowska

In their reviews of concert performances of the pianist and harpsichordist Wanda Landowska who died fifty years ago on 16 August 1959, critics frequently remarked on her elaborate and stunning appearance. This suggests that the sound she produced in concert could hardly be separated from her semblance on stage. And indeed Landowska made ample use of her visual appearance, more so than most other concert artists. She published, among other things, many postcards showing herself performing on the harpsichord, and in particular with her hands playing on both manuals, thus visually indicating the characteristic feature of her instrument in contrast to the pianoforte and concentrating on the special interface between the musician's body and her particular instrument.

On the other hand, Wanda Landowska was the first harpsichordist whose international fame was largely due to her success in respect to gramophone recordings. Recordings, however, emphasise the concentration on music as pure sound. Therefore she was very successful in an abstract medium that is virtually detached from any visuality, as it seems at first sight. In my presentation, which should be considered as a critical tribute to one of the most influential musicians of the 20th century, I want to look at these, at first sight conflicting, issues and discuss to what extent they complement each other. This comprises the role of the artist's body in conveying a special musical style and the role of the sound recording as a souvenir token for a holistic medium.

Elena Esteban Muñoz (Complutense University of Madrid), Gestures in Live Performance: A Resource to Consolidate Musical Memory

When we tackle gestures as part of musical discourse it is because we consider them as part of the content of performance as a whole. The first hypothesis of this research is that gesture, as an intentional impulse of movement, can be developed for exclusively technical purposes, treated as something deriving from a specific motivation, or both. This hypothesis is supported by the following assumption: it is possible to distinguish between two types of gestures—those necessary to produce the sounding of a score (technical gestures) and those inessential for that purpose, but essential for recreating or representing with the body the metaphor that sound carries (expressive gestures). Both contribute to consolidating the player's memory through the repeated movements generated by continuous practice.

The second hypothesis affirms that gestural movements instill in performers a feeling of freedom which is essential for playing by heart. Ever since Franz Liszt founded the memorised solo recital, it has been a social requirement for instrumentalists to appear on stage without scores. Although part of one's self confidence will be diminished in such a situation, playing from memory actually reinforces the understanding of music, and allows performers to steer the musical discourse from the abstraction of creation rather than from the reading of notation. But, how and when does the process in which a gesture turns into a resource of memory occur? How do gestures contribute to consolidating the holistic musical memory? And how can a performer memorise gestures in order to be effective when playing by heart?

All of these questions have quite precise answers if we consider the problem in its cognitive and emotional dimensions. This research takes into account aspects of expressiveness and pianistic technique in order to show how important it is for pianists to rely occasionally on gestures as one part of the polyphonic content of piano music. The findings have to do with the evidence (through 'oral confessions', tape and video-tape recordings) of my own and others' experiences, during live performances played by heart, in which gestural memory has made it possible just to play, to attend to sound-quality, to resolve lapses, and to enjoy the performance and connect with the audience.

John Robert Ferguson (Newcastle University), Beyond the Record: New Roles for the Live Musician?

This paper will utilise a reflexive methodology to reflect on practice-led PhD research (which I am currently writing up), and will focus more specifically on a recent project developed at the Studio for Electro-Instrumental Music (STEIM) in The Netherlands. As an electronic musician my work is inspired by notions of instability, and focuses on tactile approaches to the live manipulation of audio/visual materials. Predicated on listening and real-time (re)negotiation, my combination of wireless gaming controllers and custom software/mechanical systems is frequently loud and exuberant. But the

resistance inherent within these instrumental ecologies significantly affects the performance process, raising issues of causality, agency, legibility and authorship. My aesthetic preference for both intentional and unintended activity incorporates hacked electronic toys, performing with shadows via light sensors and the hardware appropriation of Nintendo's Wiimote. This apparatus can be used to tap into movement complexity beyond simple trigger recognition, magnifying accidental/unintended action, and resulting in highly tactile yet challenging systems where gesture transmission is often inverted, or manipulated 'on the fly'. My relationship with technology highlights systems as situations and ambiguity as an alternative to functionalism, in serving up moments of resistance to direct causal action, interfaces that foster unpredictability can allude to a perception of autonomy that is essentially dialogic. Although specific causality may not be entirely legible to an audience, the sense that a sound is being caused (live) is apparent. Any ambiguities must be considered an accurate reflection of the musical interaction. So although no causal link is inherent, through performance I can imbue meaning into a system that remains essentially 'playable', but offers enough sense of agency to facilitate challenging modes of engagement. Drawing on my own research and previous work in this field, I will attempt to locate a notion of 'virtuosity' within the practice of electronic musicians today.

Jane Ginsborg (Royal Northern College of Music), Roger Chaffin (University of Connecticut), Beating Time: The Development of a Singer's Mental Representations Using Kinaesthetic Learning

Context

Performers' mental representations for music have been studied in a series of longitudinal case studies (e.g. Chaffin et al., 2002; Noice et al., 2004; Logan et al., 2007; Ginsborg et al., 2006). In these studies, performers were required to report the features of the music to which they remembered paying particular attention when they were practising and which of those features they thought functioned as retrieval cues when they were actually performing; these were subsequently shown to predict recorded practice and rehearsal behaviours.

Aims

The present study investigated the role of kinaesthetic learning in the development of a singer's mental representations, asking what movements were used, when they were used during the course of four weeks' practice and rehearsal, and where they were used in relation to the musical features and performance cues identified after the performance.

Methods

The singer undertook nine video-recorded practice sessions (alone) and rehearsals (with a pianist who subsequently conducted the performance) of the first *Ricercar* from Stravinsky's *Cantata*. For the purposes of analysis the sessions were grouped into four periods representing learning and memorising (1-5), the first joint rehearsal (6), the

follow-up practice session (8) and final rehearsals (9-15). The singer's physical movements (pulse-beating, conducting, gesturing) and periods of 'no movement' were coded by an independent observer.

Results

Pulse-beating was relatively infrequent and peaked in Session 8. Conducting was highly prevalent in Sessions 1-5 but decreased over the remaining sessions. Gesture, by contrast, increased over time (again, peaking in Session 8) while 'no movement' was most common in the final rehearsals.

Conclusion

Beating a pulse, particularly in the early stages of learning, provides the framework for ensuring rhythmic accuracy. Conducting, during the memorising phase, helps in the formation of a metrical representation. Gesture, once the piece is learned and memorised, underpins the communication of semantic meaning (whether musical or verbal). It is also vital, however, for the singer to practise *not* moving, in preparation for performance.

Marie Glon (Pantin), Performing Steps or Notes? The Musical Dancing Body in the *Danses en chorégraphie* (18th century)

In 1700 dancing-master Raoul-Auger Feuillet published his *Chorégraphie* in Paris. This manual established a way of writing down dances. It was translated into English in 1706 and was followed by the publication of many dances in Europe throughout the 18th century. Obviously, music provided dancers with an intellectual tool – music notation – leading them to develop their own notation and to consider dance in an abstract way. These beautiful 'choreographic scores' have often been used by historians to describe the dances of the 18th century – but the way the *Chorégraphie* represents the dancing body and its musical qualities has never been studied.

The first component of the '*danses en chorégraphie*' or '*dances written into characters*' was the musical score, written on the top of every page. Below, the '*tract*' showed the figure of the dance. This tract was divided into measures, and each reader was invited to relate the steps (written down on this tract) to the rhythm of the tune. In some developments of the *Chorégraphie* (published by dancing-master Rameau in 1725), the link between dance and music was even tighter, as the symbols of the steps were turned into a kind of music notes, with black or white spots, according to their duration: it is as if notes were dancing, or as if dance steps were merely a new tune...

Thus, the *Chorégraphie* put a new emphasis on specific components of dance: first of all rhythm and measure, but also composition (repetitions, refrain...) – all of them directly related to music. It also led to the development of new categories to characterize a dance, such as sinking, rising, springing, falling, sliding: whereas the description of the dancing body traditionally concentrated on the theatricality or on the attitude, the

'genteel way', the 'grace and air' that were supposed to reveal the dancer's social status, the use of the *Chorégraphie* reveals an entirely new way of considering the dancing body, focusing on its physical and musical qualities.

Rolf Inge Godøy (University of Oslo), Sound, Movement, Key-Frames, and Inter-Frames

Close links between sound and movement are ubiquitous in musical performance, listening, or innumerable everyday situations. Body movements (real or imagined) seem so integral to musical experience that it is hard to think of music without also thinking of body movement.

