Infant & Child Studies

@ The University of Maryland

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Inside the Issue

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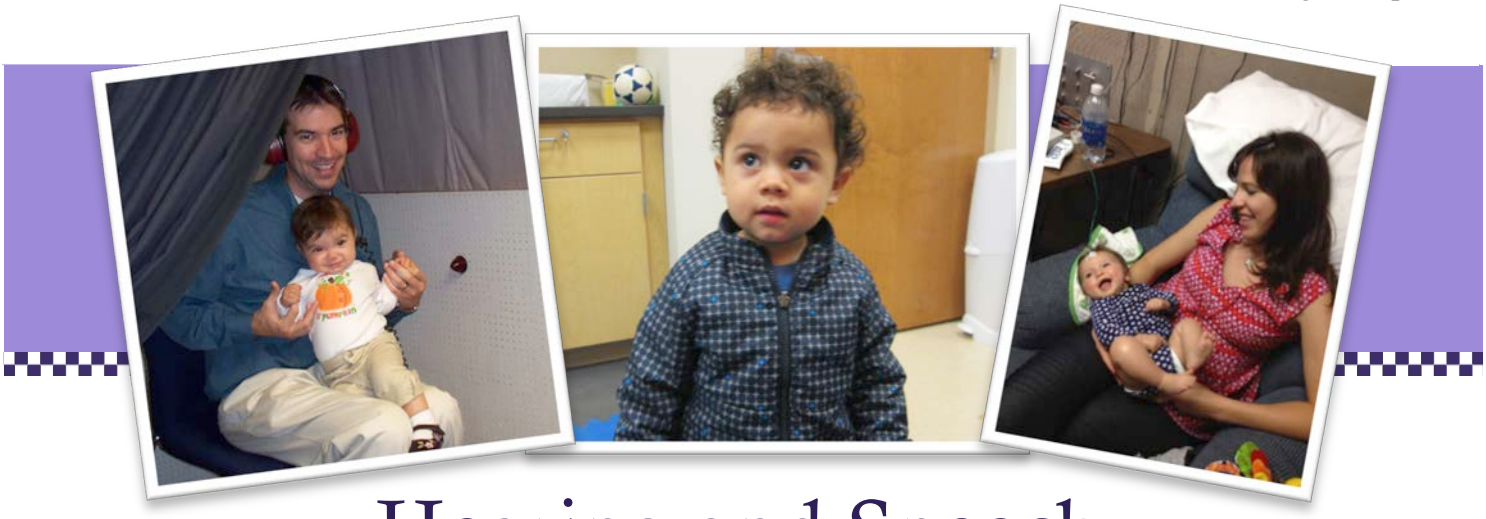
UMD Infant and Child Studies

What's new in child development research?

This academic year has been a time for growth and expansion within our research consortium. We've increased our number of running studies, invited more families to join our research, and a new member joined our research team. This issue of our newsletter highlights some current studies from our various offices, as well as recent findings!

We always welcome new families!

The Infant & Child Studies offices always welcome new families to participate in research. Spread the word to friends and colleagues!



Hearing and Speech

The goal of the HESP department is to improve speech, language, and hearing through continuous research efforts.

Bilingualism and vocabulary development

Many children are raised in bilingual homes where they may hear the same adult providing input in multiple languages. Such "code-switching" (CS) could potentially have implications for children's language learning.

Most research has looked at switching in the context of adult speech or speech between an adult and a school-aged child. Data from adults suggests that it is sometimes harder to process information associated with CS, which might suggest that parents would avoid CS when speaking to young children in order to avoid confusion, or would limit CS to certain contexts. However, not many studies have investigated CS in speech to children. This study explored the nature and frequency of such code switching in put to young children.

Parents and their 17-24 month old children came into the lab for the study. Together, parents and their children played with the toys provided and were encouraged to speak naturally during the session. Parents also filled out surveys to describe the kind of language their child hears on a daily basis.

