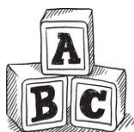
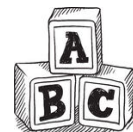


Infant Learning Lab Newsletter



2017 In Review



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. In addition to the study highlights, 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, Ph.D. – Principal Investigator

Sarah Oakley, B.S. – Laboratory Manager



Our 2017 Studies

What types of speech do babies prefer: The Infant Learning Lab goes global!

This year, the Infant Learning Lab joined with over 50 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 features. This type of speech, often referred to as “baby-talk”, is called infant-directed speech. In this study, we investigated whether infant-directed speech

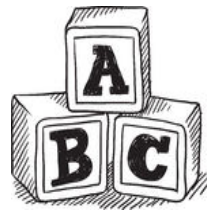
helps babies break into language, by asking whether infants prefer infant-directed speech compared to adult-directed speech.

To ask this question, we played babies from 6 to 15 months of age recordings of a mother talking with her child or with another adult. We measured how long infants listened to the infant-directed recordings compared to the adult-directed recordings to determine

whether babies prefer to hear speech aimed at infants.

At the same time, over 50 infant development labs in the U.S. and around the world asked the same question using the same methods and recordings. Our research community was interested in how frequently different labs will find the same results when trying to test the exact same question. The reason this is important is that we know that babies are somewhat “noisy” participants –their behavior isn’t always easy to predict, compared with adults. We want to know how well our methods are able to break through the noise to determine infants’ preferences and knowledge, and what we can do to improve our methods

The results from our lab are in – but they are an in-lab secret for now, so we do not bias the findings from any of the labs still collecting data. The findings from this many-lab study will be reported next summer and we are excited to see the results!



Martin Zettersten, M.S.

zettersten@wisc.edu

How does predictability affect children's learning?

Young children are really good at acquiring the predictable patterns that are in their environment. Additionally, they can detect when something occurs that is unpredictable or unexpected. But how does predictability affect young children's learning? In this study, we explored if children learn new words differently if they are presented from predictable vs. unpredictable events.

For this study, 2-year-old children were shown a video where four windows open and close to reveal pictures of novel objects. The windows open in a specific order (window 1, followed by window 2, window 3, and window 4). Children first saw the windows open over and over again in this order. If children learn the order, children should be able to predict which window will open up next. After a few minutes of seeing the sequence, children then heard some of the objects being named. Some objects were named at the window that was supposed to open up next, and therefore, children had the opportunity to correctly predict that event.

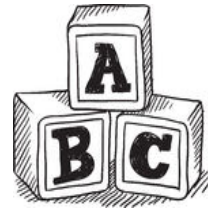


Some objects, however, were named at a window that was NOT supposed to open up next. This event was therefore unexpected, and

children could not predict that the window would open up. We then tested if children learned the names of these different types of objects.

To measure learning, we used an eye-tracker which allowed us to examine in detail where children looked throughout the video. What we found is that children learned the order of the windows opening, such that they were successfully predicting which window would open up next. Additionally, we found that

whether objects were labeled at predictable vs. unpredictable events in the sequence mattered for word learning. Objects that were labeled at predictable events were learned much better than objects that were labeled at unpredictable events. These findings suggest that events that are consistent with young children's expectations may be particularly beneficial for learning new information.



Viridiana Benitez, Ph.D.

viridiana.benitez@asu.edu

Could music play a role in how infants are able to learn new words?

In this study, we explored the interaction of music and language in infant learning. After being exposed to music in increments of two notes at a time, infants heard a made-up language comprised of two-syllable words. We found that infants were able to distinguish words of the language from non-words. We believe this was due to the similar patterning of the music and language, which helped infants understand that the words of this made-up language were each two syllables long.

We also tested whether the type of music to which infants were exposed could differentially impact their learning. Previous research has shown that infants prefer to listen to the human voice over any other sound, and that stringed instruments may be more similar to the human voice than other instruments.

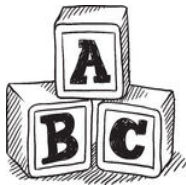
Because of this, some infants in this study heard cello music, while others heard trumpet



music. We predicted that exposing infants to cello music would facilitate learning compared to the trumpet music based on the cello's stronger similarity to the

human voice. However, we found no statistical difference between infants who heard different types of music, proving this portion of the study inconclusive.

These results provide evidence that infants can use musical experience to help them learn language, implying that music could be influencing other ways they learn to perceive the world as well. Overall, we demonstrated that cross-domain learning is possible between music and language, and that experience with music may affect infant language learning.



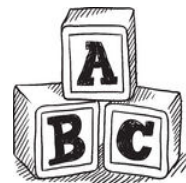
Allison Hare, B.S.
allison.hare@gmail.com

Look at the blue
one, the red one,
and the tever.

