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Recovering disembodied spirits: teaching movement to musicians

Kathryn Woodard

Department of Performance Studies, Texas A&M University, College Station, TX 77843-4240, USA

woodard@tamu.edu

Understanding physical movement is an integral part of learning to make music. This article presents the action research that the author has pursued while teaching movement to musicians. The narrative provides a theoretical underpinning for the teaching practices discussed. It provides examples of musicians' movement with analyses of the anatomical structures involved, and it discusses the influences of bodily perception on observing and learning movement (e.g. the body map). The implications of the study are to provide a somatic foundation for music education and thereby to enhance the understanding of music as embodied experience.

Movement and music

The discussion of movement in teaching music is certainly not a new development given the numerous pedagogical texts that stress the acquisition of physical skill in singing and playing instruments (e.g. Uzsler *et al.*, 2000). What has been widely neglected in this sort of training is a full consideration of research into the perception and cognition of movement and how teaching movement with this knowledge can enhance a student's sense of embodiment. I draw on sources from a wide range of disciplines to provide a theoretical framework for my action research, and I explain the practical application of the source material to teaching movement.

My career as a pianist has been strongly influenced by exposure to the Alexander Technique and a newer field called 'body mapping' that grew out of the work of one prominent Alexander Technique teacher in the USA, Barbara Conable (2002). I credit the work I learned with Conable and other teachers within these disciplines with nothing less than saving my performance career at a time when I was plagued with tension and tension-induced injuries. The process of overcoming these injuries through relearning movements at the piano led me to train as a teacher of body mapping, to research aspects of cognitive neuroscience that support such fields of 'body work', and to explore the implications of musicians' limitations and injuries within the broader social milieu of music making.

Action research

My path then to engaging in action research – defined generally as practitioners researching their own practice with the aim of improving it (Elliott, 1991) – has followed a somewhat

predictable trajectory: from pursuing individual study and professional development to formulating a specific research focus that identifies and implements changes needed in approaches to music education (e.g. McNiff *et al.*, 2003).[1] When I learned the teaching methods described here, the instructors did not frame them explicitly as part of an action research agenda. However, many facets of body mapping work overlap with the tenets of action research, and I have adopted this model as a way to establish a sound research practice. The data for my investigations here have come primarily from private studio teaching over the last 4 years but also from classroom settings and workshops. Documentation includes both written accounts from the participants in those settings and my notes in which I recorded interactions with participants and reflected on teaching and learning outcomes.

Below I provide a selection from Somekh's 'methodological principles of action research' (statements a–e), which are most pertinent to my research (Somekh, 2006, p. 6–8). I then provide a summary statement describing the adherence of my research to these principles:

(a) Action research integrates research and action in a series of flexible cycles.

In all the contexts where I investigate body mapping there is always a shift between emphasising the action of teaching or performing and reflecting on and drawing conclusions from what was taught or performed. Often the participants in my research are at different points in the cycle, however, the flexible, and even 'messy', nature of our work together allows us to refresh each other's work continually.

(b) Action research is conducted by a collaborative partnership of participants and researchers.

My students are the most constant collaborative partners in the research as we investigate movement practice in private lessons, larger classes and through performance. They are called upon to record data from lessons and classes in the form of journals and to offer analysis in written assignments. Fellow musicians often offer perspectives on their own training and practice, and I record these comments just as any ethnographer would in the field. I rely on interactions with colleagues in outside fields as well as fellow body mapping instructors for feedback on my research.

(c) Action research involves a high level of reflexivity and sensitivity to the role of the self.

The practice of body mapping, which participants engaged in for this research, calls for a high level of self-perception. The main research question addressed in this article is 'How can body mapping be used to recover an enhanced experience of the self?'

(d) Action research involves exploratory engagement with a wide range of existing knowledge.

I draw on a wide variety of disciplines to inform my research and establish theoretical frameworks. These include but are not restricted to: cognitive neuroscience, ethnomusicology, music pedagogy, somatics and cultural theory.

(e) Action research engenders powerful learning for participants.

Similar to my own experiences with body mapping, participants have reported significant learning outcomes from their engagement with this research. Examples include realising performing skills ('I never thought I'd be able to play that piece.') and establishing broader roles for the research, for example, in cultural advocacy and arts presenting.

While I continue to use body mapping to further my performing skills (just as one continues to practice), the main objective in reflecting on my work as a performer is to enhance my teaching and share my discoveries with students and other teachers. This creates a unique cycle not only between teaching and research but also including performance as a mode of inquiry (Bial, 2004; Madison & Hamera, 2005). This further enhances the notion of 'flexible cycles' above and emphasises the importance of action research's cyclical nature (Cain, 2008). However, a distinct challenge in relying on self-observation and participant-observers is bridging the divide between the quantitative and qualitative methodologies of varying disciplines. Specifically, I seek to support my ethnographic documentation with evidence culled from quantitative research in the sciences. However, quantitative research often neglects to credit subjective experiences from participants in studies, and those perspectives are integral to ethnography as part of action research (Bresler, 1995/2006). Bowman's rationale is particularly useful here: '[w]e need theories that grant both the necessity and the trustworthiness of corporeal experience, of bodily-constituted knowledge' (Bowman, 2004, p. 34). This statement summarises a key feature of body mapping and leads perfectly into one of the first interventions I use with students to encourage them to reclaim their own experience as musicians.