We found that all parents code switched at least once during the short play session, which suggests that many infants are likely to hear a substantial portion of CS on a regular basis. Importantly, there was no evidence that the input children received had a negative impact of children's language development. Furthermore, code switching does not appear to be a technique used specifically for teaching but rather as a way parents get their child's attention.

-Language Development Lab

Storybook reading intervention

In many homes, reading books at bedtime is a nightly ritual shared by parents and children that is almost as regular as singing lullabies, brushing teeth, or changing into pajamas. Reading has been shown to benefit children in numerous ways, from cultivating positive relationships with caregivers and books to exposing children to new words and sounds that may lead to later academic success.

Research suggests that young children are especially effective word learners. Often, children only need to hear a word once or twice for them to learn a word and even remember it later. Storybook reading provides many opportunities for word learning, as children come across new words that stand out visually or are paired with pictures. In schools, speech-language pathologists frequently use reading interventions to help with children's literacy and vocabulary development. This study explored different aspects of storybook reading to discover what part of reading is particularly beneficial to children's vocabulary development.

Children aged 35-37 months old participated in this study. While sitting on their parent's lap, children looked at a color storybook and listened to a story that included some familiar words and some new words. Some new words were accompanied with a definition, some were simply repeated and some were mentioned only once. Children then watched a short video to demonstrate what they had learned about the words.

We found that for this age group, repetition was the most effective strategy that helped children learn the new words. Repetition is often helpful in word learning because it draws the learner's attention to the new thing that needs to be learned.

Continued

While elaboration was not found to be helpful in this particular study, it is likely that the extra information provided during elaboration was confusing to the

Examples of pictures in the storybook

children and made it more difficult for them to focus in on the new word. Elaboration may be more useful as children get older and are able to consider more information when learning a new word. *-Language Development Lab*

Bilingualism and processing speech in noise

Many people all around the world grow up learning two languages. Recent research suggests that bilingualism leads to advantages in some areas of cognition, with bilinguals being better than monolinguals in tasks that rely on short-term memory (involved in the temporary holding of information – e.g., remembering a phone-number you just read, long enough so that you can dial it) and attention (necessary for selecting what information to focus on).

One common situation frequently encountered by adults and children of different ages is hearing speech with noise in the background. Think of how often you find yourself in a room where there are other people talking, or there are noises from the environment, and at the same time you are trying to have a conversation. When this happens, you must separate the speech that is being addressed to you from the background noise, and then use attention to focus on your conversation, while ignoring the distracting information. Given that bilinguals have been found to have advantages in some cognitive skills, could they be better than monolinguals at processing speech in noise?

Studies with adults in our lab examined monolingual and bilingual listeners' ability to understand familiar words – such as "*knee*" or "*young*", and also learn new/unfamiliar ones – such as "*chechepatile*" or "*tabitogobe*", in the presence of noise. During these studies participants hear a voice producing speech ("Repeat the word *knee*"), and at the same time hear "white noise" (similar to the static sound in unused radio frequencies) in the background. Our results find that bilinguals appear to be less accurate than monolinguals at identifying familiar words in the presence of noise. However, this is only the case during word recognition. Monolinguals and bilinguals perform equally when asked to learn new words in noise. This means that bilingualism alone does not lead to better or worse abilities to process speech that is accompanied by distracting sounds - whether the speech is familiar or unfamiliar also plays a role in the ability of different listeners to process speech in a noisy setting. Our work also suggests that the skills used when performing other attention tasks, where bilinguals show an advantage, might not be the same as the skills that we rely on when having a conversation in a noisy room. *-Language Development Lab*

Participation Opportunity!

The Language Development Lab is investigating how bilingualism interacts with word recognition abilities. We are looking for **bilingual** families with children 17-24 months old to assist in this new line of research.

In this study, children will sit on their parent's lap and will watch a short video with some familiar objects (for example, a doggy), while we record what they pay attention to.

