Do Babies Cry in Different Languages?

A pioneering German researcher decodes newborns' cries. Here's what they reveal.

By Sophie Hardach Nov. 14, 2019

Dr. Kathleen Wermke, head of Würzburg University Clinic's Center for Pre-Speech Development and Developmental Disorders, records baby sounds from 6-month-old Lara in a sound booth at her lab.Felix Schmitt for The New York Times

In a sunny hospital room in the German university town of Würzburg one recent afternoon, Dr. Kathleen Wermke positioned her microphone next to the tiny red face of a 4-day-old named Joris. As Joris's mother, Judith Fricke, began changing his diaper, the baby wriggled, stretched and opened his eyes.

"Joris," Dr. Wermke cooed. "Do you want to say something?"

He didn't appear to at first. But eventually, Joris let out a few snorts that built up to a disgruntled cry. This was the moment Dr. Wermke, a biologist and medical anthropologist who studies babies' first sounds, had been waiting for. She made a recording for later analysis in her lab, Würzburg University Clinic's Center for Pre-Speech Development and Developmental Disorders. But even without the aid of computerized tools, Dr. Wermke could make out a distinctive pattern in Joris's wail.

"He really cried in German just now, right?" she said, smiling as she packed up her equipment.

[Do children soak up languages like sponges? A writer finds out.]

In 2009, Dr. Wermke's and her colleagues made headlines with a study showing that French and German newborns produce distinctly different "cry melodies," reflecting the languages they heard in utero: German newborns produce more cries that fall from a higher to a lower pitch, mimicking the falling intonation of the German language, while French infants tend to cry with the rising intonation of French. At this age, babies experiment with a wide variety of sounds, and can learn any language. But they are already influenced by their mother tongue.

Today, Dr. Wermke's lab houses an archive of around a half-million recordings of babies from as far afield as Cameroon and China, where a team of graduate students armed with recording equipment paced the corridors of a Beijing hospital around the clock. (Babies are never made to cry for the sake of a recording, so the students dove into a room whenever they heard a promising specimen).

Dr. Wermke's lab houses an archive of half a million babies' sounds, from crying, cooing and babbling to early speech, recorded over decades of research. Felix Schmitt for The New York Times

Quantitative acoustic analysis of these recordings has produced further insights into the factors that shape a baby's first sounds. Newborns whose mothers speak tonal languages, such as Mandarin, tend to produce more complex cry melodies. Swedish newborns, whose native language has what linguists call a "pitch accent," produce more sing-songy cries.

These studies underpin the lab's broader effort to map the typical development of a baby's cries, as well as vocalizations like cooing and babbling. Knowing what typical development looks like, and what factors can influence it, helps doctors address potential problems early on.

Dr. Wermke's team already routinely works with doctors at the Würzburg University Clinic to support babies with hearing difficulties, recording babies before and after they receive hearing aids or surgery. These recordings can help doctors and parents understand how hearing problems are affecting the babies' ability to imitate and experiment with language — long before this would otherwise become obvious — and how they are progressing after treatment.

Hearing and imitating are fundamental to language development. By the third trimester, a fetus can hear the rhythm and melody of its mother's voice — known as "prosody." Since individual words are muffled by tissue and amniotic fluid, prosody becomes the defining characteristic of language for the fetus. After they are born, young babies mimic many different sounds. But they are especially shaped by the prosody they heard in the womb, which becomes a handy guide to the strange sounds coming from the people around them. Through stress, pauses and other cues, prosody cuts up the stream of sound into words and phrases – that is, into speech.

Dr. Wermke records sounds from 3-week-old Konstantin at the neonatology clinic.Felix Schmitt for The New York Times

"Imagine you're thrown into a new language environment, which is what happens with the newborn," said Judit Gervain, a senior research scientist at the National Center for Scientific Research in Paris who studies early speech perception. "There's just so much going on: There are all the words, there's all the meaning, all the grammar, all the sounds, all of it. You can't do it all, it's just too much. One way prosody helps is it gives them nice little chunks that are the right size."

In English, for example, a stressed syllable is often a cue for the start of a word, as in: *Eng*lish *lang*uage. In French, a lengthened syllable signals the end of a sentence, as in: "Bonjour Ma*dame*!" Long before they can speak, babies begin to recognize patterns like these.

"A lot has to happen before that first word is produced," said Janet Werker, a developmental psychologist at the University of British Columbia who studies early language acquisition.

Babies also use prosody to distinguish between languages, explained Krista Byers-Heinlein, a developmental psychologist at Concordia University in Montreal who studies bilingualism. “No one has told them ahead of time, watch out, there’s going to be two languages!” she said. And yet, she said, “Children exposed to two languages from the very beginning are perfectly capable of acquiring those two languages at the same time.” One of the ways they do this is through prosody. They may not yet grasp the concept of language, but they can hear that some sounds follow one rhythm, and others another.

Babies like Max, who is growing up in a bilingual French-German household, use prosody to distinguish between the two languages.Felix Schmitt for The New York Times

The Würzburg team has shown that newborns don’t just hear prosody. They also imitate it.

“Babies come to language through musical elements, through hearing the intonation of their mother tongue,” Dr. Wermke explained as we sat together in her lab, a cluster of bright offices and a recording studio. Around us,

graduate students wearing headphones listened to recordings of baby sounds. One area of the lab was kitted out with a play mat and toys. A giant model of a human ear sat on a shelf.

