

Science meets art: The body and its role in “shaping” piano music

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This paper seeks to show that the body of the pianist may have a role to play in “shaping” musical works for performance. This view is now supported in musical academic circles who wish to promote a more interdisciplinary approach to performance. The argument is presented in three stages as follows. First, “Human Movement Systems” explores how order emerges in such a complex system as the body. Second, “Shaping Musical Performance” examines the most important conceptual challenge a pianist can face, which is how to shape a musical work for performance; a simple “performative” analysis is devised which exposes the structural elements of the music which support its shape. In the final stage, both approaches are shown to converge and complete the performative analysis as a design which may be used during the preparation of a musical work for performance.

Keywords: piano performance; embodiment; kinetic chain theory; performative analysis; melodic shaping

The general attitude of pianists toward a scientific investigation of their art is most regrettable—the “whys” and the “wherefores” do not concern them. Thus wrote Otto Ortmann in 1929. Today, Ortmann would find that there has in general been little change. Performers and pedagogues alike still largely ignore the role of the body in performance, preferring the traditional approach to piano teaching with its emphasis on correct finger usage.

Thus, this paper seeks to show that piano performance may be enhanced by examining the role of the body in “shaping” the music for performance. As yet, this is an unexplored area of piano performance which reflects some of the most important trends in the study of musical performance, such as the relationship between performance and analysis on the one hand, and physical anthropology and the human movement sciences on the other. “Human

Movement Systems” is an account of recent research which shows how movement systems function in humans and how they synchronize in such a complex system as the body which is continually undergoing change during piano performance. For example, the “kinetic chain theory,” so described because of its emphasis on the processes of coordination and control in the human movement system is viewed here as a viable framework by which the movements of the performer may be organized in piano performance. In “Shaping Musical Performance,” a simple “performative” analysis is given as an example of a way in which structural elements of the music which support the melodic “shape” can be exposed. The final stage is “The Performance.” Here, the analysis is completed by showing that aspects of the music which support the melodic shape, such as the accents and dynamics, can function as musical goals toward which the performer directs the movements of his/her body.

MAIN CONTRIBUTION

Human movement systems in piano performance

Until recently, detailed analysis of the anatomical structure of the body has been the main focus of leading researchers. Now, there is a shift in contemporary research from structure to function. This means that some researchers are seeking to understand the body by examining not just the anatomical structure of the bones and muscles, but their function in relation to movement. There are three main areas of the body which function in piano performance. They are the shoulder complex, the hand, and the torso. Each is discussed briefly below.

The shoulder complex comprises the scapula, the upper arm (the *humerus*), and the collar bone. The scapula and the collarbone form the foundation upon which the upper arm moves. Kinesiologists Tyldersley and Grieve (1996) describe the function of the shoulder complex in a way which is apposite for the pianist: “Acting like the cab of a crane, the shoulder positions the hand in the same way as the jib of a crane places its load.” This means that the hand may be positioned on and around the keyboard according to the requirements of the music.

The function of the hand is described by Marzke (1994) from an anthropological point of view. She says that our earliest primate ancestors had pentadactyle (five-finger) hands with a divergent thumb, but the design was sacrificed when our more recent ape-like ancestors developed longer fingers and independently controlled movements of the index finger and opposable thumb. In piano performance, this means that not only are the

fingers of the hand able to flex around the shape of a chord while the thumb grasps the bottom note of the chord in an opposing movement towards the other fingers, but individual fingers can be trained to flex against the key surface without the thumb opposing the movement, as in scale passages.

There is very little reference to the function of the torso in piano performance. However, insights into the function of the spine of the torso may be gleaned from another area of research which is cybernetics (i.e. the study of automatic control systems in living things). For example, Gracovetsky (1998) says that when analyzing our evolution from fish-like ancestors, we seem to have lost touch with the fact that the spine and surrounding tissue of a fish are the primary engine which the animal uses for locomotion. He concludes from this observation that the human “spine behaves like an engine driving the pelvis, with the legs following and amplifying its motion.” Thus, it may not be unreasonable to suggest that if the function of the spinal engine is to drive the pelvis, which in turn amplifies the movement of the legs, this may equally be said to be the case for the movement of the arms in piano performance.

While the preceding description of the body partially clarifies the function of the three main areas identified above, it does not address the problem that in piano performance synchronicity of movement between the shoulder complex, the hand, and the torso is essential. However, recent research into human movement in physical anthropology and the human movement sciences all point to a better understanding of how the movements of the shoulder complex, the hand, and the torso may be synchronized in piano performance.

Of the synchronous relationship between the shoulder complex and the hand, Marzke (1994) writes that our:

early hominid ancestors dwelt in the trees and the development of their synchronous ability to position the upper arm and perform grasping actions with the hand for food were essential to their survival and success. By the time they left the trees to dwell on the ground, this ability to position the upper arm and perform grasping actions with the hand was as developed as ours is today.

Thus, in piano performance the shoulder complex positions the upper arm and enables the hand to make appropriate pre-shaping movements according to the demands of the music. Forces are then applied by the shoulder complex and modulated to maintain a stable grasp of the piano keys.

