

## POST-FESTIVAL REPORTS BY THE STUDENT BURSARY RECIPIENTS

### 1. LINDSEY DRYDEN

#### Saturday 15th August 2009

Only a few minutes into Friday's programme of presentations and music, I found myself wishing that I'd chosen that day to report on. The moment that Professor Nigel Osborne took to the plinth in the Mews conference room, the atmosphere became charged, with a keen sense of inquisitiveness, enthusiasm, and a hunger for rigour. It was an atmosphere that would prevail throughout the weekend, as speakers, musicians and delegates immersed themselves in a rich world of music, psychology and neuroscience.

So it was on Saturday that I armed myself with notebook, pen and a larger-than-usual supply of ink cartridges to attend the day's presentations by Dr. Katie Overy and Dr. Stefan Koelsch, interspersed with a dizzying array of music by Beethoven, Schumann, Mozart, Saint-Saens, Ravel, Debussy and Schubert played by members of the Nash Ensemble.

As he did each morning, Professor Osborne began the day with a tantalising summary of the topics at hand. He eloquently described the "miniature world of amazement" that is the auditory system, set out in vivid and gripping detail the journey of sound from the timpani drum to the ear drum to the brain, and explained how hearing human beings experience every single vibration of sound, to an extent far beyond that of any other faculty (the ocular system's generalized response to light, for example). He went on to describe in more detail – picking up on his introductory words on Friday – how the auditory cortex is the fastest firing area of the brain, conjuring vivid images of the auditory system's workings and the speed of its complex responses, with words that were at once reverent and searching. Already, and again, the audience was gripped. It seemed to me that throughout the festival Professor Osborne struck exactly the right balance of wonder and actuality, hard science and philosophical marvelling, informed by a vast knowledge of world music and cultures. His introduction was the perfect start to an exciting and informative day.

#### Dr. Katie Overy – Music and Language

Dr. Katie Overy began by describing the basis of her approach – that great music really means 'great musical experience.' She explained that the notion can be used to enhance and support learning in a therapeutic environment, and moved on to the focus of her presentation: the relationships between music and language processing in the brain. Outlining the similarities between language and music, she explained that in both music and language processing the brain is interpreting incoming tiny units of information, constantly; the phrasing of particular musics is similar to the phrasing of language (this was observable in the afternoon's concerts); and similar neural processes are used to process linguistic and musical information.

Then, a little audience participation: sharing her enthusiasm for Japanese Taiko drumming, Dr. Overy taught the assembled group to speak, and then tap on legs and hands, the rhythms of a Taiko beat – do don, ka ra la ka – mirroring the way that Taiko drumming is taught (players learn to speak the patterns of the drum before they're ready to actually touch the instrument!) With this exercise, she demonstrated links between music and language, and came to the crux of the central question that had drawn most of the Festival's audience to attend: why do we love music? Because we're not only appreciating the aesthetic beauty of music, but we're also tapping into deeper neural responses to it that are linked to the very essence of human interaction: communication.

#### Dr. Stefan Koelsch – Schubert Is Making Us Sweat

Dr. Koelsch began his presentation by playing extracts from the Schubert quintets that we were to hear in full later in the day, and highlighting the unusual syntactic musical patterns that they contain. He explained how our brains are constantly relating what we hear to previous context, therefore predicting and anticipating based on our expectations of musical patterns (stored in long-term memory); in fact, it takes 50 to 80 milliseconds – less than the blink of an eye! – for the brain to respond to hearing an out-of-key sound. The audience visibly shivered with admiration at that piece of information. Building on concepts that Dr. Overy had introduced, Dr. Koelsch described how some areas of the brain are used in both musical and linguistic syntactic processing, and, bringing the focus back to why it is that we love music, posed the question: how do these cognitive processes affect emotional processes?

Here he introduced a spectrum of relaxation and tension, and research diagrams showing that tension is most experienced when musical patterns or events are unexpected or very unexpected. He went on to describe the skin conductance tests he has carried out, the results of which indicate that levels of sweat production in the hands correlate with tension / relaxation, and that when listening to music like Schubert, with his out-of-key chords, tension rises and the listener's hands thus produce more sweat. In short, Schubert makes us sweatier. Linking back to the effect of music on the emotions, Dr. Koelsch explained a little about the area of the brain called the amygdale: that it is the core structure involved in emotion in the brain; that it initiates, generates and terminates emotional response; and that its presence and workings have some kind of ancient survival value for human beings. When he concluded this segment by explaining that the amygdala is activated by unexpected harmonies, the audience was hooked, and hungry for more information.