For some objects color is important (strawberries are red), but for other objects color is not important (pencils come in many colors). When children learn the name of a

novel object, they must learn and remember which properties are important. For instance, are all tevers green? In past research in our lab, we found that children attend more to a familiar object's color, when we previously asked them to identify other familiar objects using colors rather than names.

In the current experiment, we are examining whether having children identify familiar objects using colors rather than names will influence whether they learn and remember that tevers are green. To do this, we first showed 38- to 42-month-old children pictures of familiar objects and asked to them to find objects using their colors. They were then taught the names of novel objects with different colors. We found that children remembered each object's specific color. In ongoing work, we are now having children identify familiar objects using their names and will test whether they remember the specific colors of novel objects. Young children have sticky attention, which becomes more flexible with age. These findings are important in helping us understand how children's sticky attention influences what they learn when they learn new words!



Ron Pomper, M.S.
ron.pomper@wisc.edu

Does a child's use
of touch-screen
devices have an
effect on their
attention?

Touch-screen devices are deeply embedded into today's society, with many children owning their own device and using them independently on a daily basis. The distracting features in many popular applications are a cause for consideration. The effects of these devices on development, particularly on attention, have not been clearly understood. Selective attention shows an individual's ability to focus on a specific stimulus, maintain attention, and resist distractions.

This study involved showing children ages 4 to 6 a stream of individual shapes of different colors. They were told to press a button whenever they saw a yellow star. If they were focusing on their task, they may notice that a yellow circle always came right before the star. This would help them be more accurate in pressing the button when the star appeared because they are prepared for it to show up. During their task to find all of the yellow stars, distracting pairs of cartoon characters appeared in the corners of the screen.

We compared touch-screen device exposure, as measured by a survey that parents completed, with the child's reaction time to pressing the button when they saw the star.

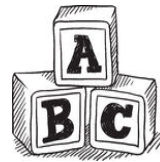


We also compared their touch-screen device exposure to their accuracy on recalling information about the distracting cartoon characters. The study did not show significant results in either of these areas. We did

find slight significance with greater touch-screen device exposure relating to more accuracy in pressing the button when the star appeared. This may mean that children with more exposure are able to focus more on a

task amidst distractions because they have learned to do this from their use of technology.

Much more research needs to be done to best understand the full picture of the effects of these devices in development. In the future, we hope to learn more about the effects of specific apps, both positive and negative. We are continually trying to learn and adjust to the ever-changing times of technological use in childhood.



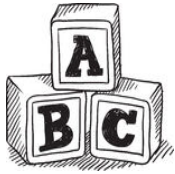
Elizabeth Hoff, B.A.

lizzie.hoff@du.edu

You can eat the
modi!

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 (e.g., foods in a kitchen). We hypothesized that children may learn facts about a novel object (that it's a food) based on the company it keeps. We taught 38- to 42-month-olds the names of some novel objects that were always paired with familiar foods and the names of other novel objects that were always paired with toys. Children then heard the novel words played over a speaker. They listened longer to the novel words when they were both from the same category (e.g., both were paired with foods) compared to when they were from different categories (one was paired with foods, the other with toys). These results are exciting because they show that children are not only learning the names of novel objects,

but also the company those objects keep! While familiar objects may make word learning more difficult (by making it harder to find the object that is being labeled by the novel word), their presence can help children learn more about a novel word.



Ron Pomper, M.S.
ron.pomper@wisc.edu

How do children actively choose what to learn about?

Children hear millions of words during their first years of life. How do they sift through all of this new information to figure out what words mean? In a series of studies, we are investigating children's active role in figuring out which words go with which objects. In these studies, we ask how children selectively collect more information as they are learning new words.

In their day-to-day lives, children have a lot of control over what they learn about: they make choices about what to look at, what object to play with, when to reach out to their parents for help, among many other decisions. In these studies, we are interested in studying how children seek more information about new words by allowing them to actively choose what they hear next.

To investigate this question with infants in the lab, we first teach babies the words for a set of new objects they have never seen before. To let babies have control over what they are watching, we use an eye-tracker to measure where babies are looking on the screen. We



then show them the objects they just learned about. As soon as they look at one of the objects, we play the label for that object. This allows babies to control –with their eyes - which word they will hear next based on which object they look toward. Later

we test babies how well babies learned these novel words.

So far, we are finding that infants are strategic in their learning choices. In particular, infants are sensitive to how useful it is to select one word versus the other: when they have a choice between an object that they have heard the name for very infrequently and an object that they have heard the name for very frequently, they become much more likely to choose the object for which they have rarely heard a name – in other words, they make choices that they can potentially learn more from!

We are also investigating how older children (3-5 years of age) actively learn new words.

