Music and Mind: A Panel Discussion

Conference 2025

SIMON WOODS: Wow. A lot of energy in this room. How is everybody this morning? Excellent. Glad to hear it. So a couple of things happened in 2024. Heather Noonan and I were at an event organized by the White House in Washington, DC, where we spent some time with Renee. And this was an event organized to put the beginning on the whole idea of a kind of cross-party approach, national approach, towards music and health. So that was the first thing that happened.

The second thing that happened was that at the conference last summer in Houston, we did a sort of first session on music and health. And it was like this. It was standing room only. Some of you — who was at that session last year? Yeah, right. So a few of you were at that session. It was standing room only. And so this was really our clue that something was going on here. That this area was really exploding in our field, and there was so much interest in it. And it was that that set us off on the course of wanting to invite Renee for the keynote. And also, it set us off down this road of producing this guide, which we've just launched, which you can download. A Catalyst Guide, which you can download off our website, which is a treasure trove of the work that is currently happening in orchestras. And we think that in a few years time, maybe we'll republish that guide, and it'll be three times as long, because there is just so much interest in this work.

But before I introduce the session itself, I want to say big thank you to our sponsor. Where, as we always say, we couldn't do anything without the sponsorship and support of our business partners. And one of the great friends of the League is Julia Levitan, who has her company, Cadenza Artists, and also is the force behind the new Salt Lake City, Utah, Eden Festival. And those of you who were at the aviary concert on Tuesday night, Julia was behind that as part of the Eden festival. So I'd like you to join me in thanking Julia. And Julia is going to come say a couple of words. Thanks.

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JULIA LEVITAN: Good morning, everyone. It is a true honor to be here today with you and to help introduce someone whose work has been deeply inspiring for me, first as an aspiring soprano pursuing opera, and later as an arts manager and producer. Renee Fleming is not only one of the most celebrated sopranos of our time, but she is also a powerful advocate for something that I believe with all my heart, that music and the arts are not luxuries. They are lifelines. They are how we stay connected to our humanity, our healing, and to each other.

As the granddaughter of four Holocaust survivors who lost most of their entire families during the Holocaust, I grew up with a deep belief that the power of music can lead people through the darkest moments in life, and can help find healing and belief in good and light even in moments of extreme darkness. In her book, Music and Mind: Harnessing the Arts for Health and Wellness, Renee brings together leading voices in neuroscience, medicine, and the arts to explore how sound shapes us, how music can regulate our emotions, support our healing, and help us to thrive body and soul. In her words, it is our moral imperative to increase positive social connection. And she reminds us that music is one of the most powerful tools that we have to do just that.

This message lies at the heart of both Cadenza Artists Management, which I founded 17 years ago, and the Eden Arts Festival, which I just founded here in Utah last year. Eden was born with the belief that in a time of uncertainty and division, we must make space for creativity, curiosity and connection through music, film, immersive technology, and youth education. Our festival creates space not just for performance, but for meaning, imagination and joy. At Cadenza Artists and at Eden, we believe what Renee Fleming so beautifully demonstrates. That the arts don't just reflect who we are, they shape who we become. So it is my deep joy to welcome her now. An artist, an advocate and a visionary for what music can do for us and for the world. Renee Fleming.

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SIMON WOODS: Thank you, Julia. Thank you Julia. Really appreciate that. Thank you. So, many of you were at Renee's keynote yesterday. She is, as Julia so eloquently said, an inspiring presence. And she's going to be joined here by two remarkable people who are going to give you some amazing insights into some of this work that is going on. We have with us Assal Habibi, who is Associate Professor of Psychology at the Brain and Creativity Institute at the University of Southern California. And I will say that in my time in LA, I had a chance to get to know Assal and the team at the Brain and Creativity Institute, and it's remarkable work. And we're so thrilled that, Assal, you're joining us today. And you're also going to hear from Indre Viskontas, who is Associate Professor at University of San Francisco, a cognitive neuroscientist, science communicator and opera stage director. But didn't you leave opera singer off that as well? Yeah, she left that off, right. Because she's a person of many skills, Indre, and you'll hear from her. So the way we're going to do this is we're going to start with Assal, and then Indra. You'll see some presentations from them. Then Renee will join them. There'll be a panel discussion, and then we'll go into questions. So thank you very much for being here. Assal. Let's go. [APPLAUSE]

ASSAL HABIBI: Good morning everyone. Thank you, Simon for the invitation. It's been such a pleasure to be here. And thank you, Renee, for putting this together. Always such an honor to share a conversation with you.

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So, I am a neuroscientist by training. I'm interested in the role of music engagement in development across the lifespan. I grew up playing piano, and I always really valued the role that being a pianist played in my life. And I hope that my science can provide evidence for policy so we can have access to music education, not only for children, but really across the lifespan, for adults and older adults as well. Today, I thought I'm going to share with you a couple of collaborations at a neuroscience lab, as we do with music organizations and orchestras in Los Angeles, to give you a flavor of what these collaborations look like and some of the results that have come from that.

The first study I wanted to talk about is a study that we have done with the LA Philharmonic and their Youth Orchestra program. This is a five year longitudinal study that we started in 2012. And we basically went in and assessed the impact of participation in YOLA, in children that who participated and enrolled in it. Over the years, we saw these children at our laboratory, and we tested them with a comprehensive battery of cognitive, language, emotion measures. But also, we looked at their underlying brain development and how the structure and function of the brain changes as a result of music training. We tested everybody when they were six years old, before they had any music training. And then every year we saw them once. We also compared them to children who were not doing music. Because we are looking at this longitudinally. Everybody changes, so we wanted to account for that. We had an active control group of participants who participated in soccer, and a passive group of participants who at the time of enrollment, they were not part of any enrichment activity, whether that was soccer or or music.

This is a very comprehensive data set. I think we have over 20 papers already published from this. So I'm happy to answer questions. I don't want to go into a lot of details, but I want to highlight a few of the findings that I think are very important in terms of development, both from an education and also a policy perspective.

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Okay. I'm not going to show you a lot of neuroscience, but just a picture of the brain. You're looking at the brain on the right hemisphere and the left hemisphere. The areas that are colored are the areas that are processing sound information. These are temporal regions of the brain, the auditory cortex. This area not only stimulates and processes musical information, but it's important for processing sound in general. Think about communication, language, and speech.