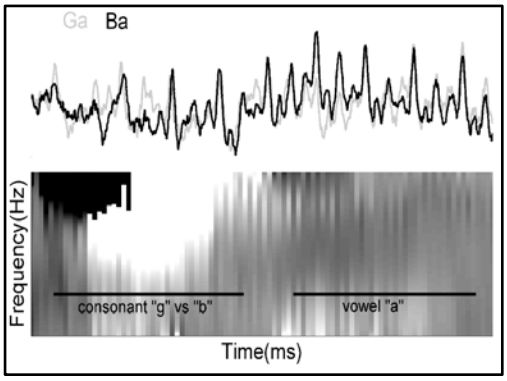
If interested, email ldev@umd.edu or call 301-405-2730!

Effects of concussions of language performance

Each year, over 150,000 sports- and recreation-related traumatic brain injuries (TBIs), including concussions, are treated in children under 19 years old. Children and adolescents have an increased risk for injury, with increased severity and prolonged recovery. Difficulty naming pictures (essentially, severe "tip-of-the-tongue" experiences) is the most common reported disturbance. Changes have been noted in various other linguistic skills including the ability to list words that have a common theme (e.g., all types of food or all words that begin with the letter "f"), repeat sentences aloud, and write sentences (both to dictation and when telling stories). As in adults, the changes to language and cognition after a brain injury do improve spontaneously over time. It is unclear how these effects are observed in children who experience the most common and mildest form of brain injury, concussion. Our lab is working with many children and young adults, both injured and healthy, to better understand how these common mild brain injures affect language performance and development. – *Language Development Lab*

Central Auditory Processing in Infants

How do babies hear differences in similar sounding words, such as "boat" and "goat?" The Hearing Brain Lab has been studying how the baby's brainstem encodes these differences. We do this by playing "ga" and "ba" sounds in the baby's ear and then recording the baby's responses through electrodes placed on the top of the head, forehead, and earlobe. Babies in this study don't need to do anything except to sit quietly – not always an easy thing to ask of babies! Fortunately, we have a great team of Audiology and Speech-Language Pathology students, who have a great way with babies and have successfully tested 50 babies (ages 3 to 12 months) in the last year. We are beginning to analyze the data, and we've discovered that even the youngest babies are accurately encoding the "ga" and "ba" differences. The ear processes the higher-frequency "ga" sound before the lower-frequency "ba" sound, so we predicted that the brainstem would process the "ga" first as well. The figure to the right shows the brainstem waves in response to "ga" and "ba" in a three-month old baby. The white color in the bottom panel shows that responses to "g" occur earlier than responses to "b." The gray color indicates no differences in responses to the shared vowel between the syllables. The ability to accurately encode speech sound differences is important for the development of language and literacy. As a follow-up to this study, we are asking the parents of these babies to fill out an early language questionnaire when they reach the age of 18 months. We will then determine if the brain's encoding of speech sound differences can predict later language development. - *Hearing Brain Lab*



Announcements from Hearing and Speech

- Giovanna Morini completed her Ph.D in the spring of 2014 and is now a post-doctoral fellow at the University of Delaware
- Catherine Eaton completed her Ph.D in the spring of 2014 and is now an assistant professor at Rockhurst University
- Maura O'Fallon graduated with a master's degree in Speech-Language Pathology in the spring of 2014 and is currently working in Washington, D.C.
- Rebecca Sherman, Emily Slonecker, Devin Heit, Krista Voelmle, Katherine Gagan, Rachel Childress, Nicole Tobin, Lyana Kardanova Frantz, Mariah Pranger, Penina Kozlovsky and Veronica Son all worked in the Language Development Lab as undergraduate research assistants and graduated this past year. Most have gone on to graduate programs in speech-language pathology, audiology, or medicine, although one is a full-time research assistant at NIH.
- We had several Eleanor Roosevelt High School interns assist with our research efforts this past school year. We welcome inquiries from other high school students interested in science!

