Dance of the Synapses

Embodied cognition is a term that continues to surface in academic dance literature. Framing an understanding of dance without polarizing body and mind is an interesting task. When analyzing the benefits of dance one cannot help but consider the brain as a muscle to be exercised. Dance and cognition are embedded within each other, one cannot and does not take place without the other. Dance-cognition can be analyzed in four categories: observation, transcription, replication, and creative synthesis. It is actionable in every stage and requires the intelligence of the body as a whole. In this way I'd like to approach dance and health without categorically separating mind from body.

As a dancer, many times I have heard my colleagues talk about the damage they are doing to their bodies as though the strength, coordination, and range of motion they exert now is on credit, and the debt that they are accumulating will undoubtedly need to be paid as they continue to age. For all intensive purposes I don't desire to argue that overexertion or repetitive motion combined with poor alignment doesn't damage the body. As dancers and movers with a high level of kinetic activity we have a higher potential for spontaneous injury or chronic injury recurrences. However, I do desire to dispel the notion that in order to dance at an advanced technical level one must irreparably sacrifice their physical wellbeing and longevity of motion. We can abuse our bodies through dance, but we needn't. Rather, if we treat our bodies as the intelligent facilities they are, dance can enhance every physical facility, aiding in body

alignment, strength, range of motion, cognitive processes in our extremities as well as processes in our brain encouraging longevity.

Dance improves our ability to encounter the world and to process our experiences. The benefits are applicable to anyone. The Australian department of Health and Human services lists these improvements to the general public welfare on their website. Dance contributes to:

- Improved condition of heart and lungs
- increased muscular strength, endurance and motor fitness
- increased aerobic fitness
- improved muscle tone and strength
- weight management
- stronger bones and reduced risk of osteoporosis
- better coordination, agility and flexibility
- improved balance and spatial awareness
- increased physical confidence
- improved mental functioning
- improved general and psychological wellbeing

While these are substantial benefits, they are generalities and each body has its own eccentricities. The fluctuation of breaking down and building up is an immensely complex

interaction between systems within the physical body. Not only can an individual go from unfit to fit, but dance can act as a physical therapy agent with the right application.

My first encounter with dance as a practice for correcting poor alignment of the body was during my undergraduate studies. Midst one of our classes in modern dance, my professor, whom I revered as an excellent dance technician, mentioned that her motivation for a lengthy, disciplined warm up, and body conditioning regimen came from her scoliosis. I was surprised because we were well into our second semester and I had not realized she struggled with spinal curvature. Over the next few years I began to pay attention to how she conditioned herself, attended to her body, and overcame her condition. I was inspired. I was nine years old when I woke up unable to turn my head to the right without a stabbing sharp pain in my neck. This was the start of many visits to the chiropractor and, later, physical therapy appointments through my teens. I had a genetic over curvature that predispositioned me to many physical ailments deriving from poor alignment. I was treated for my back, neck, pelvis, and both my knees. By the time I entered college, I had many exercises and a keen awareness of the subtle aches and warning signs in my body. I was pleased and fortunate be able to take class from someone who had a vast experience in constructing a sort of personal body intuition and conditioning practice. At the start of each class with this professor we internalized our movement in what I would call a type of kinetic focus on our own bodies. She taught us to converse with our bodies as though they had something to tell us. Not that we were separate from them, but that they had an intelligence, a system we were not conscious of but could become in tune with.

Dance classes are a place like none other, where posture, body placement, and use of correct spinal alignment are key elements. One of many reasons for this element is for the necessity of optimal shock absorption when impacting the floor. This network of shock absorption through the spine minimize stress on the joints. In an article on the spine, specifically the impact of head position, posted by the *International Association for Dance Medicine and Science,* Elsa Urmston reflects on the positive effect of tactile corrections made during dance class. These corrections of position are done in tandem with the subject matter covered in student's health and anatomy class. She exudes, "So in fact we are trying to overcome habitual movement patterns such as the forward head posture through re-education. We find a sustained deepening of the students' understanding when we work in this way". Excellence is no longer conditioning oneself to a standard outside and in spite of one's body, but it is looked within, to guide in the most efficient and natural pathways. For this dance class, a hands on approach is used in sync with kinetic practice to re-educate the student's body.

The body's function is cognitive kinesis. In dispelling the belief that repetitious impacting exercise, such as running, damages joints, Harvard Health Publishing released an article called *Exercise and Your Joints*. The article describes long term studies of 10 to 21 years on the impact of joints in running. Citing a study in Australia on 297 injury free men and women between the ages of 40 and 69 at the beginning of the study, the article bore proof that exercise not only has no affect on the development of arthritis, as some had postulated, but more over, improves joint health. The study documented these 297 people's exercise habits and joint symptoms over time, then gave each subject a knee MRI after a decade long study. Those who practiced more arduous

weight-bearing exercise had thicker and healthier cartilage than those of their less active counterparts. The body's joints are strengthened through correctly guided activity. Translating this into dance, I might dispel, not the notion that joints are impervious to injury through use, but that mobilizing and impacting the joint cripples it. In fact, quite the opposite occurs. Our joints need the work load in order to develop and sustain strength. The body builds itself up to accomplish the task required through a type of physical problem solving.