What we have seen in children who have had music training, just after two years of training, neuroplastic changes in this specific regions. The rate of cortical thinning slowed down. They

preserved more cortex in these areas, especially on the right hemisphere, compared to their age match counterparts. So not only their pitch perception is better, and their rhythm perception is better, but we see changes in the brain structure associated with that. And these results replicate after four years of training as well. And again, this is an area that we all use for processing anything that is sound-related. So we think that maturation of these regions and neuroplasticity in this area correlates with better language development skills, speech perception, perception of emotion in a communication, whether you can say if somebody is happy or sad. You probably have a more effective and successful communication with them.

We've also been looking at the connection between the two hemispheres of the brain. Renee mentioned the corpus callosum yesterday. This is a highway, really, that allows communication and connection between the two sides of the brain, and really, transfer of information.

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At the beginning of the study, when we did this measure, there were no differences between our groups. This was before they had any training. But again, after a couple of years of training, we see more robust connectivity in children who have had music training, not only in areas that connect as sensory regions or motor regions, but also the frontal lobe, the front part of the brain that is really responsible for decision making and planning. So really, that allows for better integration of information, we think leads to more creativity and decision making.

We've also been looking at their behavior. How does behavior change? And specifically, a set of behavior under the umbrella of executive function. Executive function skills are very important for life success, in general. You are a better decision maker. But also specifically for academic success and achievement. And one of the areas that we have looked at is this idea of impulse control, delayed gratification. You can have $1 now, or if you wait three hours, I give you $50. And you're able to delay that wanting to want to have that immediate reward, for something better and larger in the future. And what we've done is we basically kind of modified the size of the reward. We ask the children, you want to have a candy now, or two later? And then that size of the future reward changes. One now versus six later, or one now versus 10 later.

What I'm showing you in this plot, on the very left, you see the music group, and the colors correspond to the size of the reward. When the reward is small, sometimes the children in the music group wait, and sometimes they want the reward immediately. It doesn't matter. It's not a huge deal. When they're dealing with the large reward, 100% of the time they wait for it. They're able to modify their behavior based on what's coming in the future, and make a decision. And this is really related to — especially in the case of YOLA, because this is a group training program — your ability to step in, to stay back, to take turn, to listen to anybody and to everybody else in the ensemble. We think

practicing those skills as part of this music training leads to this really important skill of impulse control.

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If you look at the very far end, the control children, they do not modify their behavior depending on the size of the reward. It doesn't matter if it's small or large. Sometimes they wait and sometimes they — they don't really have, built in, this capacity of decision making based on what's coming in the future. And this has real implications. Imagine a child who walks into the middle school and decides which peer group they associate with, or how often they show up to class in order to graduate. It's not just about candies and immediate reward. But really, this network of the brain supports decision making. And we've done this task also in the MRI scanner, and we showed that engagement of these regions, the frontal areas of the brain, this executive network, is more active in children who have music training compared to the others.

So not only do we see again behavioral changes in terms of their patience and delayed gratifications and impulse control, but these are regions of the brain that facilitate this process. And we see more activation in the brain. So both from a structural perspective, behavioral perspective, and also functional changes in the brain.

We've been also asking their families about, how do you think your child is doing? They're participating in this program. And over time, we see that the parents of children who have had music training rate them less aggressive and less hyperactive. The soccer players are in the middle. And we don't see that pattern in that program, even though the parents are as committed. They have to show up as frequently, but they don't see these benefits. And really, the control group on the right, you can see that they're not participating in activities. And even from their family's perspective, in these really important indices of mental health, their parents think that they're doing worse over time as they get older. So really, absence of any enrichment program is a disservice to these children.

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So I wanted to move on from this study and talk about a new study that we are doing with the LA Opera and the Los Angeles Children's Chorus. We've been thinking a lot about impact of music by itself, but also when music is paired with something else. With storytelling. We are not teaching six year olds to be opera singers yet, but we are really introducing them to the opera in a way that — these are 25 children who participate in this study. It's a study one year old. We just started. Six year olds, they do their choir training with the Los Angeles Children's Chorus weekly. But twice a month, we have teaching artists from the LA Opera who go to their program, and there's an additional hour of training about, what is an opera? How do you put a story with music together? Who is a hero? How

do you amplify that voice? And they really learn about elements of opera, and then practice some scenes together with their teachers.

We also have asked them to attend six performances during the year with their family. Because we think for a child to be able to walk in into a performance space, see the lights, see the costumes, it really opens their mind about this world. And in a way, we also get these families who often do not go to these performance spaces, to participate in performances. So we just finished collecting their post-intervention data, and hopefully I'll have something in the future soon to share with you. But in terms of the skills that we're looking at, we're looking at musical skills, social emotional skills — so the ability to take another person's perspective, have empathy, put yourself in somebody else's shoes through a story—but also language skills. Learning how to pay attention to subtlety of different languages that comes associated with singing, and also paying attention to an opera performance. We think that would support their language performances and language abilities.

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Okay. So, moving from childhood to older adults. As I said, I think music engagement should be available for everyone at every stage. So we have been looking into using music as a way to bring back communities of older adults together. And one of the mechanisms that we are focusing on is the ability to hear speech in a noisy environment. Speech in noise perception is very difficult. Think about yourself, when you go in a restaurant and you almost have to scream to hear another person. And we know that musicians who have had many years of music training are better at speech in noise perception. They're just better at allocating their attention to the relevant signal.

So our idea was, what if we teach music to older adults who have had no music training? Can we help them with their speech in noise perception? And if they have an easier time communicating with others, they probably participate in more social events. They go to family gatherings.

So we have started this study. This is the third cohort we are doing. We recruited older adults above 65 who have had no music training or singing background at all. They come to our laboratory, we test them, and then we randomly assign them to a choir intervention for 20 weeks, or a group music listening. We wanted to control for the group aspect interactions of choir, but also presence of music. So the music appreciation class, they listen to music, they talk with each other, but nobody sings. There is no music production.

And the choir, they learn singing. And nobody wants to sing when they first come. They signed up for a singing trial. Nobody wants to do this. It really takes about three weeks or so until they feel comfortable.

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It's very vulnerable, if you have never had that experience, especially at an older age, to go on a stage and share your voice with others. But I have seen now three times that we've done this, really the progression of how much bonding happens between these individuals. We just had their performance about a month ago, and these are individuals who did not want to have anything to do with singing. After 20 weeks, they had a performance. They had their grandchildren, their family members, their friends. And they just performed so beautifully, and they've bonded so strongly as a group.