Disembodied spirits

No matter what the context, an important early step in teaching movement is to pose the following question to students: 'What are you aware of when you play?' Answers from students most often relate to qualities of the music (tone colours, scales or harmonies) or negative aspects of the performance (wrong notes or memory slips). However, without bodily awareness there is no hope of intervening in the student's movement practice. When I inquire further in order to bring the student's awareness to movement, or any bodily sensation, I sometimes meet with some befuddled responses. 'You mean I'm supposed to pay attention to that?' or 'How can I pay attention to that and play at the same time?' Just as often some students will recognise the limits of their awareness and will then ask to play again in order to revisit the question. In the process of this exchange I then pose a question to myself: 'What do I need to bring into the student's awareness in order to enhance his or her playing (or singing)?'

A useful tool in heightening students' bodily awareness is the illustration shown in Fig. 1, taken from Conable (2002). It portrays magnificently the plight of so many musicians who do not conceive of themselves as movers, like dancers or athletes, but rather as inhabitants of mostly a spiritual or intellectual realm, where the mind or soul, defined as separate from the body, is responsible for creative activity.[2] However, the caption ('Disembodied spirits can't play pianos!') makes it clear that when it comes to making music, a performer can only conceive of mind or soul or spirit as separate from the body at his or her own peril. Conable's work grew out of years of being confronted with musicians' injuries, and she attributes this first and foremost to a lack of awareness of the body and movement. She conveys the need to address this issue first and foremost with students through her own incisive questions with students and trainees. In her caption she doesn't challenge the concept that spirits make music, but instead makes the point that spirits within bodies – embodied spirits – make music by moving.

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Fig. 1 From *What Every Musician Needs to Know About the Body.* By Barbara Conable. Reprinted with permission from Andover Press and GIA Publications

The rationale for considering a student's attitude toward embodiment at the outset is that it informs everything relating to their experience of themselves, including while making music. Students from early ages are influenced by the concepts of 'mind' and 'body' as separate entities. When teachers and students are made aware of how such dualisms influence Western thought and education, there is an opportunity to bridge the gap between mind and body and create an integrated understanding, and an integrated experience, of the self (e.g. O'Donovan-Anderson, 1996; Juntunen & Westerlund, 2001; Bresler, 2004). The process of 'recovering a disembodied spirit', as I have termed it, is multi-faceted. Without first establishing what the student is aware of when he or she plays, it is difficult to proceed to next steps in training movement.

The step following the first question above ('What are you aware of when you play?') is to explain the role of the senses in any kind of awareness. In the case of making music, identifying the sense of movement is particularly crucial. What follows is a discussion of recent research on sensory perception and movement cognition, which provide a theoretical underpinning for my research.

The sense(s) of movement

Because of the divisive mind/body model prevalent in Western thought, movement is not understood or taught as a mode of perception, but rather the resulting action from other sources of perception (e.g. Damasio, 1994; Overton *et al.*, 2008). In essence the five named senses – hearing, sight, taste, touch and smell – are pitted against motor action or movement. However, movement does involve sensation, from sensory receptors in the joints and muscles in conjunction with other sensory systems (Zion, 1996). Although the separation between sensory and motor is still found within discourses of psychology and neuroscience, there are current trends that credit the interrelatedness of sensory modalities, including movement, and the links between perception and action.

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Berthoz (2000) has explored the sensory aspects of movement and challenges the standard paradigm of five senses. However, he resists establishing a new number, stating noncommittally 'eight or nine'. He goes on to explain that there is no need in listing them since 'the brain does not process sensory cues independently' but rather groups receptors together depending on the task or action (p. 5). Berthoz does use the name for sense of movement, 'kinesthesia', which was coined about 100 years ago by joining the Greek roots for movement and sense.[3] But in keeping with his new paradigm, he defines it broadly as 'the result of cooperation among several sensors', including receptors in the muscles and joints, tactile receptors in the skin, vestibular receptors in the inner ear for balance, and subcortical visual receptors. In addition, this grouping of receptors 'requires the brain to coherently reconstruct movement in the body and in the environment' (p. 5).

The establishment of a specific sensory hierarchy and the exclusion of the movement sense from awareness are certainly not universal. From the field of anthropology Geurts (2002) shows how the Anlo-Ewe culturally value 'balance as a bodily mode' which should be learned and developed at an early age. She explores how this emphasis informs all aspects of the culture since balancing is considered 'in physical and psychological senses as well as in literal and metaphorical ways' (p. 4). Greene (2002) discusses how cultural differences in body perception and experience point to an understanding of the body itself as a cultural construct:

> [C]ulture shapes how bodies sense the world around them, heightening the body's awareness of some phenomena while making others virtually imperceptible. The body that senses, knows, and remembers is also in many ways culturally constructed, shaped through the disciplines of culture practices and understood through cultural beliefs. (p. 95)

Greene's conclusions support the specific notion that I am proposing, namely that movement and bodily sensation have become near 'imperceptible' phenomena among many musicians based on cultural practices of performance and training, resulting in 'disembodied spirits'. Raising musicians' awareness of bodily sensation and movement then comes from an understanding that they have the capability to sense movement.

Responses to learning of this 'new' sense have included, 'Why aren't we taught this much sooner?' to 'Isn't that just stating the obvious?' to 'But I thought I wasn't supposed to pay attention to myself when I play'. For those who are more resistant to embracing their sense of movement as in the latter comment, further explorations of movement – further 'actions' – are required to recover students' movement perception. Often these actions involve having students observe one another, not only for the sake of visually perceiving another, but also to recognise the phenomenon of identifying with another through movement. For example, a student might comment, 'I recognised the difficulty in that passage because I have played it' or 'You were rushing in that passage and I know I do that too'. These are moments to intervene and inquire what kinds of movement the student is identifying with and how the experience relates to perceiving movement in oneself. The following section describes recent research into the links between perception and action, providing a further theoretical basis for aspects of movement training.