Human Development

The core mission of the Human Development department is to advance our knowledge on the growing human across varying levels. This can range from an individual's genetic make up to the overarching society.

Neural Correlates of Action in Infants

The Child Development Lab (CDL), under Dr. Nathan Fox, has been investigating the neural correlates of action understanding in infants, children, and adults! The CDL utilizes electroencephalography (EEG) and structural and functional magnetic resonance imaging (MRI and fMRI) to better understand what areas of the brain are active when performing and observing motor actions. Many of the studies in this project examine the brain when a participant both grasps and watches an experimenter grasp a small toy. In order to examine changes that may occur in the brain over time, we have had infants as young as 7-months of age come in and wear the EEG cap! In the EEG signal, there is a specific rhythm that appears in the brain waves, called mu rhythm. We know that in monkeys, a similar rhythm shows activity when observing and when executing certain motor actions. Additionally, using the MRI, we are able to locate the region of the brain that is activated for each of these actions; we find activation in the motor cortex, which is responsible for planning and executing intentional bodily movements. These findings are particularly interesting because they suggest that there may be certain "mirroring mechanisms" in the brain that help us understand others' actions! The CDL has also investigated whether these mirroring mechanisms are related to one's understanding of thoughts, intentions, and desires in an attempt to draw conclusions about additional functions of this neural system in our day-to-day lives! - *Child Development Lab*

Recently Moved?
New Baby?
Updated email address?

Let us know of any changes so we can update our list!

childstudies@umd.edu
or 301-405-6302

Linguistics

Research in the Linguistics Department focuses on the human capacity for language. To study this, researchers are looking at children's language development and the mental processes that support it

Understanding Complex Sentences in Childhood

By the age of 4, children both understand and produce very complex sentences. But 4 year olds still make some mistakes. One type of mistake is how they understand sentences like this:

Diego bumped Dora before eating a cookie.

This kind of sentence presents a challenge. Normally, a verb and its subject occur next to each other, like in the first part of the sentence (*Diego bumped Dora*). But the second verb (*eating*) doesn't have its subject right next to it. We understand that Diego was eating the cookie, even though *Diego* is not right next to *eating*.

Previous research has found that children sometimes act like this sentence means that Diego ate a cookie and sometimes act like it means that Dora did. There are a number of reasons that children and adults might differ in their interpretations:

-Children might not know how the 2nd verb finds its subject.
-Children's nonlinguistic cognitive development might interfere with their ability to reach the right interpretation.
-Children might have had difficulty with the methods used in previous studies, making them unable to display their knowledge.

To test these possibilities, we set up some stories like the following:

First **Diego eats a cookie** (picture 1). Then, Diego brings the cookies to Dora but he accidentally **he bumps Dora** and drops the cookies on the floor (picture 2). Luckily, there's one cookie left, so **Dora eats a cookie** too (picture 3)

Then, a puppet described the story like this: "Diego bumped Dora before eating a cookie."

Since Diego bumped Dora *after* he ate a cookie rather than before, adults would say the puppet got it wrong. However, if children think that the one who ate the cookie was Dora, they would say the sentence is true, since Diego did bump Dora before *she* ate a cookie. Children were asked to help the puppet, by telling him whether he "got it right" or "made a mistake."

We found that children made some mistakes, the overall pattern of answers was similar to the adult pattern. This suggests that problems with previous methods may have overestimated children's difficulties.

How do children learn to talk about people's minds?

Learning to talk about other people's thoughts and desires is difficult—we can't observe *thinking* or *wanting*. But children learn words like *think* and *want* by three years old. Interestingly, words about desires (1) occur in different kinds of sentences than words about belief (2). Can children use these differences to learn word meanings?

* means that the sentence is unnatural.

1) Max wants to get a cookie.
Max wants the snack to be a cookie.
*Max wants that the snack is a cookie.

2) *Max thinks to get a cookie.
*Max thinks the snack to be a cookie.
Max thinks that the snack is a cookie.

