The Musical Experience through the Lens of Embodiment

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Music, by way of acoustics, is inherently physical. It is a phenomenon experienced through the senses of the body, regardless of the media used to render it. The increasing use of digital media and technology for listening and for performing music disguises the physicality of the experience. Listening to digital sound files, watching performers using computers and other electronic devices manipulating sounds with seemingly unrelated gestures and entering a sound installation in which the sound environment is generated by a computer algorithm all give the impression of disembodied sound. Phenomena such as these raise the question whether physicality is required to engage an audience or whether the sound itself can validate the event. Are visuals, such as large performative motions of a musician at an instrument or the projected screen of the computer, required to give authenticity to the performance, or is an audience able to perceive—using all their senses—subtle gestures in the sound and movements of the performer to track the performer’s presence? By considering theories taken from the fields of biology, philosophy and performance, I examine the nature of music as an embodied experience.

The theory of embodiment developed by philosophers such as Heidegger and Merleau-Ponty and cognitive scientists such as Varela argues against mind-body dualism, suggesting that the natural state of human experience is a unified body. These writers put forward the idea that the body starts with lived experience. This knowledge includes the body knowledge understood to reside in the body, such as muscle memory, habit and instinct, but has at its core the process of perception in which the body and mind are unified in the sensing and understanding of the world of which we are a part. A key concept within this approach to embodiment is that I am part of the world. I am neither in the world (empiricism) nor have the world in me (intellectualism), but rather I am both subject and object at the same time, in constant interaction [1]. My knowledge of the world is constructed by the interplay of my presence in it and my perception of it. In this context, perception is seen as the pre-cognitive interpretation of data received from the body’s senses. Through experience, our senses provide input about the world, but this input is not knowledge until it is perceived. Perception is the reflective process involving all the data being sensed, including the sensation of self-awareness. The self-awareness gives context that makes the perceived input knowledge. One’s self-awareness during the act of turning one’s head insures that the shifting image on the retina is not interpreted as movement in the environment. The pre-cognitive process involved in turning one’s head is an example of knowledge gained through lived experience as a body among bodies interacting with a world. It is this interaction between self-awareness, sensation and perception that forms our knowledge.

Recording and Space

The implications of such knowledge for musical experience are perhaps most easily understood in the perception of space. The sonic experience in musical understanding is a unified, spatial environment. The implications of such knowledge for musical experience are perhaps most easily understood in the perception of space. The sonic space, the space in which a sound propagates, is experienced mainly through the sensation of acoustic space, although other senses such as sight are also involved. Merleau-Ponty argues that our perception makes us both object and subject at the same time. He describes this dual state as being both a thing among things and that which sees and touches [2] and refers to this key idea in his philosophy of embodiment as reversibility. A full discussion of reversibility is beyond the scope of this paper; however, it is sufficient to understand that Merleau-Ponty uses the concept of reversibility to explain our existence as a reciprocal interaction with the world. The reciprocal quality of the interaction demonstrates the state of being both subject (one who is touching) and object (one who is being touched) in rapid succession, inspiring the term reversibility. Although he expresses his idea in terms of vision, in terms of the seer (being) seen, his argument can be extended to include sound, becoming: to engage the world as one both hearing and being heard. Yet in reforming the statement we must remember that what is being set up here is a subject-object polarity. A simple understanding of this wording could lead to the interpretation: I am heard as I hear others. However, we should consider the meaning from the perspective of the sensation, being heard. Regardless of the means of production, electronic or acoustic, all sound has the same physical nature [3]: that of a wave propagating through a medium. The physical phenomenon being engaged is the sound wave; what is being heard is the sound, not the material instrument. The sound itself is a physical presence in the space. Through my perception of its physical presence (I as subject) in relation to my own presence (I as object), I come to engage with the sound.

Jazzettz alludes to this separation between the physical and sonic experience in musical understanding with the comment:

Indeed, among the objects that surround us we don’t know of any which would allow the production of such amazing sounds as we get from a musical instrument…. Thus, musical instruments subvert our expectations about the sounds that such devices would produce. What a musical instrument allows us to do in terms of...

