

The Infant Learning Lab

2019 in Review

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Free!

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Dear Parents and Friends:

Thank you so much for participating in the language research studies being conducted at the University of Wisconsin's Infant Learning Lab! Even though many of our participants are not yet talking (we have studies with children as young as 6 months of age), all of our participants are paying close attention to the sounds, syllables and words that surround them. With you and your child's help, we are able to address important questions related to language acquisition. Answering these questions will help us to better understand how typically-developing infants process and learn language, information that could lead to a better understanding of what happens in cases where children don't acquire their first language as readily.

Many families participated in one or more studies over the last year, and we have been busy collecting data for all of these studies! As always, we have had some very interesting and exciting results. This newsletter is intended to highlight the findings of some of the different studies we have been conducting over the last year. You can find a list of recently published work at the end of this newsletter.

We hope that you and your child had an enjoyable visit to the Infant Learning Lab. Thank you again for your participation! Without your help, this important research could not happen. If you would like copies of any of the papers we are writing or have any additional questions or comments, please feel free to call us at (608) 263-5876 or email us at babies@waisman.wisc.edu.

Thanks again,
Jenny Saffran

Combining Clues to Learn New Words

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When children hear a new word, they are often surrounded by many objects. Children are able to use many different clues to help them figure out which object is being labeled. For instance, they reject familiar objects with known names as potential referents for the novel word. Children also use a speaker's gaze, rejecting objects that a speaker is not looking at. Past research has found that children can learn new words successfully using each of these clues on its own.

In a series of studies, we examined whether children are more successful in learning new words when they can use multiple clues. To test this, we had 3-year-olds come into the lab and watch videos of a person labelling novel objects. We tracked their eye movements to see how successful they were in looking at the correct object in different situations.

Sometimes children could find the correct object using only familiar objects as clues, sometimes they could find the object using only the speaker's gaze as a clue, and sometimes they could use both clues. We also tested children to see how successful they were at learning and remembering the names for the novel objects in these different situations. We have just completed these experiments and are in the process of analyzing the results.

The Infant Learning Lab

Meet Our Team



Lab Director:
Jenny Saffran



Lab Manager:
Jing Shen



Graduate Student:
Martin Zettersten



Graduate Student:
Haley Weaver



Graduate Student:
Desia Bacon



Graduate Student:
Ron Pomper

Thesis Spotlight

ANNIKA HENDRICKSON
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We know that infants attend to vocal emotion shortly after birth. At just two days old, infants can discriminate between four different vocal emotions: happy, sad, angry, and neutral. Furthermore, in the early months of life, infants begin showing preferences for specific intonations. Infants use these intonations to socially evaluate others, preferring individuals who use positive affect over those who use negative affect. Despite infants' knowledge about and preferences for certain intonational properties of speech, and the importance of speech in infant word learning, no studies exist that investigate the relationship between vocal affect and word learning in infants. We are aiming to understand the effect of vocal emotion on infant word learning.

We investigated this by presenting four novel objects and labeling them with novel words. Two of the objects were labeled in happy intonation and the other two were labeled in neutral intonation ("This is a Manu, look at the Manu"). Each object was presented four times. The study then moved on to the test phase, where two objects were presented on the screen and the child was asked to find one of the objects ("Find the Manu. Do you see it?").

If infants have learned the name the object, they will look longer at the target object than at the distractor object.

Data collection is ongoing so we cannot present any findings at this time. But we hypothesize that infants will learn the words presented in happy affect better than the words presented in neutral affect. Past research has shown that infants prefer listening to happy speech more than neutral speech, and it is likely that those forms of speech infants most prefer will be more thoroughly committed to memory. This project will fill a significant gap in the current body of research regarding vocal properties and their effect on infant word learning.