So we actually do see the benefits in speech in noise perception, which were our primary outcomes of change. So we see that their hearing abilities are better, but we also see significant reduction in anxiety and depression and improvement in interest in life. This is such a low investment, to bring older adults together to create communities. And they all have now been placed in community choirs in their own communities, and they want to continue doing that. And you know, they're just going to sing and enjoy for the, really, enjoyment and joy of music that that brings to their life.

And I wanted to end, because Renee mentioned memories and music yesterday, and I thought I'd share this study that we're doing about the power of music to help us access memories at times that that access is difficult. Think about mild cognitive impairment or dementia. We think music is a soundtrack to our life in a way that really helps us encode memories. But maybe not every type of music is appropriate for everyone when we are dealing with patients that have difficulty remembering. And we think nostalgic music — specifically, music that is nostalgic to an individual. This is different from me, for you, for somebody else. Music, if I — just think about the song of your wedding. If I just play about 10 seconds of that, you see yourself in that space, you probably know everybody who was there. What are the smells? What are the colors?

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So we've been really concentrating on looking at nostalgic music for individuals. My graduate student, Sarah Hennessy, has designed this really nice algorithm that, individuals come to our laboratory. We ask you, “What is your nostalgic song?” And you share with us three songs that are nostalgic for you. And then she uses a Spotify API to find songs that are familiar, but not nostalgic, but also they match in every auditory feature as possible. Lyrics, valence, arousal. So really, the only difference between the two sets of songs that we are comparing, is one is nostalgic for the person, and one is just familiar.

And next I'm going to show you the brain activity associated with nostalgic music listening. These are brains from the outside of the brain from the top, and the middle of the brain on the bottom. And what we see is that music that is individualized and nostalgic significantly engages memory areas of the brain. So not — a lot more than just familiar music. Areas that are related to self and self referential. So, the default mode network. And also, reward regions of the brain. These are dopaminergic networks of the brain that are associated with listening to nostalgic music.

And we think that this information is really going to help us to design interventions that are a lot more effective for the individual that we are working with. To really come up with musical playlists or musical activities appropriate for that person. Adam is telling me I'm out of time, so I'm just going to acknowledge my funders and my lab and thank you for the opportunity.

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INDRE VISKONTAS: So thank you Simon, thank you Renee, and thank you Assal, also, for the beautiful setup. Because now I'm going to talk about some choral work. So thank you for laying that groundwork about why might be important to a room full of people who are orchestra professionals.

One of the things that we know now, and that was written about by the former US Surgeon General Vivek Murthy, is that we are in the midst of a loneliness epidemic. And that epidemic has measurable and serious consequences to our health. And our young people are particularly at risk, because they are spending more and more time alone.

And this isn't just an effect of the pandemic. The pandemic super-sized this effect, but it was already going in this direction. So our young people are now at risk of a lot of the poor outcomes of health, of loneliness, more so than any other generation. And this has real consequences for our future in many, many different ways. And over the last century, our economy has changed from starting out with people valuing commodities, and then products, and then services, and then experiences. And we could make the argument now that experiences alone are no longer enough to get people to come. Transformation is what people are looking for. We see this as a trend going out in terms of what kinds of experiences are really drawing people in.

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And I've been really interested in this. How do we, as arts organizations, as creatives, give people these transformative experiences? And one of the ways I think that transformation happens is through the experience of awe. And in fact, we can now, as scientists, divide awe up into its various

core features. So, encountering something that transcends ordinary experience in size, scope, complexity, or significance. A cognitive challenge where your existing mental framework needs to expand to process the experience. A diminished sense of your own self, so feeling small or insignificant because you are part of something greater. A sense of connection, feeling more connected to others, nature, or the universe. Time slows down or is expanded. And there is a physical signature of awe, which is really great news for scientists, because we can track that. And we can see exactly when that happens and what the consequences of that might be. And then, beautifully, the sense of going beyond an ordinary experience or consciousness.

And all has cognitive and psychological benefits. It enhances creativity. It increases curiosity and wonder. It promotes learning, reduces symptoms of depression and anxiety, increases life satisfaction and well being, enhances mood and positive emotions, and promotes psychological resilience. All of these tools are something that fight some of the most nefarious consequences of being lonely. So if we could use the experience of awe, or the promise of giving someone a transformative awe experience that brings them into whatever it is that we're providing, they can then reap these benefits and we can help mitigate the negative effects of the loneliness epidemic.

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Last year in Lithuania, it was the 100th anniversary of the Choral Festival. And this festival happens about every four years, and it's massive, and the whole country comes behind it. It's a UNESCO cultural heritage event, and some might argue it was responsible for bringing down the Soviet Union. Because during the occupation, this was one place where Lithuanians, and actually all the member Baltic states — Latvia and Estonia — could come together and sing things like the National Anthem, which was banned. So, The Singing Revolution —there's even a documentary film about this — was one of the ways in which people were brought together as an act of resistance, and that gave them the resilience and the strength to essentially overcome the oppression.

Now, Lithuania hasn't been occupied for 30 years. That might change in the future, and it is a country that is preparing for that possibility. So it feels very real right now. But for 30 years, it has not been occupied. So anyone under the age of 30 has not experienced this kind of resistance and this kind of a festival. And so for a lot of the young people, it's their parents' and their grandparents' festival. And why do I have to put on the costume, it's hot, and walk for a mile to get to the stadium and then stand in this big thing in the heat, et cetera, et cetera, et cetera. So the leaders of the festival asked me, "What can we do to show these young people why this is important?" And I thought, "Well, if anything is going to induce a sense of awe, it's standing on a stage with 12,000 of your friends and people from your country, and singing together in unison." Right? That has to be an awesome experience. And so I wondered whether this was an opportunity to actually test the impact of experiencing awe on a number of measures of well being. And of course, we wanted to see whether or not we could see the physiology of that experience, the actual goose bumps that come with awe.

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So we wanted to look at music that induces the chills. This is this physiological reaction, frisson, whatever you want to call it, when we listen to that music. And there are certain features that we know from the lab studies. Things like sudden dynamic shifts, especially an unexpected increase in volume, an unexpected harmonic change, the entry of a new voice or instruments, especially the treble voice, this is why sopranos have high notes — that actually also has the enhanced ability to give people chills. The melodic appoggiatura, momentary creation of dissonance before resolution, and an expanded frequency range, when the music suddenly extends into a significantly higher or lower frequencies than previously established.