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Active perception

Following his integrated description of the senses, Berthoz (2000) provides a rationale for linking sensory and motor modalities in cognition: '[T]he dissociation between perception and action must be discarded. *Perception is simulated action*' (p. 10).[4] An important step in establishing the neuroscientific basis for this link was the discovery of 'mirror neurons'. In the early 1990s Rizzolatti along with other neuroscientists observed neurons in a particular area of the brain in monkeys that discharged both when the animals moved in a particular way and also when they observed the same movement. Additional studies showed that the discharged neurons were linked to specific movements such as grasping, holding and tearing either with the hands or mouth and that the movements were context-specific, for example, the observed hand needed to grasp a similar item not just reproduce the movement. Soon after the initial discovery of mirror neurons, Rizzolatti and Arbib recognised the role of mirror neurons as an 'observation/execution matching system [which] provides a necessary bridge from 'doing' to 'communicating'' with particular emphasis on the acquisition of language (Rizzolati & Arbib, 1998, p. 188). However, Ramachandran (2000) pointed out that 'the significance of their findings for understanding other ... aspects of human evolution has been largely overlooked', and established connections between the acquisition of language and other facets of expressive culture. In a later study of mirror neurons Kohler *et al*. (2002) dubbed a particular class of mirror neurons as 'audio-visual' which were driven by the *sound* of an action, such as noisy eating, not only by visual observation of the same action (Iacoboni, 2005; Gallese, 2006).

The functions of mirror neurons then demonstrate the links between perception and action, namely, that the mere observance of movement stimulates the brain to activate patterns and schema close if not identical to producing the movement itself. What is implied, however, is that the movement is known at the same level in the observer as in the mover. In early studies Gallese and Goldman (1998) explain that mirror neurons are not a tool for imitative learning, defined specifically as learning a new movement through observation alone without ever having experienced it before, but rather, mirror neurons activate when a movement is identifiable in the observer's brain. Subsequent studies (Rizzolatti *et al*., 2001; Rizzolatti & Craighero, 2004; Iacoboni, 2005) have established mirror neurons as the neurological framework for imitative behaviour, but the need to identify the movement in oneself before imitating it remains.

Imitation and observation have always played integral roles in learning and teaching music. These new perspectives from neuroscience shed light on the process of observing and imitating and serve as a theoretical underpinning for the practice of body mapping as discussed below.

Mapping the body

William Conable, cellist and Alexander Technique teacher at The Ohio State University, came to recognise that patterns of students' movement were consistent with their perceptions of the body and how they conceived of its structures and functions. He called this phenomenon the 'body map', which has correlates in neuroscientific research as

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'internal representation' and 'body representation' (Clarke & Davidson, 1998, p. 75). As Conable (1991) states:

> We all seem to have in our minds maps of our bodies and their workings. They include the attributes of size, structure and function. These maps are what we use to interpret our kinesthetic and visceral sensations; at least to some extent, we also guide our movement by them. This is not the same thing as the well-known neurological correspondence of various parts of the brain to various parts of the body. That is simply physiological; the map being discussed here is something constructed in consciousness.
>
> The function of creating these maps may be in some way innate, but their contents are not. It is easy to understand that this must be so. Our bodies change in size and shape so radically and so continually throughout the course of our lives that if our maps of them could not change, the maps would almost always be erroneous.
>
> Because the maps must be able to be changed, they must be learned. They are created from the experience of movement, of touching and being touched, and maybe from other things as well. They are our memories of our interpretations of our experience. But because these interpretations may not be accurate, the maps based on them may also not be accurate (p. 2).

By 'accurate', Conable is referring to whether the map coincides with the body's structure and/or function as defined by anatomy and physiology. The need to establish standards for measuring and judging maps as 'accurate' or 'inaccurate' is described below in relation to the practice of teaching. Apart from that final statement in the excerpt, Conable's initial understanding of the body map is remarkably similar to Greene's interpretation of bodily perception and experience stated earlier as a perspective from cultural theory.

Barbara Conable has taken the proposed theory of the body map and developed what she has dubbed the practice of 'body mapping'. She recognised the need to train movement among musicians just as hearing is trained, and she developed a course that addresses the subject areas of attention, the kinesthetic sense, places of balance, movements of breathing and of the limbs. She defines body mapping as 'the conscious correction and refining of one's body map to produce efficient, graceful, and coordinated movement' (Conable, 2002, p. 5). Implicit in the work is the need to judge quality of movement based on the subjective experience of the mover and on input from observers. The role of the observer is important because the performer's perceptions can be restricted, unreliable and faulty precisely because movement and balance perception have not been trained or have been negatively influenced. This has an obvious correlation in the teacher's role in correcting a student's intonation by drawing her attention to out of tune notes and telling her whether they are sharp or flat if the student is not able to perceive this according to the tuning system she is working in.