How Stable are Individual Infants' Preferences for Speech – Collaborating Across the Globe

MARTIN ZETTERSTEN, M.S.
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Over the past few years, the Infant Learning Lab has joined with 67 other labs around the world to ask a single question – what types of speech do babies prefer? We know that adults tend to speak to babies differently than they do to other adults. When talking to babies, we often speak in a higher pitch and with more pitch variation in general, we draw out our vowels, and we speak more slowly and distinctly, among many other differences. This type of speech, often referred to as "baby-talk", is called infant-directed speech. In this multi-lab study, we investigated whether infant-directed speech helps babies break into language, by asking whether infants prefer listening to recordings of adults

speaking to infants compared to adults speaking to other adults. With a final participant count of over 2000 babies (including about 100 babies from Madison), the results showed that babies consistently prefer infant-directed speech compared to adult-directed speech.

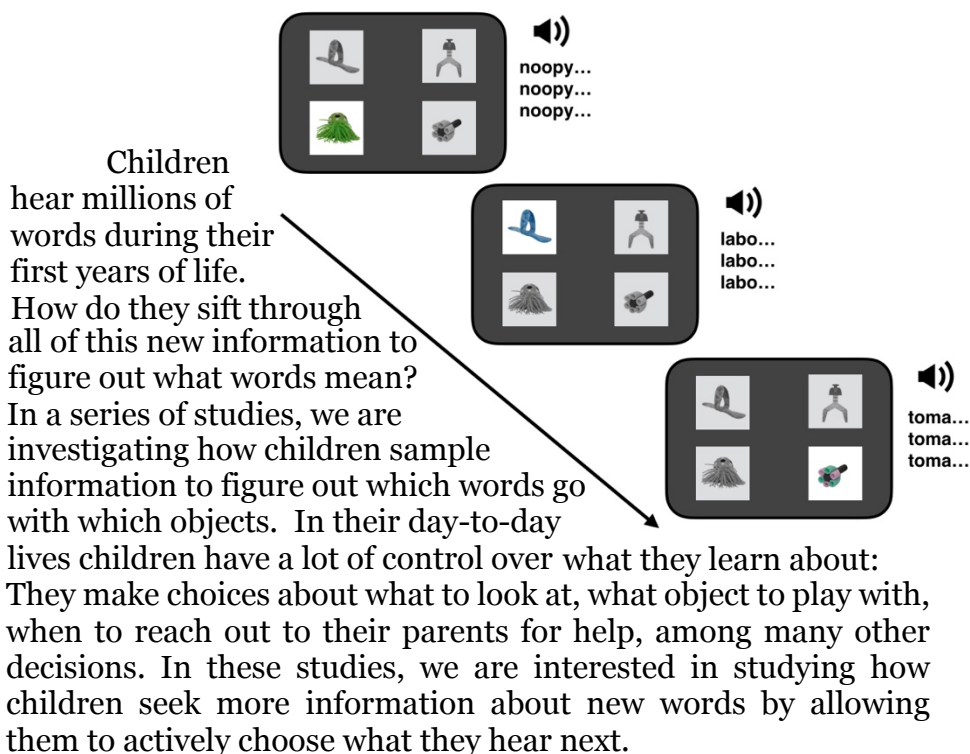
Last year, we joined with many of the same labs to ask a follow-up question: when we measure an infant's preference for infant-directed speech during one session, can we expect to find a similar preference if we measure that same infant again, at a later timepoint? This question is important because it helps us understand how reliable our measures of infants' preferences are on an individual level. When we measure infants' preferences, are we able to get information about an individual infant's preferences, or are we only getting reliable information at the group level, once we look across all of our participants? To answer this question, we tested a new group of 6- to 9-month-olds' preference for infant-directed speech twice, with about one week in between testing sessions.

The results paint an interesting, and perhaps surprising, picture. Across all of the data contributed by several labs from around the world, we consistently found that infants – as a group – prefer to listen to infant-directed speech, during both the first and the second test session. However, the preferences of individual infants did not stay consistent across testing sessions: infants who showed a strong preference during the first test session did not necessarily show a similar preference during the second session. These findings are important because they help us understand what kind of inferences we can – and can't – make from our measures. The results also open up new research questions asking how we can measure individual infants' preferences and learning more reliably.