The author addresses the impression that digital media is diminishing the engagement of the body in our musical experience. Combining theories from the disciplines of philosophy and psychology, he constructs a framework for examining the experience of listening to music. A link between research in mirror neurons and the act of perception, as described by Merleau-Ponty, is used to demonstrate the role of embodiment in the listening experience. While acknowledging that hearing and viewing a musical performance do not provide the same musical experience, he aims to demonstrate how our embodied experience exists relative to the body's engagement in any musical experience.
sound production goes beyond what our common sense would expect from any other ordinary object. It establishes an almost magical relation between gesture and sound… [4]

For Iazzetta, the essence of music is the association between sound and performance gesture. What is evident in his statement is that by exceeding our expectation of common objects, the sounds generated by musical instruments become noteworthy. It should be noted that Iazzetta’s argument is constructed from the perspective of the performer and therefore does not totally eliminate the effect of the instrument; but it will be shown that from the listener’s perspective, understanding of the instrument—gesture relationship is unreliable and therefore of less importance [5]. Of more importance to the listening experience is the argument, implied through Iazzetta’s reference to a “magical relation between gesture and sound,” that since the sound of acoustic instruments surpasses the expectation for the object, the arbitrary sound production of electronic instruments is experientially no different from our experience with acoustic instruments. Both electrical and acoustic instruments are artificial constructions, designed to produce sounds with efficiency beyond the expectations of their physical presence. Our experiential knowledge of the ordinary connection between material and sound has been subverted through intentional design; our musical experience, electronic or acoustic, is guided by the sound’s transcendence of our common sense and expectations. We are left with a sensation of the sound itself as primary. Through the perception of the sensation, we build knowledge about the lived experience, which includes physical acoustics but also includes a self-awareness. Incorporated in the self-awareness is the act of hearing, encompassing the physical, cultural and personal context of our self. This argument brings us back to Merleau-Ponty’s notion of perception. Through our perception, we engage with the sound as an object in the environment, constructing our knowledge of that object as we experience it. Thus, the listener’s experience can be understood as based on the act of perception. The listener’s perception includes the vast array of available sensations, all being understood pre-cognitively through the body. Such a model has two implications: Sound is the only consistently available sensation in the musical experience and as such may be considered dominant; and for understanding to be achieved, some form of learning must take place.

The context in which the dominance of auditory sensations is most obvious is a sonic environment produced through headphones. The question that arises in this context is: Where is the sonic environment? It would seem that at least two sonic environments, that of the natural world and that of the media world, are superimposed in what could be referred to as a “schizophrenic split” [6]. This idea comes from the belief that the technology creates an artificial sonic world that is placed around the listener and that the listener stays physically and sensually, through sight, touch, smell and small amounts of audio stimuli, in the natural world. As Truax states, “The challenge of the schizophrenic situation for the listener is to make sense out of the juxtaposition of two different contexts” [7]. In order to address this situation through the lens of embodiment we must consider Merleau-Ponty’s statement:

We have to reject the age-old assumption that put the body in the world and the seer in the body or, conversely, the world and the body in the seer as in a box. Where are we to put the limit between the body and the world, since the world is flesh? The world is not “in” my body and my body is not “in” the visible world ultimately: as flesh applied to a world, the world neither surrounds it nor is surrounded by it [8].

By this statement we may reject the notion of superimposed environments and instead maintain that we are still, through perception and self-awareness, part of a single sonic environment. The perceived sonic environment, constructed by the pre-cognitive interpretation of our senses, is, however, complex, including sounds and sensations from both the mediated environment and the acoustic environment. Still, there is no reason to assume that understanding of the environment is not being achieved in the same manner as if there were no headphones. The only addition is the role of attention that guides us through the intricate sound relationships, allowing us to draw our own meaning and experience, dividing or mixing the sound objects perceived.

**Consciousness and Learning**

It is through attention that embodiment theory incorporates learning in consciousness.

The miracle of consciousness consists in its bringing to light, through attention, phenomena which re-establish the unity of the object in a new dimension at the very moment when they destroy it. Thus attention is neither an association of images, nor the return to itself of thought already in control of its objects, but the active constitution of a new object which makes explicit and articulate what was until then presented as no more than an indeterminate horizon [9].

