

# interview with Ruth Feldman

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Founder of the Center for Developmental Social  
Neuroscience at Reichman University



**“Love really protects  
you, the parent and  
the baby”**

**For Ruth Feldman, social neuroscientist and founder of the Center for Developmental Social Neuroscience at Reichman University, Herzliya, Israel, there is a poetry to the science of human connection. At her lab, she combines neuroscience, research on hormones, and a child and family community clinic in order to further our understanding of person-to-person synchrony.**

**Through this work, Ruth and her colleagues have advanced our understanding of how parents and children bond through biological and neurological mechanisms. In conversation with Michael Feigelson, CEO of the Van Leer Foundation, Ruth discusses how our brains and bodies adapt to caregiving, how we learn to connect with our babies, and why the science of synchrony is so important for understanding and repairing our sense of wellbeing.**

**How did you come to study the topic of synchrony?**

It was my experience with music that got me closer to the study of synchrony. With music you need no words to connect, but you feel that deep connection in your body and brain, which always amazed me. This started when I was little. I used to write melodies in my notebook. At the time, my parents didn't have much money, but after watching me play our neighbour's piano for a year, they got together the money to buy a piano.

Eventually, I began playing jazz. When you improvise in jazz, you can feel yourself a part of something bigger, truly connected with someone; they could be familiar or a stranger.

**When did you decide to leave the study of music and focus on using psychology and neuroscience?**

Part of it was that I realised I wasn't going to be such a terrific musician, but the other part was that I became a mom. I was a mother at 22, so I was a young mother, but by choice. I wanted my adult life to start with motherhood.

This is not only the most intense experience you can have, but it's also a gateway to a different type of knowledge about what binds humans to one another. This deep sense of connection, and its underlying biology, is rooted in the bond between a mother or primary caregiver and an infant.

When my first daughter was born, we were living in New York and I remember that when I took her outside (she was born in December) I wrapped her up and I took her out to the street. That is an experience I will never forget. The world looked different. The trees had a different colour. The sky had a different blue. The smell was different.

I noticed that something fundamental had happened to my brain and the way it sees the world. This later got me to study the parental brain and then how the parental brain, like synchrony, expands to support all other bonds of love humans form throughout their life.

**“I noticed that something fundamental had happened to my brain and the way it sees the world.”**

When synchrony is presented in this way it may sound poetic; synchrony is the mysterious thread that connects us to others both biologically and mentally. But synchrony is not poetry. It abides by precise mathematical equations and can be studied with scientific methods. The idea that we can talk about human love by using the tools of science is, in my opinion, one of the important contributions of research on the neurobiology of attachment and bonding to both science and the humanities.



Photo: Center for Developmental Social Neuroscience



Over time, our research on synchrony expanded in wider and wider circles and to more physiological systems. We have been doing extensive research on the synchrony between two brains; how brain-to-brain synchrony develops between infants and their mothers and how it is different from the brain synchrony they create with their fathers. How brain synchrony with a mother is impacted by her physical proximity and body odour and how it is impaired by postpartum depression. We found how a special intervention for mothers with postpartum depression improves the impaired synchrony between the mother's brain and the child's brain.

We also followed the brain synchrony between infants and their parents to later childhood and adolescence and saw how more brain regions and brain rhythms participate in this synchrony.

I think we are one of very few labs that look at synchrony through so many scientific methods.

**Okay, so here's a personal question. When my daughter was born, her mom had an unplanned C-section, and while they were taking care of her – she was never in any danger – they sent me to a room with our baby. It was just us and I took my shirt off and put her on my chest. Based on your research, what was probably happening in her and my body?**

I imagine in those moments you felt a sense of elation because there's lots of theta waves in your brain and those connect to the waves of your newborn child. Theta waves are the type of

wave that occurs when your brain is in a relaxed, daydreaming state.