So there was one piece of music that, after looking at the program of the 35 songs that were going to be performed in this final concert of this festival that we felt were was most likely to give people the chills. And it's called “Kur Giria žaliuoja [?].” And it’s not the national anthem. It's the anthem that was often sung instead of the national anthem because it hadn't been banned. But it also has all of these musical features. And I'm going to play you a video of this song being sung at the event, to give you a sense of what it might have been like to be in that experience. And I would like you to sort of listen for these musical features and see if you can hear them. If you would agree that this was indeed a good choice. And I'm not going to translate the words for you, because then you would just be focusing on the words. So instead, the words in Lithuanian will be put up there. And the words — unless, if you speak Lithuanian, great. If not, it's essentially about how the natural beauty of the land is something that we have to take care of. And when we do take care of it, that's when we can reap the benefits. So it's a beautiful ode to the beauty of the homeland. But the metaphor is really about the culture that we need to continue to nourish.

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[song plays]

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So hopefully you noticed, especially when the men come in, there's a big unexpected increase in volume and a change, and there are all kinds of those features. And it repeats again, and it's the second time through, really, where I think most people get the chills.

So the first question I had was, is getting the chills from music limited to special brains? Because this is the story out there. When we come into the lab, not everybody gets the chills. In fact, somewhere between 50 and 80%, depending on the study, of people are reported getting the chills. But it's certainly not something that people think of as a universal phenomenon. And I have shown this video in audiences like this, with people who know nothing about this piece. And inevitably, a small proportion of people come up to me and say, “I got the chills.” So I don't think that it's a rare phenomenon, because most of you don't have any meaningful connection to this music. And yet it already has that impact. And we also hear that, “Well, you only get the chills from music that's meaningful to you, that you've heard before,” et cetera, et cetera.

Well, 95% of our respondents reported getting the chills. And I should say that we asked people before the festival a number of well-being questions and various other questions about their relationship to music. During the actual concert, we asked them about this song in particular. So these are results from over 1500 people who responded to the survey about this particular piece, and 95% of them reported getting the chills. And then after the festival, we had another 2000 people fill out our questionnaires looking at well-being.

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So it's not a rare phenomenon. It's rare to have an experience that is this awesome. And I think that's really the key feature, is that we are all primed for this kind of an experience of awe. We just need to have the right conditions.

It turns out that this kind of situational awe experience was very common. And it was more common in our participants than viewers. And the viewers, though, I will say, that mean score in situational awe is higher than the scores published of this particular survey scale from studies that were distinctly designed in the lab to give people a sense of awe, like watching videos of nature, listening to other kinds of music, et cetera. So already, the viewers have a high proportion of situational awe, and the participants, even more so.

And it turns out that the song festival was indeed a powerful inducer of the state of awe. And feeling the chills, that physical sensation, was very strongly connected to feeling connected with one another. Very strongly related. And so when we experience awe together, we feel more connected, and that sense of connection is higher even in participants than in viewers. But even among viewers, it's a scale out of five. So they're averaging 4.4 out of five. There's a very strong sense of connection. In terms of general well being, before the festival, our participants showed maybe a trend towards slightly higher general well being than our audience members. After the festival, the audience members were at the same level as the participants before the festival. So we do see this increase in

general well being of even just being in the audience of this event. But the participants got the most benefit.

And the fact that we saw this kind of an increase in a general well being scale — we used the World Health Organization's five question well being scale, which is not supposed to have that much movement. It's supposed to be essentially a litmus test of, in the moment, how well are you? It has questions like, you know, “Do you feel well rested? How's your stress level?” Et cetera.

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So to see this huge bump, I think, is really kind of amazing. And I will say that when we looked at people who did not attend the festival or watch it on TV, we saw no difference in their general well being. So it does seem to be relatable to what happened at the festival.

So awe has physical health effects. It lowers stress hormones and cytokines. It boosts immune system function. It is associated with better cardiovascular health. And we wanted to have a physiological measure to see what was happening in our participants and our audience members as they were experiencing this concert. So we tracked heart rate synchrony in 70 of our participants. That's as many heart rate monitors as we could get that were research grade. We literally had, all over Europe, labs sending us their heart rate monitors so we could put them on people.

And what we were interested primarily in looking at was whether heart rates, the variability of the heart rate, synchronizes. So these are two performers, and their heart rates over time. And one is in blue, one is in orange. And what you can see is their regular heart rate is not the same. So we all have different baseline heart rates. But what's interesting is that they peak and valley around the same time. And that's what we're interested in, because that is the kind of synchronization that happens when we experience music together, or when we move together. And that is driven by the attachment hormone oxytocin. That's what helps synchronize your brain and body and so on. And it is a big driver of empathy and feelings of attachment. So we saw this physiological measure as a kind of proxy of whether people were also feeling socially bonded to each other beyond what they could tell us in a survey.

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So when we looked at the song “Kur Giria žaliuoja,” I put a line where there is zero. So if there was no heart rate synchrony, all those dots, which are all of our participants, should be scattered around that zero, up and down that. But instead, you can see it's significantly higher than zero. And in fact, Ivana

Konvalinka [?], whose lab conducted this part of the study, said that she was incredibly surprised at how robust these results were. She's studied synchrony and heart rate variability in the lab in a number of different conditions, and this was off the charts for her, until she looked at the song just before the song that we all felt was going to be the one that was going to bring everyone together. That's the synchrony for the song before "Kur Giria žaliuoja."

So then we were like — well, we need to — what was happening during that song? Let's go back to the video and look at what was happening in the concert during that particular part of it.

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[video]

So this is a pop song. It's a fun song. Everybody's swaying, and so on and so on. And I will say it's not just a swaying effect. But this is what we were able then to do, is go back it through the entire length of the concert and look at where synchrony was high, what people were doing. And we saw some really, really interesting results. Which, unfortunately, I don't have the full time to tell you about, but I'm happy to talk about it in the question and answer period.

So awe gives us meaning and purpose. Awe has social benefits. It promotes pro-social behavior and generosity. It strengthens our sense of connection. And it helps us put our daily stressors in perspective. It has all of these benefits.