We hope to find out by looking at how children interpret *hope*, which occurs in both desire and belief sentence structures (3).

3) a. Max hopes to get a cookie.
b. Max hopes that the snack is a cookie.

Previously, we found that as a group, three-year-olds tend to interpret (3a) as being about what Max *wants*; but they tend to interpret (3b) as being about what he believes. Now we want to know if individual children interpret *hope* differently depending on which sentence it is in. *-Project on Children's Language Learning*

Does the Third Thing Matter?

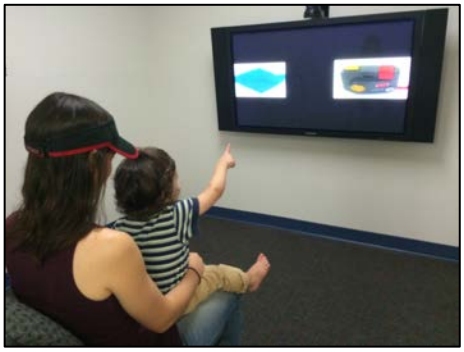
Infants learn language from two streams of input: the sentences they hear and the world they experience. This study explores how young infants see the world around them. In particular, we ask which aspects of an event are psychologically foregrounded and which are backgrounded.

Imagine a scene where Anne gave Betty a teddy bear, and another scenario where Anne hugged Betty while holding a teddy bear in her hand. The teddy bear's role in these scenes is different. It seems intuitive that the teddy bear is more important in the giving scene than in the hugging scene. The hugging scenario is still a 'hug' with or without the teddy bear, but if you take the teddy bear out of the giving scenario, it would no longer be the same event. For an event to be understood as a giving, it requires something to be given. A slightly more subtle case might involve a scenario where Anne opened a box using the lever as a tool (i.e. jimmying) as compared to a scenario where Anne opened a box with one hand while holding a lever in the other hand (i.e. opening). The lever plays a different role in the two events, but do infants see that difference as important to defining what event they saw?

In this study we look at how 9-to-12-month-old infants understand these kinds of events. Do infants recognize the difference between the role of the teddy bear in the giving vs. the hugging? Do they recognize the difference between the role of the lever in the two kinds of openings?

We investigate this using a method that relies on the link between infants understanding and their attention. As they understand a scene better, their attention to that scene decreases. So, we familiarize infants to a video and allow them to get used to it, leading to a decrease in attention. We then change the video into a similar one with some small difference, to see if the infant's attention is recaptured by the new video – if so, that means the change is important to them and reveals something about how they understood the first video.

By measuring when infants' attention was recaptured, we learned that infants see the teddy bear as a significant feature of a giving event, but not a hugging event. And we learned that the lever is seen as a significant feature of an opening only when it is used as the instrument of the opening. These findings give us an initial understanding of what features infants see as important in these events, allowing us to formulate specific questions about how the sentences they hear allow them to learn the meanings of words in sentences that describe those events.- *Project on Children's Language Learning*



Word learning in varying sentence structures

This study looks at how the sorts of sentences kids hear affect how they learn words. In previous research, we found that if 16-month-olds were watching a scene like the one below and heard "she's wiping the tig," they learned that "the tig" refers to the camera; in contrast, if they heard "she's wiping WITH the tig," they learned that "the tig" refers to the cloth.

Interestingly, 19-month-olds do something different: they think "the tig" refers to the camera in either case. We think this might have to do with the fact that 19-month-olds are more experienced with language. It turns out that sentences like "John is wiping the tig" are far more common than sentences like "She's wiping WITH the tig." What could be happening is that when a 19-month-old hears "John is wiping..." they are thinking "I know how these kinds of sentences usually turn out: the next word is going to be 'the'." When they get "with," they don't know what to do, so they figure they must have heard the sentence wrong. This would explain why they always think "the tig" refers to the camera, even if they heard "she's wiping WITH the tig."

