

Music is one of many expressions of life in which we document, process, and explore what it means to be human. The conclusions we reach and their implications vary between cultures and eras, but collective self-discovery is an instinctive pursuit in which we all partake. While the sciences push us towards progress, the humanities counterbalance these endeavors by analyzing the Promethean effects they can have on society. Reciprocally, the static nature of underlying scientific principles can give unique insight into the dynamic and subjective nature of the humanities.

Identity, both on an individual and collective scale, is a theme that keeps surfacing throughout my work. Last year, I began to volunteer as an amateur music therapist for patients with Alzheimer's Disease and Dementia, ailments which, in addition to the deterioration of memory, cause people to lose their agency and sense of self. Music can help rebuild the neural pathways ravaged by Alzheimer's Disease and mitigate many common mental illnesses including anxiety, depression, ADD, PTSD, addiction, and so on. After seeing this first-hand, I co-founded a company that designs and produces brainwave-sensing headphones, called Trills, to curate playlists that help users focus, relax, get motivated, and reduce stress. Music is intensely personal, so the machine-learning algorithms embedded in the software are designed to find the intersection between a user's personal tastes and cognitive responses. For instance, the algorithm recognizes that I focus well when I listen to orchestral songs in the range of 160-180 bpm, so it might recommend "A quai" from the *Amelie* soundtrack by Yann Tiersen. While this product ultimately aims to help people, the technology also challenges the notion of why we listen to music. Throughout history, people have asserted that music is for the glorification of God(s), the degenerates of a society, displaying social status, challenging power structures, or simply enjoyment. Trills claims that music exists, at least in part, to supplement the human experience by improving our emotional and mental wellness.

This experience inspired me to pursue studies into the humanistic effects of new music technologies. Recently, I have been working on a talk entitled, "The mi.mu

Gloves: Finding agency in electronic musical performance through ancillary gestural semiotics,” which will be presented at the Whalen Symposium this year. Technological innovation has revolutionized the ways in which we consume music. While most of these applications have contributed to the dissemination and accessibility of music, live electronic musical performance has inversely become more disengaged from its audiences. Technology prioritizes the aural components of performance over the visual, limiting a performer’s ability to communicate with the audience through gesture. Recognizing this disconnect, Imogen Heap and a team of engineers developed a set of technologically enhanced MIDI gloves that allow a performer to sculpt music through gesture and movement. The gloves, called mi.mu gloves, track a performer’s spatial and temporal inflections to filter, parse, and add effects to music during live performance. The gloves can be programmed to reflect the unique physical language of individual performers. In essence, the performer becomes a techno-biological instrument and the architect of the space they occupy. The mi.mu gloves allow the performer and audience to construct a mutually recognized aesthetic landscape, created with ancillary gestural semiotics, which grants the performer agency over their body, space, and time.

In my academic work I have sought out opportunities to aggregate knowledge and buttress historical/cultural hypotheses with scientific evidence. Last year, I published an article in the Honors Journal about the theoretical reconstruction of Mayan music using only fragments of instruments, murals, dance practices, and ancient mythological texts. By analyzing the acoustical properties of performance spaces in relation to these cultural relics, I was able to make logical inductions about the music that would have been performed there. Essentially, I reverse engineered the premise of the mi.mu gloves. I argued that there were two distinct veins of music, one for private ritual ceremonies and one that supplemented public spectacles. Using an integrative approach to recreating the Mayan musical soundscape allowed me to explore what it meant to be human in Mayan culture and how they sought to expand their understanding of it.

I used a similar logical framework to conclude that the Crystal Palace of Britain’s Great Exhibition inspired the composer Hector Berlioz to make extensive and innovative edits to his monumental work, *Te Deum*. The Great Exhibition of 1851 procured the latest

innovations and discoveries in the humanities and sciences, all of which helped launch the British Empire into the modern era. These advancements were housed in the Crystal Palace, a visually stunning array of 293,655 panes of glass encased in an iron framework that reflected the marriage of art and science featured in the exhibition. Berlioz captures the affect of the building and its unique acoustical properties through the sparse texture, orchestration, and arrangement of ensembles in the revised version of *Te Deum*. The genius of *Te Deum*'s interplay between the progressive use of performance space and instrumentation to create a three dimensional auditory experience for the audience was lost on Berlioz's generation. However, his works were steeped in a movement of British intellectualism and innovation that anticipated the cultural relevancy of the technology and music presented during the Great Exhibition. Looking at one composition rather than a whole culture helped me focus on the individual mechanisms of change within a collective conscious.

The intersection of the humanities and sciences provides a holistic understanding of a society and its constituents. Trills and the mi.mu gloves allowed me to probe the societal effects of new music technologies at the advent of the Internet-era. Inversely, the physics of sound allowed me to peer back in time to different cultures to understand how the acoustics of performance spaces transformed the role of music in different societies. I see music as the artistic expression of every discipline, therefore I often use it as a lens through which I can explore different subjects.