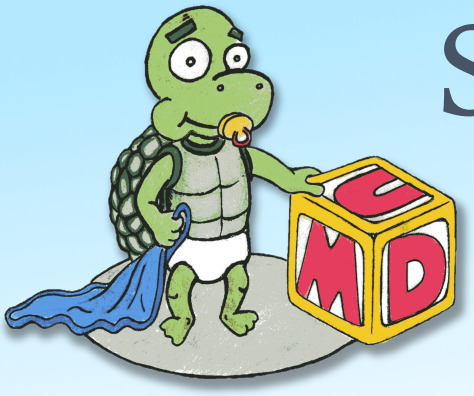
SPRING 2013

INFANT & CHILD STUDIES



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We are always recruiting!

The Infant and Child Studies labs welcome new and returning participants for a wide range of studies on child development.

Please contact us if you are interested, and pass the word to families and friends who may be interested as well!

Studies for ages 2 months to 18 years!

Inside the Cover

Infant and Child Studies Labs

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Dr. Naomi Feldman, Computational Psycholinguistics
Dr. Yi Ting Huang, Language and Cognition Lab
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HEARING & SPEECH

The effects of caregivers' speech rate and style on preschoolers' speech

Speech-language pathology websites and textbooks recommend that parents and caregivers speak slowly and clearly to encourage young children to imitate slow and clear speech. Another common approach to elicit good speech is to simply direct children to speak slowly or clearly. We were interested in exploring whether 3- and 4-year-olds actually imitate the articulatory and/or rate characteristics of the speech they hear and whether they can change these characteristics when they are told to do so. Although we are ultimately interested in how these methods might be applied to children with speech disorders, we first needed to explore how typically-developing children respond.

To explore these questions, forty typically-developing preschoolers participated in 3 activities: 1) a sentence repetition task where half of the children heard slow, over-enunciated speech while the other half heard fast, under-enunciated speech, 2) a story retelling task where children narrated the events of a picture book, and 3) a puppet correction task in which children were asked to correct fast, under-enunciated sentences "spoken" by a puppet by saying them slower and more clearly.

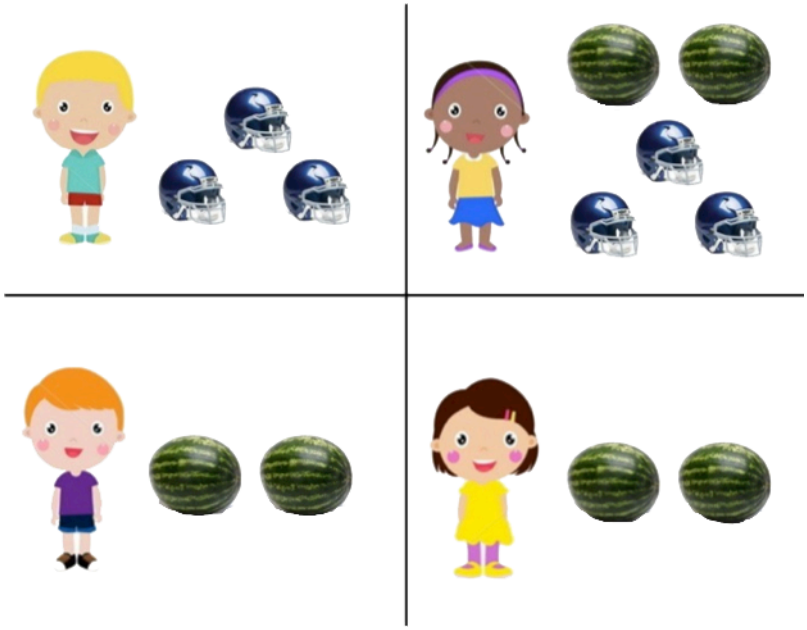
Results from the first task showed that 3- and 4-year-olds were highly influenced by both the clarity of the pronunciation and the rate of speech that they heard; both age groups imitated the speech characteristics that they heard. Results comparing children's natural speech (from story retelling) to directed speech (when they corrected the puppet's slow, under-articulated speech) demonstrated that only 4-year-olds changed their speech style when told to do so. The younger children used a similar clear style in both tasks. Also, neither age group was able to slow down the fast rate of the puppet in their own speech.

In sum, conventional wisdom for typically-developing preschoolers might not be wrong: modeling slow, clear speech might actually rub off on your child. Telling them to slow down (particularly when you're talking fast) is likely not very effective.

How do children interpret ambiguous sentences?

Imagine you see two girls holding several objects. One girl has watermelons, and the other girl has watermelons and football helmets. Now your friend says to you, *"there's the girl with watermelons."* Which girl is your friend referring to? Even though both girls have watermelons, adults will generate a *pragmatic inference* that the speaker means the girl that has watermelons but not football helmets. This is because they assume that their friend wants to be as informative as possible and would have mentioned football helmets if they meant to point out the other girl.

In this study, we are interested in whether children can generate the same kinds of pragmatic inferences in spontaneous situations, in the same way as adults. Using an eye-tracking paradigm, we show the children four characters on a screen, two boys and two girls. Importantly, both girls share some of one object (like watermelons), but only one of the girls has another object (like football helmets). The children hear a story followed by an instruction to choose one of the characters, *click on the girl that has watermelons*. For each story we keep track of which character they choose, as well as where they were looking during and just after the instructions. Where children are looking tells us how they are interpreting the sentence.



