

ARIA EVANS: Hi, I'm Aria Evans, the artistic director of Political Movement, a dance theatre company that makes work from a social and political lens. And this is The 'D' Word. I am back for season three, and we have some incredible guests lined up to talk about this year's theme: science and the mind. How do ideas like curiosity, dance and infancy, and shifting trauma through movement, influence or interact with the work of dance artists? Well, we're going to dive into those conversations right now. This episode, Dr. Laura Cirelli is here in studio. Laura is an assistant professor at the University of Toronto. Her research interests lie in infant development, music perception and cognition across infancy and childhood, rhythm perception, prosocial development, and mother-infant song. She's here today to talk about the impact of music on babies. Laura! Thanks for joining us, we're so happy to have you on the show.

LAURA CIRELLI: Thanks so much Aria.

ARIA EVANS: We already mentioned your research interests, which are heavily around infant development, music and dance. But can you briefly describe your work for our listeners?

LAURA CIRELLI: Yeah, definitely. So at the University of Toronto I direct the TEMPO lab. And yes, as you mentioned, we are really interested in exploring how young children, infants, form a relationship with music and dance. When do they start to engage in music? When does it capture their attention? How do they express that interest through movement? And how do they use music and dance to connect with other people like their caregivers, their siblings and their larger community?

ARIA EVANS: I'm curious, just because it seems like such a cheeky name, and tempo is something that I feel like really binds music and dance together, how did you come up with that name?

LAURA CIRELLI: Yeah, so it stands for timing, entrainment, music, perception lab. And these are really exciting facets of music cognition that have captured me from the beginning. So I'm really interested in how kids and babies, when they're listening to music, they're listening for that ongoing beat in the song and using that to predict when the next beat is going to happen. And that is really like the recipe for

using music to bond other people. If I'm clapping along to a specific song, and you are listening to the same song, and you're able to clap along to that song too, then now we're clapping together. So, when I started to research how children engage with music, one of my questions really was like, why? Why do we do this, even really young babies are engaging with music, and we do it throughout our lives, across cultures. And the social aspect of that is something that's really exciting in research right now. You know, if the reason why we use music is because it's a tool that captures us and connects us to the people around us, and now because we are both entraining to the same underlying pulse in a song we're entraining with each other too, then that can really help explain why we invest so much time and energy into this activity, that humans are the best at compared to every other species.

ARIA EVANS: Wow, it's interesting to hear you also touch upon how we see that across different cultures. And it is truly like a social habit that connects us all to this sense of finding a common beat together. There's something about that that I wouldn't necessarily put together on my own, that's really beautiful to hear when we think about society and our world and people and connections. Well, we've seen it before. I mean, I know when I'm scrolling on social media, I will always pause and watch the babies in my life or other people's babies dancing to music at an early age. And how young do babies generally start dancing when music is playing?

LAURA CIRELLI: Yeah, this is a great question, and one that I'm really excited about right now, as well. So, based on parent reports, people generally report that their kids are usually dancing by about eight months. But there's a pretty broad range. So some parents report that their babies start much earlier than that, some babies really take off and start dancing a little bit later. So it's similar to walking in that sense. We have this average age where we seem to see most babies are probably doing something but there's a really wide range around that. And so, what does baby dance even look like? Another question? You know, what does it mean to say that an eight month old is dancing? And really what we're asking parents when we look at these questions is like, are they moving rhythmically in a way that seems to be related to the music? They are by no means expected to be nailing the beat, especially across a range of

tempos. That's something that comes later. But this really joyful urge to move to music is something that we are starting to see really before they're taking their first steps, before they're saying their first words, they are responding with movement when they're being exposed to music, either through song or through musical recordings. So you know, we can ask parents when these things happen, but we can also try to measure them by getting video footage of babies moving to music. And that's something we've been exploring a lot. Right now, whether we have babies coming into the lab and listening to music, and then going back to those videos and seeing what they did, or sending parents songs to play for their kids and recording them to see what their response is. So through these different methods, we can look at those videos and identify how much time they spend moving to music, and if they're moving faster to faster songs, slower to slower songs, and so on. So, yeah, you know, in my lab, we've documented that even like eight month olds are dancing more when they're listening to familiar music compared to unfamiliar music.