Sampling the Words Around You: How Babies Collect Information About New Words

MARTIN ZETTERSTEN

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To investigate this question, we designed an experiment in which children can control with their eyes which object they will hear the word for next. In the study, four objects appear on the screen. What happens next depends on which object an infant looks at: as soon as they focus on one of the objects on the screen (which we determine automatically using an eyetracker), that object lights up, and the name for the object plays as long as children continue to look at it. When they shift their focus to another object, that object is automatically triggered, and they can spend time listening to the name of the new object (see image below). This allows infants to sample information about new words quickly, controlling everything with their eyes.

So far, we have found that infants appear to be curious and strategic samplers – they tend to spend more time listening to the names of objects that they may be less sure about (because we have made the names for those objects more difficult to learn). These are exciting results, because they suggest that infants, from a very young age, are curious learners, motivated to figure out what the words are for the objects they see all around them.



Friends of the Waisman Center

Mark Hayward Yo-Yo & Juggling Show

Date: Sunday, February 9th from 1:00pm – 2:30pm

Location: Friends of the Waisman Center Auditorium

Cost: \$2.00 adults, \$1.00 children

Davide Stokes Wildlife Fun

Date: Sunday, March 8th from 1:00pm – 2:30pm

Location: Friends of the Waisman Center Auditorium

Cost: \$2.00 adults, \$1.00 children

Most Popular Baby Names in 2019

Most Popular Girl Names

1. Sophia
2. Olivia
3. Emma
4. Ava
5. Aria
6. Isabella
7. Amelia
8. Mia
9. Riley
10. Aaliyah

Most Popular Boy Names

1. Liam
2. Jackson
3. Noah
4. Aiden
5. Grayson
6. Caden
7. Lucas
8. Elijah
9. Oliver
10. Muhammad

Waisman Day With the Experts

Autism

Date: Saturday, January 25th from 9:00am – 12:30pm

Location: Friends of the Waisman Center Auditorium

Cost: Free!

Down Syndrome

Date: Saturday, March 14 from 9:00am – 12:30pm

Location: Friends of the Waisman Center Auditorium

Cost: Free!

Cochlear Implants

Date: Saturday, June 6th from 9:00am – 12:30pm

Location: Friends of the Waisman Center Auditorium

Cost: Free!



Judging Novel Objects by the Company They Keep

RON POMPER, M.S.
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When children learn the name of a novel object, it is often surrounded by other familiar objects. These familiar objects are not random and usually belong together; for example, you're more likely to find foods in the kitchen and toys in the playroom than vice versa. We hypothesized that children may learn facts about a novel object (that it's a food or a toy) based on the company it keeps.

To test this, we had 5-year-olds complete a task on a tablet at the Children's Museum. Children were asked to tap images of familiar and novel objects that were named. One novel object was always paired with familiar foods and another novel object was always paired with familiar toys. Afterwards, children were shown images both novel objects and asked which one was a food that could be eaten and a toy that could be played with. We have just completed this experiment and are in the process of analyzing the results.



Do Faces Help Infants Learn Multiple Languages?

DESIA BACON, M.S.
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The acquisition of language presents a number of challenges for young learners. Learners in bilingual environments have the additional challenge of needing to not only track the structures of multiple languages, but also keep these patterns separate in order to discern the structures unique to each language. Studies in our lab, in collaboration with other researchers, have found that monolingual infants displayed difficulties in learning to segment two artificial languages when they were presented one after the other, even given the addition of contextual cues; however, the materials lacked an important cue that may be present in real bilingual environments: social information.

The current experiment extended the findings from Benitez et al. (2019) to include a new group of 8.5- to 10.5-month-old monolingual English-learning infants. The question of interest was whether infants use faces as a cue to determine that they are hearing two different languages. Participants were exposed to two artificial speech streams, each paired with a different female face, as well as the acoustic cues used in prior research. If the addition of a social cue helps infants determine they are hearing two languages, we would expect looking times to word and nonword items to differ, indicating a preference.

