

Cochlear Implant and Hearing Aid Research Lab OHSU



October 2020 Newsletter



History of the Laboratory

The Cochlear Implant and Hearing Aid Research Laboratory (CIHARL) began in July 2010 in the Department of Otolaryngology at Oregon Health & Science University.

The overall goal of the laboratory is to improve patient outcomes with hearing devices, whether they are cochlear implants (CIs) and/or hearing aids (HAs). Our research focuses on auditory perception in children and adults with hearing loss - how they hear and process sounds differently from those with typical hearing, and how these differences explain difficulties with understanding speech, especially in noisy situations like a crowded room.

Several long-time lab members have moved on in the last year and a half - Bess Glickman is now in graduate school, Curtis Hartling is now a clinical faculty member teaching audiology at Portland State and Pacific University, and Yonghee Oh has started his own lab as an assistant professor at the University of Florida. Current personnel include Lina Reiss (principal investigator), Morgan Eddolls (research assistant), Melissa Lawrence (research assistant), Irina Omelchenko (research associate), and our newest members - Holden Sanders (research audiologist) and Langchen Fan (postdoctoral researcher). This is the second newsletter and research update written for patients and other individuals who have participated in research in this laboratory.



Welcome Our New Postdoc and Research Audiologist!



Langchen (Elsie) Fan joined our lab in July 2020 soon after graduating from University of Rochester with a PhD in Biomedical Engineering. At U of R, she worked in the Carney Lab studying how neurons in the midbrain respond to tone in noise to better understand how we detect signal in noisy environments. In our lab, she is planning to use both psychoacoustical and modeling approaches to understand the differences in binaural fusion of vowels between people with

normal hearing and those with cochlear implants. This work will improve our understanding of binaural hearing with cochlear implants. When Langchen isn't working, she loves to watch movies and hike!



Though some of you have already met Holden, some of you haven't! Holden graduated with a Doctor of Audiology degree from the University of Arizona in 2019 and joined our lab soon after as our research audiologist. Prior to studying audiology, he studied American Sign Language. He specializes in research with cochlear implants and auditory evoked potentials. In his time off, Holden enjoys playing guitar, reading, practicing martial arts, and hiking. Rain, shine, or snow, Holden can be seen out and about with his dog and sidekick, Beauty.

Previous lab members: Where are they now?



Yonghee, the previous postdoc in the lab, moved to Florida to work as an Assistant Professor and Principal Investigator at the University of Florida in the Department of Speech, Language, and Hearing Sciences. His lab of auditory computation and psychophysics focuses on improving clinical and research tools to measure the benefits of cochlear implants and hearing aids, as well as the effects of hearing loss. When he is not working, he likes to spend time with his family, his wife and 19-month-old son. He misses all of his patients he worked with at OHSU and all of his friends in Portland. He is excited to visit Portland again after it is safe to travel!



Since leaving the Cochlear Implant & Hearing Aid Lab, Curtis, the previous research audiologist, has been working as an Assistant Clinical Professor at Portland State University (PSU) and Clinical Supervisor in the Pacific EarClinic at Pacific University. This unique split position with both institutions involves working with undergraduate and graduate students studying communication sciences and disorders. At PSU, Curtis teaches undergraduate level courses including Hearing Science, Clinical Audiology, and Aural Rehabilitation. In the Pacific Ear Clinic, Curtis provides clinical supervision to audiology graduate students in training. It's a nice mix of clinic and classroom

experience. Although this work is extremely rewarding, Curtis does miss playing Tupperball™ with the research participants at OHSU :-)



Bess Glickman, previously one of our research assistants, is now a Ph.D. candidate in her third year in the Interdisciplinary Graduate Program in Neuroscience at the University of Iowa. She studies the neurobiology of learning and memory; specifically, how spatial memories can be modulated during consolidation. Her current work focuses differences in memory modulation if you recall a memory after only a couple days versus after a longer period of time. Bess misses interacting with all of the amazing research participants in the cochlear implant and hearing aid research laboratory and still likes to share some of her favorite jokes that she learned while working with the pediatric participants.