ARIA EVANS: Oh interesting!

LAURA CIRELLI: Yeah, and we see that through toddlerhood, as well. And we also see, in early toddlerhood, this moving faster to faster music and moving slower to slower music. And at least by three to six, if not earlier, we see that the kinds of songs that make adults really want to move, like things we call highly groovy music like "Superstition" by Stevie Wonder if, for example, the songs that you just can't resist the urge to move to, kids are sensitive to that as well and will dance more and with more precision by the preschool, early school age level as well.

ARIA EVANS: Amazing. It's so interesting, because as a dancer, and I feel like I hear this so commonly across this sector, we talk about, like, "I was dancing before I was speaking" and in interviews I'll tell people, you know, dance was my first language. And that feels very unique and authentic to my experience, because dance has continued to be a part of my life as I've grown. I'm curious if you see that. Is it something that is innate in our development from being babies that we all have that? Or do we see it in different scenarios come up

based on maybe how an infant is being introduced to the world of music?

LAURA CIRELLI: It's so hard to tease apart, right? I will say that, you know, it seems like quite a human skill to listen to music, and pull this information out about the timing of things and then attach that to movement. In adult research, for example, there's lots of really cool work showing that when we're listening to music, not only are the auditory parts of our brain responding, but the motor cortex is responding as well. So the motor system is involved just in listening, even if you're not moving. And it's even more involved when you need to work a little harder to predict when that next beat is going to happen. So I think that movement is inherently linked to music listening. Whether that would happen if you were in a black box with no society and no socialization and no modeling? I don't know. But that's kind of where it comes to the point of, you know, I think I have reason to believe that there's something innate about it. But to claim that is very bold, because we would never have a lack of socialization, right?

ARIA EVANS: And we would never conduct a study where we were making that a reality for someone.

LAURA CIRELLI: Yeah, I mean, there is really cool work right now from some research groups out in Nashville, looking at genetic markers for rhythmic ability.

ARIA EVANS: Whoa.

LAURA CIRELLI: So that is definitely an exciting direction where, if there are these genetic markers for rhythmic ability, then that builds the case for this being like an innate human feature. But yeah, you know, we see that it's not just the babies who go on to make a career out of dance who start to dance, right? Many, many babies, most of the participants in our studies do show at least a little bit of dance, some more than others. So, you know, I think it's safe to say that the majority of babies do start to dance before toddlerhood in some capacity, but whether that's really fostered by the people that are around, and encouraged, and whether it's something that carries through to create this foundation of their relationship with music and

dance in their future, that's the sort of thing where, both have to be involved, right? Like, I think that there's these parts of our brain that exist that allow us to do these things. And then the world that we're surrounded by is going to hone that or not.

ARIA EVANS: I want to circle back to something that you said that, being somebody who does not have children, I was like, "what's that?" What is the parent report?

LAURA CIRELLI: Oh, sorry!

ARIA EVANS: No, no, no!

LAURA CIRELLI: We just literally give questionnaires to parents and ask them like, "How old is your baby?", "Do they dance yet?", "What are the songs that they listened to most frequently?", "When they heard the song last week how often did they express something through movement?" So we're really just asking the parent to think back and report on what they have observed in their child in terms of how they're responding to music.

ARIA EVANS: When you were speaking to our producer, in one of the pre interviews that we did for this episode, you mentioned an experiment where you conducted research with 14 month olds, and it had to do with bouncing and music. Can you walk us through what that experiment was, and what the findings were?

