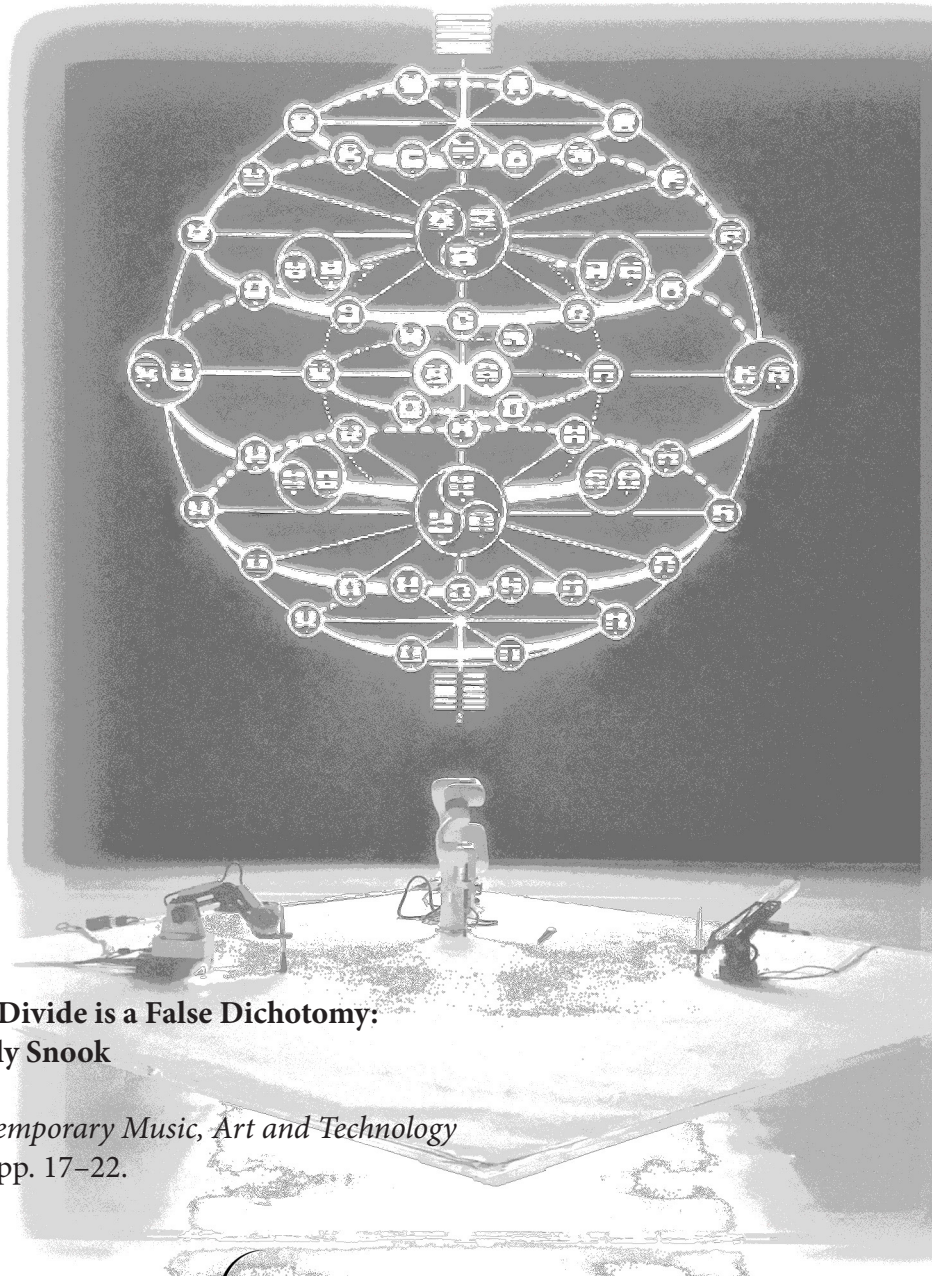


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JOURNAL OF CONTEMPORARY MUSIC, ART AND TECHNOLOGY



“Human vs. Machine” Divide is a False Dichotomy:

Interview with Dr. Kelly Snook

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INSAM Journal of Contemporary Music, Art and Technology

No. 4, Vol. I, July 2020, pp. 17–22.

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“HUMAN VS. MACHINE” DIVIDE IS A FALSE DICHOTOMY

Interview with Dr Kelly Snook¹

Following this INSAM Journal issue’s main theme of human-machine collaboration, I was inspired to start a conversation with **Dr Kelly Snook**, Professor of Media Art Technology, and one of the creators of MI.MU Gloves. Manufactured in the UK and sustainably sourced,



this wearable musical instrument truly gives human-machine collaboration another dimension, considering the organic unity performers can achieve with this instrument. This interview is dedicated to discussion on this project, but also touches on topics such as the intersection of art, science and technology and the position of women in the science and technology world. Given that my first introduction to Dr Snook and her work happened at music industry related conferences where she demonstrated her specific outlook on the industry, part of the conversation touches on that topic too.