COVID-19 Safety Updates

The CIHA lab has revised all protocols to ensure maximum safety for research participants and researchers. Currently, we are only recruiting subjects in the **low-risk** group, which includes those under age 65 and with no underlying medical conditions as listed on www.cdc.gov. In order to minimize time in the lab, we are conducting pre-appointment interviews over video chat before meeting in the

lab. During appointments, we are following strict social distancing and sanitizing protocols. We provide face masks with a clear window to all subjects at the beginning of the appointment to allow for lip reading, which the subject can take home. Additionally, only one appointment is allowed a day to ensure no crossover in contamination between research participants. If you have any questions or concerns, about our COVID-19 safety procedures, please don't hesitate to reach out to our research assistant, Morgan (eddolls@ohsu.edu).



Screenshot of current lab members in a recent virtual lab meeting, where we discuss

papers, recent projects, educate ourselves on racial justice issues, and show each other our animals and gardens at home!

Pictured (left to right; top to bottom): Holden Sanders, Lina Reiss, Irina Omelchenko, Langchen Fan, Melissa Lawrence, and Morgan Eddolls

Brief Research Update

Our studies focus on how people with hearing loss integrate sounds between the two ears – binaural integration of spectral information. The spectrum of a sound describes how much energy there is at each frequency. A tone has a narrowband spectrum, and a noise like “shhhh” has a broad, flat spectrum. Spectral information is the basis for how we discriminate between tones, noise, and other sounds like speech.

This research has focused on how binaural spectral integration, or fusion of sounds with different pitch, differ in children and adults with hearing loss. We also examine how these differences affect speech perception, especially in noisy listening situations.

Over the past year, research has been paused, and then slowed down, due to the COVID-19 pandemic. In the meantime, we have focused on presenting and publishing research findings from the past few years. Here are some of the publications that came out this year (reprints available on request):

1. Anderson, S.R., Glickman, B., Oh, Y. and Reiss, L.A.J. (2020) Binaural pitch fusion: Effects of sound level in listeners with normal hearing. *Hear. Res.* <https://doi.org/10.1016/j.heares.2020.108067> online ahead of print.
2. Hartling, C.H., Fowler, J.R., Stark, G.N., Glickman, B., Eddolls, M., Oh, Y., Ramsey, K., and Reiss, L.A.J. (2020) Binaural pitch fusion in children with normal

hearing, hearing aids, and cochlear implants. *Ear. Hear.* doi: 10.1097/AUD.0000000000000874. Online ahead of print.

3. Oh, Y., and Reiss, L.A.J. (2020) Binaural pitch fusion: Binaural pitch averaging in cochlear implant users with broad binaural fusion. *Ear. Hear.* doi: 10.1097/AUD.0000000000000866. Online ahead of print.

Our lab’s recent findings was also presented internationally to researchers, audiologists and speech therapists, and families via the annual Alexander Graham Bell Convention in July, 2020. This convention was held virtually for the first time, and Dr. Reiss presented a keynote talk in the Global LSL Symposium titled “Binaural fusion in children and adults with hearing loss”. Here is a link to watch the talk online, along with those of other keynote presenters that you might be interested in watching:

<https://www.agbell.org/Professionals/2020-Symposium-Research-Proceedings>

Future Studies

It is our hope that things will get back to normal soon. We are still conducting in-person studies with rigorous distancing and disinfection procedures. We are also exploring ways to conduct testing remotely. This may involve dropping off a computer/tablet and headphones at your home, and conducting testing via wireless connection. Stay tuned!

Current New Research Opportunities:

- *Adults (18 to 65 years old) with no hearing loss*
- *Children and adults (10 to 65 years old) with hearing loss:*
 - *bilateral hearing aids*
 - *one CI and one hearing aid*
 - *bilateral CIs*

Compensation levels:

- *Adults with no hearing loss:
\$15/hour*
- *Adults with hearing aids: \$20/hour*
- *Adults with at least one CI: \$25/hour*
- *All pediatric subjects under age 18:
\$25/hour*
- *Transportation costs also
compensated as applicable*

THANK YOU to all of you who have participated in this research!!! These findings would not have been possible without the generous time and support from our research participants and their families.

Please do not hesitate to contact us if you have any questions about the research or if you would like to request copies of publications.

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