Increasing interest in studying music-related body movement has given us improved methods and technologies for our research, yet one of the most intriguing issues is how we conceptualise and represent sound and movement in our minds and in our research: How can we have more or less solid images of sound and movement as they in their very nature are transient and ephemeral? The question is both conceptual and pragmatic as it directly concerns how we capture, process, and represent sound and movement data.

After years of theoretical reflection alternating with practical work, our solution is to regard music-related movement as focused around key-frames, meaning salient postures in time, interleaved with inter-frames, meaning continuous movement between the key-frames. Borrowed from film animation and now applied in human movement science, we believe key-frames and inter-frames correspond to similar elements in the sound, giving us a coherent framework for studying music-related movement.

Anthony Gritten (Middlesex University), Why is Ergonomics Useful for Performing'

Ergonomics is concerned with human performance, and in particular with the design and production of products and processes that maximise safety, comfort, productivity and efficiency. Across virtually all industries and disciplines, ergonomic issues are central to the effective management of performance, performers, and performing, whether these be systems, machines, or musicians.

For musicians, there are at least two senses in which performing can be called ergonomic. First, it is by nature ergonomic, in utilising (parts of) the body in specified, coordinated, and broadly intentional ways in order to attain a specific end; in this sense, performing is ergonomic because it is about directing matter towards a given goal. Secondly, only certain types, styles, or modes of performing are ergonomic, because they intend to use the body in ways that have been specifically designed and rehearsed

because they are efficient and maximise the musical output (however this is defined) for any given physical (or other) input; in this sense, performing ergonomically might be termed a performing style, choice, or decision, and open to a degree of intervention and manipulation.

This paper argues that ergonomics is a vital constituent of any complete picture of performing, but that it should be understood in the context of the wider aesthetic trajectories to which performing is subject. There are elements of performing that ergonomics does not deal with, but upon which it can shed fascinating light. In particular, aspects of the phenomenology of performing can be unpacked by examining ergonomically-couched descriptions of performing, and mapping these onto narrative accounts of the lived experience of performing as lived by the performer. Examining the tensions and complementarities between these two approaches to performance documentation provides key insights into the dynamics of music performing.

**Christina Guillaumier (Royal Scottish Academy of Music and Drama),
Autobiography in Performance: The Case of Sergei Prokofiev**

The Russian composer-pianist Sergei Prokofiev started playing the piano at an early age and composed his first work for the instrument in 1896 at the age of five. For him, the piano was a lifelong source of inspiration. It was the particularly primal activity of piano playing and his physical connection with the instrument that first attracted Prokofiev to the piano. Over two decades Prokofiev's growing awareness of his own physicality gradually became the basis of his compositional inspiration. This process of self-awareness is charted musically in the early unpublished works for piano and developed to its most succinct expression in works like the *Études* Op. 2, *Four Pieces* Op. 4 (particularly the *Suggestion Diabolique*), *Toccata* Op.11 and *Sarcasms* Op.17. During his years at the St Petersburg Conservatory, Prokofiev painstakingly built a reputation for himself as a powerful and virtuosic, if idiosyncratic and unconventional, performer. As his 'Diaries' reveal, Prokofiev carefully put together a public persona to go with his appearances as a performer of his own works; through this constructed persona Prokofiev wrote his own personality and physique into his compositions for piano. Of necessity, Prokofiev fashioned his own musical and performing identity and created his own performance traditions.

Drawing upon unpublished manuscripts, rarely seen photographs, as well as recordings of his piano rolls, my paper will show how Prokofiev's body and personality were active drivers in his compositional process. The composer's early works for piano, such as those mentioned above, are thus an intriguing form of musical autobiography which reflect not only his continuing development as a pianist but more importantly, the way in which his physique and personality as a pianist developed into compositional processes.

Jill Halstead (Goldsmiths, University of London), Physio-sonic: Body Instrument Interactions and Creative Process

'My guitar is not a thing. It is an extension of myself. It is who I am.' Joan Jett

The sight and sound of the electric guitar have been integral to western popular culture for over six decades. The enormous popularity of the electric guitar has been explained in many ways, from the practical (portable and relatively inexpensive), to the fetishistic (its 'feminine' curves and phallic neck), but perhaps the least discussed aspect of its enduring appeal is the spatial and tactile immediacy of its sound production. Above all the guitar remains a highly instinctive and malleable sound-producing object. This paper explores the role of the body and movement in the creative processes of electric guitarists. It seeks to challenge the traditional emphasis on 'head bound' cognitive processes (Clarke 2005) that so often relegate the role of the body and movement to merely a means to an end in the production of music. Drawing from a range of sources including cognitive neurology (Zatorre, Chen and Penhune 2007), ethnomusicology (Baily 1977, 1985, 1987) and the author's own participant observer involvement in UK rock music scenes, this paper assesses how guitarists experience their creative process. It is suggested that interaction with the guitar not only predisposes spatio motor thinking in players, confirming the ideas initiated by Baily and Driver (1991), but that it embeds an auditory-motor interplay resulting in a physio-sonic, rather than sonic, approach to creativity. In this sense movement not only brings about the production of sound via *how* something is played, but it can influence *what* is played, through a range of movements interconnected with, and sometimes independent of, the sound. A number of examples are used to support and develop this position including Steve Cropper's *Midnight Hour/Knock on Wood*, *Fire* by Jimi Hendrix and *Cowboys from Hell* by Pantera.

Patricia Holmes, Emma Redding, Claire Mera-Nelson (Trinity Laban Conservatoire for Music and Dance), Dance and Music Science: Optimising Performance Potential

Most music and dance training is still primarily based on pedagogic experience and tradition rather than sound scientific principles: musicians and dancers generally perceive themselves as artists rather than athletes. Although in recent decades science has become a major contributor to advances in sport training and performance, dance and music training have not benefited similarly.

Insufficient injury prevention can be an inhibiting factor in music and dance training. Although there has been growing progress in the diagnosis and treatment of musicians' injuries, as evidenced by a number of generic and instrument specific research based studies (e.g. Greer & Panush, 1994); prevention has not been properly addressed.

Screening is used both to identify potential problems, and to develop prevention and/or rehabilitation strategies for individuals (Liederbach, 1997), but methods to identify injury

risk have been mainly biomechanical and orthopaedic. Profiling gathers more rounded descriptive information about the status of a performing artist and/or observes changes to their status across time (Chatfield, Byrnes, Lally & Rowe, 1990). Brandfonbrener (2006) advocates that although time-consuming and complex, musicians' playing, medical and psychological histories should be examined in order to treat, or by extrapolation, predict the likelihood of injury. This gives a clear indication of the value of screening and profiling for musicians.

Trinity Laban will therefore undertake a descriptive and longitudinal interdisciplinary profiling project, aiming to bring about greater awareness and understanding of the nature of injuries in music and dance as well as other relevant health issues. Though evidence is available indicating that psychological, physiological, and biomechanical parameters interact in the health, injury, and performance of dancers (e.g. Laws, 2005), there are only a few scientific studies of this kind in music (MacNamara, Holmes & Collins, 2006; Williamon, 2004). Without further data, it cannot be said with certainty which factors contribute to positive outcomes (e.g. staying injury free; adherence to training; performance success; psychological well-being), and which are mostly likely to compound problems, at worst leading to career-shortening injuries.

There are aspects of music training (such as one-to-one tuition) which have the potential to reveal and manage issues concerning the health and well-being of individuals. However, the culture of resistance to disclosure of such issues, reinforced by tutors and the inconsistent level of knowledge amongst educators of the biomechanical and physiological functioning of the body in relation to music performance inhibits effective management.

By collaborating with the existing model in dance science at Laban and enabling generic guidelines for healthy performance training in music, it is hoped that considerable progress will be made in the prevention of injuries and the development of healthier musicians.

Bennett Hogg (Newcastle University), Culture, Consciousness, and the Body: The Notion of Embodied Consciousness as a Site of Cultural Mediation in Thinking about Musical Free Improvisation

Musical free improvisation is one of several cultural practices that problematises those Western epistemological positions that construct a division between the physical and mental self. Both within the practice itself and at many levels of discourse about improvisation, the split between consciousness as something located in the mind, and action as something located in the body, is continually brought under interrogation. Though this paper argues that a 'bodily consciousness' has been a significant trope in conceptualisations of improvisation since the first widespread blossoming of the practice in the 1960s, such conceptualisations often run the risk of essentialising and naturalising 'the body/bodily' in ways that are ultimately unrepresentative and unproductive.