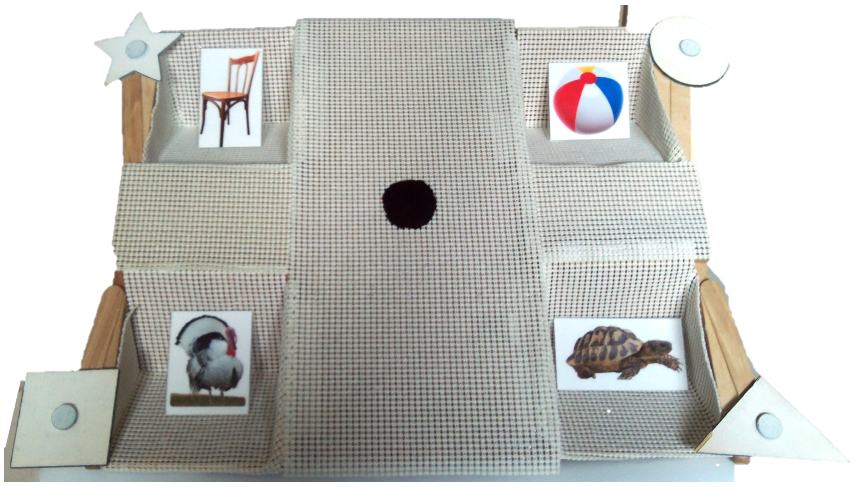
For example, when children hear *click on the girl*, they will look at the two girls on the screen and not the boys. Once they hear *watermelons*, we can see whether children focus their looks to the girl with only watermelons or the girl with watermelons and football helmets. From previous studies, we know that while adults always choose the girl with only watermelons, their looks immediately after the instruction sentence are to both girls.

This tells us that they are considering both of the girls equally before choosing the unique character. We see the same results with 3- to 5-year-olds, but with more delays. Children typically choose the girl with only watermelons, but take much longer to make that interpretation. This is evidence that from early on, children have knowledge about the intention of a speaker even when the sentence they hear is ambiguous. However, the timing difference between adults and children suggests that children are not yet as confident in generating these pragmatic inferences.

Understanding of prosody by children with Autism Spectrum Disorders

Autism Spectrum Disorders (ASD) are a diverse set of conditions that involve impairments in communication and social interactions. Because of this diversity, children with autism do not necessarily present the same way, and research continues to investigate the underlying differences between children with and without ASD. But many individuals with ASD exhibit differences in the prosody (intonation) of their speech. For example, sometimes their speech has been reported to be all the same pitch (monotone), or considered to be too high or too low in pitch. Thus, individuals with ASD often produce prosody incorrectly. But, there has been limited research investigating how well people with ASD are able to understand the prosody of other people's speech.

Prosody serves a number of functions in speech. For example, it indicates the difference between a question (*You went to the store?*) and a statement (*You went to the store.*), it draws attention to important components of the message (*I want the BLUE bowl* vs. *I want the blue BOWL*), and it provides information about the feelings of the speaker (e.g., being excited vs. sad). Because of these factors, as well as social implications to appropriate prosody use, this is an important skill!



We examined individuals with ASD's ability to perceive and interpret changes in intonation, compared to the ability of age-matched children and adolescents without ASD. Participants heard sentences with different components highlighted, either with correct stress (*Put the turtle on the square. Now put the TURKEY on the circle.* Or *Put the turtle on the square. Now put the turtle on the CIRCLE.*) or with misleading stress (*Put the turtle on the square. Now put the TURTLE on the circle.*). Here, stress typically usually indicates a difference – so if the item that is stressed is the same as in the prior sentence, this is misleading. Here, we found that participants with ASD showed the same pattern, suggesting that participants in both groups perceived and interpreted the prosodic cues appropriately. However, there was one important difference between the groups. The participants in the ASD group were found to have significantly less natural prosody use than the participants with neurotypical development. This finding, along with other research on this topic, leads us to believe that children and adolescents with High Functioning ASD may have an intact understanding of prosody, even if they demonstrate atypicalities in their use of prosody.

How do children learn to read?

Many everyday activities demand reading proficiency. Those who cannot read or do so poorly are less able to take advantage of the benefits that comes from accessing the abundance of information that is conveyed through this modality. Critically, prior research has shown that a child's performance in early literacy has been shown to be highly predictive of his/her subsequent reading achievement. These patterns also exhibit cascading effects on other areas of educational performance. This suggests that understanding the basic mechanisms which support successful reading development plays a foundational role in providing interventions for those who are disadvantaged.

One important mechanism that has been studied is the role of processing in early literacy. Using an eye-tracking while speaking paradigm, this study explores the moment-to-moment changes that occur in young children's minds as they learn to read. We are particularly interested in their ability to process letters that are similar and dissimilar in orthographic form (see figure above).

(1) SIMILAR:	e	o	q	p	e	f	t	o
(2) DISIMILAR:	e	o	f	p	e	v	t	o

We also test adults in the study so that we can compare children's interpretations to those of a linguistically mature population. Our independent variable is the degree of similarity in the adjacent letters (similar versus dissimilar). Our dependent variable is the amount of interference that children have when processing these letters. We measure this in two ways. First, we examine the delay between when participants first look to that letter (q) and how long it takes them to say that letter (q). Second, we examine the delay between when participants first say that letter (q) and how long it takes them to look at the next letter (p). If participants show interferences when processing these letters, they should be slower to say that letter and slower in looking to the next letter as well. Our hypothesis is that children (but not adults) experience interference when adjacent letters are similar compared to dissimilar. We predict this relates to their reading abilities.

Toddlers' fast word learning in noisy environments

Whether in a daycare center, home, or classroom, many of the environments children are exposed to are, undoubtedly, quite noisy. This noise could potentially have detrimental effects on their language development. Yet, somehow, these toddlers are still able to rapidly acquire thousands of words. Most studies of children's ability to recognize speech in noise have examined words that children were expected to already know; i.e., words they presumably had learned in quiet settings. In this situation, noise merely limits the ability to recognize the signal. But background noise, particularly background speech, may also be a factor in situations in which children are attempting to learn new words.