Synchronizing the movements of the torso with the shoulder complex and the hand may well be explained by the research of sports scientists Glazier *et al.* (2003), who suggest that “the dynamical systems theory is a viable framework for modeling athletic performance owing to its emphasis on processes of coordination and control in human movement systems.” A key theoretical concept is the kinetic chain, although they admit “that this has yet to be fully explored.” They define this phenomenon as a “proximal-to-distal linkage system through which the energy and momentum (as in a wave motion) are transferred sequentially, achieving maximum magnitude in the terminal segment.” This means that the build-up of velocity in the segments with high moments of inertia move first, with the smaller segments involving less mass moving later and with higher velocities. Such a sequencing allows proximally located muscles (in the torso) to use their capacity to the full to do work in contributing to the continued acceleration of the most distal segments, which in piano performance would be the hand.

“Shaping” musical performance

If a performer makes claims for melodic shaping, then a contingent interpretive question must be: which analytical assumptions are going to inform these decisions? In Figure 1, the assumption is that accents (such as >) and dynamic markings (such as *ff*, *sfz*, and *sff*) shape the melodic line.

Figure 1 is a simple performative analysis which the pianist may easily devise during the preparation of *Em Um Berço Encantado* (1918) by Villa Lobos for performance. Bars 10-16 are a complete melodic phrase. It is reproduced deliberately on one line (see Level 1). The intention is: (i) to see the shape of the phrase as a whole, when it is not broken by the printed notation wrapping round onto the next line and (ii) to note the accents and dynamic markings which are deemed here to support the melodic phrase. Below this, Level 2 shows a reproduction of those same accents and dynamic markings in the upper-most staff at Level 1. They are positioned directly below the accents and dynamic markings in the score. The reason for this is revealed below in the “The Performance.”

The Performance

The final stage of this paper is to demonstrate a convergence of both approaches described above. Thus, Level 3 (see Figure 1) completes the performative analysis. It depicts the trajectory of the performer’s body as the wave motion directs it toward each of the musical goals. The wave motion is initiated by a contraction of the deep abdominal muscles in the torso and

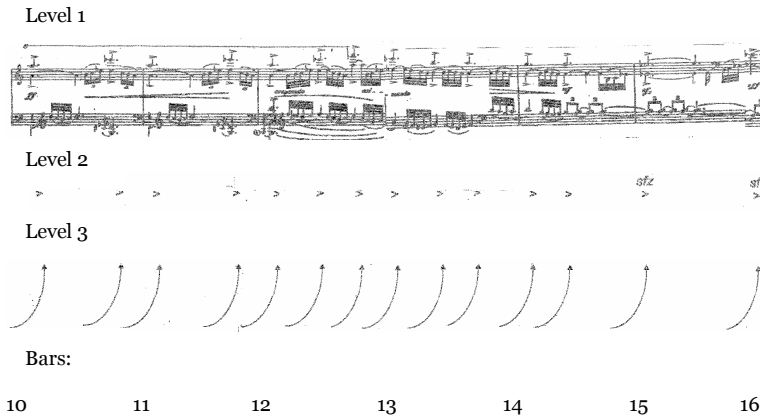


Figure 1. A performative analysis of bars 10-16 of *Em Um Berco Encantando* by Villa-Lobos (1918). The time signature is 9/8. Level 1: Upper staff shows the accents >, *ff*, *sfz*, and *sff* which provide the structure for the entire melodic phrase. Level 2: Melodic goals—accents >, *ff*, *sfz*, and *sff* are reproduced from the score above. Level 3: The trajectory of the performers' body as the wave motion directs it toward the musical goal.

transferred sequentially. It passes through the torso, the shoulder complex, and the hand with increasing velocity, thus allowing the grasping function of the latter to be fulfilled before the energy is finally transferred to the key bed. Once the wave motion has been initiated and the performer's body has reached the musical target, the lower abdominal muscles may relax before repeating the same procedure toward the next musical goal. It should be pointed out, however, that the velocity of the wave motion will vary since it is dependant upon the intensity of the musical goal. This can only be determined by informed intuition on the part of the performer.

CONCLUSION

The aim of this paper has been to examine the role of the performer's body in shaping the music. This is an interdisciplinary approach which has required an examination of the research of writers in other fields such as physical anthropology and the human movement sciences, as well as exploring recent innovations to traditional analytical procedures in areas which have resisted systematization, such as shape.

As a result, I have been able to show: first, that the movements of the shoulder complex, the hand, and the torso may be synchronized by a wave

motion in piano performance; second, a simple performative analysis may be easily constructed by the performer, which exposes the structural elements which shape the music. Finally, I have sought to show that the structural elements of the music can function as the musical goals to which the movements of the performer's body are directed during the performance, thereby deliberately engaging the body of the performer in the act of music making.

IMPLICATIONS

Overuse of the hand is prevalent in piano performance. This often leads to tendonitis, which is a condition caused by an inflammation of the synovial sheaths which surround the tendons of the muscle. Force should only be applied by the shoulder complex as the muscles of the hand flex (rather than push) the fingers in a grasping action against the piano keys.

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