**Attention** is an active process of repeatedly re-articulating the sensed object, building up the conception of a perceived object and providing a base of embodied knowledge. This dynamic building of the perceived object insures that the act of perception and understanding is not limited to objects previously experienced or imagined and that the building process does not require any innate knowledge. In this way, **attention** links learning with the pre-cognitive act of perception. This link is of great importance for constructing and understanding the association between sound and gesture. It is also reasonable to assume that **attention**, through the constant re-construction of perceived sonic objects and interactions, is instrumental in understanding musical structure, even structures of which the listener has no rational or pre-constructed knowledge. Therefore, the link between perception and attention constitutes a pre-cognitive process of musical analysis and learning in the moment of listening, an embodied process for experiencing music.

While attention provides a model for pre-cognitive learning through experience, the act of interpretation also has roots in our embodied experience. We begin to understand its embodied nature by considering the link between interaction and perception. Merleau-Ponty’s notion of reversibility (the seer seen) provides an understanding of the interaction with sound as an embodied experience in an abstract space. In this statement, the term “embodied” implies that the knowledge remains based on experience, while the term “abstract” suggests that the space is not in reference to material objects. Michele Lomuto proposes a similar idea:

Abstract listening is therefore, a kind of listening that is disinterested in things, but this lack of interest in things necessarily implies a suspension of the world and, therefore, of our *In der Welt Sein*. We are putting the relationship of contiguity and causality in parentheses; we are forgetting the transparency of noise that cancels itself in its indexicality that speaks not of itself, but of the vibrating thing of which it is an emanation as a secondary quality. The noise listened to—therefore, already interpreted—abstractly, shares then in the same opacity as the image, it presupposes a standpoint in thought, it captures, it does not simply let itself be used as a “sign vehicle.” In
These comments all support the claim that the ability to understand the gestures involved in musical production is not innate. The process requires previous experience and learning. In fact, even when some exposure to an instrument is acquired, the experience is not sufficient to provide full understanding of the gesture. However, if it is not possible to rely on knowledge taken from viewing the sound-making gesture, there must be an associated gesture that is being perceived. Consider that it is not the physical movement necessary for playing the instrument that is interpreted, since a large portion of the audience is not qualified to judge such gestures, but rather the intention of the performer that is being transmitted. It is likely that part of the musical experience is the embodied perception of the performer’s intentions, and yet our discussion of Merleau-Ponty and Lomuto suggest that pure sound objects constitute the musical experience. Still, the example of Ligeti’s Continuum demonstrates how listeners, without understanding the physical performance gestures, were able to perceive and respond to the performer’s intention to construct and manipulate dense sound textures. If the performer’s intention is what is being produced and understood by the listener, how is the intention perceived through listening?

** Gesture, Performance and Mirror Neurons**

Recent research in psychology has begun to explore the function of a class of neurons referred to as mirror neurons. Classical mirror neurons are a set of neurons in the pre-motor region of the brain that fire both when performing a goal-oriented action and when observing the same action performed by another. These findings imply that there is a pre-cognitive physical reaction to the sight of an action that provides the viewer with an understanding of the performer’s action. A key to the functioning of these neurons is that the action must be perceived as goal oriented, although it is not necessary to observe the goal [15].

When a given action is planned, its expected motor consequences are forecast. This means that when we are going to execute a given action we can also predict its consequences. The action model enables this prediction. Given the shared sub-personal neural mapping between what is acted and what is perceived—constituted by mirror neurons—the action model can also be used to predict the consequences of actions performed by others [16].

It has been suggested that these neurons are essential for social interaction, being linked to empathy and intuition and allowing us to recognize the actions of others. Furthermore, studies have indicated that mirror neurons are involved not only in recognizing the action, but also in understanding the intention of the action [17]. By presenting mirror neurons as a pre-cognitive process associated with intuition concerning the actions of others, this theory provides a model of embodied knowledge that allows for the perception of a performer’s intention.