To examine the effect of background noise on children's early word learning, we attempted to teach children aged 32-36 months two new words, either in a quiet setting, or in the presence of noise. We used levels of noise that were comparable to those measured from daycare centers during story-time. We then tested the children on their learning of these new words. Surprisingly, children were no worse at learning words in the presence of noise than in quiet. This bodes well for their ability to acquire language in the varied environments in which they may find themselves.

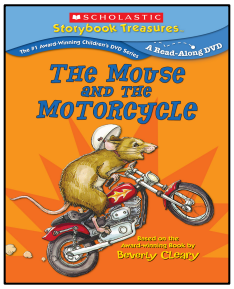
HUMAN DEVELOPMENT

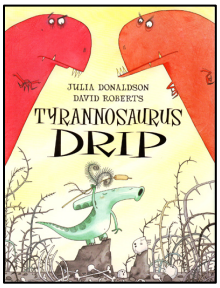
Parents' and preschool children's reading discussions

One of the goals of the Language Development and Parenting Lab is to understand how parents foster children's language and early literacy skills. In a recent study, we examined the discussions parents have with their preschool children during picture-book and chapter-book reading.

Studies have found that during picture book reading, the frequency of parent-child discussions outside of the text relate to children's language development, particularly conversations that include extended discourse. Extended discourse conversations draw connections between the story and more abstract topics. For example, a parent may ask the child to predict what will happen on the next page, or relate part of the story to something in the child's life. These conversations challenge preschool children to talk about things removed from the here-and-now, which in turn prepares them for the academic language used in elementary school. What we don't know is how often these conversations occur during other book genres, like chapter books. Recently a New York Times article reported an increase in chapter book sales among parents of preschool children. Since the benefits of discussions during picture book reading are well understood, we were interested in seeing whether these types of challenging conversations occurred during chapter book reading as well.

We visited parents and their five-year-old children in their homes and asked them to read a picture book and the first chapter from a chapter book together. We videotaped these interactions and examined the number of discussions that occurred outside of the text, as well as the number of those discussions that included extended discourse (e.g., predictions, connections to the real world, explanations). We also had the children narrate a story using a wordless picture book to assemble a measure of their current language ability (e.g., the number of main ideas in the story they mention).





We found that parents used the same amount of extended discourse when reading picture-books and chapter-books. Children, however, engaged in more extended discourse during picture book reading. Children's language ability also seemed to make a difference in their contributions to the discussions, but only during the more difficult chapter book. That is, children with higher narrative skills talked more than children with lower skills during chapter book reading, yet during picture book reading, the amount of discussion was similar for all children regardless of narrative ability.

In conclusion, parents engage in challenging discussions during picture-book and chapter-book reading with their children. Children, however, are more able to engage in these conversations during picture book reading. However, having greater narrative abilities helps children engage in these conversations around chapter books. The results suggest that it's important for parents to take into consideration the book genre given their child's language ability, as more difficult books are not necessarily better for fostering children's early reading skills and kindergarten readiness.

LINGUISTICS

How do kids learn new words?

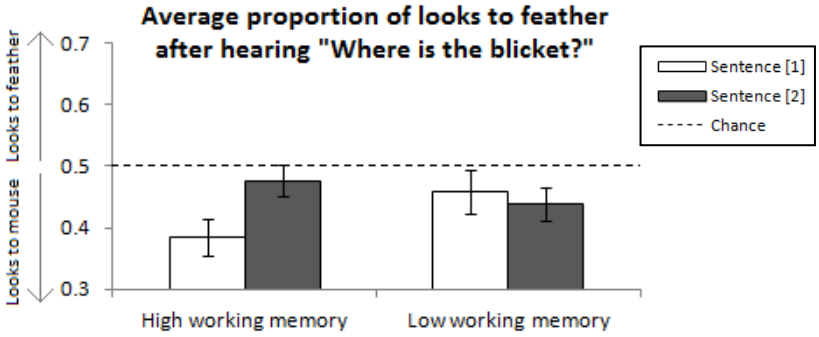
Young children are usually pretty good at using cues from a sentence to figure out the meaning of new words. However, these cues may sometimes lead children to the wrong word meaning. In these cases, cognitive abilities like working memory (the ability to update and maintain representations in memory) may help children to overcome temporary misinterpretations and recover the intended word meaning. In our study, we explored whether working memory aids sentence-based word-learning when children have to revise misinterpretations.

Twenty-month-old children watched a video of someone using a tool to influence an object; for example, one video shows a woman tickling a mouse with a feather. During the video, each child heard one of two sentence types:

[1] She's tickling the blicket.

[2] She's tickling with the blicket.

In sentence [1], "blicket" refers to the mouse that is being tickled whereas in [2], "blicket" refers to the feather that is being used to tickle. However, kids at this age struggle to interpret "blicket" in sentences like [2], because they know that verbs like "tickle" are typically followed by objects (like the mouse); they often incorrectly assign the "mouse" interpretation. After each video, kids saw pictures of both objects and were asked, "Where is the blicket?"



We can tell what kids think "blicket" refers to by recording their eye movements and measuring which object they spend more time looking at.

We measured each child's working memory (WM) by playing a game in which a researcher hid a sticker in one of three boxes and asked the child to find the sticker. On critical trials, the researcher covered the boxes with a blanket before inviting the child to search so that the child had to rely on WM to find the sticker. Kids were assigned to a "high" or "low" WM group based on the number of trials where they found the sticker on the first try.