On average, participants had a preference for nonword items compared to words items, though this difference was not significant. These results indicate that the addition of a still face is not sufficient to help English-learning monolingual infants separate two incoming artificial languages. This research further highlights the difficulties monolingual infants have in disambiguating two languages after short exposure time, despite the addition of multiple cues, including a social cue.



Wor(l)d Explorers: How Do Children Actively Learn New Words?

MARTIN ZETTERSTEN, M.S.
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Children are curious explorers. Just like astronauts jetting off to explore the stars, children embark on voyages to make sense of new mysterious worlds. One of the first great mysteries children must solve is how to make sense of the words that are being used all around them. How does children's motivation to explore new information relate to how they learn? In a series of studies, we are investigating how giving children active control over their learning supports their ability to learn new words.



In these studies, we teach children new words for little 'alien' characters in a touchpad game. During learning, we vary what kind of experience children get with each of the new words, making them more familiar with or certain about some new alien names than others. Then, children get to explore the new words: children are given the opportunity to choose which 'alien' they will learn the name for next. Later, we test how well children learn the words, to see whether being able to actively choose what word to hear helps children learn.

So far, we have found two main results. First, children are indeed explorers by nature when it comes to making sense of new words. Children tend to make choices that reflect their curiosity, choosing to hear the names of aliens that they are less familiar with or that they are more uncertain about. Second, children who are given active control over what they will learn construct a useful "curriculum" for learning: children tend to select words that can help boost their own learning. Ongoing studies that follow up on these initial results will help us understand when and why being able to control their environment as an 'active learner' is particularly helpful for young children.

What's in a Name?

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When meeting new people, adults use many automatic mental strategies to categorize and remember people's faces. For instance, adults automatically store information about people's gender, race, and age in their memory, and this process often occurs outside of their immediate awareness process begins.

Although we know much about how adults incorporate social category information into their memory of other people, much less is known about when and how this process begins.

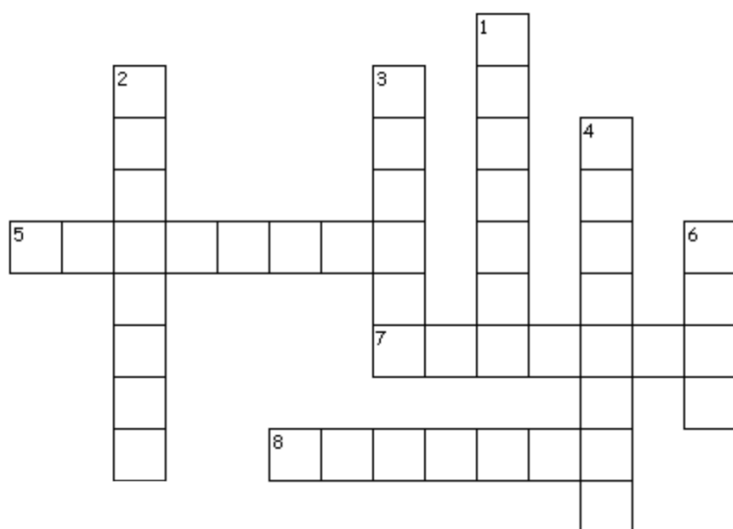
We investigated whether infants remember novel people's names differently depending on the gender of the person. Infants saw four unfamiliar adults' faces, two males and two females, and were told each person's name (e.g., "Look at Tevi. This is Tevi!"). We varied whether particular names were associated with the male or female faces; for example, half of the infant participants heard the name "Tevi" paired with a female face, and the other

half of participants heard “Tevi” with a male face.

The data have revealed that infants are not demonstrating a significant preference for hearing gender-matched name pairs or gender-mismatched name pairs. This suggests that after four exposures to four novel face/name pairings, infants are not considering the names attached to two people of the same gender as more similar to one another than a male name paired with a female name. Ultimately, continued research in this area is necessary in order to extend our knowledge about children’s early social learning.