And I'm just going to end with one final data point that I think you might find particularly interesting. As orchestra professionals, we looked at collective self esteem. And this was important to the leaders in Lithuania, because collective self esteem is something that is going to help the country be more resilient. And it has a number of different elements, including membership. So, do you feel like you are a valuable member in your group? But also, are you proud of your heritage? Are you proud of who you are? How's your collective self esteem? And then, of course, your individual self esteem?

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Those who did not watch or attend had a significantly lower collective self esteem than those who sang in the concert. People who watched on TV had a slightly higher self esteem than those who did not watch or attend, and same with those who attended in person. But of course, those who sang in the concert were the ones that had the highest self esteem. But those who played an instrument did

not. There were 1000 instrumentalists who are accompanying these singers. So my friends, what's happening to our instrumentalists that we need to bring them into the fold and boost their self esteem? That's the question I'm going to leave you with. And — that's it. So, yeah, thank you.

RENEE FLEMING: Hi, everybody. So, okay, just tracking that. So were they professional musicians in the orchestra?

INDRE: Yes, they were professional musicians. So maybe that's the answer.

RENEE: So they just showed up and read their charts. Whereas the singers had to prepare for how long?

INDRE: For two years. Yeah.

RENEE: Yeah. Well, that's one major difference right there. But it's really good if all participants can always feel great about what they're doing. Morale is important, and there's no question that the changes in our classical arts landscape has really probably been hard. So first of all, I had waves of goosebumps through this whole thing, and chills. Just her talking about it gave me chills. How many of you had the chills in the presentation? See, that's —

INDRE: It's not not a rare phenomenon.

RENEE: Yeah, no. It's very moving. And the the elements of the song, I also attribute to kind of typical folk music. Which I think is universal in cultures that have had a shared type of folk music, which would be Europe and the US, and probably beyond that as well. So that was really exciting. And this idea about awe.

Now I'm connected to my role at the Kennedy Center. The National Symphony Orchestra started having sing-alongs before their concerts. And I sort of thought, "Wow, that's odd. It's an orchestra concert. So why are they having people come early if they want to, and do a little sing along?" So I never got a chance to ask Nigel about that, and the team there. But if anybody's here from NSO, we'd love to —is anybody here from NSO? Okay, so I thought we had a chance to ask them. But in any case, it promotes all of those things, and then it also primes them for the actual concert.

I have so loved attending orchestral concerts, attending, in the last year. And really three or four years. It's been a special gift to me as I tour, to be able to, the night before, go to a concert. And I also tell people, “You've got 100 people on stage who are actually really listening to each other and collaborating.” That's really heavenly, I think, and something to cherish.

So, I just absolutely love both of your presentations. They have phenomenal chapters in my book, and I think Stanford Thompson, are you here? Did I hear that you're here today? Where are you? Raise your hand. Okay. Anyway, another one who's here, who has a great chapter in the book about a phenomenal program in Philadelphia.

So, Assal, we had — Assal put together a whole day of talks on Monday in Los Angeles about education and about childhood, early childhood, all of that, which was incredible and really powerful for me to see where all the disconnects are between the research and the dissemination of the research in schools and with young people. What was your takeaway from that day?

ASSAL: Similar. So, the idea of the day was to bring researchers and educators and policy makers together, because, like as my lab and many other labs, Indre’s, and others — we have the data. But how can we use this data, both in education and healthcare, that is effective? And I think one thing that I came away from was needing to have better communication in the scientific community. They told us that we have to write one page briefs for policy makers. So don't go into too many details. But also, include educators in these designs of these studies, and their perspective on what is needed in the classroom. I think that was something that I haven't thought about before. I mean, in our work with YOLA, we worked very closely with the education team, because we wanted to know what they do. It was a new system. But in general, including either a music therapist or an educator within the design of a study, I think that's very important.

RENEE: Well, and also messaging to policy makers. You know, we just learned that day that it's not the Board of Education who makes decisions about accreditation. Because a representative from Los Angeles Philharmonic was there, and she said that she's been really thinking hard about all these teaching artists that she has. How many of you in your orchestras have teaching artists, wonderful musicians, who also either go into a healthcare situation, or who are teaching as well. And how to get them accredited? Because LA, or California, has this Prop 28, which is providing funding for arts education. But there's a tremendous shortage of educators. So how to fast track them, how to get them that accreditation.

[0:46:04.0]

And so it took us the whole day, and I made some phone calls the next day to figure out that it actually has to happen at the governmental level, and be a change in laws. So it has to happen in Sacramento. So we're going to try and work towards that.

And I've been also talking to organizations about providing a fast track for so many trained musicians in our country, both singers and instrumentalists, who are not somehow able to work in their chosen field, but who have all this training and education. And what if they wanted to become music therapists, say? And to try and figure out ways, since they already have the instrumental or vocal training to get them through that process, also, without four years or six years. Because music therapists typically have a master's degree. So we're working on that as well. And I welcome your any of your thoughts. Are any of you working on that? Thinking about that? Fantastic. Where are you from? Which organization? Queen's University. Oh, fantastic. Okay, so, yeah. I think it's something we can do for all these young artists. Education has typically been the track that they could go on. But how much better if they can have the benefits and a structure around K through 12 education.

So, so let's talk about ensemble learning. Because I think with YOLA, which you — so, Assal is really the leading researcher on instrumental music in children. She is the go-to person. And her work with Antonio Damasio and Hanna Damasio, has kind of — they really just kind of encouraged you to go with it, right?

ASSAL: Yeah.

RENEE: So YOLA — I was really interested to see that you had such strong ADHD associations with this. Can you talk about that?

ASSAL: Yeah. I mean, I think the ensemble part of YOLA — and when we first walk into these classrooms, there are 40 kids with violins, and nobody's playing the violin. Everybody's just, like, hitting each other and everything. That's chaos. So it's like, “Well, this is not going to lead to anything.” But the community aspect of it, the sense of belonging, the sense that they matter, their voice matters, and their presence matters. I mean, YOLA has been really successful in creating that community for the participants and their families.

[0:48:32.7]

And at the beginning, when we asked the kids, “Why are you going to Orchestra?” Well, half of them wanted to be Gustavo when they grow up. So that was the first time I heard the role model of a rock star type musician. But it was also because, “I have friends here, I have a community here. I belong

here. I feel safe here." And I think that social aspect of music learning as a group really leads them to just really be committed. Because when you are six and you're playing the violin, it just doesn't sound — it doesn't give you the emotional reward or an awe experience to continue. It takes time. But I think creating that social, interactive aspects of it.