I should add that Conable's assessment of movement does not imply a prescriptive stance for a 'correct' way to be in the world. She relates her observations specifically to playing or singing, as a way to achieve musical expressiveness and technical mastery for any given style. The following is the sort of typical admonition I've heard Conable give to students: 'You can sit like a lump all day long if you like, but when you go to play the violin, you'd better be balanced and free, especially if you want to keep playing for

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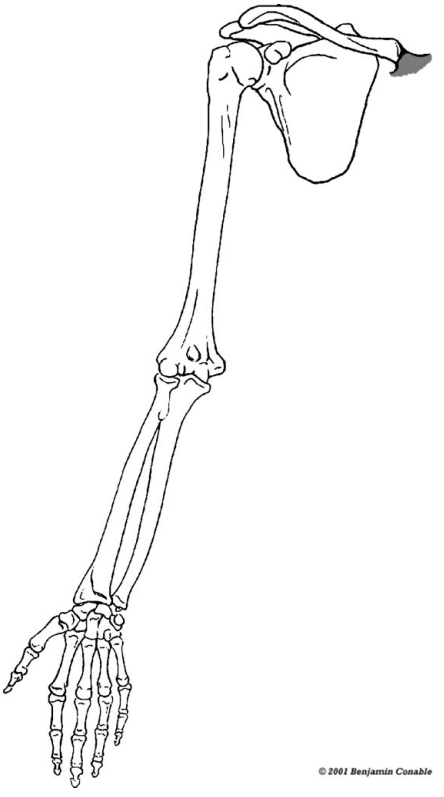

Fig. 2 The arm structure. Illustration by Benjamin Conable. Reprinted with permission

the next 30 years.' Learning what 'balanced' and 'free' mean while playing is achieved through correcting one's body map and through ongoing awareness of one's movement while playing. The importance of 'ongoing' has become clear to me through tracking and recording students' progress with various mapping tasks. The following mapping exercise will demonstrate the nature of my action research and the importance of the body map in movement education.

Mapping the arm

The reader can experience the practical application of body mapping through a short mapping lesson. I'll follow the standard order for accessing and correcting one's body map and ask you to identify a particular joint. The first arm joint will provide us with several mapping issues to discuss and so I'll ask you first, as I do with my students, to point to your first arm joint. If there's confusion about which direction I'm starting from, I'll clarify with the instruction: point to where the arm meets the rest of the body. After you've found it, look at the illustration in Figure 2. When going through this process with students, I'll

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often notice them pointing somewhere in the shoulder region, and so I ask them to look at the arm structure in its entirety and notice that it includes the collarbone and shoulder blade. In fact, the only place where the arm connects to the rest of the body *skeletally*, is where the collarbone starts. It connects to the sternum at that place, and the joint is called the sternoclavicular joint. One can locate and palpate this joint as part of the process of remapping it.

The second stage in the mapping process is to experience movement at the joint, and so we put our first arm joints through a full range of motion, which involves movement in all directions from a resting point and allows for a fluid rotation at the joint as well. I'll point out that one movement at this joint is often described as 'shrugging shoulders', but students and readers should notice that the movement actually initiates from the sternoclavicular joint. The next step in the process is to experiment with different maps of the joint – the old map and the new one. 'What does it feel like to move with the old map and how does the new map compare?' is a useful question in a mapping session as it allows the student to ascertain different qualities of movement based on the different maps, and because it makes one aware that the map can be consciously changed by bringing it into awareness.

Finally, a discussion of why joints are mis-mapped is useful. The first arm joint in particular is so often mis-mapped that students often need additional information before completely making the cognitive shift necessary for adding an entire joint to their arms. Language and visual models are cultural influences that contribute to mapping errors (Conable, 2004). For example, we don't have a simple English word for this joint like 'shoulder', 'elbow' or 'wrist', which could reflect a long-standing lack of awareness of this joint as relating to arm movement. Also, models that we come into contact with at an early age can inform our perceptions of our bodies. I'm thinking specifically of the 'Barbie doll' model (or 'action figure' generally), which has the telltale single arm *joint*, closer in range to the second arm joint, where the humerus meets the scapula. Not only is this a visual model, showing where the arm attaches to the rest of the figure's body, but it is also experienced on tactile and kinesthetic levels by manipulating and moving the arm in relation to the rest of the figure's body.

In a lengthier session, mapping the first arm joint would lead to mapping the rest of the arm, which would lead in turn to another aspect of body mapping: the need to map structures as integrated. Understanding how joints of the arm move together is key to free, fluid movement. Also, free and fluid arm movements are not reliable without an integrated understanding of balance and stature and the movements of breathing. These concepts and practices are supported by recent research. Capaday (2004) describes how recent studies 'strongly support the notion that the motor cortex controls the muscle activities subserving movements in an integrated manner' (p. 207). He gives the example of studies that show that 'motor cortical zones controlling various forelimb segments and those controlling antagonistic muscles are strongly interconnected' (p. 208). In his study, evidence for coordinated multi-joint movements is demonstrated by a neuroanatomical chaser, which when 'injected at a point in the motor cortex identified … to activate intrinsic thumb muscles, retrogradely stained neurons are found in wrist, elbow, and shoulder regions'. Later in the review of several such studies, Capaday concludes that 'the integrated nature of motor cortical control strongly suggests that neuro-rehabilitation programs should be aimed at reinforcing complete tasks, such as reaching to grasp or standing up from sitting'

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(p. 218). These tasks will be familiar to anyone who has studied the Alexander Technique or other somatic disciplines, and this integrated approach is central to the work of body mapping (Alexander & Barlow, 2001).

