

Sloka Iyengar

Scientists like myself know that a diagnosis of cancer can be associated with substantial levels of stress and trauma. While different individuals experience this stress differently, the diagnosis and the treatment of cancer often are associated with mental and psychological distress. The diagnosis, self-discovery, an invasive diagnostic procedure, and the wait times to find the results can be a source of stress and make one question patterns of predictability and control. Treatments of cancer can have their side effects and, superimposed on all the biological and physiological changes, can contribute to immense psychological distress.

It is no secret that the arts can help us cope with the trials and tribulations life throws at us. Spending time immersed in the arts, any arts, can help express emotions, facilitate communication and healing, help reduce stress, and perhaps even help us understand ourselves. Indeed, for individuals receiving chemotherapy, art therapy has been shown to decrease levels of pain, emotional distress, anxiety, and depression. Viewing art is correlated to substantial changes in the brain as well. Detailed scientific studies have shown that viewing visual artworks leads to the activation of distributed brain structures. It also activates a set of structures in the brain known as the "default mode network," which, among other things, is vital for contemplation and self-assessment. Hence, viewing emotive works of art can help us better understand and appreciate our own mental selves and internal state. This effect may be particularly beneficial after a diagnosis of cancer; with so many appointments and so many things to be done, it may seem impossible to stop, meditate, and introspect. Increasingly, the arts' role in generating self-discovery and knowledge is being recognized in the healthcare community. So, in addition to the science behind the medical care individuals receive, the artwork on the walls of the UCSF Helen Diller Family Comprehensive Cancer Care Center also has scientifically proven therapeutic impacts. The intensely humanistic implications of the arts and the sciences to relieve suffering move me to do the work I do, and I am grateful to write these words for you, the reader of this beautiful book.

My early life was surrounded by art. I am from a city in India called Ahmedabad, and my home overlooked the historic river Sabarmati – the banks of this river are where Mahatma Gandhi started the movement of ahimsa (nonviolence) against the British. Art to me was the colors of the saris and blouses that women wore, intricate handmade embroidery on these fabrics, and the sheer range of colors of cloth that seemed like a vibrant mirror to nature's colors. Even simple cloth used to cover fruit was decorated in the local print and embroidery of the region. Called the Manchester of the East, the fabrics of Ahmedabad are a joy to behold. Art in Ahmedabad is a way of life, how people arrange their homes and colorful pottery, and the pride people take in making beautiful things from waste. Even now, I cherish the (now) threadbare dupattas (scarves) of my childhood. My mother ("Amma") shared with me her love for classical Indian music and my father, Appa, his love for words.

Inspired by Amma, an inveterate animal lover, I learned to care for animals around me. Stray dogs, cats, pigeons, and crows were my charge, and this love for animals led me to help set up

the first humane spay-and-neuter shelter for stray dogs in my city of Ahmedabad, India. Along with being a deeply public-facing work around animal welfare and wildlife conservation, I saw the beauty in the feathers of pigeons, symmetry in the wings of bats, and depth in the eyes of my beloved dogs. I was also fortunate to facilitate a program called Dr. Dog, where I took dogs to schools, centers that served children on the autism spectrum, the Blind Peoples Association in Ahmedabad, and any place that needed the kind of healing only a dog could provide. This love for animals led me to ask questions about animal behavior and eventually to my doctoral and postdoctoral work in neuroscience.

My scientific work consisted of many glorious years of understanding how the brain works, the tools we can use to comprehend the brain's functioning, and acquiring a framework to ask scientific questions, form hypotheses, and formulate experiments to test hypotheses. I studied epilepsy, specifically, a process called synaptic plasticity, which is the capacity of our brains to change with experience. I was interested in finding out how seizures change the brain and why specific neural circuits (e.g., after a stroke or a closed head injury) are more susceptible to seizures and epilepsy. I remain fascinated by the ability to study something that otherwise is so intangible, and every day, through science, I have been given entry into a secret, mysterious world open to a few.

I also learned about the scientific method, which consists of systematic observation, measurement, and experimentation, followed by formulating, testing, and modifying hypotheses. While the scientific method is powerful and has given rise to numerous discoveries, it is also limited. Its shortfalls could be due to limited knowledge and the inadequate applicability of the technique to test the hypothesis. There is a particular paradox (and might I add beauty?) in this dichotomy between knowing and the quest to know more. However, this is the basis of science – always forward-moving but constantly checking itself in light of new knowledge and information. Hence, science, by definition, is eternally incomplete.

A constant companion growing up was dance. I am a practitioner of a traditional, classical Indian dance form called Bharatanatyam. This 2,000-year-old traditional Indian dance form blends expression, emotion, storytelling, music, and rhythm and supports a systematic narrative structure. Offering an enormous and almost endless scope, Bharatanatyam, at its core, has the feeling of devotion (bhakti) and a lifelong relationship with one's teachers (gurus). This gift of culture and tradition in the form of Bharatanatyam is corporeal but still beyond this one's physicality. There is no tangible artifact, but the very act of dance is an act of devotion.

As a practitioner of Bharatanatyam and neuroscience, I have become interested in the convergences between the arts and the sciences and the growing movement that the arts and the sciences are complementary ways to perceive the world around us. This work has taken the form of a production called "Vichaar" (Sanskrit for "thought" or "contemplation") and explores the points of convergence between the arts and the sciences. Dancing as a scientist made me realize how fortunate I am to experience these two very different yet connected disciplines. Whereas science is the theoretical study of reality, dance, to me, is the practical study of reality. Together, science and dance can help us appreciate our world more fully. Even after all these years, I harkened back to my days at the shelter, which attuned me to the world of suffering. I wonder if

science can give us a framework for understanding suffering and if the understanding of suffering can help us alleviate it. The study of suffering seems to fall outside the scientific purview. Yet, my work with animals and as an artist provides me with complementary ways to contextualize science around the alleviation of suffering.

A few other incidents have shaped my thinking about the sciences and the arts. I lost Amma and my mother-in-law ("Mother") within six months of each other in 2019-2020. As I saw these strong women lose autonomy over their bodies, I noticed the way they were spoken to, the words used to describe them in front of them but never to them directly, as though they couldn't understand the enormity of what their bodies were facing. I saw that science and medicine fell short of addressing their suffering and often compounded it. In an attempt to avoid falls, my mother was discouraged from walking. The less she walked, the less confident she was in her ability to walk, and her body and mind disintegrated before my eyes. Every day, I wonder what could have enhanced the lives of Amma and Mother. Both women were very artistic (Amma as a singer, Mother as an art historian), and they acutely missed the ability to create and participate in art.

My work at the intersection of the sciences and the arts is a tribute to Amma and Mother. While medicine and the sciences help us understand pathology, the arts help us understand suffering. While science can inform us about aggregates, art tells us about the person. As a neuroscientist and dancer, I am privileged to share my insights into the interplay of art and science and to be a part of this book whose beautiful artwork and stories of life, morality, and meaning showcase the therapeutic power of creating and participating in art.

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