As time was sorely constrained – perhaps more noticeably during Saturday’s fascinating presentations than at any other point during the weekend – Dr. Koelsch moved on to the idea of ‘musical chills’; again, it was as if everyone in the audience sat up a little straighter and pricked up their ears. He described his work with research subjects, who he had asked to bring to the lab a piece of music they knew to give them chills, so that he could study their brain patterns using imaging techniques while they were listening to music, specifically looking at the nucleus accumbens, a so-called fun centre in the brain associated with stimulation and reward. The tests’ findings were fascinating: even if we don’t have a particularly strong ‘chills’ response to music, the fun centre brain structure still shows activity. Dr. Koelsch then talked about the use of this research in a therapeutic context: specifically, that his group is starting a study on the therapeutic uses of music for people with disorders involving abnormal responses in emotional structures of the brain (the amygdala, the hippocampus) like depression.

At this point, after some questions from the audience and various interjections and responses by Professor Osborne, Dr. Koelsch had to really hurry to conclude his talk; he spoke briefly about how and whether music can convey semantic information (he revealed that results indicated it is possible to convey information through music, but only by contrast i.e. playing ‘wide spaced’ music followed by ‘narrow spaced’ music), and all too soon he had to draw the morning to a close, so that attendees could travel to Windsor for the afternoon’s first concert. Disappointingly, there wasn’t time for him to finish, elaborate on, or respond to questions about his very exciting presentation, but Dr. Koelsch was eloquent as he concluded, and left no doubt that his work was highly exciting, and promised more insights into the question of music’s impact on the emotions should there be time to explore them.

After journeying to Windsor Parish Church, the afternoon’s Nash Ensemble concert began with an introduction by Professor Osborne, and a surprise appearance from Radio 3 presenter and music journalist Stephen Johnson. While many moments of the weekend’s concerts were musically moving, the presentation that both men made at this point was probably the most moving event of the weekend for me. They spoke of the transformative and uplifting qualities of music, the philosophies behind the creation of great art, and the importance of context, openness, and willingness to embrace trauma and insecurity for music-makers, and indeed makers of any art. It was very interesting at this point to consider the emotional histories that lie behind popular understandings of music and its makers, and the emotional climates in which music is born. A stirring example came from one of Beethoven’s sonatas, written after he became deaf, and was no doubt facing a period of enormous personal upheaval and difficulty: when the music begins to rise and re-emerge after a delicate, repetitive and troubled passage, he annotated the score, “little by little, returning to life”. There was an atmosphere of great stillness and attention in the church as the assembled group of musicians and music-lovers listened to Stephen Johnson sum up the magic of music: that it takes our worst feelings, and makes them beautiful.

Saturday’s first concert by the Nash Ensemble was followed by lunch, and then an Open Rehearsal for the evening’s performance. It was a privilege to be able to watch the rehearsal of such an esteemed group of musicians, all of whom were generous and thoughtful in answering questions from the audience. As was becoming a theme over the weekend, it felt as if there wasn’t enough time to address the multitude of questions from delegates, so only a few people were able to ask what they’d no doubt been pondering since Friday morning. I have a notebook full of questions – whittled down to three main ones, for brevity’s sake! – that I would have wished to ask the Ensemble had there been enough time. At strategic points in the afternoon, delegates drifted gradually out of the rehearsal to discuss the issues at hand with colleagues and new friends, take time to reflect, and travel back to Cumberland Lodge for dinner (before they would embark on another trip back to Windsor for the evening’s performance). At this point, I was very happy to have the time and opportunity to walk back to the Lodge along the grand driveway of Windsor Castle, through the Park, but wondered if it might have been a better use of time that afternoon had it been planned that delegates would stay longer at Cumberland Lodge, to have more time with the scientific team, and then would only have travelled to Windsor and back once. Either way, it was a brilliant afternoon, stirring and provoking.

During the evening’s concert, back at Windsor Parish Church, I chose to sit up in the gallery to hear how the music would sound from that perspective. I found it a great location to listen from as, being partially deaf, I could make the most of the music coming up to surround me from below, and feel immersed in sound, without losing the spatial dynamic of the music, as often happens when sitting on one side or the other of players. It was refreshing to have the freedom and flexibility of the venue to explore the best acoustic. The music itself, particularly Debussy’s dances for harp and strings and Schubert’s ‘Trout’ Quintet, was captivating, and it was testament to the power of the programme and the issues at hand – how music affects us emotionally – that, looking to my left, I could see a row of faces hanging eagerly over the edge of the gallery, transfixed, as the concert unfolded in the church around us. The day ended with another well-organised and straightforward bus journey back to Cumberland Lodge, a delicious late supper, and the chance to relax and talk with new-found friends and colleagues.