The multifaceted and experiential approach to body mapping is important in making the initial impact on students and convincing them that the new anatomical information is crucial to enhancing their performance. These lessons are the 'action' of my action research, serving as interventions to begin processes of change. What my studies show as I track and record student responses is that ongoing reminders and additional experiences of remapped structures and movement are needed in order for a new map to take hold. Even though the work is often framed as 'returning to one's innate structure', the nature of movement and postural habits is that they can take on the feeling of 'normal' and 'natural'. Many students have responded to new mapping instructions with the observation, 'But this is just how my arm moves (or has always moved). I don't think I can change it'. Others want to take on the new map they are now aware of but lack the ongoing body awareness to effect change in themselves. Teaching responses then will vary based on each student's feedback to the mapping experience, but strategies include: emphasising the benefits of the new map (in the former case) by demonstrating increased range of motion, and encouraging the student to tap into his or her body awareness as often as possible throughout the day (in the latter case) not only while sitting at the piano.

Observing arm movement

In order to enhance the mapping of the first arm joint, I often show an excerpt of an audio-visual recording, featuring Ustad Alla Rakha playing the tabla. I sought out a recording of Indian classical music while teaching an introductory world music course and noticed how prominently Alla Rakha demonstrated first arm joint movement in his playing. In the context of a body mapping lesson, students immediately recognise the movement they've just practiced when viewing Alla Rakha's playing and are able to relate their observations specifically to the newly mapped joint that initiates the movement, the sternoclavicular joint. Such video examples (Rakha & Shankar, 1994) then bring home the point that without knowledge of the body and specific movements involved in playing instruments, certain features could be neglected or misinterpreted.

My aim with such an exercise is to make clear how knowledge and refinement of the body map is valuable to a person wanting to learn to play the tabla and to someone – possibly the same person – wanting to describe and study the performance fully and effectively. In reference to the implications of mirror neurons discussed earlier, I suggest that experiencing movement in a new way should initiate new neuronal pathways that in turn provide more complete perceptual schemata for observing movement. Baily (2001) stresses the importance of learning to perform as a mode of inquiry and research in the field of ethnomusicology, and Ness (2004) from the field of dance ethnography has observed that 'a reliance on participation and embodied practice has more often than not resulted in an *increase* not a decrease in observation of the movement practices at issue' (p. 131). This observation is linked to the role of mirror neurons discussed earlier and supports the new understanding that movement is perceived only to the degree that it is recognised by the observer through past experience.

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The close observation of students as they learn new mapping information has shown that the link between action and observation – although seemingly direct through the mirror neuron mechanism – is still mediated through the body map. A student does not immediately recognize and imitate certain movements if a faulty body map hinders him from understanding another's movement. This position is supported by the notion of 'intentional attunement', the process of identifying intentional states in another person, which is now thought to be yet another role for mirror neurons with broad implications for empathic emotion (De Vignemont, 2004). Gallese (2006) has related the function of mirror neurons directly to recognising emotional states: 'When we see the facial expression of someone else, and this perception leads us to experience a particular affective state, the other's emotion is constituted, experienced, and therefore directly understood by means of an embodied simulation producing a shared body state' (p. 18). He uses the model of 'direct experiential understanding [through the] activation of a neural mechanism' as a means to explain the lack of intentional attunement in autistic patients (p. 22).

Cross-cultural perspectives on movement

Although the video example of Alla Rakha serves as a valuable tool for observing arm movement as I teach it, I am aware that many questions remain when considering body mapping practice from a cross-cultural standpoint. Was Alla Rakha familiar with the notion of a 'body map' and was that awareness part of his training? Would he have described his arm structure in the same way I have, i.e. in accordance with anatomical sources? To what extent is his playing indicative of movement at the tabla? And could answers to such questions point to a substantially different mode of training for musicians in north Indian classical music? Even without the availability of first-hand accounts from Alla Rakha on his understanding of the arm structure, I sought answers to such questions through the prominent tabla player Gourisankar Karmakar of Calcutta.

I have observed Gourisankar Karmakar perform on several occasions over the past two years with sitarist Indrajit Banerjee as they make Texas A&M University a regular stop on their US tours. At these performances I noticed that the prominent first arm joint movement I had observed in Alla Rakha's playing was almost non-existent in Karmakar's. I initiated a longer interview with Karmakar in 2007 in order to query him on arm movements and began the conversation by mentioning my choice of Alla Rakha's playing on video to demonstrate particular arm movements to students. After modelling these movements, I asked if they were typical of tabla playing. Karmakar's responses delved into several areas of music making that traced not only the importance of teaching in the Hindustani tradition, specifically the master/disciple relationship, but also the role of individual experimentation that he saw as a seminal factor in Alla Rakha's playing style. He emphasised that Alla Rakha came from a different school of tabla playing, the Punjab *gharana*. He described the instructions of his father, Shib Shankar Karmakar, his first guru, who was a disciple of the renowned tabla master Ustad Keramatulla Khan of the Farkhubad *gharana*:

> We were told not to move [the upper arms]. The purpose of this direction was to stay as relaxed as possible. Such arm movements were not taught as part of the technique.

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> Backward and forward [at the first arm joint] was legitimate at certain times for certain techniques, but not up and down as Alla Rakha did.

When I asked how Alla Rakha may have come to play this way, he speculated that it is possible it could be traced to his guru, Qadir Baksh, but he also explained it as a facet of Alla Rakha's 'musical genius': 'What sets Alla Rakha apart as one of the great tabla players is that he was able to create his own unique style of playing. His movements are part of an entire approach that he developed from observation and experimentation.'

