

New Tool for Children With Speech Errors

Speech therapists are using ultrasound imaging to help fix the hardest speech problem in children. WSJ's Sumathi Reddy and NYU's Tara McAllister Byun, Ph.D. discuss.

Photo: University of Cincinnati Academic Health Center

By

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Oct. 20, 2014 2:57 p.m. ET

It is one of the most common and hard-to-fix speech errors: making the “r” sound.

Researchers and speech therapists say the use of an unlikely tool—an ultrasound probe—could help children who have difficulty saying the letter “r” correctly. Instead of red, these children might say wed. Or buhd instead of bird.

About 10% of preschool children have some sort of speech or sound disorder, experts say. Many children naturally outgrow these, or get help correcting the problem with conventional speech therapy. But when the problem is pronouncing “r,” speech errors can persist; studies have estimated that 2% to 3% of college-age people still have trouble with the sound.

“We actually have a lot of 12-year-old boys who say, ‘Can you teach me to say the word girl?’ ” said Tara McAllister Byun, an assistant professor at New York University’s Steinhardt School of Culture, Education and Human Development. Dr. Byun is part of a group of researchers from several institutions who plan to begin studying how best to implement the ultrasound technology in clinical practice.

Conventional speech therapy is often effective at helping to resolve speech errors from sounds that are made with the lips, such as “p,” “b,” “m” and “v.” Children can look in a mirror and imitate a therapist’s lips. But more complex sounds like “s,” “l” and “ch” are harder to fix because they involve movements of the tongue hidden inside the mouth.

Experts say “r” has a particularly complex tongue shape. Using ultrasound biofeedback allows children to see and visualize the tongue as it moves, something not possible in

traditional speech therapy. Also, unlike other speech sounds, “r” isn’t always produced the same way; there are many different tongue variations that produce the same sound.

For some children, part of the problem may be an auditory-perceptual problem that makes it difficult for them to hear the difference between correct and incorrect “r” sounds, Dr. Byun said. Ultrasound images “replace the auditory channel with the visual channel,” she said.

‘It’s a complicated sound to make. It requires some difficult and coordinated movements with the tongue.’

—Jonathan Preston, assistant professor at Syracuse University, commenting on the letter ‘r’

To use the technology, an ultrasound probe is dabbed with gel and placed under a child’s chin. Sound waves capture real-time images of the tongue, which help patients and therapists see the outline of the tongue’s shape and position.

The University of Cincinnati has one of the few speech clinics in the country using ultrasound on young patients. Suzanne Boyce, a professor of speech pathology and speech science at the university, said the clinic is open to children 8 years of age and older who have been in therapy for at least a year with little improvement. About 110 children have gone through the therapy in recent years and there is usually a waiting list, she said.

“Before around 8 years old, most kids will respond to conventional therapy,” she said.

“However, around this age a group of kids who are less responsive seems to emerge.

While some kids continue to improve and do well, this is usually the point where people start thinking this might be a persistent problem.”

Jill Matacia, a stay-at-home mother with three girls in Cincinnati, has been bringing her daughter Ruby to the clinic since April. Ruby, who will soon turn 8, was allowed to start the program a little early.

“It’s something fun for the kids,” said Ms. Matacia. “They get to see their tongue on the screen. It’s visual.”

Ms. Matacia said her older daughter Sophia, who is now 12, also used the ultrasound biofeedback a few years ago and was able to fix her problem with “r” after just five sessions. Ruby’s progress has been slower, partly because she can have difficulty concentrating, said Ms. Matacia.

“Right now she’s not being teased by the other kids but I have a feeling it’s coming,” she said. “With my oldest daughter, by the end of second grade they started noticing that she wasn’t speaking properly and they started teasing her.”

Among the most common tongue shapes for producing the correct “r” sound is the bunched “r,” where the tip of the tongue is pointed down or forward and the bulk of the tongue is raised up near the hard palate. Another is the retroflex “r,” where the tongue tip is curled up and slightly back.

In both these cases, parts of the tongue are doing different things at the same time. Generally the tongues of people who don’t pronounce the “r” sound correctly are making simpler or undifferentiated shapes.

“It’s a complicated sound to make. It requires some difficult and coordinated movements with the tongue,” said Jonathan Preston, an assistant professor in the department of communication sciences and disorders at Syracuse University.

“Ultrasound makes it more obvious since people can visually adjust and they can learn to adjust in real time,” he said.

Dr. Preston, who is participating in the multisite research on implementing ultrasound technology in clinical practice, led a small study that found ultrasound biofeedback improved pronunciation in eight children who had trouble with the “r,” “s,” and “ch” sounds. The study is scheduled to be published online this month in the *Journal of Speech, Language and Hearing Research*.

On a recent day at the NYU Speech-Language-Hearing Clinic, Dr. Byun tried ultrasound biofeedback with Nate, a 6-year-old who has been coming here for speech therapy. NYU is researching the technology but isn’t using it in clinical practice.

“I’m going to show you what the ‘r’ sound looks like,” Dr. Byun said to the boy, holding

up a small ultrasound probe under her chin and making the sound “er.” “We call it a horse shape because it has a bump in the back and then another bump in the front,” she explained to him as the image of a line with two curves appeared on the laptop in front of them. “If my ‘r’ sound isn’t good we’ll only see one bump,” she added, demonstrating a poor sounding “r.”

Dr. Byun then placed the probe under Nate’s chin. “Can you make two bumps at the same time?” she asked him. “Try all different things.”

Dr. Byun said research has shown that experimenting by making different shapes with the tongue is the key to arriving at the right shape. “You can’t really try to shoehorn kids into the same tongue shape for ‘r,’ ” said Dr. Byun. “They have to find the one that really fits for their vocal tract.”

Ultrasound technology has long been used by linguists studying different languages. To adopt it for therapeutic use, experts say more research needs to be done to come up with the best protocol, such as the optimal length of sessions and what kind of verbal cuing the clinician should provide. The devices, some of which are portable, can cost \$4,000 to \$5,000.

Jaclyn Goldman, a speech therapist at North Shore Pediatric Therapy in Glenview, Ill., currently might ask her patients with trouble saying “r” to hold a lollipop or an upside-down spoon in their mouth and tracing it with their tongue to get a retroflex shape.

“Ultrasound definitely would be useful,” Ms. Goldman said. “Having the visuals can be helpful so they can see what their tongue is actually doing.”

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