Edited by: Jing Shen

Crossword



Across

5. American Psychologist known for stages of moral development
7. A child beginning to walk
8. Where the Infant Learning Lab is Located

Down

1. Freud
2. 26 letters
3. Swiss psychologist known for stages of child development
4. Early stages of talking
6. Reflex in babies

Does Infants’ Social Category Knowledge Inform Their Language Processing?

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Adults link social category information to words and objects. However, the age at which people begin to draw connections between language and the social world is unknown. One potentially informative link is gender, which is marked by both speaker information (e.g., vocal pitch) and object attributes (e.g., color and design). The current study examined whether 22- to 24-month old infants use the perceptual cue of speaker voice to predict which object a speaker is referring to. That is, do infants make associations between objects and the intended referent of a speaker based on gender cues?

Infants viewed two objects, a target and distractor object. Whilst viewing these objects, they heard a male or female speaker ask for the target object. The object pairs were prototypically gendered (one masculine object and one feminine object). Over the course of each trial, the eye-tracker recorded infant eye movements, allowing us to see where they were looking (and for how long) as the trial unfolded.

Data analyses are ongoing, but thus far indicate that on Consistent trials (in which the speaker’s gender matched the prototypical gender of the target object), participants spent more time looking towards the named object compared to Inconsistent trials (in which the speaker’s gender did not match the prototypical gender of the target object). This indicates that the presence of a gender-matched voice facilitates infants’ lexical processing.

The Infant Learning Lab on NETFLIX

Our lab is being featured in a new Netflix docuseries, *Babies*, focused on child development. This twelve part series will be released in the Spring of 2020. Our lab’s research on language learning will be featured. Check out our episode to learn more about our research and what goes on behind-the-scenes in our lab!

Science Times

The New York Times

VITAL SIGNS

ERIC NAGOURNEY

STAGES

Your Baby May Be Wailing Right on Key

Think your child is a natural-born musician? You may well be right.

But, a new study suggests, *everyone* is.

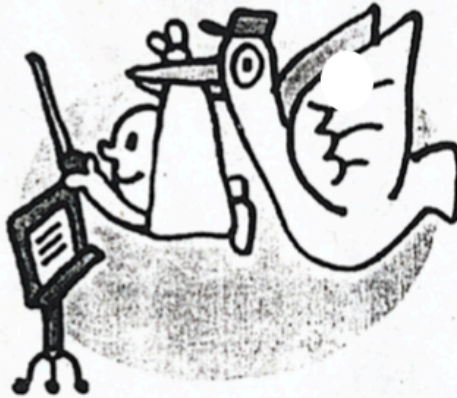
Dr. Jenny Saffran, director of the Infant Learning Laboratory at the University of Wisconsin, has uncovered evidence that all newborns may possess perfect pitch, a trait rare among adults, even musicians.

Perfect pitch allows people to identify a single note without using another one for comparison. Most people rely on relative pitch, which allows them to identify notes only in context. Thus, an adult recognizes a song even if it is sung in a different key — something a newborn, the study suggests, may not be able to do.

Writing recently in *Developmental Psychology*, Dr. Saffran said she began by devising a test to measure newborns' response to notes. The goal was to determine which ones the infants recognized.

As rare as it is in adults, perfect pitch seems to be basic in newborns, the researchers found. But the infants did not do as well on tests involving relative pitch.

The question is, Why would humans born with such a powerful skill lose it as they developed? One answer, Dr. Saffran said, may be that while perfect pitch helps



Stuart Goldenberg

an infant "map" his aural world, much as he does his visual one, it becomes less useful over time.

Older people equipped with only the precise measure that is perfect pitch, and not relative pitch, may find themselves overwhelmed by the world around them and unable to communicate well with others. The word "cup," for example, may seem to be two words, depending upon whether it is spoken by a man or a woman, Dr. Saffran said.