My overall impressions of the weekend were extremely good. The programme of science and speakers was impeccable (all of the speakers were fantastic; Professor Osborne, Dr. Grahn and Dr. Overy were particularly good at communicating complex information with a non-scientific audience); the music brilliant; the surroundings, food and care taken by our hosts at Cumberland Lodge outstanding; the choice of venue conducive to an invigorating yet also comfortable experience, and to discussing, reflecting on and processing the information disseminated in a sociable and enriching way; transport well-organised and hassle-free (and much appreciated by those of us without cars); the opportunity to interact with other delegates a privilege. It only added to the weekend to be told, on Sunday morning’s Lodge tour, that we were walking in the footsteps of Oliver Cromwell, Queen Victoria

and Wagner, in such an impressive seat of academic and philosophical debate as Cumberland Lodge.

The structure of the weekend was well-planned, and felt very calm and organised; a real pleasure, when often events of this kind can feel as if they are terribly hectic behind-the-scenes. The combination of concerts and lectures was well put together, though less linked in practical terms than I anticipated. I would have liked to have heard more about the Nash Ensemble musicians' emotional responses to music, and have seen more music incorporated in the presentations. I also felt that perhaps the overall programme was made up of too much music, if that's possible! It would have been excellent to spend longer on Sunday, for example, with Dr. Koelsch and colleagues, with more presentations of their work, and – perhaps most usefully – with an opportunity for discussion and questions, perhaps in the form of a panel Q&A with all of the assembled scientists. The weekend was so illuminating and enjoyable though, that really the only thing I would change would be to provide that opportunity for formal discussion, and for delegates to have a good period of time in which to pose questions.

I left on Sunday evening (after a long walk in the grounds and kind offers of afternoon tea from staff at the Lodge, even after it had officially closed) feeling uplifted, enlightened and invigorated, and full of information to process, leads to follow up on, and contacts to talk with; all of this is essential to my documentary research, and I very much look forward to putting into action the ideas and plans that were inspired by the Festival. I would absolutely come to another event, and would very much like to keep in touch with the Nash Ensemble and with the scientists who presented their work.

Very many thanks!

## 2. PIERCE HALE

### The Nash Ensemble and the Musical Brain Event: Day 3

Upon arrival at the beautiful Cumberland Lodge nestled in the heart of Great Windsor Park, back garden of the magnificent Windsor Castle, it would have been difficult not to feel dignified taking residence in this place – even if just for a weekend. Had the event not been so deserving of such a regal location, I might have felt awkward touring the grounds. However, there could not have been a more appropriate setting for the first Nash Ensemble and the Musical Brain Festival.

Soon after arriving, the welcome announcement was made, and the event was officially underway. A whirlwind of brilliant lectures, engaging conversations, exquisite cuisine and inspired performances by the renowned Nash Ensemble ensued. Two full days of this had left me in an ecstatic state of exhaustion on Saturday night. But the natural desire for rest had to be set aside because as soon as we had all settled in and the magnitude of the event seeped into the forefront my consciousness, the final day was upon us.

The third day began with the usual gourmet breakfast buffet. We were then treated to a historical tour around the Cumberland Lodge, just before making our way to the Mews for the final lecture of the series. Professor Robert Zatorre from the Department of Neuropsychology at McGill University took to the podium to discuss Music and the Brain: Hard Wired or Hard Work?

After giving a brief introduction to his field of research, he touched on its usefulness for understanding brain functioning in general as well as for other parts of the nervous system. Later, he played a clip of a 10,000 year old bone flute to show the extent of the relationship between humans and music. 'Studying music and the brain is a mutually revealing endeavour,' he stated before moving on to the body of his lecture. I felt this to be a poignant point that could serve well as the theme for the entire event. This research is not just about understanding the brain through music, but also about understanding what music is through the brain. Music is so present in our lives that we often take it for granted. Its existence is as mysterious as our own and events like this celebrate both.