When I explained how I used the video of Alla Rakha in order to teach arm joints that students might not be aware of, I asked Karmakar if he was familiar with the first arm joint where the clavicle meets the sternum (again pointing to it and moving at the joint). He replied, 'No, this is new to me as well. But I was taught to move as you are doing as a relaxation technique.' When he moved to demonstrate he placed his hands over the shoulders (second arm joints) much as my piano students do when they are asked to locate their first arm joint. Karmakar was clearly pondering the new information as he moved this time and commented:

> You know, I find this so interesting. I think about these things a lot. Relaxation is so important because in our style [Hindustani music] you never know if the concert is going to last one and a half hours or three hours or longer. There has to be an underlying relaxation no matter what we play, how fast the tempo gets. But even though I was taught by my guru how to be relaxed, at times I find myself getting tense in a performance. It's not something automatic that once it is learned takes care of itself. Afterwards I have to ask myself 'What happened? Why did I get tense this time?' Maybe it was something related to the performance circumstances, or the way I was playing, but I have to constantly ask myself and keep learning.

At this point I interjected, 'So it's a constant self-education', to which Karmakar added, 'Yes, self-education and self-*realisation*'.

In this exchange Karmakar did not betray how an awareness of the first arm joint might influence his performing skills. But he did capture the essence of body mapping work with his reference to self-realisation. His statement reiterates the importance of understanding such work as a process with individual interpretations rather than as a means for recapturing a 'natural' state inherent in every body. This is a common misconception, and admittedly aspects of the work lend themselves to such an interpretation. Anatomical information in the form of fixed visual representations necessarily imparts a presumption of 'the way things are' or 'the way things should be'. But when dealing with anatomy *in movement*, students learn that they carry a range of experience with them from the course of their lives that will affect how they process new information and incorporate it into their movement at an instrument. Such factors as psychological traumas, physical injuries and even prevailing social attitudes surrounding performance affect one's perception and experience of the body. The purpose of movement training, including body mapping, is not to erase these influences, bringing about a natural state (a 'return to innocence' as it were), but rather to recover use of the body and enhance performance skills. It is after all this constant process of loss, change and growth that defines the course of nature, not a fixed ideal state. What body mapping and other forms of somatic work provide is choices for directing an individual's course. This process can happen without direct input from somatic disciplines

and anatomical models but from a keen observation of one's own movement as Karmakar suggested was the case for Alla Rakha.

Within the structure of a mapping lesson I have also witnessed students demonstrate the capacity for such self-observation. One of the most striking examples came from a beginning adult piano student in 2005, who had no prior instruction at the piano, but was a college athlete at the time, playing on the Texas A&M women's soccer team. 'Emma' demonstrated a remarkable ability to explore maps and movements, and when queried as to where the first finger joints are located (another often mis-mapped area), she immediately turned to her own experience as the source of information, going through a set of movements and tactile sensations to identify the first finger joints accurately, about a centimetre below where the skin defines the fingers on the palm side. She had already mapped herself as a mover, and therefore had reliable means with which to explore the questions I gave her. The illustrations and explanations I include in my discussion are simply additional tools when students, performers, or observers are lacking in the types of experiences that result in movement awareness.

Donald (2001) sheds further light on the human capacity to self-monitor movement by stating that in hominids 'the executive brain system improved its ability to monitor the state of the physical self and gained access to much more detail, so that precise attention could be paid to the body's own movement patterns' (p. 270). He cites as an example the highly refined and complex movements of a classical Indian dancer and explains that 'to construct these kinds of skill hierarchies, the dancer needs a substantial metacognitive, or self-evaluative, capacity' (p. 270). As appropriate as the reference is to Indian classical dance, I should note that Donald does not refer to the complexities of musicians' movements in this section of his book after referring specifically to dancers, actors and athletes. This omission is further evidence of the generally accepted notion that music is separate from movement practice, at least within Western thought. From teaching general music appreciation classes targeted toward non-musicians, I have traced the lack of awareness of musicians as profoundly self-evaluative movers to the fact that our movement is so refined, and therefore complex, that observers without musical experience fail to notice the subtleties of movement exhibited by musicians. Heightening non-musicians' awareness of the complexity of music-making movement has in turn become an integral part of my teaching method. Not only does this enhance the perception and training of movement for musicians, but it also intervenes in broader cultural attitudes toward music and corrects misconceptions regarding the acquisition of musical skill. The following section explores further examples of body mapping practice as they relate to teaching movement in a piano studio setting.

Applying body mapping in the piano studio

In contrast to Emma's readily available awareness, many piano students who have played for a number of years seem to lose their self-awareness rather than enhance it over time. This has traditionally been tied to the emphasis on finger technique typical of early piano pedagogy, from C.P.E. Bach to Czerny, when the action of the piano did not require more than the lightest of finger movements to depress the keys (Uszler *et al.*, 2000). The continuing emphasis on acquiring finger technique from an early age comes at the price of depriving

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students of a broader understanding of larger structures of movement that govern playing. This is particularly evident when considering the role of the spine in balance and support and as the structure that organises movement of the arms and legs (Mark, 2004).

Core support, balance and stature

While working with a student, Alex Hlavinka, in 2008 on the Beethoven Sonata Op. 10, No. 3, I noticed his balance and poise at the piano needed addressing as he was habitually curved over the keys and never came to his full stature while playing. His playing was remarkably expressive, but I knew he would not progress as a pianist with this strenuous habit. We mapped the spine in one lesson, observing its size and length in particular. I encouraged him to explore his new-found 'height' while playing at the piano. When I asked him to compare that to his normal playing stance, he responded readily that it felt 'strange' and that it would take some time to get used to. I encouraged him to hear the difference when he played at full stature, but he also admitted he had difficulty hearing any change.