Kids with low WM preferred the "mouse" interpretation of "blicket" regardless of which sentence type they had heard. In contrast, kids with high WM were divided in their interpretations: high WM kids who heard sentence [2] were more likely to look to the feather than those who heard sentence [1], suggesting that these kids were correctly using sentence structure to guide their interpretation of "blicket." Thus, WM appears to help children correctly use sentence cues to learn new words.

Does the teddy bear matter?

Infants learn language via the interactions of two streams of input: the sentences they hear and the world they experience. This study is interested in the latter and looks at how 9-12 month-old infants, who are largely prelinguistic, understand the world around them. What kinds of similarities in the world constitute a category of events for these infants and what objects present in a scene count as participants in those events?

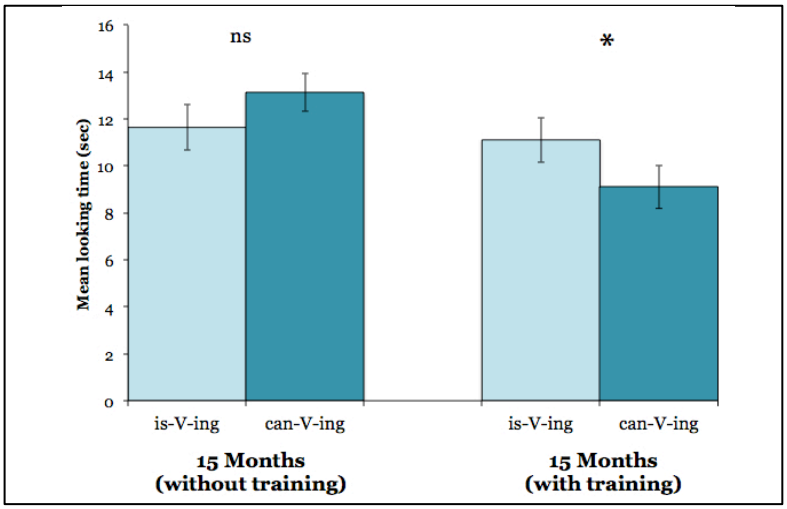
In this study we look at how infants categorize two types of events – GIVING events, which necessarily consist of a giver, a recipient, and a thing being given vs HUGGING events, which only require a hugger and a person being hugged, but not necessarily a third participant. We use a teddy bear in both events: in the GIVING event, it is used as the thing being given, and in the HUGGING event, it is used as the thing that is held by the hugger when the hugging takes place. Even though the same teddy bear is present in both types of events, its significance differs, that is, it matters in one case (i.e. GIVING) but not in the other (i.e. HUGGING). Do infants recognize the different role the teddy bear plays in the two different events? We investigate this by showing an event (either hugging or giving) with the teddy bear. We play the video of the event repeatedly over and over again until the infant loses interest, and at this point, we remove the teddy bear from the original video while keeping everything else constant. If infants notice that the teddy bear disappeared then their interest in the video should return, as indicated by increased looking times. If infants analyze the events in the same way as adults do, they would be surprised by the disappearance of the teddy bear in the GIVING event but not in the HUGGING event.

Current data show that infants are surprised more in the GIVING event than in the HUGGING event, indicating that 9-12 month-old infants and adults represent their experience in similar ways.

How do children learn the relationship between parts of sentences?

We explored children's learning of the relationship between "**is**" and "**ing**" in sentences like "Mary ***is*** sing-***ing***"? Earlier work has shown that 15-month-olds have not yet learned this relationship but that 18-month-olds have. In addition, earlier studies exposing children to miniature artificial languages (with made up words) showed that 15-month-olds can learn dependencies just like the one between **is** and **ing** just in case there is high variability in the set of words that occur between the two parts. We showed that these results extend to real language learning.

In experiment 1, we used a listening preference experiment to replicate the earlier finding that 18-month-old English-speaking infants have acquired the *is*-Verb-*ing* relationship but 15-month-olds have not. We used 6 passages in which each passage contains either natural sentences like "Mike is swimming" or unnatural sentences like "Mike can swimming." These passages were presented from a TV monitor in the center of the testing room, and we measured the duration of looks toward the monitor in each passage. Eighteen-month-old infants looked toward the monitor significantly longer when they heard *is*-Verb-*ing* sentences than *can*-Verb-*ing* sentences, whereas 15-month-old infants showed no reliable preference (below).



We then examined whether 15-month-old infants can learn the *is*-Verb-*ing* relationship after exposure to input sentences with *is*-Verb-*ing* across 24 different verbs. During a learning phase, infants heard 24 sentences with *is*-Verb-*ing*.

*At the park, everyone **is** play**ing** a fun game. A little boy **is** throw**ing** a ball. His friend **is** hitt**ing** it with her bat. Another boy **is** kick**ing** some rocks across the grass. Near by, a duck **is** splash**ing** in a pond. The water **is** wash**ing** the duck's feathers….*

Each sentence contained a different verb that is familiar to 15-month-old infants. After the training passages, we presented the same test passages used in experiment 1. Now, 15-month-olds looked towards the monitor significantly longer when they heard *is*-Verb-*ing* sentences than when they heard *can*-Verb-*ing* sentences (see graph).

These results demonstrate that exposure to *is*-Verb-*ing* sentences, in the lab can promote learning of this relationship. This result is important for two reasons. First, it shows that results from artificial language learning can be informative about the mechanisms that drive natural language acquisition. Second, it highlights the role of particular experiences in shaping language development.