Using ideas from consciousness studies, in particular theories of 'enactive consciousness', I begin from a position in which the body and consciousness are mutually inseparable. Whereas some earlier epistemological positions have sought to locate 'the cultural' in a mind equated with consciousness, leaving 'the body' to nature, the notion of enactive consciousness offers an epistemology that, in including the body in consciousness, does not evade its cultural role, and thereby offers up a productive dialogue with Foucauldian perspectives on the body as a site of cultural 'inscription'. In this paper I am particularly interested in how free improvisation can be thought about from the perspective of 'the body' where the body is both an active participant in, and something that is in a sense formed by, culture. Where some perspectives that see free improvisation as informed by and structured by embodiment have represented it as something like an *escape* from culture through tapping in to originary or natural modes of expression, I argue that it is a site of cultural mediation and intertextuality where gesture, aesthetics, interaction, and structure are corporealised in acting bodies for whom the conditions of possibility of meaningful musical action – however counter-hegemonic they may be in intention – are always learned and culturally constructed. The musical body is as much a site at which culture is recorded as is the musical mind (memory), prescriptive notation, or technologically-mediated recording.

Koos Jap van Zweiten, K.P. Schmidt, G.J. Bex, P.L. Lippens (University of Hasselt), W. Duyvendak (Virga Jesse Hospital, Hasselt), R. Medaer (University of Hasselt), Some Factors Contributing to the Stabilisation of Normal Human Fingers

The freely moving human hand, either in gesture or e.g. whilst preparing to strike the keys of a keyboard instrument, generally makes use of motions to be performed with stabilised finger positions. Any disturbed tonus of the muscles maintaining this stabilization may produce an imbalance of agonists and antagonists, during the various trajectories that finger motions have to follow. This may eventually lead to focal dystonias - in hands of musicians and e.g. PC workers alike. The following overview will present some of the underlying mechanisms of normal finger stabilisation.

Most analyses of finger interphalangeal coordination do not take into account the shifts of the different tendon fibre bundles within the so-called extensor assembly of the finger, which occur during interphalangeal motion. This finger extensor assembly consists of tendons from extrinsic and intrinsic finger extensor muscles. Its respective bundles are often depicted as single lines, although medial bundle and lateral bundles are flattened ribbon-like structures at proximal interphalangeal (P.I.P.) joint level. Beyond the extended joint these bundles maintain dorsal positions. Lateral bundles constitute the terminal extensor tendon of the distal interphalangeal (D.I.P.) joint.

To demonstrate some of the subsequent positions of finger flexion, a mathematical simulation model of finger motion is used. In this kinematic model, tendons and tendon fibre bundles are supposed to be non-elastic and non-contractile, like ropes for instance.

Simultaneous proximal interphalangeal flexion and distal interphalangeal flexion are correlated. Plotting of the successive angles of D.I.P. flexion against corresponding angles of P.I.P. flexion, in normal fingers, results in an S-curve. To analyse this S-curve, forward and reverse kinematic modelling of the extensor assembly of the finger may be applied. It is suggested that such curves may also add some prognostic value during diagnostics and rehabilitation of dystonias and other neuropathies in musicians suffering from hand problems.

Alexander Refsum Jensenius (University of Oslo), An Overview of Methods for Visualising Music-Related Movements in Time

Sound and movement happen in time, and visualisations of sound and movement will thus have to deal with a timeline when it comes to creating useful representations in print and on screen. For audio we are used to working with waveforms and spectrograms, both of which are useful displays when it comes to visualising qualities (dynamical and timbral respectively) in the continuously evolving musical sound. Moving into the visual domain from a musical perspective we are faced with a lack of similar tools and techniques when working with video. The traditional approach of representing 'movement' in a video by sampling static video frames and presenting them as a keyframe display does not do justice to the continuously evolving movement happening between the sampled frames. In this talk I will present an overview of my work on visualisation techniques of musical performance based on video recordings. This includes motion images, motion history images, motiongrams and videograms. Examples will be given of how such displays can be used for studying audiovisual material of musical performances, both qualitatively and quantitatively. Finally, I will present some preliminary results on how we can visualise reduced displays of multidimensional data sets from motion capture systems together with audio and video displays. Such tools will hopefully enable us to study musical performance as continuously moving bodies and sound over time.

Karen Jones (Yale University), Brahms's Second Piano Concerto and the Staging of Anti-Virtuosic *Virtuosität*

Brahms's Second Piano Concerto is one of the most difficult, physically demanding works in the modern pianist's repertoire. From the perilous leaps and crashing chords of the first movement to the sparkling passagework of the finale, this concerto presents the performer with not only a daunting range of challenges but also a gruelling endurance test. And yet these challenges harbour a paradox. As Roger Moseley has

recently noted, commentators from Brahms's own time onward have been eager to assert that unlike comparable Romantic 'warhorse' concertos, Brahms's Second should not be classified as a 'virtuosic' work.

This apparent contradiction is a fruitful starting point from which to examine the changing, often conflicted concept of virtuosity in the 1870s and 1880s. Drawing on contemporaneous descriptions and definitions of virtuosity as well as on accounts of performances of the period, I situate this standard critical response within an ongoing discourse that attempted to define an appropriate role for performance in an increasingly work-based musical culture. While a central aspect of this discourse during Brahms's time was its denigration of flamboyant types of virtuosity as shallow or superficial (Hanslick's mere *Virtuosenthum* as opposed to the higher-aesthetic goal of *Virtuosität*), to take this at face value is to oversimplify a far more complex issue. In fact, physical, visual, and theatrical aspects of performance continued to be essential even among performers and works that ostensibly propagated an anti-virtuoso, *Werktreue* ideal of performance.

These seemingly irreconcilable attitudes towards performance play out in Brahms's Second Piano Concerto in several ways. An examination of the types, locations, and functions of virtuosity in this 'symphonic' concerto sheds light on how it could project an anti-virtuosic stance even while presenting enormous difficulties to the performer. Ultimately I offer an interpretation of the Second Piano Concerto as a work that attempts to put forth an ideologically justifiable mode of virtuoso performance within a network of conflicting discourses surrounding virtuosity, physicality, and performance.

Eleni Kallimopoulou (University of Macedonia, Greece) Of Bonds and Boundaries: The Embodied Encounter of Two Musical Worlds in a Concert of Greek Music

This paper will examine the musician's body in performance, querying especially the ways in which it is musically and culturally constructed as well as its role in the generation of musical affect. A series of questions will consider the relation of gesture and body posture/movement to audience reception, performance style, organology, and visual representation.

The discussion will focus on a particular ethnographic event, a concert of Greek music which took place in Cyprus in 2003 and in which I was involved as performer. My presentation includes footage of the concert, while I will also draw from conversations conducted with the band members. The specific concert brought together on stage musicians representing two musical worlds which, although adjacent, are quite distinct in terms of their history, geographical distribution, social networks, and musical features: *dimotikó* ('folk'), and *paradosiaká* ('traditional').

My paper will trace the ways in which the tensions between the two styles were borne out visually and by the musicians' bodily movements, especially during the solo improvisatory parts. The level of interaction and feedback between the performers and the audience will be examined. The expressive gestures of the clarinet-player, a *dimotikó* musician, served to accentuate (at times arguably even generate) musical affect, in contrast to the sober, 'non-embodied' performance conduct of *paradosiaká* musicians. The differences in the physical aspects of performance of *dimotikó* and *paradosiaká* exponents thus reproduced the divide between 'music to dance to' and 'music to listen to', on the basis of which the two respective styles are defined and differentiated from one another. The musician's body emerges both as a site of bonding or, conversely, of constructing boundaries, and as constituted by and constitutive of the aesthetics and performance ideologies of his/her musical world.