Dr. Wermke played her recording of baby Joris on a computer, using specialized software that mapped the fluctuating pitch and intensity of his cries. Joris took a breath and let out a gently falling sound as he exhaled, as if his voice were gliding down a long slope: *Waah!* He took a breath and repeated the sound: *Waah!* Together, these sounds formed the chain so typical of newborn cries: *Waah! Waah! Waah!*

On the screen, each "Waah!" appeared as a little arc with one long, sloping side.

"You can see that he has this falling pattern," Dr. Wermke said, pointing at the long slope. "So that's already German."

In a healthy newborn, the shape and sequence of these individual arcs evolve rapidly. Within the next days and weeks, Joris is expected to combine the arcs, using them as building blocks for his ever-closer imitation of the sounds he hears from the adults around him: *Waahwaah! Waahwaahwaah!*

Eventually, he will produce his first consonants. For example, pressing his lips together will naturally result in an "m" sound. *Waah-waah* will become Ma-ma — "Mama" being the German word for "mother," as in many other languages, probably because it is so easy to say.

In some babies, however, this process stalls.

Dr. Wermke and M.D./PhD candidate Jennifer Schenk discuss some of the babies' recordings.Felix Schmitt for The New York Times

Wermke played me a recording of a cooing 2-month old with profound hearing loss. At this age, he should be producing varied, gliding melodies, visible on the screen as multiple arcs during each exhale. Instead, the screen shows a series of individual bumps, mixed up with his breathing.

"It sounds cute, and as a parent, you wouldn't notice anything," Dr. Wermke said. "But when you analyze it, you can see the differences."

One of the lab's current projects with the department of otolaryngology at the Würzburg University Clinic aims to deepen our understanding of how hearing difficulties affect crying and cooing. Wermke's team are sampling 150 newborns. For half of them, a hearing test signaled potential problems. The other half, including Joris, passed the test and form a control group. They are recorded in their first week of life, and again at 2.5 months, to see whether and how their cries and coos have evolved.

Pinpointing problems at this early stage can help put a baby's development back on track, especially if the parents articulate words carefully to show how each sound is formed.

We listen to another baby. She is almost 10 months old, and has just had a cochlear implant, which turns sound into electric signals and sends them to the cochlear nerve. Implanting it is a big decision, as the operation irreversibly destroys any remaining hearing.

In this baby's first recording after the operation, she emits a series of high-pitched, metallic calls, imitating the beeps of her newly activated device: *'Hooo! Hooo!'*

Dr. Wafaa Shehata-Dieler uses a special monitor to test the hearing of baby Max in a soundproof cabin at the neonatology clinic.Felix Schmitt for The New York Times

Soon, however, she grows used to it. What happens next is astonishing.

In just over a month, the baby undergoes a fast-forward version of the typical developmental path. She races from single arcs to multiple arcs to

syllables with consonants. The next stage will be words.

“They catch up pretty fast,” Dr. Wermke said of post-implant babies.

The 2-month-old with hearing problems also makes a leap. Nine days after receiving a hearing aid, his irregular, choked cries have given way to confident experiments with vowel sounds.

It’s not just babies with hearing devices who can be tracked this way. Two of Dr. Wermke’s Ph.D. students, Pauline Hammerstädt and Jasmin Mack, showed me a tiny plastic plate that’s used to cover the roof of the mouths of newborns with a cleft palate. They analyze recordings of babies with and without the inserted plate from birth to 180 days, to investigate how this affects their speech development. Such information can help doctors decide on the best treatment plan.

For ordinary parents wanting to give their child the best start, Dr. Wermke’s advice is simple: “They just need to listen, spend time with their babies, sing to them, cuddle them.” While looking after her grandchildren, Dr. Wermke also experimented with another sound that proved very soothing: howling.

Felix Schmitt for The New York Times

She demonstrated this to me in her office, puckering her lips and filling the room with an undulating, wolf-like sound. I tried to copy her, she offered tips for improvement, and for a while we sat there, howling at each other. Later, I saw her howl at two babies and newborn Joris, none of whom she'd met before. One of the babies laughed with delight and seemed absolutely transfixed. The other stopped crying and relaxed. Newborn Joris turned his head to peer at the howling scientist, let out a deep sigh and fell asleep.

All parents, Dr. Wermke said, have an innate ability to understand and respond to their babies. Indeed, it was mothers who supported her research from the beginning, even as other scientists were skeptical. In the 1980s, when Dr. Wermke first began recording babies' sounds, many researchers viewed crying as a mere biological alarm signal, worth investigating only in the context of problems such as colic. But mothers never doubted that their tiny babies were worth studying. As Judith Fricke, little Joris's mother, said, "I think you'd recognize the sound of your own child among a hundred

others. You develop an ear for that."

And the howl? After returning from my trip, I tried it out on my 3-week-old nephew. My version was not as melodious as Dr. Wermke's, but to my delight, it sort of worked. He snuggled against my shoulder and stopped crying – at least for a little while.

Sophie Hardach is a journalist and author living in London. Her next book, "Languages Are Good For You," celebrates linguistic diversity. It will be published by Head of Zeus in 2020.