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¹ This interview was done within the scientific research organization the Institute of Musicology SASA, funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

Your professional biography is very complex and your professional road seems very exciting: from aeronautics and astronautics to music production and developing MI.MU Gloves; from working as a NASA Research Scientist to teaching Media Art Technology at the University of Brighton, but also collaborating with Imogen Heap as her studio manager and touring with Ariana Grande as her MI.MU Gloves technician. Could you tell us more about those experiences and how one led to another? How are they (if they are) interconnected?

As I get older, I see more and more how everything is connected. From an early age, I knew that music was central to my own purpose in life, but it took years of exploring the world outside of music to understand how science, technology, and service fit together with music. The catalyst for the re-integration of music, science, and technology in my work was my re-discovery in 2001 of Johannes Kepler's use of music and harmonic theory in his astronomical and mathematical investigations. While preparing for an invited speaking tour in Japan on the topic of the role of astronomy and space science in the evolution of collective human consciousness, I was intrigued by his use of music, together with arithmetic, geometry, and astronomy, as one of the "Quadrivium" of fields of scientific inquiry. My quest from that point on to develop a way for people to immerse themselves in data or information has led me to the fields of data sonification, media technology, and game design in the creation of Concordia, a musical instrument platform for playing the universe (www.concordia.world). You can read more about it [in this recent paper about Concordia](#) in the *Journal of New Music Research* (Vol.49/1, 2020).

What specifically is there in Kepler's writings that pushed you in the direction of creating these projects at the intersection of music, science and technology?

What first drew me to his work was the exciting idea that he used music to launch modern astronomy. I wondered, why don't we use music in this way today? What could it be like if we did? Then, as I investigated more, I was extremely moved and inspired by his commitment to pursuing truth, sometimes at the expense of his own world view. The first break from prevalent thinking was the idea that planetary orbits were elliptical, not circular, and that they orbited the Sun, not the Earth. It is difficult to overstate the radical nature of this thinking. But his third law was the most challenging for him to accept – so far beyond what he would allow himself to believe that it was three months between when he made the discovery and when he accepted it. Moreover, it rendered his earliest and most cherished work incorrect, so he went back and corrected it. It takes a special kind of soul to be confronted by their own blind spots and to overcome them. Finally, Kepler was a very spiritual man, but not so religious that he would let Christian dogma override scientific observations

or mathematical proofs. His conviction that God's creation was intelligible and could be understood by us, and that God's organizing principle was Harmony, was what drove his scientific inquiry. In our modern era where science, religion, and music have diverged into separate realms of human activity, it was Kepler who convinced me they are not, actually, separate. That is, I don't see this work as an "intersection" of different fields. I actually believe they need to be considered as one.

How was the idea of MI.MU Gloves conceived? Who are main actors and what are their particular roles within the project?

In 2009, Imogen Heap was actively searching for new tools to liberate her from her computer and music tech on stage. I was working for NASA on assignment at the MIT Media lab at the time and invited her to visit, where she encountered all manner of new ideas for musical expression. Ph.D. student Ellie Jessop had created the VAMP glove, which inspired Imogen so much that she returned to the UK and immediately started looking into how to create her own version of gloves for musical performance. She found Dr. Tom Mitchell at the University of the West of England (UWE) and then I joined them soon afterwards in early 2010. The project was spearheaded by, and centrally focused in the early years on, Imogen's desire to write, record, and perform a song entirely with the gloves. We quickly realized we would need to design our own gloves, as what she needed was not available off the shelf, and we gradually assembled a small team for the software, hardware, and textile work. As it was an independent and informal project with Imogen Heap at the center of the design process, we all wore multiple hats and I was the only one on the team working directly for Imogen, and even then, we had many other projects besides the gloves. So the technology evolved as everyone's side passion project, punctuated by high-visibility performances. Tom Mitchell wrote the initial glove software, and worked with Seb Madjwick of x-IO technologies to design custom sensor and networking hardware. Adam Stark and I worked together on the user interface in Max-MSP for Imogen to be able to create her music and performances with the gloves. Eventually the two pieces of software were combined and rewritten by Adam and Tom into what is today called Glover. Textile experts Hannah Perner-Wilson and Rachel Freire were brought in to design robust and beautiful gloves, and I also worked on coordinating the different aspects of the project and maintaining Imogen's glove hardware setup. Dutch artist, Chagall van den Berg (aka Chagall) joined the team in 2014 and worked on Glover's user interface. At the end of 2014, we sold our first round of gloves to about 15 people, including Ariana Grande, and I left to support that tour. Adam and Chagall took over managing the project, and its eventual conversion into a company.

One of the features of MI.MU Gloves, if I understood correctly, is that every performer can make their own set of commands that best serves their own specific creative needs. Thus we have very varied outputs with MI.MU Gloves, differing in sound, but also the visual side of performance, making them immersive live experiences. What kinds of possibilities for artistic expression does your team strive to provide with MI.MU Gloves? Do performers themselves sometimes approach you with ideas, suggestions or requests?