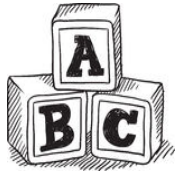


In this study, we teach children new words for little 'monster' characters in a touchpad game. During learning, some children

can choose which 'monster' they will learn the name for next, while other children only passively learn the words for the 'monsters'.

Later we test how well children learned the words, to see whether being able to actively choose what word to hear helps children learn.

Together, these studies will help us understand how young children actively seek new information to make sense of the incredible number of words they hear used all around them.



Martin Zettersten, M.S.

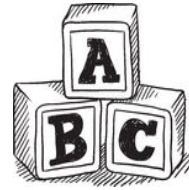
zettersten@wisc.edu

How do infants learn grammar?

During the first year of life, infants begin to acquire grammatical patterns of their native language. Babies learn that words belong to different categories such as determiners, nouns, verbs, etc. To what extent this learning process is specific to language? In this new project, we are interested in whether infants can acquire grammatical patterns resembling those found in natural languages, over non-linguistic sounds.

To address this question, 12.5- to 13-month-olds listen to a made-up language composed by sounds instead of words, and the sounds will follow each other according to a grammar; for example, some sounds predict the presence of others somewhere down the stream. After they listen to the sound-language, we measure babies' listening preference to new strings of sounds, some of them match the patterns of the sound-language whereas some others do not match those patterns. If babies show a difference in listening preferences between the two types of sound strings, this would suggest that the mechanism through which infants acquire grammar may not be specific to language. We

found that 12.5 to 13-month old babies can successfully differentiate strings of sounds following the grammar from those that do not, similarly to what they do with natural language.



Chiara Santolin, Ph.D.

chiara.santolin@upf.edu

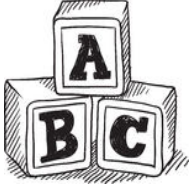
Where's the wuggy? Can children use diminutives when learning new words?

Parents use a distinctive style of speech when communicating with infants and young children. This child-directed speech includes many features like exaggerated intonation, higher



pitch, and the use of diminutives. In English, diminutives are formed by adding -y or -ie to the ends of words (e.g., doggy). However, only a small number of animals (e.g., doggy), proper names (e.g., Ronny), and baby objects (e.g., blanky) have diminutive forms. We wanted to know whether infants have learned that diminutives usually refer to living things. To test this, we showed 16- to 19-month-old infants pictures of unfamiliar animals (e.g., a meerkat) paired with unfamiliar vehicles (e.g., a rickshaw). They then heard a sentence with

a novel word that was either a diminutive (e.g., Where's the wuggy?) or was not a diminutive (e.g., Where's the blicket?). By tracking infants' eye movements, we can measure whether they look at the unfamiliar animal more than the unfamiliar vehicle when they hear the diminutive novel word.



Ron Pomper, M.S.
ron.pomper@wisc.edu

Can songs help infants learn the meanings of new words?

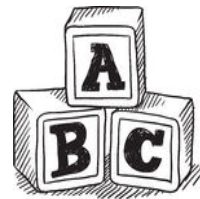
Word learning is one of the most important aspects of language development. Specifically, we know that an infant's ability to learn the meanings of new words underlies the language skills necessary for reading and writing. With this in mind, it is no surprise that language research seeks to find new ways to help infants in this word learning process. Since past studies have shown that music can be beneficial for language development, and other studies have shown that infants prefer to listen to the human voice over any other sound, this study seeks to determine if singing, in particular, can help infants learn the meanings of new words.

In order to investigate this idea, infants watch a video in which new and familiar objects appear on the screen in front of them. While each object appears on the screen, infants are taught the name of the object in either a song or a regular spoken sentence. After several minutes, infants then begin to see pairs of



objects on the screen. They are then directed to look at one of the two objects. If the infants look at the correct object during this portion of the study, we will be able to tell that they have learned the meaning of the new word. We will then be able to see if there is a difference in word learning between the object names that were taught in a song versus the object names that were taught in a spoken sentence.

We predict that infants will have an easier time learning the words that were sung than the words that were spoken. This study is ongoing, so we have only just begun to analyze the data! However, we hope that the results will extend our knowledge of the connections between music and language, with potential clinical applications for intervention in children with language delays and disorders.



Michaela McCabe,
UW Undergraduate
mkmccabe@wisc.edu

How do infants learn complex patterns in language?

Language is full of complex patterns that infants learn over their first few years of life. In this study, we are interested in one particularly difficult kind of pattern: sometimes, the form of words depends on words that occur earlier in the sentence, “at a distance”. For instance, in English, we add an “-s” to a verb only if the sentence begins with a third person singular noun (“dinosaur”) or pronoun (“he/ she/ it”), e.g. “the **dinosaur** eagerly walks toward the cake” or “**she** celebrates the dinosaur’s birthday”. To learn this kind of pattern, infants must keep track of two words that occur far from each other in a sentence. This is a really difficult task, even for adults!