A few weeks went by and I noticed Alex's stature was again compromised at the piano during a lesson. In his words from a later recollection of the lesson:

> I was not as comfortable with the development . . . as I was with the exposition. This was forcing me to close my body in tighter, from waist to shoulder leading into my arms, and then pushing my entire upper-half forward, as if being physically closer to the sheet music in front of me would help [me] absorb what was written.

In response to what I observed, I decided to address mapping the spine again, this time focusing on the functions of the spine. Specifically I showed how the skull, spine and ribs form the core of the body – the axial skeleton – which supports and organises movement of the arms and legs (the appendicular skeleton). This knowledge resulted in a marked change in his stance at the piano with what seemed to be an easy lengthening out of his habitual compression downward, while he also related his arm movements in a different way to his torso. I asked him to play with this new stance. What I noticed as the most significant change was the increased fluidity of his phrasing and rhythmic flow. It seemed clear (and indeed I know this feeling from experience) that Alex's shortening in his spine was restricting the fluid movement of his arms which inhibited his ability to shape phrases and to keep a steady pulse. Before sharing this with Alex I asked him what differences he may have noticed, both in his playing and in his movement. He did readily notice the change in the flow of the piece, but was hard pressed to describe his own bodily sensation as he played. When I encouraged him to consider this aspect again he asked to 'play a bit more' in order to sense bodily what he had heard musically. This kind of awareness did not come to Alex in a few short lessons, but he immediately recognised the need for further action – to keep playing – in order to make strides in his sensing of movement and balance.

From his later recollections of the lesson, Alex reported:

> After your intervention I was able to reopen myself and release some of the tension associated with my effort to play the piece expressively. . . . I continue to practice widening [my torso] in order to, if you will, widen my perspective on the music. From this new perspective, it feels as if I have more control over the keyboard and I am able to elicit the response that I want from the instrument.

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For the purposes of this article what is most striking about Alex's two statements (from the same journal entry) is the shift in his thinking about individual agency. In the first statement he uses the phrase, 'this was forcing me to', whereas in the second statement he states, 'I have more control' and 'I am able', reflecting an increasing awareness of his own agency in playing.

'My fingers are me!'

Whereas much of my teaching addresses movement and body mapping issues in response to a student's performance, I have also devised projects that approach body mapping in relation to learning specific pieces. One such project from 2006 called on all my students to learn Debussy's Etude 'For the eight fingers'.[5] The etude is a sterling example of how bodily knowledge can inform creative process, or what Bowman (2004) has described as the 'human capacity ... for mapping structures, patterns, and gestures from our embodied existence and actions onto inviting sonorous materials' (p. 40). In Debussy's case he considers the structure of the hand and creates a work based on rapid movement patterns of the eight fingers without using the thumbs. In terms of body mapping it is an excellent exercise in heightening the player's awareness not only of hand and finger movements but also of the alignment of the hand with the forearm, a commonly mis-mapped structure. Many students, both beginning and advanced, conceive of this alignment as organised around the thumb side of the hand. However, the alignment that allows for free forearm rotation at the elbow and full mobility of the thumbs is organised around the little-finger side of the hand (Conable, 2002). The resting position of a free, fully mobile hand aligns the little-finger side of the hand with the ulna in the forearm, shown in Figure 3. (This alignment can be observed by resting the hands on the keys of an ergonomically designed computer keyboard and is indeed the reason for such a design.)

Student responses to learning the etude and group discussions about the piece were very informative both in regards to remapping the hand/forearm structure and to analysing Debussy's compositional process. Central questions that students were asked to address were: How did learning the etude change your perception of your hand alignment with the arm? How did it change your perception of finger agility and strength? What effect(s) did the prescribed mode of playing the piece (without thumbs) have on your aesthetic judgement and appreciation of the piece? Did you attempt to play the piece differently (with thumbs, for example), and what effect did that experience have on your understanding of Debussy's intentions with the etude?

A full account of the research project is beyond the scope of the current article, but one student's experiences address the broader issues of movement perception and embodiment considered here. Lily Ko described how sensations of playing the piece enhanced her understanding of the forearm-hand alignment, but also how some of the tetrachords that Debussy composed, and their seemingly random combinations (i.e. not following major or minor scale patterns) made the movements challenging and unfamiliar. In describing her observations she referred to the fingers as 'they', as many of us often do, in such statements as, 'they don't seem to want to play that pattern'. By referring to her fingers as 'they' she was interfering with an integrated solution to difficulties in the piece. With the pronoun 'they', we express the belief that fingers have an agency of their own, both to explain the moments

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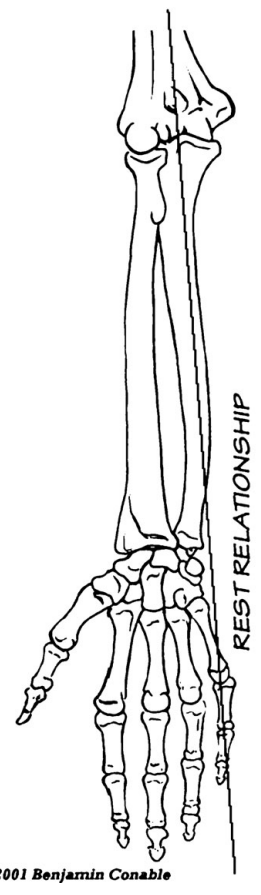

Fig. 3 The forearm-hand rest relationship. The little finger aligns with the ulna in the forearm. (The illustration shows the hand palm-up.) Illustration by Benjamin Conable. Reprinted with permission

of 'uncontrollable' sensation – 'They have a mind of their own' – but also to explain playing as an automated process that we don't have to guide with intention – 'They are (and should be) on their own'. Berger (2004) has described this as 'humuncular thinking' referring to the theory of the 'humunculus,' or 'little man,' as a form of body representation in the mind, but leading to the concept that the 'little man' in the mind is separate from the body with varying control over it (p. 175). Before I even thought to intervene in Lily's cognitive process, she stopped and questioned herself: 'Why do I say 'they'? My fingers are *me!*' As we chuckled together at her realisation, I took note of it as a unique assessment of our struggles as musicians to claim not only our bodies but also our experiences and intentions, thereby crediting our own agency in music making.