So I've been, I think, just having group interaction. And also, in terms of engaging their attention. I was recently at a YOLA Institute, which is kind of like their higher-level orchestra at the Beckman Center. And I walked into this room. It's a Saturday morning. These are teenagers who have had four or five years of training with YOLA. And for the three hours I was there, not a single one of them picked up their phone. And I teach undergraduates, and I see them, that as I'm teaching, everybody is doing —it's something that they all do. But these teenagers, they were so focused. And I think in this environment, this kind of these business of attention, the fact that they can focus, and they have sustained attention, and they're paying attention to not only the conductor, but also to the players next to them, and have that emotional exchange. It was such a profound moment for me to see how that music training has impacted them as individuals.

[0:50:18.0]

RENEE: So I heard Jonathan Haidt speak recently, and he wrote The Anxious Generation. If any of you work with young people, you must read that book. And so he said that his his book actually talked mostly about the negative effect on girls on social media. But he said actually, as a teacher now, he would have rewritten the book to include boys. Because he said it's been, he thinks, in some ways more destructive for boys, because he said they have no attention span. And we've seen recently that even in Ivy League schools, kids are not able to read. They have huge anxiety around reading. So that's another reason. These are messages that you can share with your constituents. If you have youth orchestras, if you have the possibility for going into schools, these benefits are proven. That's the advantage of science, is that you have evidence which is necessary for sure in our health care system, but also in education. Somebody said to me the other day, who came with me on Monday, why —okay. We know it works. Why don't we just do it? It's not our system, you know. And for many good reasons.

So anyway. So Indre, I I just think that study is incredible. And to talk about awe, and the reasons why people would come to a concert. You know, you almost have to help them. You know, with this language about — if you've been brought up with the music — we know this. If we know it, if you've played instruments, you're indoctrinated. But for people who want to try it out, it doesn't hurt. You know, one of the things I said, if you have super titles, put some of these factoids on your super titles during intermission or before the concert to kind of just start educating people. I start now talking about it in my concerts. I constantly — we have sing-alongs for at least two songs in every concert I give. And then I just say one sentence about the health benefits of that. And I'll leave them with,

“Don't you feel joy? Don't you feel better?” And they’re literally jumping out of their seats by the end, if I tailor make the encores just right. You know. There is a method to that.

So, the— well, you answered so many of these questions, actually. How would you recommend artistic directors and creatives in the orchestra world think about programming with the information you have?

INDRE: Yeah. I mean, I think we are at a time where, as Assal mentioned, we are fighting for attention. And sometimes we have a creative vision, and there is something to be said for art for art's sake, and “It's my creative vision, and I don't care if nobody likes it.” But that has to be balanced with something that's going to bring people in, especially young people, who have so many different options of how they can be entertained. And so giving them these transformative experiences—and as you said, making, also, them conscious of that—

RENEE: Yes.

INDRE: — I think is really important. And so I think artistic directors, now more than ever, do actually have a responsibility to, if they want people to come and be transformed and include people that have never come before, give them a sense of what they might expect, and then help them notice that in the moment. That this is actually happening. So you really solidify that understanding. And then, you know, if I could just advocate for working with some scientists. There are a lot of really great neuro tools available now. And, I mean, the whole industry of this neurotech is now exploding. There are times where, look, you've got to be careful about— some of these tools promise things that are really not backed up by solid science. And so, you know, you don't just take the company's word for it. Partner potentially with a scientist or someone else who's maybe a little bit skeptical. But there are these tools that you can use to measure impact and learn a lot from that.

[0:54:05.2]

So from our study, for example, we learned that the audience members, when their children were performing, showed greater heart rate synchrony than the performers who were on the stage but were not actually singing. So we see this dip in synchrony for the performers when the kids are singing, but we see this boost in the audience when the kids are singing, if the parents are the ones that we're measuring. And so there's all these interesting things that you can kind of learn.

And also, I think when, when we think about these experiences, if we understand a little bit about the biology, we will understand that not everything can be a peak experience all the way through the

program. So you have to design a program where you know what you're expecting the peak experience to be, and how you set that up and so on. And so I think being mindful of how your audience is physically reacting is something that could really enhance the transformative potential of your programming.

RENEE: Right. You're going to start getting complaints from your audience saying, “I didn't feel awe today. This was— you obviously didn't do your job.” But I thought it was kind of interesting. Chason Goldschmitz was in my office for the last six years, and he has an orchestra in Pennsylvania now. And I just looked at his program, and it had at least three concerts with candlelight. And I thought, “Wow, that's a really simple thing that would definitely give people awe, no question.” But if you can also tell them that that's what it does, then they'll look for these experiences.

And I loved your thing about the fact that now we're looking for these types of enhanced experiences. We're don't want just the regular old. So, you know, thinking about how we can evolve and add the health benefits of what it is that we're doing with music, I think it's very important, this messaging. And there is a grassroots movement. There are a lot of books. You know, it's not— my book, for sure. But Dan Levitin has a new book out, who's our probably best-known neuroscientist. Susan Magsamen and Ivy Ross’s book, Your Brain On Art. Connie Tomaino has a relatively new book out about elder care and music. These are all really helpful. Do you guys have books out? Are they coming?

[0:56:19.0]

INDRE: Mine is coming out in 2027.

RENEE: Okay.

INDRE: So it’s a while yet. But, yeah.

ASSAL: Yeah. I’m in preparation.

RENEE: But I also think this communication piece for scientists— you know, Francis Collins, when I started working with the NIH, National Institutes of Health, I didn't know what they were. Never heard of them. Had no clue what music therapy was. I thought, if you played at bedside, that was music therapy. It's not. And so I had a massive learning curve, and I'm a musician. So this communication

piece is important. And the larger the structure and the more unified the message, which is what you can do and are doing together at this convention, the more powerful it will be.

So we have time now for Q and A. And there are two microphones here, so come on up with any questions for any of us. And I'm just delighted that you're all here. I'm so thrilled. By the way, how many of you— while you're you're standing up and going to your microphone, how many of you have youth orchestras and youth programs? Oh, that's great.

ASSAL: Oh, wow. That's amazing.