Professor Zatorre's lecture was divided into three segments. The first segment explored how the brain is 'hard-wired' for music processing. Zatorre began with an overview of some of the main brain regions active when listening to music. He then described a number of studies, including lesion studies and single-cell tracking studies using monkeys, by which researchers have located specific areas that play important roles in pitch processing. The effects of musical training on brain structure and function were also discussed.

In the second segment of Zatorre's lecture, he discussed our ability to imagine music in our heads without having any 'real' physical stimulus present. He called attention to Beethoven's ability to compose years after becoming profoundly deaf. The same region that is active in imagining music (and in manipulating imagined music) is also active in mental rotation, maths, pointing, grasping, and coordinate transforming. Many of these tasks represent very basic survival abilities.

The final segment of the lecture dealt with the ever-so popular topic of music and emotion. Zatorre discussed music's position among the most pleasurable luxuries of life. He alluded to studies of "chills" effect that music can have. A connection with anticipation and experience was made. Music is continually building expectations, anticipation and then resolution. The limbic processes associated with listening to music offer a possible explanation for how this feature of music warrants its place among those luxuries.

A central theme to this lecture was that music is somehow able to access some of the deepest structures in the brain – those that play important roles in our survival as a species. Or, as Zatorre put it, “music reaches down to these most primitive areas of the brain.” I believe that it is the deep-rooted nature of this relationship between music and humans that drives composers to create, researchers to explore, and all of us to events like this one.

Following the lecture, Philippa Davies (flute) and Lucy Wakeford (harp) gave an intimate preview of Piazzolla’s *Café 1930* and *Concert d’aujourd’hui*. Closing remarks were made before we made our way out to the garden for lunch. We then proceeded on to the final performance by the Nash Ensemble. The programme included a slightly more daring assortment of pieces by 20th century composers: Turina, Debussy, Piazzolla and Ravel. Nash executed the pieces masterfully as they had done throughout the weekend. As an audience, we were able to experience the music on a deeper level with increased understanding of the physical effects it was having on our bodies and brains and how the composers use sophisticated strategies and creativity to ensure those precise effects. In that respect, the event was a success.

As a closing statement, I’d like to echo the sentiments that bounced around the brains of all in attendance throughout the weekend: “MORE!” This sentiment was occasionally manifested in the form of an eruption of questioning during the lectures. It was obvious that a chord had been struck with the attendees that teased their brains, cracking open insights that only lead to further inquiry. In this setting, knowledge became like heroin; the music became morphine. I realise that it is ridiculous to ask for more from an event that provided consistent stimulation for every waking hour. I gratefully request that the desire for more be satisfied through the implementation of this as an annual event. Its success is a guarantee.

### 3. CAROLINA NAESS

#### Music and Movement and Stillness

With my background in professional dance (classically trained) and current studies in Somatic Movement Therapy, I came explore the study of music, brain, movement as well as stillness. From all the music concerts I’ve attended over the years it always puzzled me to see, that it was only during classical music concerts that the audience was still! Was it cultural phenomena? Or was it something within classical music that brought forth this stillness? I was hoping the brain research and latest neuroscience relating to music would shed light on how we are moved, whether internally or externally.

Personally I had experienced over the years the difference between making movements to music and being moved by it. Trained in classical ballet and other strict dance forms, the focus had always been to be in control of the movements. I was not taught to allow myself to freely be moved by the music, or the emotional range it encompassed. It was almost as if moving came to be sort of distraction from being truly moved. Stillness was uncomfortable because there was nowhere to channel the emotion, or e-motion as energy in motion.

Considering the broad range within classical music, it appeared especially strange that its listeners showed the least range of movement? Was it a matter of cultural programming or training? Or was it something within that range that moved people into stillness?

While it seemed unnatural to not start moving with the dynamics in classical music. There was on the other hand within classical music, as lecturer Dr. Nigel Osborne said, a certain pattern of harmonicity. This pattern of harmonicity was a predictable sound pattern dating back to our original sound. So, perhaps this harmonicity resonated with the core harmonicity our own stillness? Interestingly enough, while musicians or non musicians to classical music may appear “still” there is clearly movement going on inside. As reflected in the range of emotion experienced and expressed in subtle ways through “chills” or tears, or other subtle body language and brain activity.

This is supported through findings in neuroscience, which shows that even when we are still listening to music, there is lots of activity in the areas of the brain relating to areas not only related to hearing and listening and processing of emotion. The movement area of the brain, the motor cortex can be as active as if we’re actually moving!