This function of mirror neurons has great relevance in the context of a musical listening experience. As discussed earlier, the intention of a performer is arguably what is being produced and understood in music. It is through mirror neurons that we may conceive of an embodied perceptual knowledge of the performer’s intentions. Perceiving the intention means that a gesture is coded by the mirror neurons through action in a context. Studies reveal that intentions, even when associated with similar gestures, such as grasping an object compared to putting it away, are distinguished by the mirror neurons through the perception of the context in which the gesture is observed [18]. The implication of this finding is that gestures made on a laptop in an office may trigger a different understanding than gestures made onstage. Yet, it is unclear the degree to which such a claim can be made, as more research needs to be done. Furthermore, the tendency for audiences to make assumptions based on their own use of the computer [19] will always play a role. Still, it is interesting to note that the theory surrounding mirror neurons suggests that we interpret, pre-cognitively, the intention of others in relation to context.

Still further research has shown that mirror neurons respond not only when a gesture is observed, but also when a sound is heard that is associated with a goal-oriented action [20]. This research expands the idea of interpretation of intention to the understanding of intention through sonic events as well. There is every indication that the embodied understanding that is apparent in a visual context is also apparent with a purely sonic experience such as listening to music. This is not to suggest that an audio recording is equivalent to a performance; rather, the theory suggests that there is more perceptual knowledge and embodied engagement in an auditory experience than has previously been suggested.

Finally, if the function of mirror neu-
rons is to provide a form of knowledge, again some form of learning must take place. “The manner in which subjects learn the connection between action and sound and the connection to the neurons is not understood, but is expected to be an associative learning. However, for this to happen would require a connection between sensory input and the region of the brain where the mirror neurons are located. At this time no evidence shows this connection” [21]. Still, Gallese has recently suggested, “These neurons instantiate sameness of informational content at a quite ‘abstract’ level. If the different mode of presentation of events as intrinsically different as sound, images or voluntary body actions, is nevertheless bound together within the same neural substrate, what we have is a mechanism instantiating a form of conceptualization” [22]. Such a statement suggests that associations are constructed across the senses, echoing Merleau-Ponty’s model of learning at a pre-cognitive level based on perception and attention. This model provides a learning that is not associative and in theory would therefore not require such a connection between sensory input and the mirror neurons but instead provide learning through active re-construction and articulation. This application of theories of embodiment may be worked into a model of musical experience that incorporates the learning of intentional gestures. Such a claim has not been empirically investigated, but the model presented may still be used as a philosophical approach for considering the musical experience.

CONCLUSION

Let us consider a performance on tabla. The subtle finger taps and palm pressure involved in the performance technique are in stark contrast to the expansive, energetic texture emanating from the drum. Yet through the perception of the sensations experienced through the course of the performance, the relations between sound events become known; the small gestures of the performer become significant. Before any rational understanding of why an action is made, the perception of an intention to act is understood. Thus, the listener is experiencing music through all body senses. The process of perception places the listener not in the world of the music—a virtual world constructed purely of sonic objects—but rather in an interactive union with the whole environment. Through the listener’s perception of all his/her senses and their use of attention, the listener gains experience and builds perceptive knowledge in preparation for constructing understanding from the experience. This learning is not limited to the sonic events but involves the learning and cataloging of sensations, including any actions by the performer. As this knowledge base grows, the listener, through the functions of mirror neurons, is able to intuitively understand the intentions embedded in the music, not only through the performer’s actions but through the sounds being produced as well. In this way, a musical experience, whether observed or listened to, involves the entire body.

Together these theories of embodiment from philosophy and science help explain the human ability to apply meaning to the sounds and gestures performed by others. As such, they provide a unique perspective from which to investigate musical experience. Furthermore, these theories have strong implications regarding current discussions surrounding the role of media and technology, trust and validation in the experience of an audience member. By providing models for considering the body knowledge and perception of the listener, these theories can help develop a better understanding of the interconnected elements that make up the musical experience.

References

18. Iacoboni [17].

Greg Cornwall is a Ph.D. student at Simon Fraser University in the School of Interactive Arts and Technology. His current research interests include interactive performance and the relationship between human and technology agents in interdisciplinary improvisation.