This physical problem solving is a fascinating truth that, once grasped, can help a dancer begin to respect and trust their own their own cognitive body, essentially their own selves. The cognitive body, as a thinking machine, is fully involved and articulated in the experience of dance. In Faber and Minton's book, *Thinking With The Dancing Brain: Embodying Neuroscience*, the neurological processes of dance are layered and built upon. Observation, transcription, replication, and creative synthesis are terms I have chosen in order to simplify each layer of vast neurological networking as depicted in their work. For somatic practices, the body is placed as the basis of knowing to dissolve the body/mind split in order to release tension, stress, and find more efficient action pathways. "Conscious integration of body and mind facilitates deep neurological patterning of movement to rid the body of inefficient movement patterns through the coordinated use of the mind to produce physical changes" (Faber 5). Faber and Minton also analyze physical patterning through vision. Located in the dorsal and ventral premotor cortex as well as the parietal cortex, mirror neurons act in correspondence to an action observation network (AON). Recent research suggests that these neurons are able to produce internal motor representations corresponding to observations of the movement, a transcription, if

you will of observed action into movement replication. This is a slightly more scientific understanding of kinetic empathy, but also helps us better understand how the body finds kinetic pathways through visual observation. Dance can be taught as observation and application, but it can also be a creative exploration as neural connections are enriched through its exercise. In the highly developed associations cortex free flow occurs through multiple brain regions. In creative activity neuronal connections fire in response to stimuli and needs, the hippocampus is involved in memory and the thalamus in decision making. Critical thinking processes integrate and respond to creative movement. The process is vast. It can connect with personal experience or relate cultural significance through an internal reflective process, among many other activities. Dance has an important role in the brain's plasticity, ability to connect and create new pathways.

Movement boosts blood flow to the entire body, stimulating the brain. In an article in Frontiers in Human Neuroscience, a study of the difference in effects to the hippocampal region of the brain between fitness sports and dance in the elderly is summarized. The hippocampus function is for regulating learning, memory coding and consolidation, and spatial navigation, including balance. Both dance and the non dance fitness regimens produced growth within the hippocampus region after an 18 month intervention. Dance, however specifically increased balance in the studied group. In a resolute statement, Dr. Rehfeld who led the study, commented, "I believe that everybody would like to live an independent and healthy life, for as long as possible. Physical activity is one of the lifestyle factors that can contribute to this, counteracting several risk factors and slowing down age-related decline. I think dancing is a powerful tool to set new challenges for body and mind, especially in older age." In another article from The

Harvard Mahoney Neuroscience Institute, other areas of the brain are elaborated upon in the study of dance cognition. PET images of the brain show the motor cortex, somatosensory cortex, basal ganglia, and the cerebellum all fire in a coordinated choreography of their own. Cited in this article is an investigative study, done by The Albert Einstein College of Medicine, on the effect physical activity had on the risk of dementia in seniors. They looked at 11 types of kinetic activity and forms of exercise such as swimming and cycling, but found that only one type of activity out of those tested lowered the risk of dementia, dance. It was recorded that dancing, midst physical stimulation, also involved a mental effort for learning and social interactions (Dancing and the Brain).

Dance studies in Neuroscience continue to deepen our understanding of dance cognition and its fundamental role in mental and physical health. Instead of viewing dance as a compartmented entity of the arts that enriches us or an exercise we take on from outside ourselves like cycling or tennis, perhaps we could go deeper. Dance is embodied cognition, creative movement that feeds the health of our whole bodies not apart from ourselves. It is a vital part of our life experience not too separate from water, air, and sleep. Many cultures throughout time have found communal mechanisms for dance, something every person in the community participated in. It is my sentiment, that as studies further show how dance is valuable for health and longevity and how each person has this embodied cognition and capacity to grow within it, that instead of an elite few who call themselves ‘dancers’ and others describing themselves as ‘non-dancers’ with chagrin, we would all see ourselves as capable practitioners.

References

"Dancing and the Brain." *Dancing and the Brain | Department of Neurobiology*. The Harvard Mahoney Neuroscience Institute Letter. neuro.hms.harvard.edu/harvard-mahoney-neuroscience-institute/brain-newsletter/and-brain-series/dancing-and-brain.

Department of Health & Human Services. Dance - Health Benefits. *Better Health Channel*, Department of Health & Human Services, 30 Apr. 2013, www.betterhealth.vic.gov.au/health/healthyliving/dance-health-benefits

Dutta, Sanchari Sinha. "Hippocampus Functions." *News*, 21 Aug. 2019. www.news-medical.net/health/Hippocampus-Functions.aspx.

Harvard Health Publishing. "Exercise and Your Joints." *Harvard Health*, 2009. www.health.harvard.edu/newsletter_article/exercise-and-your-joints.

Faber, Rima, and Minton, Sandra. *Thinking with the Dancing Brain - Embodying Neuroscience*. Rowman & Littlefield, 2016.

Frontiers. "Dancing can reverse the signs of aging in the brain." ScienceDaily. ScienceDaily, 25 August 2017. www.sciencedaily.com/releases/2017/08/170825124902.htm.

Rehfeld K, Müller P, Aye N, Schmicker M, Dordevic M, Kaufmann J, Hökelmann A and Müller NG (2017) Dancing or Fitness Sport? The Effects of Two Training Programs on Hippocampal Plasticity and Balance Abilities in Healthy Seniors. Front. Hum. Neurosci. 11:305. doi: 10.3389/fnhum.2017.00305. https://www.frontiersin.org/articles/10.3389/fnhum.2017.00305/full

Urmston, Elsa. *The Spine: The Impact of Head Position - International Association for Dance Medicine & Science*. 6 Apr. 2015. www.iadms.org/blogpost/1177934/212855/The-Spine-The-impact-of-head-position.

Wilson, Margaret. *Applying Biomechanic Research in the Dance Studio.* https://cdn.ymaws.com/www.iadms.org/resource/resmgr/Public/Bull_1-2_pp11-13_Wilson.pdf