Pronoun interpretation across time

Current research in the Project on Children's Language Learning Lab explores children's interpretation of pronouns. So far, we have found that by 30 months, children recognize restrictions on who pronouns refer to; for example, in a sentence like "she's patting Katie," children understand that the pronoun ***she*** can't refer to Katie. Instead it must refer to some other (unmentioned) girl. At such a young age, this complex understanding is affected by the speed with which children analyze and interpret the words and sentences they hear. But, interestingly, speed for word recognition contributes to this understanding differently than speed for sentence interpretation. Thirty-month-olds' understanding of pronouns is affected by how quickly they are able to put together phrases; however, it is not affected by how quickly they process individual words. This suggests that sentence understanding involves more than just the recognition of individual words.

At earlier points in development, for example before children have learned to combine words into sentences, we might expect speed of word recognition to contribute to the acquisition of sentence structure. Thus, we predict that the ability to process individual words at younger ages may be critical to unlocking more complex knowledge and therefore to predict speed of sentence understanding at older ages. To study how these processing capabilities affect understanding of pronouns, we are conducting a longitudinal study that probes children's speed of processing word- and sentence-level information at 18 months, and again at 30 months. We expect that while pronoun interpretation may not be directly affected by word-level processing speed at 30 months, it may be more closely tied to word-level processing speed at earlier ages, when sentence-level knowledge is developing.

The acquisition of desire verbs

Attitude verbs refer to people's mental states, such as *think*, *want*, *hope* or *believe*. They usually take *sentential complements*, meaning that there is a sentence embedded inside a sentence, such as the example:

*"Jeff **thinks** [that the ship is in port.]"*

Additionally, the information in the embedded clause (ex. [*the ship is in port*]) does not have to be true in order for the sentence to be true. Sentences with *think* are reported to be more difficult for children than sentences with *want,* but often tests of *think* are more complicated than test of *want*. In this series of studies, we attempt to level the playing field, testing sentences with *want* in a way that is equal in complexity to previous tests of *think*.

Traditional tests of *think* set up a *conflict with reality*. *Think* is tested in a *False Belief* situation: where a character has a belief that is different from reality in the story. In these cases, children have difficulty answering about the belief state of the child until at least four years old. In Study 1, we set up stories where a character had a desire that conflicted with reality, to see if this made *want* harder for children.

Children were great at understanding *want*, even with a conflict with reality, showing that this is not causing the difference between *think* and *want*.

*Megan's mom says, "Megan, I have to run and get something in the next aisle, **stay right there in the cart until I get back**" … Mom leaves, and Megan says to herself, "I know my mom said I should stay in the cart, but I'd like to get out and go get some cereal, so I will!" And **she climbs out of the cart to go get some cereal**.*

Another difference between the way that *think* and *want* have been tested is whether or not there is a conflict with the child's *own* mental state. In the case of false belief, not only does the character's belief conflict with reality in the story, but the character's belief also conflicts with the *child's belief*, which is not necessarily the case with desires.

In Study 2, we wanted to set up a situation where the participant had a desire that conflicted with someone else's, and see if the participant was able to correctly answer about a desire that differed from their own. In this study, the child plays a game with a puppet. Each time a card is flipped, someone gets to stamp, depending on what color the card is. While they play the game, another puppet says things about the game, and the child is asked to say if he gets it right or wrong.

We found that three year-olds are great at talking about other people's desires, even when those desires conflict with their own. This is earlier than they are good at talking about beliefs. We are now pursuing several other ideas about what might be causing the difference that we see in the acquisition of verbs like *think* and verbs like *want*.

PSYCHOLOGY

Children's memory for details

Do you think children are more likely to remember which room a toy belongs in or a new action the experimenter shows the child to do with the toy? If you said the action, you are right! Three- to 6-year-old children are better at remembering the action associated with a toy rather than the room in which it belongs.

For this study we are interested in the development of children's memory for details. Although young children can form memories, the amount of detail they are able to recall about events increases with age. The goals of our study are to examine how memory changes from 3-6 years of age and relate what children remember to their brain's activity. Children come into the lab for two visits. During the first visit children play with toys with a researcher in two characters' rooms. The researcher does one of these actions: puts a toy on her head, hugs the toy, or drums on it. Then, on a different day, children see the same old toys and some new toys. The researcher asks the children whether they saw the toy before and, if so, which action they did with the toy and which room it goes in. We also collect children's brain activity while they watch pictures of the old and new toys on the computer screen.

Over 200 3-6-year-old children have participated in our study!

Children from all age groups, even 3-year-olds, reliably remember the location and action associated with the toys. However, memory for both action and location improves with age! In 4-year-old children, brain activity showed differences for items when their action and location were remembered compared to when children forgot those details. However, there were no differences in brain activity based on whether children remembered action or location.

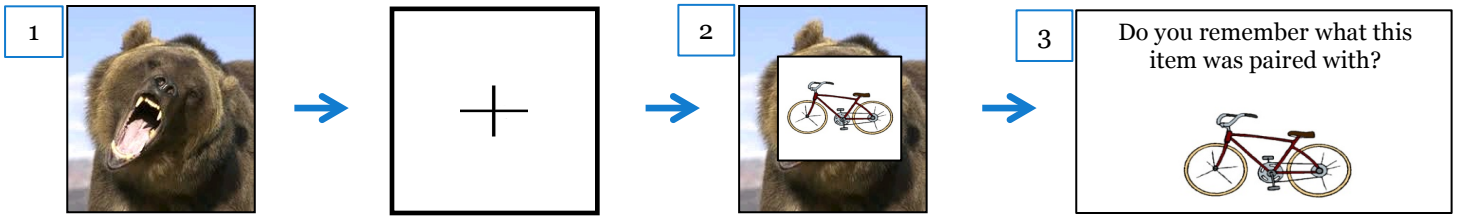
These findings show us that children's brain activity can tell us what they remember and that different types of details may be stored similarly in memory.