To test this hypothesis, we created new words, like "gorp," that we could put in sentences like "John is gorping the tig" or like "John is gorping WITH the tig." If we put sentences like the first one in the video, they might learn to expect "the" just like they did for the words they already know, and always look at the camera. But if we put more sentences like the second into the video, they might learn to expect "with" after the verb, and understand that "the tig" refers to the cloth. *-Project on Children's Language Learning*

Announcements from Linguistics

- Morgan Moyer completed her B.A in spring of 2014 and completed an Honors Thesis on 2-year olds' comprehension of personal pronouns. She is now at Rutgers University working with Kristen Syrett.
- Megan Sutton completed her Ph.D in the spring of 2014 on Competence & Performance in the Development of Principle C.
- Angela Xiaoxue He completed her Ph.D in the spring of 2015 on Verb learning under guidance: Syntax-to-semantics inferences.
- Naho Orita completed her Ph.D in the spring of 2015 on Computational modeling of the role of discourse information in language production and language acquisition. She is now working at the Communication Science Laboratory at Tohoku University in Sendai, Japan.

Psychology

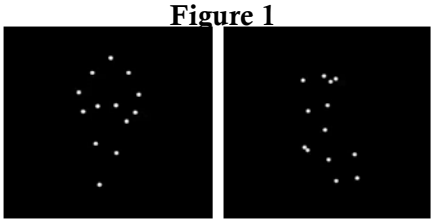
Our researchers in the Psychology Department are committed to understanding the mind and behavior of humans, especially children!

The Social Brain in Middle Childhood

From birth, babies prefer watching human-like actions compared to non-human-like actions. This preference allows infants and young children to pay attention to the social world around them and learn how to interact with other people. Past research has shown that there is a network of brain regions that underlies these social skills, including the posterior superior temporal sulcus (pSTS). We know that between the ages of 6 and 12, when children enter school, they start to spend more time with their peers, and expand their social circles, these brain regions become even more specialized to pay attention to and understand the social world. However, some children are better than others at navigating the complex social landscape of middle childhood. Is it possible that these behavioral differences are also evident in the brain?

The purpose of our study was to better understand the connection between brain activation to visual displays of human actions compared to incoherent videos (Figure 1) and children's social competency and temperament. Our preliminary results suggest that, as expected, children's pSTS was more active when watching videos of humans moving compared to incoherent videos.

Figure 1



Human Actions (e.g. riding a bike) | Incoherent Video

Further, we found that children with greater levels of anxiety and greater levels of autistic-like traits

had a decreased brain response to human motion, and children with more social competence had an increased brain response to human motion.

These findings suggest that the brain response to human motion is closely related to real-world social skills in middle childhood and may have implications for children with disorders such as autism spectrum disorder (ASD) or anxiety. This study is ongoing! – *Developmental Social Cognitive Neuroscience Lab*

Novel Agents Elicit Gaze of Attention in Children and Adults

In our adults lives we easily distinguish between inanimate objects (like phones, computers, and refrigerators) and entities that are alive (like people, family pets, and other animals). One strategy for identifying living entities that we encounter the very first time is by its external appearance (does it have eyes, fur, or does it look like another animal that I already know about?). Another strategy is to observe the novel entity's behavior (does it exhibit self-propelled motion, does it seem goal oriented in its behaviors, does it seem to be "looking" at things or interacting with others?). This second strategy can be helpful when the novel entity does not look very much like a familiar animal, or if our view of it is limited (if it is in the distance, for example). In most circumstances, once we think that something is alive we are also inclined to think that it has mental states like desires and beliefs and some way of perceiving its environment.

In a study conducted in our lab using eye-tracking technology we investigated how children (4-6 years) and adults (18+) respond to a novel entity that does not look like an animal or a human, but is capable of engaging with another person in a socially contingent interaction (Figure 1). Our primary question was: If we see a novel entity interacting with a person, do we then think of it as something alive, capable of holding mental states, and whose subsequent actions are meaningful?

