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# Dance and the Empathetic Mind

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Illustrated by Claire Hoy

If you look around a room of people, then it takes little time to identify those who are uncomfortable in the space and those who are at ease. Without speaking or engaging directly, these states are almost immediately identifiable based on the minute cues of facial expression and body language. Dance, the elevated form of everyday movement operates in much the same way—communicating moods and ideas through highly intentional movement and generating intense and visceral reactions to its content. Dance as a means of communicating, socializing, processing, and exploring has been persistent in civilization across time and space because it provokes in the observer the emotional narrative of the performer. By nature, dance requires close attention to bodies in space and a comprehension of their intention and meaning. What in the brain allows for this connection and understanding and what does it mean for the role of movement in the provocation of empathy?

A possible explanation of the neural underpinnings of empathy lies in mirror neurons. First discovered in Macaque monkeys, and later in humans, these cells comprise a network of neurons that activate in premotor and parietal areas when observing movement, emotion and sensation. Somatotopically organized, the system contains distinct regions corresponding to various body parts like the mouth, feet, and hands and is shown to play a role both in the imitation of simple movement and in learning complex movement without practice.

Research shows that watching someone move or be touched activates the same somatosensory areas in the observer as if the action had been executed on them thus unconsciously simulating the movement for the observer. In fact, the experience of observing and partaking is primarily differentiated only by the degree of activation. This phenomenon is seen in movement the observer can comprehend within the context of their own body; observing the path of a point on a screen, for example, does not elicit the same potentials because it does not closely resemble human movement and thus cannot be mapped onto somatosensory areas. This presents compelling evidence for a neurological base that allows individuals to live the experience of others through their own body.

Another interesting facet of mirror neurons is their role in understanding movement intention—determining the goal of an action and predicting subsequent actions. Compared to the observation of a movement or the movement's context in isolation, the pairing of these two increases premotor activation. This indicates an ability to recognize basic movement and understand the intention behind it—a process that is not facilitated by conscious intent but rather occurs by default. While further research is necessary, it can be theorized that, for basic movements, action prediction and understanding of intention are related processes underpinned by mirror neurons and embodied simulation of observed movement. This embodied simulation, however, is not limited to the internalization and comprehension of exterior movement, it is also key in interpreting and even adopting emotion. In actively watching an individual



experience pain, the observer maps it somatotopically onto their own sensorimotor system and when observing a face expressing strong emotions like fear and joy, a rapid electromyographic response is propagated in corresponding facial muscles of the observer. In this way, the emotion state of the observed can be actively reconstructed in the observer.

The question then becomes, if the mirror neuron system is hardwired, what factors account for variation in the ability to empathize. Research done in individuals with autism, who struggle with understanding action intention and emotional expression presents a neurological difference. In some cases, there is a thinning of the gray matter in areas of the mirror neuron network, specifically the ventral premotor, posterior parietal, and superior temporal sulcus cortices. Furthermore, the degree of thinning corresponds with the autism spectrum disorder severity. While the application of the variation question in individuals without autism requires more research, developing theories suggest that factors such as environment influences during development, pre-existing schemas, mental attitudes, and conflicts can influence the ability to empathize with and understand others.

If mirror neurons are as important to the process of understanding through embodied simulation as this research suggests, then dance and movement are intimately related to the foundations of human empathy. As an art form centered on the creation of feeling both in participants and the observer, dance utilizes the ability to communicate nonverbally, to express and to understand emotion and intention, based on a system of neurons that allow for the sensory internalization of external movement. This ability, however, is as much innate as it is learned; which begs the question of how it can be developed through dance and utilized beyond it. This is a question that demands further research and a deeper understanding of mirror neurons. However, methods like Dance Movement Therapy which employ physical mirroring and movement have been successful at fostering empathy and communication. This offers the exciting possibility of applying neuroscience to dance in an attempt to better understand and improve the capacity for human empathy. ● ● ●