Take as an example the “mirror neuron” study, where the monkey who merely observed another object taking up a glass and drinking from it, had the areas of his brain activated as if he was doing the activity himself. This made me think of the survival instinct, which babies show by “mirroring” their mother’s movements and sounds as an adaptive mechanism, perhaps sign of empathy mirroring. As we know, we can only express what we have experienced. This brings to mind a study which Dr. Satorre shared with me about brain research and dance, where dancers were only expressing movements in their motor area when watching a dance that was programmed in their motor cortex.

Ballet dancers and Capoeira dancers were given a video to watch of each dance style, only the dance that corresponded with their learning activated the movement center of the brain, the motor cortex. Nothing happened if there was no motor trained familiarity to the music. This leads to the suggestion that whether we are moved by certain dance or music sound depends on our training, or cultural background.

While the Capoeira Ballet study could shed light on why the brain of non dancers, listening to classical music, is not being activated to move in the same way as a dancer would. It still puzzled me why non dancers still move though to all kinds of music except when they are at a classical concert. Then I began to think that we may be culturally programmed to be in control of ones emotion, or e-motion( energy in motion). The big of range of e-motion contained within classical music, may well seem overwhelming. So, are we afraid to open up to the energy in motion to move us out of control? Are we afraid to express ourselves freely? If so, it makes sense that we choose to listen to music where we can objectively experience the e-motion through the music in a safe place.

Do we find completion for our experience or expression though? It appears as if the broad range withing classical music contributes to that "harmonic" that brings us into completion, where we actually do experience a sense of stillness within. While that makes sense, it still doesn't seem natural to sit still during a classical concert and not express any of the movement that we experience for hours!

Dr. Grahn talked about how moving to music is instinctive, and showed how the motor cortex automatically respond to rhythm from an infant age with the example of the "bouncing babies". Babies and animals universally move automatically to music, even classical music! Or take for example what Dr. Grahn showed us an example of the bird who danced to Backstreet Boys! While our music preferences or the ways we prefer to listen and experience music may develop over the years. We all once moved naturally to sound, whether in response to our mother or an alarming sound that made us jump. It seems to be a survival instinct to move to sound.

Eventually, we may learn self regulate ourselves to allow ourselves to be eventually harmonized by classical music, to become still within and without. On the other hand, is the phenomena, where classical music can bring out automatic movement in an other wise "frozen body",as in the case of people with Parkinson's disease. As Dr. Gran showed us , people who suffer from "frozen" movement due to Parkinson's can experience a freeing of their movement and walk without any problem by simply listening to classical music! Of course it is not all that simple, as there are amazing mechanisms at work that makes us perceive sound, in the brain and in our body.

Dr. Osborne showed us in the lecture on "Hearing and Listening" how the ear is designed to hear with our internal drum, but how we react to a drum vibration, whether from an external drum or our internal drum, is related to not only the way our brain is structured to process sound. It is our personal experience past experience with the sound that appears to determine whether we will find it in alignment with our inner harmonic, or if we will not find resonance ( as in an alarming sound perceived as threat). The same sound can make us jump, or freeze, or start making movements naturally as intended. While we may have learned to not move to certain music, we often move out of it as a distraction from feeling how we are moved by it. This way self-regulation may serve us to get into a state where we can focus on the movement within music and within ourselves. But it still feels unnatural, to not move to the sounds that take over our entire body and mind but to be in a constant state of control. What is really interesting though, is that there is always movement going on, no matter how still or composed we may come across. When we listen to musical sound, there is dynamic activity the areas of the brain relating to processing of sound, movement and emotion, whether we are actually experience any movement, or not.

The latter was my personal experience during the Nashville chamber concerts, where I practiced sitting still for hours while listening to classical music in a way I've never done before. It felt very hard and frustrating to control all the energy in motion. After lots of selfregulation and discipline, eventually I became to experience and relate classical music to a safe place to experience an emotional range, that indeed seemed to bring forth a sense of harmonic at the end. A sense of stillness within and without. Perhaps it was just because I was still, that I was able to truly access the range of e-motion, that a movement otherwise would had distracted me to truly feel, or embody the movement. I had to be willing to learn to unlearn my cultural and personal programming to "make a move", or move out of unfamiliar emotional range, discomfort and fear. On that note, this seminar weekend on the music and the brain and movement reminded me of how we are moved by music in different ways, and how much of it depends on our past learning and experience. As Dr. Satorre told me when I asked about the ratio for music preference, I was told that what is hard wired is "10%", and the rest is cultural programming. The knowledge from this seminar reinforced my inspiration to work with children, as music in our upbringing can have a profound impact on how we process and integrate music, movement and life. Most importantly, I got an important insight why music is a natural form of therapy, as Dr. Osborne mentioned: Music will never force itself upon us.

