# Auditory Neuroscience Laboratory

# www.brainvolts.northwestern.edu

Discovering early markers of language development by studying brain activity, listening, and learning



# Spring is around the corner & Year 4 is in progress!



Believe it or not, we are embarking on the 4<sup>th</sup> year of our study. Many new families and children continue to join the BIOtots project as 3 or 4 year olds, and in particular, our original 3-4yos have begun to join us in the lab for the 4<sup>th</sup> time as grown up 6 or 7 year olds. We are astounded by their growth—both their soaring heights and active brains!!

You have contributed to our knowledge and understanding of the biology behind kids' development of literacy and learning, and we know there are many more discoveries around the corner. Thank you so much for devoting your valuable time and energies towards coming into the lab...the credit for the success and longevity of the BIOtots project is due entirely to you and your wonderful children.

Our dedicated team of researchers sincerely hopes you have enjoyed your recent visits to the lab. If you know any families who would like to participate, please let them know about our project!

#### -The Biotots research team

**Researcher Spotlight:** 



Jessica MacLean Research Assistant

Jess MacLean is a research assistant in the Auditory Neuroscience Lab. She's originally from Indiana and received a bachelor's degree in violin and neuroscience from Indiana University.

While she has worked on several other key lab projects, her major focus is the BIOtots study. She administers the full protocol, contributes to data preparation and analysis, and assists with recruitment and enrollment.

If you've met Jess, you know she brings energy and enthusiasm to everything she does, but she says she especially loves getting to know the children she tests. The gifts of artwork she has received have touched her deeply... Check out her wonderful gallery the next time you visit!

We hope you had fun playing with us!

If you have any questions about the project or would like to share photos of your child with us, please call or email: (847) 491-2457 biototsresearch@gmail.com

### Your science is going places!

# SCIENTIFIC REPORTS



You know that **colorful & silly** cap you wear while watching movies with us? Well, all of your **patience** and **hard work** has helped us solve some **mysteries** about how your **brain** works!

It may sound **crazy**, but we found that the cap you wear told us your **brain** has **rhythms**! Just like how **music** has rhythm, **so too** does your brain! In fact, we found that your **brain's rhythms** help you process **speech**!

Did you know that you have a **right and left** side to your **brain**? Well, we found that if you had really **fast** rhythms on the left, and really **slow** rhythms on the right, then that told us you were really good at **listening**!

These rhythms are super **cool**, but they're very **tiny**, so you won't be able to notice them. Even though you can't hear them, they're always working,

**Now published!** Thompson EC, Woodruff Carr K, White-Schwoch T, Tierney A, Nicol T, Kraus N (2016) Hemispheric asymmetry of endogenous neural oscillations in young children: implications for hearing speech in noise. *Scientific Reports*. 6:19737.

#### Our BIOtots team presented new research in San Diego last month!

Ellie Thompson and Kali Woodruff Carr presented posters to speech and hearing scientists from around the globe this February at the annual meeting of the Association for Research in Otolaryngology.

Dr. Kraus also gave an opening talk with cochlear implant surgeon Charles Limb at a special ARO performance of the San Diego Symphony!

#### Here's what BIOtots families have helped us discover:

**Ellie's poster**: Children spend the majority of their school day listening. One of a student's most challenging jobs is to hear the teacher's voice despite interference of background noise, including everything from the chattering of classmates to the whistling of radiators. Ellie wanted to tease out which listening ingredients might make children better at hearing



speech in noise. Ellie also examined the ways the listening recipe remains stable across development. Ellie found attention and the ability to track an element of speech called the fundamental frequency (the pitch of a speaker's voice) were closely linked to performance on processing speech in noise. Ellie continues to investigate these relationships so we can better understand how to help children who struggle with classroom listening.

Kali's poster: Previous research has shown that female and male brains respond similarly to sounds, but females respond to speech onsets more quickly than males, and females process high pitch information more robustly. Kali wondered about the listening patterns of preschool girls and boys. As with adults, she found that sex differences are selective, affecting certain features of sound processing but not others. For example, she found that preschool girls responded to speech onsets relatively faster than boys, just as happens with adults, but they did not process the high pitch information differently. Kali hopes we can better understand the links between listening differences between girls and boys, and boys' higher incidence of learning issues so that school teams can eventually improve boys' odds by delivering effectively tailored interventions.

## Let's bake Audie's Paw Print Cupcakes!

Here's a yummy recipe for cupcakes that are reminiscent of visits to our lab! Help our musical dog make cupcakes with his paw prints.



#### Ingredients:

#### Cupcake base

cup milk
tsp. apple cider vinegar
<sup>3</sup>/<sub>4</sub> cup sugar
1/3 cup canola oil
<sup>1</sup>/<sub>2</sub> tsp. vanilla extract
cup all-purpose flour
1/3 cup cocoa powder
3/4 tsp. baking soda
1/2 tsp. baking powder
1/4 tsp. salt

#### Frosting

1 medium, ripe avocado <sup>1</sup>/<sub>2</sub> cup maple syrup <sup>1</sup>/<sub>2</sub> cup cocoa

#### Toppings

Oreos Chocolate chips

# Cookies and cream cupcakes (makes 1 dozen)

#### Let's do this together:

- 1. Preheat oven to 350 and grease or add liners to a muffin tin
- 2. Mix milk and vinegar in a large bowl and set aside for a few minutes to let the milk curdle.
- 3. Add sugar, oil, and vanilla extract and beat until foamy.
- 4. In a separate bowl, sift together flour, cocoa powder, baking soda, baking powder, and salt.
- 5. Add the dry ingredients in two batches to the wet ingredients and beat until no large lumps remain.
- 6. Pour into liners, filling  $\frac{3}{4}$  of the way.
- Bake for 18-20 minutes, until a toothpick inserted into the center comes out clean. Transfer to a cooling rack and let cool completely before frosting.

#### Time to make the frosting:

- Mix ingredients in a food processor.
- 2. Add water if frosting is too thick to spread.

#### Now it's your turn to help Audie make his paw print:

1. Add one Oreo to the top of each cupcake.



2. Add chocolate chips around the Oreo to make a paw print.

## Building a better Northwestern



We would like to inform all BIOtot families that multiple ongoing construction projects at Northwestern are taking place around the Frances Searle building where the lab is located. These projects will be continuing into early or late 2017. The City of Evanston is conducting a replacement of the water main lines in and around Sheridan Rd., South of Lincoln Ave. and North of Emerson St., until the end of May 2016.

We apologize for any travel inconvenience this may cause you!

To get to the lab, take Lincoln Ave. eastbound (towards the lake). Follow the road briefly through campus, eventually heading due

east again towards the lake after two bends. After stopping at the cross walk in front of the Henry Crowne Sports Pavilion, pull into the first parking lot on your right.

You will be directly behind the Frances Searle Building. Please park in one of the spots marked "Research Subject Parking Only" and call the lab at 847-491-2465 so we can bring you a parking pass.



To learn more about our work, visit our website: www.brainvolts.northwestern.edu

start under "slideshows" to learn about our current projects







#### We want to keep in touch!

Moving? Have a new e-mail or phone number? Update your contact information with us by shooting an email to <u>biototsresearch@gmail.com</u> or calling us at (847)-491-2457.

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