How does emotion effect memory?

Adults show better memory for emotional information. This effect is thought to arise because of additional brain regions being recruited in response to emotional information. However, the brains of teenagers and children are not as mature as adults. Therefore, we were interested to see if younger individuals would also have better memory for emotional pictures. We measured teenagers' and children's memory abilities when they were presented with emotional and non-emotional pictures.

During the experiment, individuals were presented with (1) a background picture that was either emotional or non-emotional (e.g., bear). Then (2) an item (e.g., bicycle) was paired with a background picture. Individuals had to (3) remember the item (surface- level memory) and accurately describe the background picture (deep-level memory). We hypothesized that accurate memory, both surface-level and deep-level, would be better for those pictures that were emotional.

We found that teenagers have better memory for emotional pictures and similar performance to adults. However, children only showed surface-level memory, meaning that they better remembered *items* paired with emotional backgrounds, but they did not show enhanced memory for emotional backgrounds like other ages. Their performance was the same for both emotional and non-emotional backgrounds. Thus, the enhancing effects of emotions on deep-level memory may not appear until the teenage years.



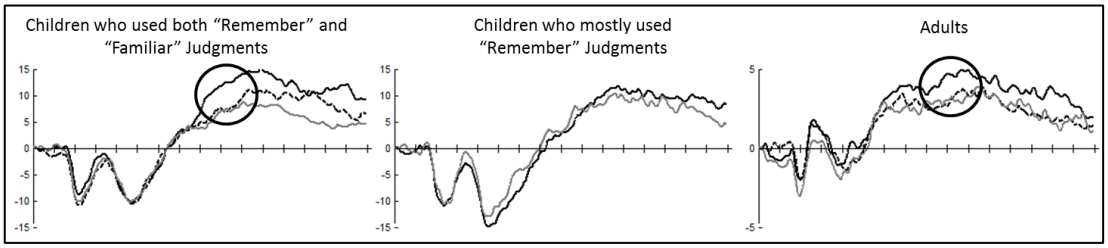
The experience of remembering

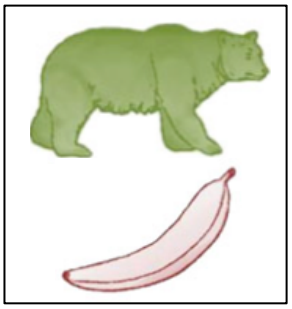
How is brain development related to our subjective experience of remembering. Memories of events have at least two components: our accuracy for events and our conscious experience of remembering. For example, knowing that you went to San Antonio for a conference in October 2009 and that you walked the River Walk is a different experience than remembering walking down the River Walk seeing the moon shining on the water.

When adults report the subjective experience of remembering they are also more likely to accurately identify specific details (e.g., item color) associated with items. Also, adult's brain responses associated with "remembering" are different than "knowing" while they are learning information (i.e., encoding) and when they are retrieving already learned information. In children, the ability to accurately recall contextual information increases with age, and even 6-year-old children reliably understand the difference between "remembering" and "knowing."

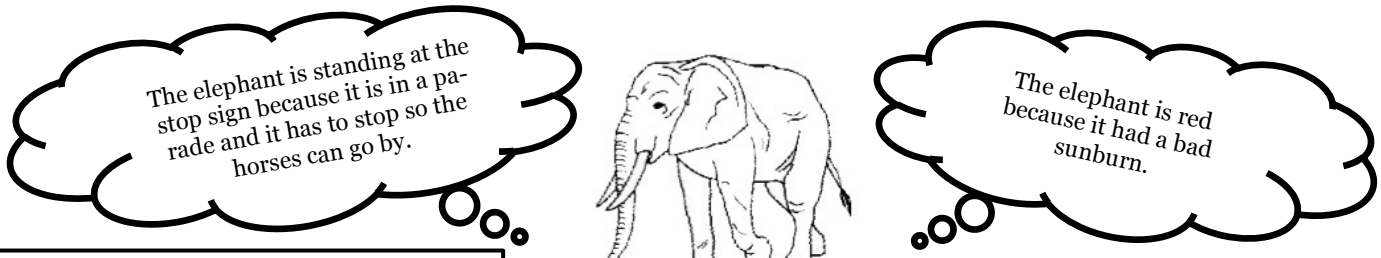
We are currently studying the brain responses of 6.5-8-year-old children, 12-13-year-old adolescents, and adults during encoding and retrieval. Participants see pictures of red and green living (e.g., bear) and nonliving (e.g., banana) items and animals on the computer screen (see examples). For each item, participants tell us what color it is and if it is living/not living or if it is small/big. Later we show them all of the pictures again in grayscale. We ask them if they 1) "remember" the picture or if it's just "familiar," 2) if the picture was originally red or green, and 3) which question they originally answered about it (i.e., "did you say if it was living or if it was big?"). Some participants will have brain activity collected while participants encode information whereas other participants will have brain activity collected while they retrieve the already learned information. We are still collecting data for 12-13-year-olds for the encoding study, and we will begin data collection for the retrieval study this summer!

Our data are currently showing that at encoding the brain activity of adults and some children is different between pictures that are later "remembered" and "familiar" (see our picture!). Brain activity was more positive to "remembered" (solid black line) than "familiar" (dotted black line) or missed (gray line) pictures. This was true of children who used both "remember" and "familiar" judgments. However, some children said they that they "remembered" almost all of the pictures! Did they? Or did they not distinguish between "remembering" a picture and a picture being "familiar?" In these children, brain activity to "remembered" pictures was no different than their brain activity to missed pictures. This suggests that they were not accurately using the "remember" and "familiar" judgments. Future research will need to figure out what causes these differences in children. Very soon we will be analyzing data from our adolescents!