RENEE: Wow. That's so fantastic. It's so powerful. I'll never forget when Herbie Hancock said to me he was really worried about music education, because we wouldn't have players. We wouldn't have brass players for jazz. We would— there's so many instruments that are crucial for jazz that we won't have. And I went, "That's terrifying." I hope all of you have watched Kris Bower's The Last Repair Shop. It's a documentary. If you haven't seen it, see it. It is beautiful.

ELIZABETH BOLINGER: Hello. My name is Elizabeth Bolinger [?]. I'm a classroom teacher. Assal, I volunteer as tribute. You are welcome in my classroom any time.

ASSAL: Thank you. [Laughter]

[0:58:03.5]

ELIZABETH: I am dead serious about that. Because the stuff you're saying is the stuff I see on a daily basis. Indre, you as well. Truly. I'm in the private sector. I'm not in the public sector, so I don't have some of the walls that public education sometimes has. I am dead serious. I would love to work with you and set up a study and see the benefits for my kids.

RENEE: Where are you?

ELIZABETH: Idaho, southeast Idaho, Pocatello, to be specific.

RENEE: Well, that's an interesting question, both of you. Are there things that can transfer from your research? Like, I know there are apps.

INDRE: Oh my gosh. Are there ever. Yes.

RENEE: Well-being apps and things like that, questionnaires.

INDRE: Uh-huh. Also, I wrote a white paper called “Music for Every Child,” that includes a lot of Assal’s work. And has an executive summary, which is designed for policy makers and superintendents and parents. And it lays out, in hopefully very accessible language, what are the exact benefits? And then it goes on into the details, and you don't have to read past that if you don't want, if you just want the executive summary. And that's freely available. Happy to send it to anybody who wants it. It's a PDF.

ASSAL: Yeah. And in terms of measures, as you said, Renee, we have just really improved in our measures that we don't have to be there in person. That was part of the pandemic work on the science part, that we have really transformed a lot of our measures to be able to do that virtually, and also send questionnaires. And also happy to connect, and also connect you to even colleagues in your area. It's really nice to see the enthusiasm from the educators. I always say my work with the LA Phil really came about because at the time, the Vice President of Education decided to respond to my email. I just send this e-mail saying, “I'm a neuroscientist. I want to study music education.” So it's really good to for the scientific community, because I think we also don't know how to reach orchestras or organizations or schools to connect with the work.

ELIZABETH: Well, it's a problem for us. Because we want to do what's best for our students, and yet, by the time research gets to us, it's three to five years old. And as the pendulum swings in education, it's already swinging back.

RENEE: Well, are you in a town with the university?

ELIZABETH: Yes, Idaho State University.

RENEE: So how would she find someone to pair with?

ASSAL: Yeah, I'm happy— if we connect, I'm happy to put you in touch.

[1:00:26.1]

ELIZABETH: But I can tell you, as far as awe goes, the day that we went to The Orchestra Sings, that was the highlight of my students' year. Because I pulled them at the end of the year, and I said, "List your top five things of the things we did this year." And the orchestra landed on about a third of their lists. And we did a lot of stuff. So it speaks volumes to how important it is, and the value that they took from it.

RENEE: Thank you.

ASSAL: Thank you. And thank you for your work as an educator.

I'm going to go this way now.

KATHY: Hi, my name is Kathy. I'm from Bellingham, Washington, and my question is particularly kind of not looking so much at young students, and not looking so much at aging. And I'm a clinician researcher who's worked in brain injury from my whole career. But I'm really curious at this point, what venues do you approach young adults to bring awe and music to them? Because, you know, I think particularly our young adults have been pretty traumatized through the COVID, five years of COVID and whatnot. And their high school, college years, that sort of thing. And so many of them are now being somewhat economically traumatized and whatnot. And I guess I wonder, what venues can you bring this to them? Because it's very hard to get them into a concert hall. And so how do you approach that particular population with these concepts?

RENEE: That's a good question.

[1:01:57.5]

INDRE: Yeah. So, I mean, I think that it's always great to be where they are. So there are incredibly successful music festivals out there. I live in San Francisco. We have the Grateful Dead coming, and people are leaving the city in droves, because there's going to be tens and tens of thousands of people coming.

RENEE: I just sang with the Grateful Dead at The Sphere in Las Vegas.

INDRE: Oh, wow!

RENEE: That was awesome.

INDRE: I mean, yeah, it's awesome.

RENEE: Insane.

INDRE: But there's Outside Lands, there's all of these music festivals, and young people go to them. They work really hard, and they save up all their money, and they go to the music festival, and it becomes how they spend their vacation. So they are doing these things. What can orchestras do in order to attract some of them? To some extent, you could have a presence at one of these festivals, by pairing up with one of these bands. And I think a lot of these bands— I see this too. Edwin Outwater is a great leader in the conducting space of working with these kinds of bands and bringing them to the stages in the great concert halls. And I think that's a great bridging way, too.

But, you know, just listening to an orchestra is awe inducing. The first time you hear all of these players in sync, it is amazing. And I think then opening the doors to young people— maybe it means giving free tickets. Maybe it means going to some of these festivals and handing out free tickets. Maybe it means, you know, going to other places where they are, and also making those kinds of offers. Or maybe it means also getting rid of some of the rules for one night in your orchestra. Making it more like a concert that people can stand up and yell at, and they can— you know, maybe there's a mosh pit of some kind. [Laughter] But, you know. I'm being facetious, but making it—

RENEE: No, that's a good idea.

INDRE: Making it okay for these young people to behave the way that they do in these other concert venues. Coming in and out, you know, et cetera. I think that is one of the ways that you can get them in the doors. And then I think once you get them in the doors, they will see that this is an amazing thing, and they will come back.

RENEE: Has anyone done some programming that you thought was especially successful with this age?

[1:04:13.9]

SPEAKER: Yeah, so I'm a student in college right now. I'm a rising senior. And I go to the Bronx School of Music, and we do a lot of collaborative concerts, including a rock symphonic concert that we helped put on. And we put a symphonic orchestra with rock bands. And we got a bunch of people who've never seen an orchestra before come in and then continue to come to the concerts, having seen the orchestra, saying, “Whoa. This is a really cool experience.” And coming back and seeing Dvorak 9, being like, “Whoa, this sounds like a rock piece.” And continuing to come back. And that's how I was introduced to classical music. I'm a classical violinist. But I saw an orchestra playing Christmas music, and I was like, “Whoa, that is so cool. I want to do this.” And that's how I got into it.