George Kennaway (University of Leeds), 'Noble and easy attitudes' or a Violent Embrace? Towards Carnality in 19th-Century Cello Performance

Elizabeth le Guin's *Boccherini's Body – An Essay in Carnal Musicology* (Berkeley, 2006) explores the physicality of Boccherini's compositional process and of the performance of his repertoire, using an innovative mode of analysis which attempts to recover additional signification from the player's movements. For example, patterns of physical tension and release are seen as important insofar as they can contradict (or enrich) the apparent expressive character of the phrase or figuration. Although well reviewed, her stimulating, albeit problematic, methodology has not so far been extended into other cello repertoires. In this context, my paper attempts an examination of some of the works of 19th-century cellist-composers such as Romberg, Bohrer, Dotzauer and Servais. It will consider their reception, prevailing attitudes to the visible physicality of virtuoso performance, the gendered identity of the instrument, and the visual aspects of portamento and vibrato. These ideas will be speculatively applied to 'canonic' works such as the cello concertos by Lalo and Saint-Saëns.

Kordula Knaus (The University of Graz), The Iconography of Operatic Travesty Traditions and Characters

Cross-sexual casting has a long and multifaceted history in opera. All-male-cast performances in the 17th century, old women played by tenors in the 17th and the 18th century, castrati in female roles in Rome throughout the baroque era, or trouser roles in the late 18th, the 19th, and the 20th century: all these conventions have in common, that a singer of one gender plays a character of the other gender. But how were these performances perceived? How were the 'wrong' bodies displayed? Was the target to make the gender of the performer vanish behind the gender of the character or did there exist a play with the various facets of gender identity?

Iconographic material is a useful and precious device to come closer to an answer to these questions. The presentation will provide a selection of singer portraits in travesty roles and analyse their gendered display with regard to the historical discourse of body images. Different strategies for different role types and genres are observable. Whereas in baroque *opera seria* the singer's 'wrong' gender in the cross-cast role was often hidden in singer portraits, the singer's gender ambiguity is displayed in a more obvious way in comic operas or comic roles. A special focus will be drawn to portraits of trouser role singers in Viennese operetta from the 19th century, where the female body was displayed in a highly eroticised way.

In passing, the paper will discuss some methodological issues related to the topic. These issues include questions about the validity of iconographic sources and problems of theorising gender, sex, and body for an investigation of cross-sexual casting.

Mary E. Larew (University of York), Medieval Art in Modern Performance

In the past century, scholars and performers have proposed and explored historical relationships between medieval drama and visual art. Medievalists have suggested a symbiotic relationship between dramatists and visual artists, citing stained glass and illuminations that record theatrical Bible scenes they may have seen performed in their own community.

Simultaneously, performing artists with Modernist aesthetic goals have sought inspiration for new, non-naturalistic, ways of performing. Often their inspiration comes from exotic cultures, but elements of historical cultures and genres have also been appropriated to inform their theatre.

In performances of medieval music-drama, many modern directors and actors have returned to medieval visual art in search of gesture and staging. The awkward, two-dimensional postures of medieval figures suggest stylised tableaux for performers. The symbolic gestures of the images are compelling as well, whether or not their meaning remains the same to a modern audience as it was to a medieval one.

By 'recreating' these tableaux in a series of exercises, actors develop a repertoire of posture and gesture that inform their characterisation. At the same time, a director who guides and observes can find interesting and effective staging for the work.

In this lecture-recital, I will guide three actors through a brief series of these exercises. We will then demonstrate how these tableaux are brought to life with movement. Using the Cividale *Planctus Mariae* – remarkable for its numerous and specific stage directions – we will perform a scene in order to demonstrate the modern synthesis of medieval tableaux, gestures, and music-drama.

Laura Leante (Open University), Gesture, Imagery and Meaning in North Indian Classical Music

North Indian classical musicians often make use of gesture in the transmission and performance of their music; they do this both to support their techniques of sound production and to describe the characteristics of *rāgs*. In this paper I will discuss how sound, gesture and imagery are three facets of the same process of meaning construction in music and I will demonstrate how the embodiment of sound as patterns of movement is a key to understanding how musicians associate particular images and emotions to *rāgs*, and at the same time how such processes of signification are intertwined with culturally embedded meanings. In particular I will present a methodology which draws on ethnography, semiotics and research on embodied cognition: such an interdisciplinary approach can shed light on how North Indian classical music is constructed, transmitted, and received.

This paper stems from the AHRC-funded project “Experience and Meaning in North Indian Raga Performance”, based at the Open University. For my presentation I will draw on video footage of musical performances, as well as interviews with performers and listeners collected during recent fieldwork in India.

Richard Leppert (University of Minnesota), Music, Gesture and the Embodiment of the Utopian Imagination

The concept of utopia needs its opposite, dystopia, to gain semiotic traction. Utopia, and its opposite, have long residencies in Western consciousness, and especially so in the history of modernity and its aftermath. The urgent hope that lies at the heart of utopian thought finds refuge in art, and perhaps music especially. As Adorno once aptly put it, art is ‘the ever broken promise of happiness’, the semblance of ‘what might have been’.

Music, the product of physical action, is inevitably ‘about’ the body; aurally and visually the two are mutually constitutive. That said, the relation between the meanings of music and the semiotics of the body is highly problematic, often contradictory, historically inconstant, and the product of deep socio-cultural anxieties and antagonisms—none more so than in the past three centuries.

The body articulates musical meanings through the *signifiante* (or the semiotic *supplément*) of physical gesture, a complex repertory of movements read against a body putatively (and impossibly) without meaning. The musical gestures discussed in this paper engage the dialectical distinctions embedded in the fraught realities of class, gender, sexuality, nationality, and, more generally, social order, considered against the uncertain terrain of utopia, a perpetual present-absence of unrealised desire.

Leslie Anne Lewis (Berkhamsted), 'Soundpainting' and 'Conduction': An Opportunity to Explore the Boundaries of the Modern Conductor's Role

In New York City in the late 1960s and early 1970s, two jazz musicians/band leaders began independently to develop and codify conducting gestures that encouraged their players to break through their habitual improvisations and to explore new ideas. Over the last thirty years, two independent systems have emerged from this work. Walter Thompson's 'Soundpainting' and Butch Morris's 'Conduction' have stayed true to their jazz roots and have kept improvisation ideologically at the centre of their techniques, though both now work with a variety of musical ensembles that range from classical orchestras to traditional folk musicians; however, the two systems diverge from there. Thompson identifies himself as a composer and has invented a sign-language of over 1000 gestures that enable communication not only to and between musicians but also across the disciplines of dance, theatre and the visual arts. Unlike Thompson, Morris sees himself as an arranger and uses a vocabulary of only twenty gestures. The two conductors use gesture to facilitate spontaneity in both themselves and their players. The main aim of this paper is to explore how Thompson and Morris's gestural techniques enable this spontaneity, and to question to what extent it might be possible to incorporate elements from their approach into rehearsals and performances taken by the conductor working in the more traditional role of leading the standard repertoire. I will address both of these questions through an analysis that reviews the balance of categories of non-verbal communication (including the use of regulators, illustrators, and emblems) present in both the innovative conducting techniques discussed above as well as the standard approach demonstrated by most orchestral conductors. The paper concludes with a discussion of how specific non-verbal gestures change the basic relationships between conductor, performer, and score.

Marion Long (Bedford), An Exploration of an Entrainment Strategy on Children's Reading Behaviour

Theoretical work by Jones and colleagues, the pedagogy of Jacques-Dalcroze and the empirical work of Hurwitz et al (1975) suggested that entrainment processes may have a beneficial effect on the reading behaviour of children. An exploratory small scale study of the effect of an entrainment strategy on the temporal organisation of reading behaviour found significant gains in reading comprehension for below-average ability readers. The entrainment activity involved groups of children rapidly developing music notation reading skills while synchronising stamping, clapping and chanting in time with a musical accompaniment.

This intervention was delivered in sessions lasting ten minutes on a weekly basis for six weeks. Investigations conducted in six schools took place. Three randomised controlled trials in three schools provided initial findings. Subsequently, a comparison of the entrainment strategy with a phonics training intervention focused the study on the

reading behaviour of a below average ability sample of readers. Finally, two school trials, in which school staff delivered the entrainment intervention, demonstrated that the findings were sustained in a 'real' educational setting. Further analysis focusing on reading fluency provided evidence of the temporal integration of discrete processes in reading behaviour. Furthermore, the children's responses in the two school trials suggested that the intervention had enhanced their sense of well-being.

The implications of the study suggested that below average ability children may benefit from a holistic approach to education that emphasises an overlap between curriculum areas; also, that the integration of reading processes may be developed through entrainment type activities. Although the impact of the entrainment activity upon the children's sense of well-being could not be quantified, the children carefully described changes they had noticed. Overall, the findings of this study suggested that the entrainment strategy had a positive effect on regulating and integrating the temporal organisation of children's reading behaviour.