LAURA CIRELLI: Yeah, definitely. So this was work that I did at McMaster University as part of my dissertation. And what we were interested in was how moving to music can be a social experience, even for really little babies. And so, at the time, there were really cool adult studies coming out where if you moved in synchrony with another adult, you rated that person as more likeable, you're more likely to trust them and want to interact with them. And we want to see if that sort of prosocial side effect of moving with another person is something that emerges early. So in these studies, we invited 14 month olds, and their parents of course [laughs], to come into the lab and participate in this study. A research assistant would hold the baby in a carrier facing forwards and they would just gently bounce them to the beat of "Twist and Shout",

ARIA EVANS: Amazing!

LAURA CIRELLI: which was just playing in the background for us as a little mini version of that. And so then the main part is really that there was an experimenter facing this duo and bouncing either in synchrony with how the baby was being bounced, or this person was bouncing out of sync, either too quickly or too slowly. So everybody is moving, but our movements are not aligned in time with one another. So after this bouncing experience, which was about two and a half minutes long, we would take the baby out of the carrier, and then the experimenter who had been facing the baby and moving either in or out of sync, would do a series of little social tasks like pinning a dishcloth up on a clothesline or drawing a picture with markers. And every now and then she would pretend to accidentally drop the objects that she was using to complete the task. So like, "Uh oh, there goes my marker on the ground", reach for it kind of pathetically, and we would just see what the baby would do in that context. They're in this situation where this person that they just bounced with needs help. And they can take it upon themselves to provide that help if they feel comfortable doing so. So yeah, every baby had basically like nine opportunities to pick these fallen objects up and hand them back to the experimenter. And if we bounced in synchrony with the babies, they handed back more than half the objects. Whereas if we bounced out of synchrony with the babies, it was really like only a third of the objects. And that difference we can look at statistically and show that yes, the babies who were bouncing in sync, are in fact more willing to help us and help us quickly, too. They would help us within the first 10 seconds, usually kind of thing. And we replicated this over a few different studies, a few little iterations to really dive into what's going on here. For example, we are interested in like, okay, they're helping this person more, is that because they like this person more? Or are we just putting them into a really social mood? So for example, will they also help some random person who is just sitting in the corner the whole time reading a book and really not involved in the bouncing at all? And the answer to that question is no, they don't help that random person.

ARIA EVANS: Oh wow!

**This transcript has been edited for clarity.*

LAURA CIRELLI: It's really targeted, specific, prosociality directed toward that synchronous partner. So it highlights that, again, engaging musically with other people is something that even really little babies identify as a social experience.

ARIA EVANS: It's interesting hearing you say prosocial synchronicity. And for me, what you're describing also relates to building trust in a really fascinating way. Are those two things connected for you? Or do you choose to separate that prosocial synchronicity with this idea of trust?

LAURA CIRELLI: I think they're related. I mean, I think as a developmental psychologist, when we talk about prosocial behaviors, that's kind of like an umbrella term. And underneath that, you see things like helping, and comforting, and sharing, and trust. So, you know, all of these different kinds of prosocial behavior feed into a similar narrative about trying to quantify something about the relationship between these two people. So, yeah, I mean, I think we're measuring helpfulness. But I think it's safe to assume that they are helping someone more if they do trust that person and feel comfortable approaching them. We used those helping tasks in some follow up work in my postdoc, where we were looking at how much the babies would help if we sang to them. And we didn't just measure helping, we also measured physical proximity. Like, how close was the baby willing to even get to us?

ARIA EVANS: Oh, wow.

LAURA CIRELLI: And so, you know, I think that component of trust is really in there. This is a stranger they just met today, it really is like an ice breaking kind of experience. So yeah, you know, I think if this interaction with this stranger allows them to be like, "Okay, this person is part of my social group, it's safe to interact with them, they know how to move to the thing", then it's reflective of them, doing these mental calculations about like, who is a safe person for me to approach in this environment.

ARIA EVANS: And it's so fascinating to think about how that can be used as a tool

and how that can be used as a way for families to connect their child to other relatives and beyond, and in scenarios where you need to facilitate that kind of trust. What a beautiful way to offer a foundation for that, it's amazing. For parents or caregivers, would you say it's important to create a musical environment for babies?