Pairing influences memory recall



Why do "Red" and "Elephant" go together?

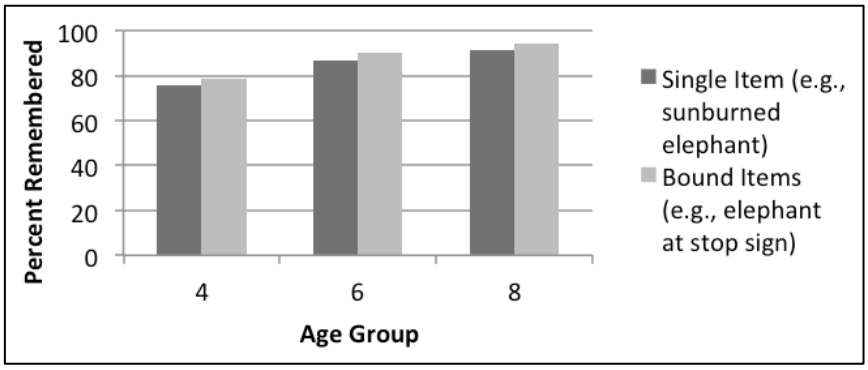
We are interested in how children remember that two things "go together" – for example, how is it that children are able to remember that they played a fun board game at their friend's house but a new video game at their cousin's house? This task can be accomplished in at least 2 different ways – remembering the two details as a single item (person in location) or as two items "bound" together (person + location).

To study this in the lab, children were shown black and white line drawings of familiar items, such as an elephant, and asked to imagine the items as a specific color (red or green) *or* as being associated with a specific object (a stop sign or a dollar bill). After a short delay, children were shown the pictures again and asked to remember which color or object the item was paired with (e.g., a child remembering that an elephant was red because it had a bad sunburn [single item] versus remembering that the elephant was stopped at the stop sign because of the parade [bound items]).

We hypothesized that 4-year-old children would have better memory for single items relative to bound items (because this requires less cognitive processing and may be an "easier" way to remember things) while 6- and 8-year-old children would remember single and bound items equally.

With the help of families like you, we tested over 100 children, and found that our hypothesis was false! In fact, 4-, 6-, and 8-year-olds showed slightly better memory for bound items. This surprised us because these associations tended to involve longer sentences and required more cognitive processing.

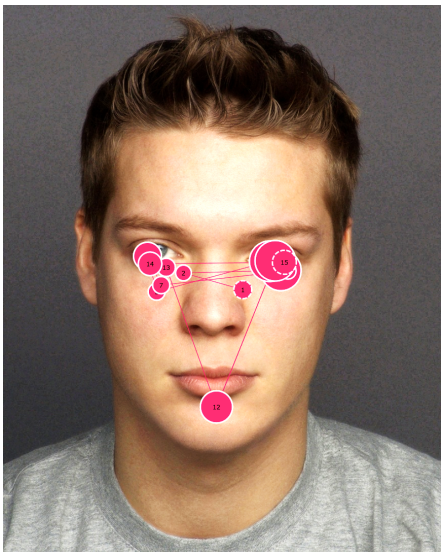
While children were busy playing our game, we asked parents to fill out a variety of questionnaires about their children's behaviors. Using these parent questionnaires, we found that in 4 year-olds, the ability to regulate and control behaviors was associated with successful memory for single items. These behaviors were not related for 6- and 8-year-olds. Perhaps it was because of these abilities that the younger children were able to remember more complex associations.



Social contexts influence face scanning

We have recently begun a project examining how children look at another person's face. To measure this, we use an eye-tracker – a special video camera that can determine where and for how long a person is looking at a particular image or stimulus.

Previous research has used eye-tracking measurements to investigate the different types of information that people gather from another person's face. Typically, people spend most of the time fixating on a person's eyes and mouth, with occasional glances to other salient features, such as the nose, ears, and hairline. You can see an example of what these fixations look like in the image to the right – the larger the circle, the longer the fixation.



In our research, we are interested in how this scanning pattern changes in varying social contexts. For instance, in one ongoing study, we are finding that 5-year-old children will look more to the eye region of a face if they have been "primed" to have an increased drive to affiliate with other people. In future work, we'll be exploring how this response develops in even younger children. We'll also investigate how children's responses may vary when the face is a person that they have previously learned is nice or mean. These types of studies help us understand how contextual and motivational factors begin to influence very subtle social behaviors, such as eye gaze, across development.

The effects of brain changes on memory and understanding

Children change dramatically between preschool and first grade. During this exciting time, not only is your child's body growing, but his or her brain is growing and changing as well. The Maryland Brain Study is interested in how these brain changes are linked to changes that you are seeing in how your child plays, remembers things, and interacts with others.

Our study consists of three visits to our lab for children aged four and six. During the first two visits, children play memory games and listen to stories about what other people are thinking and feeling. During the third visit, children watch the movie Toy Story while functional Magnetic Resonance Imaging (fMRI) data is collected. This is a safe procedure that uses a giant magnet to take pictures of the brain.

Results are in the following sections:

Memory

The *hippocampus* is a brain structure that is critical for the formation of new memories. Research in adults has shown that the ability to form new memories may be dependent on communication between the hippocampus and the *prefrontal cortex*, an area of the brain responsible for planning and organizing behaviors. In this project, we found that communication between the hippocampus and prefrontal cortex was related to memory performance. The part of the prefrontal cortex that was related to memory performance was different in adults and children, indicating a shift in brain processes supporting memory throughout development. We also found that larger hippocampi are associated with better memory performance in children.