Cristine MacKie (Royal Holloway, University of London), Enhancing the Memory: A Mind/Body Approach

According to Clarke (2002), there are two skills of central concern in the Western concert tradition. These are reading notation and memorising for public performance. However, the latter is often the cause of acute anxiety amongst a large number of pianists, because there is always the risk of forgetting the music. Despite this, there are few systematic studies which examine the mental processes that are involved in memorizing the notes, or the effect that the role of bodily movement may have on the memory process.

This paper will suggest that memorising of music may be enhanced by encouraging the pianist to develop an interaction between the different levels of mental and bodily activities in the early stages of learning a musical work for performance. Recent research shows that the performer's capacity for memorising a musical work for performance does not depend upon one or other part of the brain, but is based upon a global interaction which involves both conceptual fields and the sensorial-motor system. As Bartsch (2005), points out, the conceptual indicators in the brain are what they are only because they function together with the body.

To this end, two strategies will be presented. First, I will begin by giving a brief example of a mental representation in the form an analysis, of the temporal flow of the *Valse romantique* by Debussy. This analysis seeks to demonstrate that the key to a coherent pacing of this flow may be found in his employment of linear patterns, such as ascending, and descending diatonic, and chromatic scales which accelerate, or decelerate within, and between the areas of stasis and flux.

This analysis will inform the second strategy, where I will posit that the movements of the pianist's torso, with its facility for making large 'circumductory looping' movements, is able to move analogously with the ascending, and descending scales, and with bodily control of the pacing of their accelerations and decelerations. With repetitive practice, these movements will be stored in the memory, and performed without moment to moment reference to the sensory system, thus enhancing the memory of the music itself.

Holly Mathieson (University of Otago), Mesmeric Gestures

The relationship between conductor and orchestra is reliant upon sight. It is also an activity which is watched by others. How audiences and critics articulate what they see occurring between conductor and orchestra on the concert platform simultaneously reflects and shapes their perceptions of what the conductor's role entails. Often these potent descriptions of the dynamic relationships between conductor, orchestra and audience reflect broader musical or social values.

The written word is not the only primary source to offer information about people's views of conducting. Depictions of conductors in portraiture and other imagery may reflect, expand upon or challenge the ideas expressed in written form, and as such are valuable research material.

This paper will examine public perceptions of the conductor's role in England in the second half of the nineteenth century using two iconic conductors, Louis Jullien and Hans Richter, as case studies. Portraits and metaphorical descriptions used in describing the conductors, the nature of their work and the means by which they achieve their musical objectives will be isolated and discussed as referents of time, place and value. This requires deconstructing word and image to ascertain their significance in their own time and place, bearing in mind the influence of form, style and context on the material.

The information yielded informs us about changes in audiences' perception, taste and expectation. Moreover, it reveals a tendency to place the incomprehensible process of gesture informing sound within the frame of more established authoritative processes. Thus, we find word-based and pictorial associations with military leaders, magicians, mesmerists, and religious leaders, and occasionally ideas borrowed from natural science, the occult and popular pseudo-sciences such as phrenology. Underlying all these elements is the importance of the conductor's total visuality, as a figure whose activity hinges on seeing, being seen and being watched.

Nikki Moran (University of Edinburgh), Music, Bodies and Relationships: An Ethnographic Contribution to Embodiment Studies

This paper presents the results of a participant-observation study of processes of social interaction in North Indian music performance. Its findings emphasise the relevance of movement and physicality to the dynamics of musicians' relationships, and the impact of this on their collaborative performance, in the words of the musicians themselves. The results support the idea that music could offer an important topical focus for embodied theories of cognition.

An embodied approach recognises the need for 'a sense of common ground between mind in science and mind in experience' (Varela, Thompson and Rosch, 1991). Many different disciplines contribute to research in embodied cognition. For example, philosophers offer theoretical frameworks that provide clarity of argument; developments to theoretical proposals might rely on computational modelling; and experimental approaches can deliver observations and useful quantification. But there is also a need for studies that attempt to ground notions of embodiment in observations of real, social phenomena.

In a strong version of the embodied approach, an 'enactive' view of social interaction suggests that individuals in interaction do not so much transfer information to one another, but rather they co-construct meaning in communicative events. This view emphasises dynamic aspects of communication such as movement, change and physicality – a useful perspective to take when considering music, since musicians in performance react and adjust in real-time to very subtle gestural cues from others. The enactive account also promotes a deeply social idea of human cognition. The study of music provides a particular vantage point on this aspect of cognition, since music as a general phenomenon encourages synchronised, social behaviour.

Therefore the method of qualitative ethnographic analysis is important because it brings insight from the experience of individuals into alignment with the sorts of observations about communication and social interaction that are recognised by embodied approaches to cognition.

Jelena Novak (University of Amsterdam), Reinventing the Body after Opera: Music, Representation and Post-History of the Body

Hans Thies Lehmann's *Postdramatic Theatre* (1999) grounded theoretical context for theatre works created from the sixties of the 20th century onwards. In the contemporary opera world there are a number of works comparable in status, function and expressive means to trends in contemporary theatre. I was first prompted by Lehmann's book to define 'after opera' practice, and I proposed and defined the term of postopera.

I will give post-historical mapping of typical examples of how the singing body is represented in postopera and how music, literary and theatrical texts coincide within that representational practice. (Some of the subjects I will discuss are: looking through the diva's body, corporeal drama in postopera, multiplying bodyfiers, body after beauty, operadrome, the body of animal and animal body, the disfunctional body: pain and disease).

Lehmann discussed the status and function of the body on stage in postdramatic theatre and it appeared that those were significantly changed compared to the status and function of the body in dramatic theatre. Similarly with opera and postopera. The more than four hundred year long history of opera reveals the history of the concealed body. Roles were sung, and the singing bodies were perceived as singing machines covered up with costumes, wigs, make up, and the silent social consent of invisibility and asexuality. The operatic roles and the voices were important, not the bodies behind them. With postoperas such as the pieces of Philip Glass/Robert Wilson, Louis Andriessen/Peter Greenaway/Hal Hartley, Steve Reich/Beryl Korot, Michel van der Aa, John Adams/Peter Sellars, the singing body was 'dug out', as a kind of archaeological artifact, and reinvented, revived showing simultaneously its vocal and corporeal qualities.

Adam Parkinson (Newcastle University), Embodied Listening and Interface Design

Over the past few years, there has been a great influx in affordable technologies, accessible programming platforms and online communities with 'open source' ethics, creating a culture wherein an increasing number of musicians are able to design and build their own instruments. This paper addresses the issues that emerge when we consider contemporary instrument design alongside a model of listening which considers that listening is done by and through the body in multiple ways, for both audiences and performers. I will be drawing on my own creative practice and experience of interface design, studies of embodiment in improvisatory musical practices, and using the philosophy of Gilles Deleuze to construct expanded conceptions of music, performing and listening which expose latent connections and negate counter-productive presuppositions.

All the bodily gestures we associate with a musical practice are inherent to how we listen to it insofar as they establish structures, metaphors and a context through which the sounds can have meaning. We often move when we listen to and perform music, whether we are dancing, playing air guitar or nodding our heads, and this movement is deeply embedded in the process of listening. Increasing evidence links perceived rhythm to bodily movement, and we must recognise that listening involves more than just the ears, but the whole body. Instruments lie at the point of intersection between bodily movement and sound production, and sensor technologies allow for investigations into this relationship. We can explore and deconstruct existing gestures, and create new visual metaphors for the ways in which sounds may be generated and controlled,

exploring issues of gestural legibility and intuition relating to the sound worlds of the digital age. Through surveying instrument design, we are therefore able to engage constructively with the very way we think about listening and musical meaning.

John-Bede Pauley (Durham University), Singing With The Ear: The Tomatis Method and the Singer's Formant

Alfred Tomatis, the late otorhinolaryngologist, developed fascinating theories on the role of the ear in vocal production and overall physical health. His basic theory, as related to singing, is that the voice produces only those frequencies that the ear is capable of hearing. Therefore, those whose ears are not attuned to the frequencies of the singer's formant (roughly within the range of 2,800 to 3,200 Hz) will be unable to produce the corresponding overtones when vocalising. From this theory, Tomatis developed a method for attuning a subject's ear to the richer, energizing textures of high frequencies. The theory and method, if accurate, have important ramifications both for vocal production as well as for listening to and appreciating singing performed according to classical vocal technique.