LAURA CIRELLI: I think that musical environments often emerge in a context where there's like a relationship being formed between a caregiver and a parent. You know, we asked parents "how much do you do these things?", "How often do you sing?", "How often do you play music?" Not every single parent does these things, but many do report involving these things in their everyday life. [Laughs]. So, I have two hats. I have the researcher hat, and then I have the mom hat. And I identify and I respect that parents are just bombarded with so many, like, "You have to do this to create the perfect human".

ARIA EVANS: [Laughs]. It's a lot of pressure.

LAURA CIRELLI: It's a lot of pressure! I don't think there needs to be this pressure that you have to involve something into your life if you're not comfortable doing it. But I think that there also should be a reduction in the pressure of like, you have to be like a musician to be allowed to give music to your children. Like, you know, we've had parents come into the lab where we were like, "Okay, we need you to sing this song and that song to your baby, they're gonna love it." And they're like, "Oh, I'm a terrible singer." And they're very embarrassed. And they're perfectly capable. They're perfectly capable singers and their baby loves it. Like your baby is not judging you harshly unless Simon Cowell as a baby,

ARIA EVANS: [Laughs].

LAURA CIRELLI: is judging people harshly [laughs]. But yeah, I guess the take home message that I'm trying to get around to, is really, music is often part of early interactions. And we see that it can be a really, really fruitful way to build a connection with your baby, especially when they're quite little. And you know, especially with a newborn, for example, where they're mostly sleeping, it's hard to really capture their attention. But we see that even newborn babies will attend. They will pay attention when they're hearing a song. So it's a way

for you to get that response out of your child. And it's really a two way street. It's this dyadic interaction, if you're singing to your infant. And that really captures their attention, and that makes you feel good and capable and worthy, and then you're more likely to sing to them again and again, and it creates this feedback loop where they are quite responsive to it. We are quite capable of doing it. But yeah, you don't need to be signing your child up for the most expensive music lessons for them to be allowed to have music. It's this everyday thing that we can really involve in our rituals. Like sing a song during the diaper change to capture their attention if they're feeling really squirmy, use song if they're distressed in the car seat to try to cheer them up. Have a lullaby that you integrate into your bedtime and nap routines to connect and to convey to them like this is sleep time. So, song can have really important functions and those functions can help both the parent and the infant know what to expect and to connect with one another. Related to that, a specific research study that really relates to that as one where we had parents sing "Twinkle, Twinkle Little Star" to their babies in the lab, either in soothing way, or in a playful way, these are the two categories that we really see are often a part of daily interactions. And we looked at the infant's attention to the parent and so on, but we also looked at their physiological response. So we measured what's called skin conductance, by putting little sensors on the baby's foot. And basically, if you're stressed or excited, you get sweaty, and those sweat glands widen and your skin becomes more conductive. So we can measure that change in conductivity to capture and quantify how stressed and excited they are, or how relaxed they are. So we measured skin conductivity on both the parent and the baby while this was unfolding, and found that same song, "Twinkle Twinkle Little Star", but if the parent is instructed to sing it in a soothing way, we see a reduction in that skin conductivity, a relaxation effect for both the infant and the parent as the song unfolds. So it's really like both of them are experiencing this relaxation, and they're experiencing it together. And that can serve great functions if you both need to take a moment, or if it's time to sleep and things like that. And on the other hand, singing it in a playful way, their excitement level stay high, which you would expect, and that would be the goal anyway. But also it really captured their attention and focused them on the parents.

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ARIA EVANS: It's interesting, because you're talking about this sort of like intimate bond that can happen in a sort of microcosm way. And if we were to look at the macrocosm of this research, what do you think it tells us about society as a whole?