RENEE: Great. Okay. I know it's challenging, but it is possible. And you're not going to get everyone. You know, we've had this problem for my entire career, and well before that. But some people will be turned on to it.

ASSAL: Yeah. And I just want to add one thing that we had as part of this study with the LA Opera, having children go to the opera. And the way they talk about it— I mean, they're young. But they're so excited. They've never been into that space. And I think it just really makes a difference to open up, also, the space to the families. Maybe not every performance is appropriate for a six-year-old or a 10-year-old. But I think if they are exposed to it at a young age, they also feel more welcome. Because sometimes maybe it's a barrier, a social barrier, that, “I've never done this, so I would not walk into this strange space.” And having them being part of a performance at an early age, I think, makes a difference.

RENEE: Makes sense. Go ahead.

SPEAKER: Hi. You talked a lot about the connection between audience and participant, or between orchestra and soccer, or between choral and instrumental. What type of research has been done, or what can you share about the connection between professionalism and amateurism in the best sense of the word?

[1:06:16.2]

INDRE: Yeah, so a lot of the participatory research, as you mentioned, is— I mean, I think it varies. So, for example, in the Lithuanian Choral Festival, there are some professional choirs that are part of that, and then there are very accomplished amateur choirs. And sometimes in the music world, I don't know that we really should draw the lines so strictly. Because if you look at the average salary for a quote-unquote “professional musician,” that they make from only performing music, it was something like $6,000 a year. So even people who consider themselves as professional musicians don't make all of their income from performing. They have all kinds of other things that they do. And

so sometimes these amateur musicians, who also maybe don't have all of the resources where they can devote quite as much time, but some of these amateur choirs— and even the YOLA, it's, like, several times a week for many hours. It's the main activity that these kids are doing. And I think so too—and as we see, we do see those participant benefits.

The professional side of it, I think— you know, I guess that would be my question, is, how do you define whether someone is a professional or an amateur? And what are the meaningful differences? The reason I'm kind of pushing on this a little bit is because, what is the research question that's going to be driven by understanding those differences? And is it whether— what impact a professional ensemble has on the audience, versus an amateur ensemble? That's potentially one question. Or is it on, you know, the benefits to the participant, if they're a professional versus an amateur? That's a different question.

[1:08:05.7]

So I think all of those questions are valid. But I think, you know, research is a challenge to do unless you have the full support of the organization. And most professional music organizations are pretty busy. But you know, happy to talk to anyone who would like to explore that direction.

RENEE: My first cohort of investigators for the Renee Fleming Neuro Arts Investigator Awards, one of them was looking at the difference between live music and recorded music in an Alzheimer and caregiver setting. And those results are going to come out in the next week or so. So definitely look for some of the— they came up with the most creative ideas. And we had a very high, esteemed panel to make the choices for who would get these awards. And this year we have many more. So I'm super excited about this. Have a look at it, and if it's appropriate, tell people to apply. Okay, we've got to go really quickly. We only have two minutes left.

SPEAKER: Thank you so much for being here, and for what you've presented to us today. And for the work that you've done to prepare for all this. We are in an environment where many of our orchestras are really just striving to exist because of funding challenges. I'd like you, if you would, for just a moment, to speak to the funding component of having all of this research done and compiled. I'm certain— I think I can speak for everybody in this room. We'd all love to have this kind of research done within our own communities. But how was this the research that you did funded? And in the given environment that we're in today, what's the realistic thinking that you might have about going forward with future funding for this kind of research?

INDRE: So I would say very quickly, there's sort of two different models. And in fact, here, you have two different examples. Assal's work, over the course of many, many years, was funded by the NIH and very big grants. Because it's very expensive and it requires a lot of investment.

RENEE: Because of the technology. The MRIs. Very expensive.

INDRE: The MRIs, but also, you know, yeah, following all these kids.

ASSAL: Children, and— yeah.

[1:10:06.2]

INDRE: And all of the children and all of that. The work that I did in Lithuania, we had zero funding. We asked for help. Because we had to put it together in four months, so there was no time to get funding. There was barely time to get an internal review board consent through. But the organizers thought this was really important, so we asked for volunteers. They gave us 50 volunteers. They gave us a tent that we could put up with all the information. So in a sense, it didn't cost any money. And I think now, we can come back and we can show them all of this, and that could potentially generate more funding for future work.

But also, it doesn't have to be expensive. I think sometimes there has to be— you have to pair with a lab, potentially, that already is funded. Like, for example, we paired with the Danish Technical University, where they're well funded. And so they saw this as an opportunity to put heart rate monitors on people in situations that they normally would never have access to. And you all have that. You all have an orchestra. The vast majority of researchers don't have access to what you have, which is a concert hall space, orchestra musicians, and so on. So that's sort of— I guess my answer is, it depends on whether you want to be the main drivers of the research question, or do you want to be open up your existing resources to people who are really interested in some of these questions.

RENEE: Do you know of any studies where orchestra players have been studied? Because I don't.

ASSAL: I don't think so.

RENEE: Good idea.

INDRE: Yeah.

RENEE: Pursue that.

INDRE: Have them volunteer. You know. In terms of giving us a couple of hours of their time.

RENEE: Yeah. I would definitely really go to your local universities and see if you can drum up interest to neuroscientists, or biological—

ASSAL: And there is always internal funding within institutions that would allow for smaller studies. I'd say also, we have reached out to donors and philanthropists and foundations. So it depends on the question. And I think from a philanthropy perspective— and we have that discussion on Monday, too— that investment in the research question about arts and music sometimes is a long-term investment. But in a way, it answers a lot of questions in terms of where this organization is going forward. So I think it's just framing the question differently than funding programming, per say.

[1:12:29.0]

RENEE: And it should always kind of benefit your ecosystem of donors and audience members. To try and increase interest on both of those fronts. That's how I got interested in it. I was at Chicago Lyric as an advisor, and I thought, "Wow. All the donors are also in healthcare. Hmm." And that's what got me started.

INDRE: And it could attract new donors.

RENEE: Definitely.

INDRE: There might be donors that aren't interested in funding a particular concert, but they would be really interested in understanding the impact that the concert has on a particular population.

RENEE: Well, I'm sorry. I know you all have to go to other events. Please forgive me. Come on up if you want to ask a question personally. But we have to release the whole group now. We're out of town. [APPLAUSE]

INDRE: Thank you.

RENEE: Thank you.