I will present Tomatis's theory and method as well as the limited amount of research literature on the subject. Included in the presentation will be a demonstration of the frequency filtering used in the Tomatis method.

Alicia Peñalba Acitores (University of Valladolid), Different Implications of the Body in Music Performance: Acoustic Instruments, Hyperinstruments and Alternate Controllers

Is the body involved in music performance beyond the production of the sound? When observing a pianist playing a Mozart sonata, it is possible to distinguish many different gestures, movements and actions. Apart from the sound production actions, we can examine head shakings, torso rotations, face gesturing, etc. However, this paper argues that the role of the body in music performance is not restricted to these observable gestures; the body is also involved in other significant tasks needed to perform the music. This paper focuses on two aspects: the first is an attempt to explain a theoretical model of embodiment that investigates the implications of the body in music performance at observable and internal levels. The second compares the participation of the body within those levels, in instruments of different natures.

The theoretical model of embodied cognition and perception is based on three very relevant theories: Johnson's Embodied Mind theory (Johnson, 1987), Gibson's Ecological Approach to Visual perception (Gibson, 1979) and Sensorimotor Contingences Theory (O'Regan & Noë, 2001a, 2001b). The model takes into account elements such as:

- 1) Prior Motor Programming, necessary for the execution of an action. Our nervous system is responsible for planning conscious and unconscious movements.
- 2) Motor Execution, required to produce the sound of the instrument. Movements are controlled by proprioception.
- 3) Action involved in perception, because in order to perceive properly, it is necessary to be aware of self movements.
- 4) Storage, involving *schemata* and *affordances*. Many body feelings are saved in our memory to be available in forthcoming experiences.

Wanderley and Depalle (2004: 635) classified instruments as acoustic instruments, hyperinstruments and alternate controllers. This paper will show how they imply different programming, movement execution, self perception and storage.

**Deniz Peters, Gerhard Eckel (University of Music and Dramatic Arts, Graz),
Researching Embodiment in Musical Experience: The ‘Embodied Generative
Music’ Project**

When we hear music, we hear more than random sequences of sound—we hear music as organised, and hear this organisation as something that is articulated *in* the music. But what is it that we read in, and into, the sound? If one follows Roger Scruton, what we hear in music is an imagined world of metaphoric movement, on which the experience of musical expression is based. But it remains a mystery how we would come to experience, rather than just *imagine*, the metaphoric movement as *movement*. Rolf Inge Godoy finds that motor-mimetic elements inform musical understanding and suggests that ‘any sound can be understood as included in an action-trajectory’. While this zooms in closer on the relation between sounds as heard and as seen in their production, Scruton and Godoy say little about the *felt* dimension of musical experience; the question is still, how musical experience is grounded in bodily experience as part of our musical perception. To Arnie Cox, musical experience becomes embodied by way of mimesis also, but his argument extends the mimetic activity to subvocal, as well as, amodal (visceral) imitation of the performers’ gestures. The question whether it is possible to isolate something like a state of ‘embodiment’ in music-making led the authors of this paper to conduct a research project, turning space into a virtual instrument played by dancers. Our practical explorations of the concept of musical embodiment so far show that perception is *active* to a higher degree than motor-mimetic or vocal-mimetic accounts suggest. We believe there is evidence of non-metaphorical musical gestures as being grounded in the lived body, and, in this paper, propose to present an extended concept of musical embodiment (including the felt shape of a sonic movement), illustrating this by examples from our practical work with dancers as intermedial performers.

Sarah Robinson (Newcastle University), Loud Blasts, Puffing Cheeks and Heaving Chests: Distortions of Femininity in Female Wind Players of the Early Modern Period

Early modern behavioural guides such as Castiglione's *Book of the Courtier* confirm that the physical demands of wind instruments rendered them particularly unsuitable for women who were ideally supposed to exude a silent and still demeanour, with as little movement to the upper body or distortion of the face as possible. Wind instruments were generally associated with loudness, the outdoors and public spectacle; women were supposed to occupy the intimate, private, domestic space.

Alongside the practical difficulties of playing, the combination of women and music was in itself problematic. Whilst musical accomplishments were to be encouraged as a suitable female attribute, women musicians in the form of Sirens were archetypal seducers and corrupters of men. Although Sirens were often portrayed as singers, they were also depicted in art and literature playing the harp or pipe and in some instances the Sirens were visualised as a musical trio, enticing male attention with their alluringly sweet music and beautiful appearance.

Negativity towards wind instruments in more general terms stemmed from classical hierarchies concerning the aesthetic association of different instruments, which placed strings above the winds. Mythological stories such as Minerva's disgust for the pipes, which distorted her face, reinforced such prejudices.

All of these negative properties of wind instruments would seem to rule them out as suitable for women to play. However, despite such negative associations, inspirational female characters from mythology were associated favourably with wind instruments in their iconographical and literary portrayals, including Fame with her trumpets and various Muses and personifications of the Liberal Arts. The aim of this paper will therefore be to investigate the apparent tensions that existed between literary and visual representations of female wind players, alongside the practicalities of playing and early modern social decorum.

Matthew Rodger (Queen's University, Belfast), The Acquisition of Musical Body Movement in Relation to Acquired Skill in Expert Clarinet Performance

The body movements made by musicians during performance can be expressive of musical intention and of structural features within the music. As expressive musical performance may be considered a highly skilful human activity, it can be argued that congruence between body movement and musical movement develops during musical skill acquisition. That is, during skill acquisition, a performer's body movement may become a vehicle through which musicality can be held and expressed. In order to explore this notion, performances by an expert clarinettist of pieces at three different

stages of learning (well-known, familiar and unfamiliar) were recorded through motion-capture and audio recording. Using principal component analysis to extract body motion, amplitude of movement and correlation between movement and musical variables of melody and dynamics were compared for music at different stages of learning. Results indicate that as familiarity with the piece increases both amplitude and the degree of correlation between movement and melody increases, though the same effect was not found for the correlation between movement and dynamic contour. Considering the learning of a piece of music in terms of skill acquisition, this result suggests that musical skill involves the development of musical body movement, possibly indicating an embodied representation of a given musical piece. Further questions to be addressed include the causal direction of the relationship between body and music, and how, if at all, this proposition may play a part in the acceleration of expressive musical skill acquisition.

Roshan Samtani (Madrid), Embodiment, Ergonomics, and Improvisation: A Study of Flamenco Guitar Technique

In this paper, I examine the importance of movement patterns in the acquisition of performance ability and in the actualization of improvised performance. I shall concentrate on flamenco guitar performance, a highly skilled activity that has conventionally been transmitted and practised without the use of written notation.

The data for this study derive from fieldwork conducted in Madrid and Jerez de La Frontera, Spain (1997-2005). In my analysis, I shall draw upon theoretical insights developed by Lord and Parry (1960), Pressing (1984, 1988), Blacking (1973, 1977), and Baily (1977, 1985, 1995). I will also deploy the notion of embodied or enactive cognition and emphasise that in order to understand the structure of music and its referential qualities we must begin by comprehending in detail the structures of movement that create the final sonic product.

This perspective opens up new areas of inquiry regarding the implication of the human body in the performance and composition of music. While the study of sensorimotor factors (the human body) and spatiomotor representations (movement forms) has a small but distinguished tradition in the ethnomusicological literature (Baily 1977, 1985, 1995), conventional models of performance tend to overlook the importance of the body in skill-acquisition, performance, composition and improvisation. I contend that an emphasis on the study of sensorimotor factors facilitates a deeper comprehension of the microstructure of sound and its referential qualities, crucial to our understanding of the cultural conditions that inflect music performance. This, in turn, suggests fresh theoretical approaches to comprehending the 'human-instrument interface' (as Baily aptly terms it) and the relationship between instrument construction and environmental, visual, tactile, ergonomic, and musical factors.

**Sarah Schmalenberger (University of St Thomas, St Paul, Minnesota),
Beyond Breast Cancer: Musician Survivors Transforming Illness and Injury**

Survivorship – a new area of cancer research – has profound implications for performing artists who have had breast cancer. Although an increasing number of people are cured of the disease, breast cancer treatments can become problematic for those in physically demanding occupations. Women performing artists are a particularly vulnerable group, as treatments can impede their ability to function at least temporarily. This presentation shares data from the Life and Livelihood Study, an innovative research project that examines the occupational well-being of women musicians after breast cancer.

