When research goes remote: adapting studies in the face of COVID-19

With every challenge comes new opportunities. When the COVID-19 pandemic hit the U.S. in March 2020, much of the country went on lock-down with only essential services and operations remaining. The Waisman Center was no exception. Essential operations continued in the building and hundreds of employees transitioned to working from home. While clinic operations and appointments transferred to newly-established telehealth platforms, the circumstances posed unique challenges for the Waisman Center's robust biobehavioral research programs. The center's biological research continued fairly seamlessly at reduced capacity, but behavioral studies, which rely heavily on data collection from in-person visits, faced major obstacles. The challenges proved to be an opportunity for developing innovative new ways to continue research, transitioning studies that had traditionally been limited to in-person interactions to now accommodate remote data collection.

"Normally in a year, we would bring about a thousand families to the Waisman Center to

The Infant Learning Lab, directed by Jenny Saffran, PhD, is one of several Waisman labs to transition its in-person research studies to remote participation.

participate in our research," says Jenny Saffran, PhD, a Waisman investigator and professor of psychology. Saffran runs the Infant Learning Lab, which studies how infants and young children learn language and track speech. In a typical research environment, her work relies on being able to observe children's physical behavior. But since it is unsafe to go about research in the usual way, she had to adapt.

"When the pandemic halted in-person studies, researchers began exploring whether it would be feasible to run study sessions using Zoom," says Robert Olson, PhD, an engineer with the Waisman Center's Clinical Translational Core (CTC). The core provides investigators like Saffran with access to a broad range of supports for conducting translational research focused on human development and intellectual and developmental disabilities. The CTC has proven to be an invaluable resource during such an unprecedented time. For Saffran, who was already working with Olson on mechanisms for remote research, the pandemic accelerated the timeline to launch online data collection.

Saffran's current research examines how much infants understand of the conversations going on around them. "We're basically trying to understand what babies know about language before they can really talk," she says. "The way we try to get inside their heads is to show them images and have them listen to people talking, while we measure whether their eye gaze seems to reflect an understanding of the language." For example, if an infant is looking at a computer screen with a picture of a cat and a ball on it, and an adult says, "Where's the cat?", the researchers then use an eye gaze device to time how long it takes for the participant's gaze to shift to the cat.

An eye tracker is a device that tracks and records a person's eye movement based on where the user is looking on a computer screen. It is highly effective for infants and young children as well as individuals with severe physical or communication challenges.

Together, Saffran and Olson were able to create a program that now works on multiple platforms and operating systems, allowing individuals to participate in Saffran's research safely from home. "Instead of having the baby come into the lab and sit on their parent's lap and look at our screen and listen to our speech, we're trying to do that via web browsers and video camera technology," says Saffran.

Listening for opportunities

Waisman investigator Katie Hustad, PhD, a professor of communication sciences and disorders, found herself in a similar situation once the pandemic struck. Hustad studies communication development in children with cerebral palsy (CP). As part of her research, she records speech and language samples of children with CP. About half of all children and adults with CP have significant speech production challenges.

Hustad uses the audio samples to identify early predictors of age-specific outcomes. Her goal is to better determine when a child with CP may be expected to formulate certain words or sounds and

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identify therapies that can improve outcomes. She has been following the same children over time for close to 15 years. Losing the ability to track development in those children through in-person visits to the Waisman Center had dire consequences for the research. Although the research had the potential to be moved online and into participants' homes for some of the information being collected, she admits she was tentative to make that switch before ultimately having no choice. "There are just so many rogue variables in that mix," she says of participating in research from home. "You don't know what the noise is like in the background, their Internet bandwidth, other distractions in the environment, you can't control the recording levels when audio and video are being captured remotely. I was worried about 15 years of data that tell a longitudinal story being compromised through the use of the internet," she adds.

Prior to late March, Hustad recruited listeners – usually college students – to listen to those audio files from children with CP, and write down what they think the child said. The transcript is then scored to determine children's speech intelligibility. These listener responses to children's speech form the foundation for understanding functional change in speech abilities over time.

"We'd have one set of listeners listen to a child when they're 3 years old, then another set of listeners hear the same child when they're 4, and when they're 5, and so on," she says. "We can then track trajectories of change over time in speech intelligibility

development for the kids in our study." With this data, she is able to determine speech growth patterns including the time points when children are growing the most rapidly, and the time points when growth starts to slow down and even plateau.

"Before COVID, this would have been done by bringing listeners into a sound booth at the Waisman Center," says Olson, who also worked with Hustad to transfer her research online. "We obviously can't do that now."

Hustad worked with Olson to ensure that both the audio and the video would be of a high enough quality to properly assess participants' speech. "Rob has done amazing work with building out our capacity to remotely collect data from listeners," says Hustad. "The data feeds right back into our database at the Waisman Center, which automatically stores and scores all of our results."

Olson admits that before COVID, the online portion of Hustad's research was not meant to be the entire experiment, but drastic times call for drastic measures.

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Unexplored research areas

Olson was able to set-up the remote program to gather information from listeners by the end of May and Hustad began collecting data in June. To date, collection of listener data is going well. However, collecting data from children with CP using remote tools is much more complicated.

"The way people communicate is fundamentally different when you can actually sit face-to-face," says Hustad. "Working remotely, you can get a lot of information, but all you can see is what the camera is showing you, so you're really limited in your perceptual scope."

Furthermore, her listeners are getting a different quality of audio than they would in a controlled laboratory. Questions have arisen about the validity of those incoming results. "Is an online listener equivalent to a lab listener?" she asks. "Those are studies that we're going to have to do in order to determine if we can combine our online data from the listeners."

Minor tweaks and adjustments are ongoing. "We continue to develop new variations of the task as it appears remote listening will be the primary way new experimental data can be collected for an extended period," Hustad says. "It's better than nothing, but we're really eager to see our kids again."

Unexpected benefits

Saffran's lab began doing online research October 1 and she says it has been going well.

An unexpected result of having to move research online is the expanded breadth of accessibility researchers now have to other populations and the ability to target demographics outside of the greater Madison area.

"We're hoping that the online platform may allow us to reach families we might not otherwise reach or families who might not be comfortable coming to a college campus but are really interested in participating in research," Saffran says. She plans to advertise her studies in more diverse areas such as Milwaukee. "If we can actually tap into those participant populations and other places, we might be able to actually investigate or try to answer research questions that are difficult to answer with the population of infants that we have access to here!"

Whatever happens moving forward, Olson and the CTC will continue to work with Waisman Center researchers to adapt and expand research participation. "If online research turns out to be as fruitful as some of my colleagues around the country are reporting," Saffran says, "I think it just might give us another tool to add to our toolbox of different ways that we do our research."