Lily's case also demonstrates how students engage in their own discoveries through the process of analysing practice and performance, and thereby contribute to the action

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research project. The guidance I provided in terms of anatomical information was important to set the learning/research process in motion, but students' own observations and group discussions provide most of the data and analysis for the project. My role in the project was to intervene at key moments to remind students of mapping issues they need to address and to offer models for movement by playing sections of the etude. What became apparent over the course of the project is that not only did students correct their own maps, but they also became familiar with mapping errors in others, which they might also encounter when teaching. In group meetings when students played the etude for each other, they were able to 'try on' each other's maps through descriptions they provided and by observing performances. The application to teaching became apparent when we observed the effects of a faulty map on a student's performance. While the term 'observe' seems to imply only visual perception, students also learned the interconnectedness of seeing, hearing and experiencing the movement of fellow students through our group sessions.

Observation and attunement

The cycle of observation and experience relates again to the function of mirror neurons as it is this perceptual phenomenon that allows a teacher to identify a student's movement through observation and to recognise movement that is less free or fluid on a kinesthetic level. The term 'mind-reading' has been used to describe the implications of mirror neurons in such cases (De Vignemont, 2004). Pointing out the most obvious patterns of tension and mis-mappings can leave students associating me with a mind-reader and can lead to expressions of amazement – 'How did you know I was tense there?' or 'How did you know that would work for me?' I consider it very important to explain to the student that I am observing both patterns of movement and the resulting sound in order to arrive at a solution. I also allow them to contradict me by starting a mapping lesson with the statement, 'You can correct me if I'm wrong, but this is what I'm observing in your case . . .', because I will never actually experience the movement or the performance as the student does. It would be profoundly irresponsible in my view to leave the student with the opinion that my 'mind-reading' skills are the result of some kind of *extra*-sensory perception that is inexplicable and therefore a kind of power I can wield over them. On the contrary, my identification, and indeed empathy, with the student is rooted *in perception*, coming from a complex system of aural, visual and kinesthetic cues.

One important caveat in the process of observation and identification is that musicians can sound wonderful with painful, even injury-producing movement patterns. It is easy to be deceived when listening to an accomplished musician perform exquisitely and to assume that her movement is free and fluid only to hear the musician admit later that her experience is burdened with tension and even painful. In this case the ear trumps the movement sense. That is, a musician with a highly developed ear will do whatever it takes to produce the desired sound, sometimes with horribly misconceived notions of the body. This ability may not last long, however, as the restricted patterns of movement can result in an inability to perform (Mark, 2004). In these cases the musician has to learn that the tension is not necessarily a part of the expression. Creating artistic tension is not the same as playing with physical tension.

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Conclusion

This article has addressed the need for movement training among musicians. Because of the intricacies and complexities of performing music, musicians require accurate and specific information about their bodies and their movement. My research demonstrates that training movement through the practice of body mapping enhances musical performance with fluidity and expressiveness. There is also evidence to suggest that emphasising movement awareness while teaching music increases musicians' self-awareness as they practice and perform. By describing action research that is grounded in the specific approach of body mapping, I have provided a methodology to follow for music educators seeking to improve their teaching of movement and their own performance practice. The discussion of sources from neuroscience, phenomenology, anthropology and ethnomusicology among others provides an interdisciplinary framework for understanding the importance of considering movement and embodiment in music education. It also offers perspectives on the broader implications of such research, which range from changing the way music is taught – as movement practice – to changing the way music is heard and experienced by the broader public – as embodied experience.

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Notes

1 I presented excerpts of this research in 'Understanding Musicians as Movers', a paper read at the 'Sound Moves' conference, London (2005), at the Society for Ethnomusicology National Meeting (2004), and at the College Music Society National Meeting (2004).

2 With the word 'musicians' I am referring primarily to those trained in Western traditions, particularly at conservatories, since my presentations and workshops are directed at this population. However, a growing part of my research is to consult musicians of other traditions as demonstrated in later sections of the article.

3 There is still much discrepancy between definitions of kinesthesia and a related term, 'proprioception,' coined at about the same time. Although the two terms are often used interchangeably to refer to motor sensation, I rely on Berthoz's definitions for the sake of consistency here. He establishes proprioception as a subsidiary of kinesthesia, relying on the etymology – 'proprio' for one's self combined with 'perception' – to refer solely to the body's own sensations without situating oneself within space, which is the broader context of kinesthesia as Berthoz defines it.

4 Berthoz's claim does not originate from the realm of neuroscience. Phenomenologists Husserl and Merleau-Ponty pioneered this understanding of cognition, and Berthoz credits their influence on his work. Such links between cognitive science and phenomenology have resulted in several

interdisciplinary studies of embodiment (e.g. O'Donovan-Anderson, 1996), and Bowman specifically offers a full consideration of music as embodied experience in his *Philosophical Perspectives on Music* (1998).

5 This study exists as an unpublished manuscript, 'Teaching anatomical structures and creative processes in Debussy's etude 'For the eight fingers''.

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