Musicians are athletes, in that they must maintain high levels of performance stamina, efficiency, and proficiency. Because the fitness of their upper bodies is crucial to sustaining their careers, they depend upon sophisticated practice regimens that support optimum levels of physical and mental balance. Recovering that balance after battling breast cancer can be extremely challenging when considering how treatments for the disease affect the upper body. Problems routinely encountered by breast cancer patients include lymphoedema, post-surgical neuropathy, shoulder morbidity, post-radiation contracture, as well as more general issues of chronic fatigue, immune deficiency, and chronic pain. Data (quantitative and qualitative) from the Life and Livelihood Study shows a significant number of women musicians struggling with one or more of these problems during and after treatment, to the extent of limiting or disabling their ability to work. At the same time, the data also reveals insights into the emotional processes of survivors who drew upon their creative artistry to articulate their experience, heal themselves and others, even transform their careers as musicians.

This profile of ‘musician survivors’ facilitates an understanding of breast cancer survivorship issues, especially the rehabilitation of patients whose physical fitness, strength, and stamina are vital to their occupational well-being. This research also suggests new hypotheses for research in Performing Arts Medicine.

**Franziska Schroeder and Imogene Newland (Queen’s University, Belfast),
MOVE – a Bodily Performance of Stockhausen’s Tierkreis**

This lecture-performance is by the duo ‘Move’ (piano and saxophone bodies in movement). The duo’s work explores the physical and the sonic relationship between the performers’ instruments and their performative bodies. The two performers appropriate each other’s instruments, their intrinsic sonic qualities as well as the performative space of the other player by alternating their positions to each other and to their instruments. They extend and constrain each others’ gestural movements. In this way, the duo questions traditional performance identities and performative gestures and the ways in which particular gestures have become established and expected as part of our Western Classical music traditions.

The proposed performance is built on the work *Tierkreis* (1974–75) by German composer Karlheinz Stockhausen. The piece consists of twelve short melodies each representing a sign of the zodiac. The piece was originally written for 12 music boxes and formed part of the composition *Musik im Bauch* (Music in the belly) for six percussionists and music boxes. *Tierkreis* uses twelve tempi from Stockhausen's work *Gruppen*, and each melody centres around a single pitch while employing all twelve chromatic pitches. The work is considered to be a cycle of musical formulae for the 12 months of the year and the 12 human types.

In accordance with previous performances, the duo 'Move' will commence the performance with the melody of the zodiac sign Taurus as it falls within the day of the conference at the Royal College of Music.

Whereas previous performances of *Tierkreis* have dealt with the dynamic subtleties of the melodies and have employed different musical gestures to represent the diverse textures of the music, the duo 'Move' also takes the work into a physical domain. The immensely beautiful melodies and the alignment of each star sign with its respective element and ruling planet form the basis for the duo's choreographic decisions, including stage layout, the relationships of the two performers to each other, as well as the constraints which each performer may impose onto the other performative body. In the duo's work, performative bodies become revealed as living sculptures in the fantasy world of performance.

Crissman Taylor (Utrecht Conservatory), Violinist in Balance

Many violinists and violists at the Utrecht School of the Arts played with chronic tension and cramping due to what looked like ill-fitting equipment. Over the course of an entire school year, we designed chin rests and shoulder rests for a group of eleven students and provided support in group meetings and individual Alexander Technique lessons that helped them gradually to overcome old habits and to take advantage of their new equipment.

Typically violinists and violists are attached to their cramped style of playing and are unaware of other options. Initially students believed that pulling their head down and enduring overall muscle tension was necessary for expressivity.

Our year-long programme followed three steps to reduced pain and discomfort, and improve playing technique:

1. Adjustment of instrument position. Small and middle-sized players had trouble reaching the tip of the bow without over-stretching the arm. Taller players folded themselves unnaturally, shortening chest muscles and cramping shoulder joints when bowing at the frog.

2. New equipment. An expert technician designed a chin rest series with adjustments for each student's individual size and playing style to better stabilize the instrument. As their heads came up, musicians were at first confused by the change in perspective and took about two weeks to 'reset the internal compass'.

3. Education and support. Weekly private Alexander Technique lessons mentored individual student adaptation to improved equipment. Weekly group meetings helped overcome fear of losing control of their playing technique in the face of change.

At year's end, many students found playing techniques that formerly eluded mastery came within reach or simply 'solved themselves'. One student summed it up: 'Probably the most important thing that I got from all this was that I was not the problem. I only needed to find the way to solve the problem'.

Zachary Taylor (Aylesbury), Strings of Stone. The Representation of Stringed Instruments and the Techniques of Playing them based on Sculptured Iconography

To create representations of instruments that are no longer in existence inevitably calls for discerning examination of iconographical examples. It is not difficult to find early illustrations of instrumentalists being used as decorative devices. However such references are best discounted as a source of accurate information, because seldom do artistic presentations depict technical exactitude. In fact, precise detail is often avoided giving way to idiomatic or stylistic expression. With judicious and informed discrimination a selection may be made from numerous illustrated manuscripts, wood engravings, carvings and sculptures containing useful information for the archaeological luthier. These sources, when correlated properties are collated and compared, can provide sufficient statistics to enable satisfactory representations of instruments to be designed.

Of the types of iconography mentioned, it is the sculptured form that offers most advantages in that it presents a three-dimensional model enabling a more complete representation to be realised. The more detailed the original sculpture, the more information is imparted to the observer, especially so if the instrument is associated with a player, whose proximity makes it possible to create a scale to relate to the instrument.

Often the posture of a performer as captured by a sculptor can impart some notion as to the technique that was used to play the instrument, always allowing for artistic licence, or poor observation on the part of the artisan. It is prudent for the observer to be aware that the person used as the model may not have been a player and therefore may not have been holding the instrument in the correct manner of playing. It must also be borne in mind that the instrument depicted might not have been a perfect example of its type, or it might have been damaged, maybe missing some strings or it could be irregular in some other way. However, by comparing several contemporaneous

examples from disconnected sources, it may become possible to assume certain common criteria, such as basic shapes of the instruments and the approximate sizes of their components. Likewise, by studying the performers' posture, disposition of the hands and their physical association with the instrument, some notion of playing technique may be perceived.

Rupert Till (University of Huddersfield), Dancing to a Different Drum: The Effects of External Temporal Synchronisation of Individuals and Groups, and the Control of Gesture, Entrainment, Entrancement and Possession in Electronic Dance Music

This paper explores the entrainment of the body using music. It looks at how the movements, the dance, the bodies of groups of people are synchronised by Electronic Dance Music (EDM) within club cultures. It investigates how the music involved is designed specifically to make the audience dance, and how other elements are used to draw the participant into a form of possession ritual. It looks at the interactions of key performers within EDM, the DJ as musician/curator/librarian/performer/ritual leader, and the dancers as performers/audience/congregation/participants. It explores the effects on the body of music and dance combined. It discusses how the heartbeats of dancers can become entrained, synchronised to music by dance. It investigates key gestures such as head and hand movements, as indicators of and techniques for entrancement. It also investigates how maintaining multiple tempi with a range of bodily gestures, stills the conscious mind and frees the subconscious for 'possession' and the achievement of altered states. It looks at the role of physical crisis in participants, and at the cybernetic feedback loop involving dancers and DJ. It discusses the ability of EDM to synchronise and control gesture, thereby leading to what Durkheim called collective effervescence, and what Turner described as *communitas* and liminality.

The paper then discusses the implications of this study. It considers how music provides synchronisation to a specific external clock source, integrating with dance to entrain the body to rhythms other than the circadian tempi of nature and everyday life. It proposes that this is significant to music and dance as key foci of ritual and religious activity, and that group performance or music and dance are vital technologies for the coherence and emotional well being of communities.

Dimitrios Vlachos (University of Edinburgh), Ergonomics of Musical Instrument Controls: A Case Study of the Organ

In this paper the ergonomic issues resulting from the interactive relationship between the performer's body and the design of the instruments' controls will be presented. The motivation of this research is a number of medical reports concerning disorders of

distinguished musicians, illustrating that motion and the design of the controls of musical instruments affect the body of the performer.