*Blast from
the Past!*

*Our lab's research has
been featured in the
New York Times.*

*Thank you for your
interest in our
research! We
appreciate the
support of families
like yours so we
can continue to
uncover the
secrets to infant
language
acquisition.*

Looking into Learning

DESIA BACON, M.S., MARTIN ZETTERSTEN,
M.S., & HALEY WEAVER, B.S.
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Some words occur more often in an infant's environment than others. It's very likely that the more often a word occurs, the easier it is to learn. In the lab, we try to measure learning and information recall in young infants using their preferential looking. One difficulty with this is that our understanding of the relationship between learning processes and looking behavior is limited. In this current study, we are trying to determine whether we can measure how well individual

infants learned by studying their looking times.

To address this question, we are testing 6- to 9-month-old infants' recognition of novel auditory stimuli following a training phase while manipulating a factor that is expected to affect learning: frequency of exposure. During the training phase, infants hear a list of new "words" — words we have made up to make sure infants have not heard them before. While all infants hear the same total number of new words during familiarization, the frequency of target words varies. After the training phase, we measure how strongly infants prefer the target words, compared to words they did not hear during training. The central question is whether hearing the target words more frequently — words that we expect infants will remember better — results in stronger looking preferences. Data collection is ongoing. The findings will help us understand what our looking measures tell us about how well individual infants have learned.

Looking for More Research Opportunities?

The Little Listeners Project

Studying language in toddlers with and without autism spectrum disorder.

<http://littlelisteners.waisman.wisc.edu/home>
(608) 262-9308

The Social Kids Lab

Studying the cognitive and social development of young children.

socialkids@psych.wisc.edu
<https://socialkids.waisman.wisc.edu/sign-up/>

Child Emotion Research Lab

Exploring children's emotional development and the relationship between early experience and mental health.

childemotion@waisman.wisc.edu
<http://www2.waisman.wisc.edu/childemotion/parents.html>

Binaural Hearing & Speech Lab

Studying how children learn to locate sounds in their environment.

<https://bhsl.waisman.wisc.edu/for-participants/>

Madison Children's Museum Living Lab

UW Madison labs often conduct research with families visiting the Madison Children's Museum. Come find the Infant Learning Lab in the Madison's Children's Museum on most Sunday mornings this spring!



Know Someone with a Baby?

We are always looking for more babies to participate in our studies! Our current studies involve infants as young as 6 months and children up to 5 years of age, and we conduct studies both in the Infant Learning Lab at the Waisman Center and at the Madison Children's Museum!

If your family just welcomed a new child and you would like to update your information with us, just give us a call at (608) 263-5876 or email us at babies@waisman.wisc.edu, and we'd be happy to inform you of studies as your child becomes eligible! Also, if you know a friend who has young children or recently had a baby, feel free to pass along our contact information.

If you are involved in programs with infants or expectant parents (e.g., child care programs, play groups, or childbirth classes) and would be willing to post a flyer or distribute articles describing our research, please let us know!

Publications in 2019

- Venker, C. E., Pomper, R., Mahr, T., Edwards, J., Saffran, J., & Ellis Weismer, S. (2019). Comparing Automatic Eye Tracking and Manual Gaze Coding Methods in Young Children with Autism Spectrum Disorder. *Autism Research*. <https://doi.org/10.1002/aur.2225>
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- Santolin, C., Russo, S., Calignano, G., Saffran, J. R., & Valenza, E. (2019). The role of prosody in infants' preference for speech: A comparison between speech and birdsong. *Infancy*, 24(5), 827-833. <https://doi.org/10.1111/inf.12295>
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- Santolin, C., & Saffran, J. R. (2019) Non-linguistic grammar learning for 12-month-old infants: Evidence for constraints on learning. *Journal of Cognition & Development*, 20(3), 233-441. <https://doi.org/10.1080/15248372.2019.1604525>
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- Peng, Z. E., Hess, C., Saffran, J. R., Edwards, J. R., & Litovsky, R. Y. (2019). Assessing Fine-Grained Speech Discrimination in Young Children With Bilateral Cochlear Implants. *Otology & Neurobiology*, 40, e191-e197. <https://doi.org/10.1097/MAO.0000000000002115>