While we have our music preferences, we can take risks and explore new music in a safe way. Naturally, we move toward what is familiar.This way we tend to move away from what is unfamiliar or uncomfortable, or what we don't trust. It is much easier to move out of a situation than sitting still, as moving is a great distraction or way to move out of what we don't want to feel moving inside.

If we experience discomfort from our experience of classical music, it may well be that we do not know how to contain the range of e-motion within. It takes a huge amount of selfregulation and discipline to sit still and inhibit the impulse to move and open up to be truly moved. It takes trust, as only when we give it permission to allow it to take us on a journey to the unfamiliar, we can eventually find a resonance to our deeper, listening still self. Music can have deep powerful harmonizing stillness effect, and move us in ways we never thought possible. This way music brings out courage to move beyond our comfort zone, in a safe explorative mode where we decide how far we want to be moved. There are no limits within music to explore ourselves and our

world. In music we find a mirror of all that we are and can be. Music brings hope.

As an end note, I'd like to express my gratitude for the student bursary as it brought me hope and enthusiasm for the work I'd like to develop with children. Work that brings hope as music and movement will always be there, as a safe world of possibility, moving us in undreamed of ways.

#### 4. LOU JOHNSON

A plane journey, a bus and a taxi ride and I arrive in the Windsor Great Park to attend with eager anticipation The Nash Ensemble and Musical Brain Residence Programme. It's my first time in this area east of Greater London and I am to discover it's very splendid green rolling countryside. Fifteen thousand acres no less! At one end stands the Castle and a straight 3 miles along 'The Long Walk', a pathway lined with trees, is Cumberland Lodge, where the delegates are to be finely hosted. The Lodge was formerly a Royal residence, of which now the Queen is patron. Physically, it's a delight to be plunged into this new landscape of green pastures, trees, ponds, plenty of fresh air and summer sunlight. From an auditory perspective, the park combines quiet countryside, with overtones of 'city' and 'nation'. Overhead I hear loud sky murmurings of Heathrow air traffic.

I am attending the Residence because of my love of music, and my therapeutic practice with children. Although formally trained as an art therapist, returning to my violin ten years ago, I have been developing a passionate interest in music and its therapeutic potency. Attending this event I hope I will begin to understand in more depth and detail how music affects the human brain and consider ways that I might incorporate this knowledge into my therapeutic practice.

#### Professor Nigel Osborne begins the Music and The Brain Residence Programme.

With bubbling enthusiasm and outstanding eloquence he sets the scene, and describes a 'new' threshold bringing music and neuroscience into close dialogue. This is and old' and 'new' science. Effortlessly breaking into song, he introduces us to a Georgian chant and then explains that this is what women traditionally sing in small groups to heal a person suffering from scarlet fever. It can de-inhibit the immune system. He highlights this as an example of community practice valuing the intrinsic healing properties of music.

Professor Nigel Osborne tracks the last centuries and prominent learned figures who have strongly held connections and communications between music and the human brain. In the seventeenth century he referred to Robert Flood, a physician, musician and alchemist who identified music and its affect on the human pulse. This influenced Harvey who would then explain the observable. Nigel continues, this was later to be rejected by the Royal College of Physicians as the connection between music and the brain became lost with rationalism and empiricism and where epistemologies excluded what was not observable. However with the development of neuroscience and brain scanning devices new research is illuminating once again links between music and the brain and there is a recrossing of this threshold and evidence to confirm Flood's ideas.

Professor Nigel Osborne, states his position as a musician and practitioner and his interest in applied knowledge and its practical impact in relation to trauma and short and long term physical changes. He adds, his life experience and work with trauma and communities confirm him as a musician. He further clarifies; this debate is an offering of perceptions and by no means about meddling with human responses that are fully natural.