Understanding Others

Between the ages of four and six, children's ability to understand the thoughts and beliefs of others greatly improves. We already know what parts of the brain are related to these behaviors in adults. The results from this project tell us that, for children, the increasing communication between these brain regions is related to better social understanding. The *amygdala* is also a brain structure that is important for processing emotions. In our study, kids with larger amygdalas were better at detecting complex emotions (e.g., recognizing that someone looked worried).

The Maryland Brain Study is a joint project with the Neurocognitive Developmental Lab and the Developmental Social Cognitive Neuroscience Lab.

The social brain

Children are very social, from the first smile in infancy to making new friends in middle school. Scientists are interested in which parts of the brain are responsible for this kind of social behavior. They call these areas the *social brain*. However, most studies of the social brain use still photographs, prerecorded videos or prerecorded sound clips. Does a child's brain respond differently to real social interaction?

Children ages 8-12 will interact with one of our researchers while we collect brain responses. We will compare these brain responses to brain responses when children are just listening to a recording of someone talking.

We will collect our data using functional magnetic resonance imaging (fMRI), which is a safe procedure that uses a large magnet to take pictures of the brain.

This research will help us understand how the brain responds to real-world interaction. We also hope to extend this work to autism, since this type of interaction is often an area of difficulty. We are excited to begin this new study and we hope you are too!

RECENT NEWS

- ★ Sarah Blankenship (Psychology), Lauren Evans (Hearing & Speech), Michael Fetters (Linguistics), Arielle Gandee (Hearing & Speech), Rachel Lieberman (Hearing & Speech), Alison Robey (Psychology), Brandon Terrizzi (Psychology), and Chelsea Vogel (Hearing & Speech) are finishing their first year of graduate school at UMD and have joined the Infant and Child Studies Group!
- ★ Amanda Pasquarella, Amelie Bail, & Megan Janssen are now working full-time as speech-language pathologists (Hearing & Speech)
- ★ Previous undergraduate members of the Infant and Child Studies Group (Hearing & Speech) Justine Dombroski, Stephanie Lee, Perri Lieberman, and Allie Rodriguez are now in the Speech-Language Pathology Masters programs
- ★ Annie Gagliardi received her doctorate in Linguistics and is at Harvard University in a post-doctoral position
- ★ Leslie Rollins (Psychology) was awarded the Graduate All-S.T.A.R award, an award for graduate students who are both outstanding scholars and graduate assistants
- ★ Susan Ojo, an intern from Eleanor Roosevelt High School, won first place in the science fair for her work on children's understanding of the difference between the verbs KNOW and THINK
- ★ Vidda Moussavi successfully defended her undergraduate honors thesis and is now a research assistant at NIH
- ★ ***We have kids, too***: Tracy Riggins (Psychology), Tara Mease (Linguistics), Meredith Rowe (Human Development), and Laura Sherman (Psychology) each welcomed a new addition to their families!

NEW DEVELOPMENTS

Do you have a child with autism?

Faculty in the departments of Hearing & Speech Sciences and Psychology at the University of Maryland are conducting a research study on children with autism. We are looking to investigate the effect of multiple talkers in the background on speech perception in children with autism (2-5 years of age).

Our studies take place in a comfortable, home-like setting in which we observe how your child responds to auditory and visual stimuli. For example, your child may be shown images on a video monitor and be played sounds of people talking, and we will record how long he or she pays attention to difference items.

For more information, please call Tess Wood at the Infant Studies Lab at (301) 405 – 4233 or email AutismSiblingStudy@umd.edu.

The Maryland Brain Study

The Maryland Brain Study is interested in how changes in the brain are linked to changes that you see in how your child plays, remembers things, and interacts with others.

The Maryland Brain Study is a joint project between the Neurocognitive Developmental Lab (http://www.bsos.umd.edu/psyc/riggins/) and the Developmental Social Cognitive Neuroscience Lab (www.dscn.umd.edu). If you have any questions about the Maryland Brain Study, please send us an email at marylandbrainstudy@gmail.com. We are always excited to meet new kids and their families!

The Lab for Early Social Cognition

Dr. Jonathan Beier's Lab for Early Social Cognition (Psychology) is up and running! He is currently looking for children between 3 and 6 years of age to come in for his studies. To learn more, visit http://socialkidslab.umd.edu/!

Autism Research Consortium

The University of Maryland Autism Research Consortium (UMARC) is an interdisciplinary group of researchers in the Departments of Hearing and Speech Sciences, Psychology, Human Development, Special Education, and Kinesiology at the University of Maryland. Our goal is to advance the understanding of Autism Spectrum Disorders (ASD) in children and adults, and to contribute to the development of effective treatments and interventions. Our research examines the social, cognitive, linguistic, and neural underpinnings of autism.

Early predictors of autism: We are conducting studies with infants who have older siblings with autism to examine early predictors of autism. Infants between 2-12 months visit the University of Maryland where they listen to sounds and speech, watch pictures of people and objects, and participate in play sessions.

Studies of toddlers and preschoolers with autism: We are looking at how toddlers and preschoolers with autism separate speech from background noise and how they use facial cues to help them do this.

Brain studies of children, adolescents, and young adults (8-22 years): We are conducting brain imaging studies at the University of Maryland Neuroimaging Center. Using an fMRI machine, we are investigating how the brain responds to language, emotions, and people and how this differs in people with autism or Asperger's syndrome.

If you would like to learn more please visit http://autism.umd.edu/ or contact us by phone at (301) 405-8561 or by email at umarc@umd.edu.

SPRING 2013

INFANT & CHILD STUDIES

@ THE UNIVERSITY OF MARYLAND

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We have a wide range of studies for ages 2 months to 18 years and welcome new participants!

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College Park, MD 20742

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We'd ♥ to see you soon!