During skin-to-skin contact, parent and child become a single thermodynamic system, almost like two people in a single body. The newborn loses body heat very quickly, so if the child is on your chest, skin-to-skin, your body is providing necessary heat. It creates a feeling of oneness with the child, almost as if you're holding the baby in the womb because there are processes in your body that now incorporate her body. For example, if your leg is cold, your body will send a message to your brain to heat it up. But now, if your baby's back is cold, it will send signals to your brain to heat it up. You are really united through the synchrony of biology. Synchrony is the only way for us to become a single biological unit with those we love.

**Is there a difference between how all this works for mothers and fathers? Or for biological parents and non-biological parents?**

So, prototypically the evolution of mammals focuses on mom. Oxytocin gets very high during pregnancy, it releases during labour, makes the mother's brain very plastic, and prepares it for bonding. But evolution is not going to rely on one trail alone. It covers its bets, so to speak. So there are other pathways to making your brain plastic and jumpstarting your parental brain, because the parental brain needs to organise around that particular baby and direct all its resources to that. And the other pathway is through active caregiving. That's for dads and also for non-biological parents.

**“Synchrony is the only way for us to become a single biological unit with those we love.”**

We had this wild discovery in 2010, published in the London *Times*, when we found that if you measure oxytocin levels in biological mothers and involved fathers, but you don't do it right after birth or right after breastfeeding, the levels are the same. But this is with fathers who are very involved in caregiving.

That's not going to happen if you are a father like in the movies of the 1950s: the father comes home late, the mother does everything, and the father spends half an hour with the baby before they go to sleep.

No, you've got to be involved in the whole shebang. You have to take the baby to the doctor, feed the baby, put the baby to sleep, wake up in the middle of the night, change the diapers. If you want your brain and hormones to change, you have to work for it. But if you invest, and this is the beautiful thing, you can actually see the changes in the fathers' and non-biological caregivers' brains in a way that is proportional to the amount of time they spend with the baby.

**Beyond the fact that this is fascinating and beautiful, can you tell us something about how it impacts new parents and their babies? For example, how does it affect our health?**

Bonding is not only good for you and your child, it's critical. Babies are born with a nascent attachment network in their brain and they are biologically ready to bond to others and become social creatures. But it is through sensitive caregiving and synchrony that this biology will come to life and they'll be able to connect to other people.

Another reason why bonding is so critical for our health is because oxytocin is closely linked with the immune system. Whenever we hear that being in love is good for us, this is an important part of the story. We saw during the Covid pandemic that lonely people were more susceptible to the illness. This is the reason why we say that social loneliness is the modern plague. Love really protects you, the parent and the baby; biologically, not only emotionally.

**How do we learn to synchronise with our babies? I understand from your research that for some parents this is easier than others.**

We look at synchrony through the lens of repair and resilience so, yes, we definitely learn it and get better at it with practice.

In our research, we looked at what happens when synchrony breaks because mothers experience depression. We see what happens when mom



Photo: Center for Developmental Social Neuroscience

↑ Hyperscanning of father and baby in the lab shows what is happening in their brains as they interact

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isn't looking at the child or doesn't provide the prototypical “motherese” vocalisation. In our intervention study we found that when we taught mothers how to synchronise and attend to their infant's non-verbal signals in only eight sessions, there was a huge improvement. Mothers were not only able to interact with synchrony, but their depressive symptoms lifted, their oxytocin levels rose, and the broken brain synchrony with their infants was repaired.

We teach moms to look at the child, take time, be in the moment and focus, smile, keep close, and touch often. Give the child time to respond. Imagine what the child is thinking or seeing or experiencing and comment on it.

Once parents learn how to do it and their baby responds, that makes them so happy. It releases oxytocin and oxytocin connects to dopamine in the nucleus accumbens (the part of the brain involved in reward, motivation and learning). Once all this gets going, the parents' biology helps to sustain these interactions.

**After 30 years of research, what would you say is the most helpful (or hopeful) thing that the science of synchrony can offer new parents today?**

I think the thing that gives us hope is humanity's need for meaning, and to find meaning in our life we must turn outward towards others. The only way

that meaning comes about is by extending yourself to someone else and this allows you to extend beyond the here and now. Giving love, sharing, empathising with someone else – that's where I think we can find hope, even under the most difficult circumstances.

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