Having set the scene Professor Nigel Osborne narrates his 'Power Story'. This is an imaginative, rhythmic, narrative, rich in detail, physical descriptions and flow that transport the auditorium to Rio Janeiro. His story is evocative and transporting. The words are musical. I am struck by the magic delivery of his prose and further struck by the miraculous nature of the body and its natural responses to sound. Hearing such a live account of the intricacies of the physiological processes that are occurring in the human body when sound, its symphonic amplitude and its vigour, affect us, moves me. The 'power story' is powerful. I am transported in many ways. It takes me to a visit I once made to the Amazon where I was silenced by the birdsong around me...in awe, surprise and wonderment. I am struck by how words, imbued with life enliven and strike chords and chord progressions in my own being. I am struck by the miracle of the auditory system and its vibration and resonance with life around it. At the same time I am conscious that miraculous as it is, I can take my hearing for granted.

#### Research in neuroscience on human responses to rhythm

Dr Jessica Grahn, specialist in MRC cognition at Cambridge introduces her research in neuroscience on human responses to rhythm. Starting however from a wider context, she begins with a video footage of a Cockatoo, and demonstrates the bird's natural movements with and without music. The difference is dramatic. Playing Back Street Boys music, the Cockatoo is dancing and its majestic crest and neck clearly move in time to the beat!

The power of a beat now demonstrated, Dr Jessica Grahn presents research on human responses. This includes: rhythm in newborns and infants, individual differences in human rhythmic abilities and medical uses of rhythm for movement disorders. Is a human's response to rhythm simply innate and hardwired for this function? Dr Jessica Grahn proves in her 'experiments' with 1-2 year old babies, that the auditory environment affects its responses and shows that when a rhythm is disrupted, a brain

response can be identified. She continues further that babies are in fact developing hearing in the womb.

Dr Jessica Grahn, in her research, investigates newborns bounced to two different beats, a baby who is bounced to two beats and a baby bounced to 3 beats. Her experiments show that the babies develop musical preferences. Could this be related to the babies' changing visual environment as they are bounced? Jessica conducts a control study and the subjects are bounced blind-folded. The results are consistent. The babies are responding to an auditory environment not a visual one.

Investigating differences between infants and adults in their responses to music and its impact on their movement, Dr Jessica Grahn discovers that adults, compared with infants, are less able to pick up other culture's rhythms due to the development of musical preferences. She also detects individual differences across the spectrum in adult responses and that there is increased brain activity in a musician compared to a non-musician. Magnetic resonance scanning shows different patterns in brain processing. In the sample of adult brain responses increased activation in the motor area and greater communication occurring in the auditory cortex is seen in the musician responses. What accounts for the participants' wide difference in results? The capacity 'to feel the beat', memory ability and ability to reproduce rhythm are variables investigated. With specific measuring tools Dr Jessica Grahn can detect different brain processes. A Beat Alignment Test can measure ability to 'feel the beat' and a 'Digit Span' can record memory ability. She discovers 'feeling the beat' and working memory are unconnected.

What therapeutic applications are presented? Dr Jessica Grahn researches Parkinson's disease and discovers a U-tube Video of a man with Parkinson's crossing a room with and without music. In the absence of music we see the man is having difficulty initiating movement and shows evidence of momentary freezing and hesitation in his progression from one corner of the room to the other. When music is played he achieves this task with greater speed, fluency and direction. Does this suggest a steady beat can help people suffering from Parkinson's and other degenerative brain disorders? Dr Jessica Grahn highlights that there are scientific tests that say 'yes'. Practice walking to music, improved speed, balance, stability, stride length and stride symmetry. One research, for example showed a sample of patients who attended a ten-week Tango class, improved their balance and reduced their likelihood of falls.

Dr Jessica Grahn concludes her research. Recapping, she reminds us of the following points: we all respond to music when we are very small, the music that we hear shapes our future rhythm, listening engages the motor areas of our brains, humans differ widely in their rhythmic ability and music has the power to improve movement.

### **A Tour of the Cello solos in Le Coeur Sonore, Beethoven**

Professor Nigel Osborne introduces us to live musical experience in the drawing room of Cumberland Lodge. As we listen to musical extracts from Beethoven played by Ian Brown and Paul Watkins, pianist and cellist in The Nash Ensemble, he draws our attention to how chords are built up in this music, the intervals between notes, the harmonics in the music and tone production. He demonstrates 'foreign' sounding notes that can be added to chords and elicits how taking a note that doesn't belong to a chord and including it, creates new resonances, ones that are like right 'wrong' notes. He adds that these chord developments can also be heard in music by Mahler.