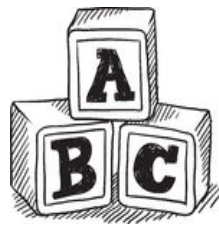
How do infants learn this type of pattern? One situation that helps infants track these patterns is if there is a lot of variability in the words that occur in between the two elements that depend on each other. For instance, babies hear a lot of different verbs in the third-person form: “**she** runs”, “**she** jumps”, “**she** kicks”, “**she** skips”, “**she** eats”, etc.



Hearing a lot of different elements helps infants track what is remaining constant – the connection between **she** and –s.

In our study, we are interested in whether picking up on patterns “at a distance” then helps infants pick up on new patterns of the same kind. Once you’ve recognized patterns “at a distance” once, do you have an easier time recognizing a new pattern of this kind? In a separate set of studies with adults, we have shown that adults can pick up on these types of abstract patterns and then apply them to a new set of patterns they have not seen before.

To test our question, we play infants an artificial language with patterns embedded in it. We then test how well they learn these patterns by seeing whether they prefer to listen to sentences consistent with the pattern as compared to sentences inconsistent with the pattern. This tells us they have learned the ‘grammar’ of the artificial language. This study will help us understand how infants build on what they have learned about language to discover new, complex patterns.



Martin Zettersten, M.S.

zettersten@wisc.edu

Looking for more research opportunities?

Here are some other labs in Madison that are looking for families with kids to participate!

- ✓ **Little Listeners Project** - Studying language in toddlers with and without autism spectrum disorder
 - Sign up online!
<http://littlelisteners.waisman.wisc.edu/home>
 - Or call today at (608) 262-9308
- ✓ **The SPACE Lab** - Studying the development of children's memory for visual features and locations of objects
 - Sign up online!
www.spacelab.psych.wisc.edu/parents
 - Dr. Vanessa Simmering:
spacelab_psych@wisc.edu

- ✓ **The Social Kids Lab** - Studying the cognitive and social development of young children
 - Sign up online!
www.waisman.wisc.edu/socialkidslab/socialspacelabs/Sign_Up.html
 - Dr. Kristin Shutts:
socialkids@psych.wisc.edu
- ✓ **Child Emotion Research Laboratory** - Exploring children's emotional development and the relationship between early experience and mental health
 - Sign up online!
www.waisman.wisc.edu/childemotion/parents.html
 - Barb Roeber:
childemotion@waisman.wisc.edu
- ✓ **Binaural Hearing & Speech Lab** - Studying how children learn to locate sounds in their environment
 - Visit the website for current studies!
 - http://www.waisman.wisc.edu/bhl/patients_participants.html
- ✓ **Madison Children's Museum Living Lab** – UW Madison Labs including the Infant Learning Lab studying various aspects of child development
 - Visit the museum website at
www.MadisonChildrensMuseum.org
 - Call today for hours and events
(608) 256-6445

Recent Publications

Please visit our website for direct links to these and other lab publications:

<https://infantlearning.waisman.wisc.edu/publications/>

Zettersten, M., Wojcik, E. W., Benitez, V., & Saffran, J. R. (2018). [The company objects keep: Linking referents together during cross-situational word learning](#). *Journal of Memory & Language*, 99, 62-73.

Santolin, C., & Saffran, J. R. (2017). [Constraints on statistical learning across species](#). *Trends in Cognitive Sciences*. <https://doi.org/10.1016/j.tics.2017.10.003>

Saffran, J.R., & Kirkham, N. Z. (2017). [Infant Statistical Learning](#). *Annual Review of Psychology*, 69, 2.1-2.23.

Potter, C. E., & Saffran, J. R. (2017). [Exposure to multiple accents supports infants' understanding of novel accents](#). *Cognition*, 166, 67-72.

Potter, C. E., Wang, T., & Saffran, J. R. (2017). [Second Language Experience Facilitates Statistical Learning of Novel Linguistic Materials](#). *Cognitive Science*. 913-927.

Know someone with a baby?



We are ALWAYS looking for more babies to participate in our studies!

Our current studies involve infants and kids between 6 months and 5 years of age. We are also recruiting children ages 3 to 5 years old to participate in studies at the lab and the Madison Children's Museum!

Please pass on our phone number (608-263-5876) and/or email address (babies@waisman.wisc.edu) to any parents who might be interested in participating in our research studies.

If you are involved in programs with infants or expectant parents, including 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!

~ Lastly, we always welcome new babies! If you would like to update your information with us, we are more than happy to do so! Just call or email us! ~

Thank you for your continued interest in our research! We couldn't do it without the support of families like yours!