That is correct. One of the more challenging aspects of trying to build the gloves is the almost endless variety of personal expression that people want to achieve with them. We are constantly trying to find the balance between creating a powerful, flexible, customizable tool and limiting complexity so that tool is as accessible as possible. We do get many requests and suggestions, and not only from performers, but from people who want to use the gloves for other things like robotics or communication. Even a single performer may have many different styles of interaction that they would like to explore. We want it to be relatively straightforward to incorporate the gloves and the Glover software into any performer's unique setup in a way that empowers them and lets them work in ways they have customized to their needs. The gloves can be used to control anything that can talk to a computer, so this makes them appealing to musicians, DJs, visual artists, dancers, and roboticists. We hope that the artificial barriers between these different areas of human expression will begin to blur through the use of technologies like the MI.MU Gloves.



Since the topic of this INSAM Journal issue is Human-Machine Collaboration, it would be interesting if you would share your perspective on some of the questions that we seek to address within issue. How are novelties in machine learning and artificial intelligence changing the ways humans create and think about music? Are these kinds of artistic endeavours important to prepare us for more increasing role technology has in our daily lives? Is the deeply rooted dichotomy of humans vs. machines fading after all?

I do think the “human vs. machine” divide is a false dichotomy, and I hope it continues to fade. Music is a realm where partnership between human and machine yields one of the most abundant harvests of creative output of any field. Whether for personal, individual enjoyment and fulfilment, or for thrilling public performances, machines can help us break through barriers in our own physical environment or in our creativity like never before. Machine learning, when used in technologies like the MI.MU Gloves and other gestural interfaces, can enable such intuitive mappings from gesture to sound that the technology itself seems to disappear as you become one with it. In another example, when used in cooperative ways between performer and audience, ML and AI can create new modes of audience participation and co-creation at small or large scales, and in ways never before possible. Machines will never replace humans, but as they get better, they can make us more aware of what makes us important as individuals and collectives.

As a woman in the science and technology world, would you say this world is more open to women than few decades ago, especially with the development of new technologies? Are there more opportunities for women for work in this field or do you feel there are still some specific challenges?

In general, our society is still in the beginning stages of learning how to operate inclusively, fairly, and without discrimination. That said, I consider myself to be just as limited by my own blind spots resulting from my privilege as I am by disadvantages due to gender. Also, as a person on the autism spectrum, I find the challenges stemming from society’s immaturity in its attitudes toward neurodiversity to be personally troubling. Before being in the CIS-white-male-dominated world of music technology, I was in the field of Aerospace Engineering, so I have been engaging in these women-in-science or women-in-technology conversations for several decades now. I wish there were no longer need for these discussions, but this issue is tightly coupled with some of the other challenges of this time in history, such as racism, colonialism, economic disparity, political partisanship, nationalism, and a host of other symptoms of society’s failure to embrace its oneness. The equality of women and men cannot be solved without addressing this broader failure.

Since we are doing this interview in the midst of Covid-19 pandemic, could we share a few thoughts on the world after this? Do you have some expectations regarding the music industry and its existence in the present form? On the other hand, would

you expect that there is going to be even greater importance given to the projects at the intersection of art, science and technology, bearing in mind the recent renewed emphasis on the importance of trust in scientific efforts?

I am not a fan of the “music industry” in its current form, and I’m always standing up at conferences saying radical things about doing away with it altogether and learning how to create a society that works for everyone, including artists and musicians, by removing the need to commodify our art and music. I dream of a world where everyone’s basic needs are met and economic disparity is eased. I suspect we haven’t seen the end of the changes that the current pandemic is going to bring about, so it seems premature to try to find any kind of stability in this inflection point. I do hope that through this time, our collective attention will be sufficiently drawn to the deep inadequacy and injustices in our systems, which we called “normal.” I very much hope we do not just return to them, as an attempt to do so will be our undoing. You keep asking about the music industry, but I keep zooming out because I think that the music industry often gives us clues about where our weaknesses lie before other systems do. But at this moment in history, when almost no system seems unaffected, my hope is that we will use this opportunity to re-evaluate and redesign from scratch some of our ways of thinking and the infrastructure of daily life using improved metrics.

I was thinking how the conferences where we met were all about the music industry, music innovation and technology, but we do not actually hear so much music there, which is understandable given their focus. But in order not to follow that route, could you tell us what kind of music shaped you, do you have some preferences when working with artists in a studio and what is your soundtrack these days when working on research?

I don’t listen to music as a background for other things, so in that sense, there is no “soundtrack”. As a child I was most moved by intense and dissonant classical music from the 19th and 20th centuries like Mahler’s 10th symphony. When working in the studio, I put most of my energies into composition, production, arranging, and mixing devotional music that is being created for the purpose of elevating spiritual prayers and writings. As a producer who is also a member of the relatively small global Bahá’í community, I most often work with Bahá’í artists. In this way, I am often helping to create music that has a specific purpose, which is a bit like film scoring, but without picture and more conceptual. I am extremely interested in collaboration between artists who are focused on this more lofty goal through processes of consultation and in a spirit of service. Typically, the projects I choose to work on are not traditionally commercial, nor do they have financial profit as a goal. Musically, I love helping people bring what’s in their brains and hearts into reality through both traditional instruments and electronics.