The pipe organ was selected as a complex ergonomic system for this project. This study examines the design of the variety of controls, and how these determine both the performer's physical and perceptual behaviour, as well as the musical result. The body of the performer is forced to work in harmony with the instrument. The musician's kinesiology and the layout of the controls will be observed and analysed because their interaction is crucial for the musical performance.

This intensive case study of the controls of organs (and relating keyboard instruments) in terms of human factors focuses on the aetiology of the variety of designs for the controls. This study is also important for the understanding of the physicality between the performer's motion and the types of the controls, which result in the performance.

This paper will present the data from the pipe organ case studies. The outcomes aim to interpret the ergonomic strengths and weaknesses of the design strategies of the pipe organ in particular, as well as how these factors apply to music.

Charles Wiffen (Bath Spa University), Waving or Drowning? The Use of Gesture as a Compensatory Tool within Practice and Performance

This paper documents a research project that tracks the use of gestures by a group of nine pianists over a two-month period. The subjects were jazz and classical student pianists and were split into two groups: these were an experimental group (n=5) and a control group (n=4). The subjects were videoed in weekly practice sessions and the experimental group members were required to view their practice sessions while the control group did not have this possibility. Both groups documented their activities through reflective logs and video-taped interviews. All the participants were asked to perform their repertoire in a final performance, the overall quality of which was self-evaluated by the pianists on playback using a 7-point scale. These performances were also evaluated by a team of expert listeners. The paper draws on the work of Jane Davidson (2005 and 2006) and aims to analyse the ways in which awareness of gesture influences performance decisions and performance quality across different stylistic areas. The results from the study are considered with reference to their potential pedagogical implications.

Aaron Williamon (Royal College of Music), The Healthy Musical Body: An Investigation of Wellbeing, Fitness, Injury and Health-Promoting Behaviours among Conservatoire Students

Musical performance is undoubtedly a physical skill. Even the most basic technical demands of singing and playing an instrument require an exceptional degree of physical coordination, speed, accuracy and control. These increase substantially when considering performance at the highest of international levels. However, recent survey studies suggest that over 50% of professional musicians experience performance-related pain and injury within a given one-year period, severe enough to interfere with professional commitments. Moreover, recent studies of conservatoire students indicate that they do not, as expected for individuals facing high physical demands on a daily basis, engage in health-promoting behaviours. Compared with age-matched controls, music students do not take responsibility for their health, take part in physical activity or manage their stress effectively.

Thus far, research has relied heavily on self-report to understand musicians' health and wellbeing. In this study, we have employed objective measures of cardiovascular fitness and physical strength and flexibility, in addition to a battery of standardised questionnaires, covering general wellbeing, health promoting behaviours, trait anxiety, perfectionism, and performance-related pain, injury and ill health. Fifty-nine conservatoire students were recruited to take part, of whom 53 provided full datasets and have been considered in subsequent analyses. In addition, students' height and weight were measured, as were hand grip strength and finger digit span.

The results show, for example, that 27.5% of participants (16 of 53) achieved above average cardiovascular fitness, 19.0% average, and 44.7% below average, compared with age- and sex-matched normative data from the general population. In terms of health promoting behaviours, participants scored on average 2.57 across the entire scale (of a maximum health promoting score of 4.00, $SD=0.34$), and on the six health promoting sub-scales, they scored higher on interpersonal relations, spiritual growth and nutrition than on stress management, physical activity and health responsibility. These findings are consistent with published means which indicate that music students are less health promoting than age-matched non-musicians. Despite this, the students on the whole rated their present state of health, on a scale of 1=poor to 5=good, as above average ($M=3.62$, $SD=1.04$). In the presentation, interrelationships between all physical and mental health dimensions measured will be explored, and the implications of the findings will be considered for musicians' training.

Clemens Wöllner (Royal Northern College of Music), Rouwen Cañal-Bruland (University of Amsterdam), Perceiving the Movements of Others: A Research Technique for Studies in Music and Sport Psychology

Musicians and athletes have to accumulate several years of practice to accomplish skilled executions of complex bodily movements. For both domains of expertise, not only the execution but also the perception and assessment of other's bodily movements is essential. If experts are capable of performing certain actions themselves, then they show a superiority in responding to similar actions of other persons, as recent research has shown. Although music is primarily associated with aural processes, over the past two decades researchers have provided evidence for the significance of visual information channels between ensemble musicians and between musicians and an audience. In a similar vein in sport psychology, several researchers highlighted the importance of identifying advance visual cues in order to cope with highly time-constrained interactive tasks.

This paper reviews and discusses an interdisciplinary research technique for studying processes of visual perception in sport and music psychology: The spatial occlusion approach has been employed in a number of studies to analyse task-specific effects for different bodily cues. Typically, specific areas of the body are visually masked in video recordings (i.e., occluded) in order to identify their perceptual relevance for skilled performers and novices. In music psychology, spatial occlusion techniques were mainly employed to identify cues in musicians' body movements that contain perceptually important information about the intended expressiveness. Research on conductors' body movements has shown perceptual advantages of seeing a conductor's face as compared to the arms or whole body in simulated peripheral vision in terms of expressiveness judgements. In different sport domains, the spatial occlusion technique has been used in order to identify which cues or information athletes need to visually extract for recognising and anticipating opponents' actions. There was a high degree of consistency over a series of studies showing differences in the way novice and expert athletes process relevant visual information. Benefits and limitations of occlusion methods as well as new developments are discussed and potential implications for research and education are drawn.

Chia-Fen Wu, Dirk Moelants, Marc Leman (Ghent University), Interacting with the Public: a Comparison of Concert and Rehearsal Performance Using Sound, Video and Movement Recordings

As a musician it is clear that a concert performance involves a specific engagement. Both the physical attitude and the musical expression are different from practice or rehearsal performances, through the interaction with the public. However, the mechanisms involved in this interaction are not well documented. New capturing technologies and analytical methods enable a detailed analysis of both the rehearsal and the resulting performance.

To study the influence of the public on performance, a baroque music concert with 17th century music for soprano and viola da gamba was recorded using audio, video and acceleration sensors (invisibly) attached to the arms and body of the performers. The music contains many contrasts, with regular, dance-like pieces and pieces with a free metre, where the expressivity of the text determines the musical gestures. These data were compared to the general rehearsal, recorded in identical settings. This enables a scientifically valid comparison, without challenging the ecological validity.

General rehearsal and concert performance are relatively similar, which shows that performers are able to reproduce their interpretation precisely. However the comparison reveals some interesting differences.

Analysis of the tempo shows that the pieces in a slower, rather free tempo are performed slower in concert, while the faster, more dance-like tempi are performed slightly faster. Globally the spread of inter-beat intervals and the intensity differences increase in the concert performance. Also the gesture analysis shows an overall increase in intensity in the concert. The effect is especially seen in the pieces with a more regular metre, which shows that performers seem to use their body to convey the metre to the audience. Thus, the analyses of different recording modes each show that the concert performance is more intense than the rehearsal performance.

Lawrence Zbikowski (University of Chicago), Music, Movement and Embodied Knowledge

Over the past ten years research by neuroscientists has shown that certain groups of neurons in monkeys are active when observing the actions of another agent, and that the pattern created when these neurons fire is a mirror image of the pattern created when the monkey performs the same action. Should such findings hold for humans, it would mean that simply observing a dance causes the activation of a group of neurons that have structural similarities to the neurons active when we ourselves dance. On the one hand, such findings would suggest that the embodied aspect of music runs deeper than our personal experiences of making and moving to music. On the other hand, they point to a need for further explanation: no matter how often or how carefully I watch Fred Astaire dance, the grace and refinement of his steps forever elude me.

In this paper, I explore connections between music and movement that are both explained and challenged by our emerging understanding of how knowledge is embodied. Building on recent work, I propose that music can serve as a sonic template onto which we can map the movements of our bodies and the bodies of others. For those who know both the music and steps for a dance, for instance, hearing the music can evoke the dance, and seeing the dance can evoke the music. This correlation can then be understood to combine, imperfectly but consistently, with the activation of various neural maps, including those associated with the mirror neurons activated when we

watch others dance, those associated with our performance of the music, and those associated with the emotions summoned by our experience of the dance (as observers, as participants, or both). I argue that basic structural features of music provide a means to negotiate this dense network of embodied knowledge: through the perceptual anchors of pitch replication and regular metre, music supplies a framework for understanding crucial aspects of bodily experience. I may not be able to dance like Fred Astaire, but I can know what it means to synchronise intent and action with sound.