### **Open Rehearsal of The Nash Ensemble in Windsor Parish Church**

We are now an audience witnessing The Nash Ensemble rehearsing excerpts of music by Ravel in preparation for the evening's concert. "Straight to the natural material" begins Professor Nigel Osborne, and begins offering us illuminating examples of harmonic series, intervals, modalities and chromatic tones. Here, he reminds us that we can combine harmonics and that two different structures can be going on at the same time, and humans have an ability to hear and understand more than one stream of consciousness at any one time. In Ravel, there is a wholehearted acceptance of harmonics and a transparency of streams. In this music we forget the 'Classical' dynamic of tonality. It's born out of spontaneous pitch discovery and chromatic intervals, and represents a new departure in musical culture.

Professor Nigel Osborne brings focus to the human body, and the implicit and visible connection between music and musician, body movement and gesture. This takes us into dance and deep music body resonance. He draws our attention to how movements communicate musicians' intentions and how musicians' gestures change in the course of the music and how musicians' movements affect an audience.

Now, I am watching and listening to The Nash Ensemble practicing, immediately struck by the extremely high quality and skill of their playing and their warm friendly manner yet 'to the point' communications and interactions with each other. Unfortunately when the musicians stop playing I cannot make out what they are saying to each other. I am sat in the middle of the church and they are speaking quietly, so this isn't surprising. However, I am confronted by this indecipherable dimension of communication, and this, I contemplate. Casting my eyes and lending my ears for a moment, to the physical space of the church I consider the concept of auditory zones and varying levels of sound projection. Maybe it is the musicians' intentions that we do not hear all of what they have to say? Maybe they are tentative to begin with because they are taking the time to feel what kind of audience and listeners we are? Then in a brief practice pause, I find myself compelled to leave my seat, walk to the stage and ask them quietly if they would mind my taking some photographs of them playing? I love photography and capturing in compositional terms poignant moments...I receive accommodating but mixed responses. A few individuals draw the line 'only if it's without a

flash'. As it turns out, I am not able to take photos because I discover there's no battery in my camera. Clearly not meant to be!

The dialogue about witnessing and recording performance interests me however. Between performers and audience I am reminded of delicate line. Camera flashes may be experienced as intrusive and distracting. Inaudible 'stage' conversations may be frustrating. I am conscious of the intimacy of playing and performing and in witnessing this Open Rehearsal I am also sensitised to the human dimension of the players.

The Nash Ensemble musicians begin to invite us into their space, by some individuals raising the volume, projecting out and articulating details of some of their discussions. Some of the members of the Nash Ensemble volunteer insights into what they have been talking about and share with us personal aspects of playing. This includes, an example of an in-house joke concerning the double bassist blowing his nose when the pianist is majoring, and how communication amongst themselves in rehearsals can be conducted in half-finished sentences because they know each other well. Technical and artistic aspects of rehearsals are also illuminated and demonstrated. This included matters such as deciding on a seating arrangement, checking sound balance, becoming familiar with the acoustics and the space. The audience are also reminded that the Nash Ensemble are used to playing in all sorts of combinations of which make them highly flexible. They are also involved in playing lots of different repertoire. As well as Classical and Romantic works, they play much contemporary music and a large number of commissions have been written for The Nash Ensemble. As Marianne Thorsen, 1st violin player comments 'We never get bored...and we all chip in...and its democratic'. Watching and listening to the players I can see and hear their togetherness, their musical cohesion, their joy in playing and communicating. Their music transports me. Their physical movements and gestures enlighten me. For example, seeing the exquisite and majestic bow and arm movements and body gestures that punctuate the end of a fast passage, like a dancer would draw on full breaks when landing from pirouettes. I feel deeply honoured to be witnessing such an interesting and a high class Ensemble of musicians. I know that this day will leave an unforgettable experience imprinted upon me.

### **Journeying, dining and exchanging**

As well as the extremely fine musical performance given that night by The Nash Ensemble I was struck by the careful thought, effort, organisation and sensitivity put into this Residence Programme. I loved meeting the delegates and sharing journeys to and from Cumberland Lodge to the concerts in Windsor Parish Church and the opportunities for exchange with different delegates. I also found the music notes in the Concert programme beautifully written and very comprehensive. Windsor Great Park was a splendid setting and Cumberland Lodge provided delicious and memorable meals and comfortable accommodation. My deepest thanks to everyone who made this wonderful event possible, The Institute for Music in Human and Social Development, The Nash Ensemble and The Friends of The Nash Ensemble, Cumberland Lodge staff, the delegates at the Residence Programme, The Sponsors and anyone who I have not mentioned who was involved in making it happen.

Thank You