LAURA CIRELLI: Certainly I think that it goes back to this idea that humans have these skills that allow us to be musical. Like we call this musicality, the parts of us that allow us to track auditory patterns over time and make predictions about them. There are some universals across musical systems, there are a lot of differences. So in some ways, you know, we often say things like, "Every society has some form of music, and mothers around the world sing to their infants", and you can also identify, if you listen to someone singing to an infant from a completely different part of the world, you are better than chance at identifying that that is a song for an infant. So, you know, on a big kind of global scale, music is something that is very often part of the everyday lives of really little babies all over. And if that's creating some sort of foundation, and feeding into the pre-existing foundation of our ability to engage with music, then you can see how fostering that, and encouraging that, and allowing people to take back music, even if they're not a professional musician, to integrate that into their lives can help build a foundation of musical engagement throughout the lifespan. I focus on infancy a lot, but we see that music has important impacts on social identity, and emotional regulation, and wellbeing in general throughout the lifespan. So it's something that is not just for babies. And I think, you know, going back to the microcosm,

ARIA EVANS: Yes!

LAURA CIRELLI: I think it's really important to think about when we're engaging musically with the little people in our lives, they are experiencing something, but we're experiencing that with them. So it's really not just about one person's experience.

ARIA EVANS: Amazing. I have one last question for you. Because I know that you grew up dancing and it's in some ways a part of your adult life, but has your relationship to dance informed this research that you've undertaken?

LAURA CIRELLI: Yeah, so I mean, I think it brought me here [laughs]. It got me here in the first place. So that's definitely one of the ways in which it informed it. So I danced recreationally throughout childhood and into early adulthood and I think that is probably why I really have a hard time thinking about music or dance as independent things. And that's reflected in a lot of the research that I do. You know, it's really hard to tease these things apart for me, because it feels almost impossible to think about music listening without involving movement.

ARIA EVANS: Yeah.

LAURA CIRELLI: So I think that has definitely informed it. It's one of those things too, where like, my experiences dancing in an informal way and in more of a formal way, in like, traditional ballet class and things like that, attending dance class and having these social relationships with the people I'm dancing with, I think that also fed into my interest in the social side of what's going on here. You know, the relationships that I've built in my dance career, the friendships are long lasting. I'm very close friends with many of the people that I've danced with since I was a kid. So you know, I think that that is a story that many dancers have. And I think it highlights that there's more to it than just the fact that we were moving in synchrony every few days. But also that probably helped us feel connected, and like we were achieving the same goal and achieving that goal together. So, yeah, I'm sure there's a trickle down. And in many of my papers, somebody would be like, yes, she danced. [Laughs].

ARIA EVANS: [Laughs]. Speaking of that, is there a way that people can find your research online? Or if they want to know more about you, where can they look?

LAURA CIRELLI: Yeah, so if you look up the TEMPO lab, University of Toronto, we do have a lab website. And there's some links there of papers that are available for the public to look at, and also a few press releases about some of the work that came out.

ARIA EVANS: Thank you so much for joining us.

The 'D' Word Season 3 - Episode 4

LAURA CIRELLI: Thank you, Aria.

ARIA EVANS: That's our show. The 'D' Word is presented by dance: made in canada, a contemporary dance festival featuring Canadian dance artists who possess unique artistic visions and come from all cultural backgrounds. This year, dance: made in canada presents in person programming featuring artists from across Canada in our mainstage, WYSIWYG, dance on film and video, installation and photography exhibition at the Betty Oliphant Theatre in Toronto from August 16th-August 20th. Dance: made in canada's co-festival directors are Janelle Rainville, and Jeff Morris. Yvonne Ng is the artistic director and also co-festival director. The 'D' Word is produced by Grace Elliott with Taylor Young. Our editor and composer is Jamar Powell, our sound engineer is Chris Dupuis at 1990 Studios. And I'm your host, Aria Evans. Thank you to Canadian Heritage, the Canada Council for the Arts, Ontario Arts Council, and Toronto Arts Council for making The 'D' Word possible. Find us wherever you get your podcasts and don't forget to rate and review. Talk to you soon. Bye.

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