Figure 1

Previous research shows that adults and children of all ages have fast, reflexive responses to the shifting eye gaze of other people, a behavior that happens so quickly it is not under conscious control. In our current study, we measured the same response when participants viewed the novel entity turn to the left or right. Our results show that adults and children shift their attention toward a location where a novel entity is "looking" but they only do this after seeing the entity interact with a person. That is, both the adults and the children see the novel entity's interactions with another person as evidence that it is alive, and has a "gaze" that is meaningful. This influence of agency representations emerges by at least the fourth year of life and persists into adulthood. Ongoing research is continuing with 18-20 month olds, but preliminary findings suggest that this attention shift is not as robust during infancy. *-Lab for Early Social Cognition*

Memory Strategies in Children

Children younger than 8 years of age are notoriously bad at remembering multiple pieces of information that go together (called memory binding). In our lab we are trying to improve memory binding skills in young children by teaching them visualization strategies. Children are presented with a picture surrounded by a color border (e.g., an elephant surrounded by the color red; Figure 2). Children are told their job is to remember what color goes with each picture. We then teach children one of two strategies. Half of the children are taught a unitization visualization strategy where they visualize the picture in the color of the border (e.g., a red elephant). The other half are taught an interactive imagery strategy where they are told to visualize the picture with another item the same color as the border (e.g. an elephant and an apple). This study will help us determine if these strategies improve children's memory binding, and which strategy works better. *-Neurocognitive Development Lab*

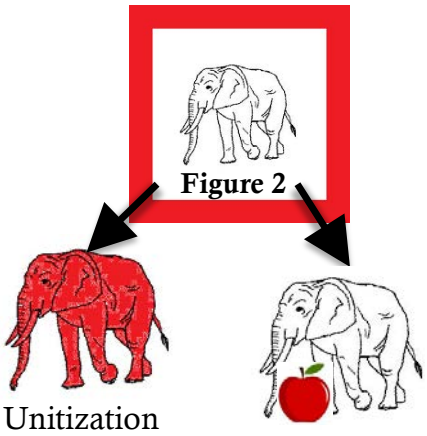


Figure 2

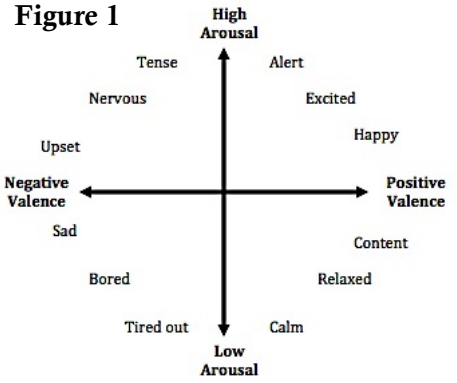
Unitization

Interactive Imagery

How does emotion affect memory across development?

Adults show better memory for emotional information than neutral information. This effect is thought to arise because of additional brain regions being recruited in response to emotional information. However, there are still many questions about how exactly emotion improves memory and how this influence develops over the lifespan. Emotion can be divided along two dimensions: valence and arousal. Valence refers to whether an emotion is negative or positive, and arousal refers to the intensity of an emotion (Figure 1).

Figure 1



Although it is known that memory changes significantly throughout childhood and adolescence, it is debated what role valence and arousal play in age-related differences in memory. To study this, we measured children's, adolescents', and adults' memory of emotional and neutral pictures. We hypothesized that participants of all age groups would better remember emotional pictures, especially those that were rated as high arousal.

During the study, children saw 1) a background picture that was either neutral or emotional (e.g., a snake, Figure 2). After rating the valence and arousal of the picture, (2) a neutral item was paired with the background picture (e.g., whistle). Individuals were asked to make a connection between the two images. Later, after a short delay, participants were presented with the second neutral image and asked if they (3) remembered the item and, if so, which background picture it was paired with earlier.

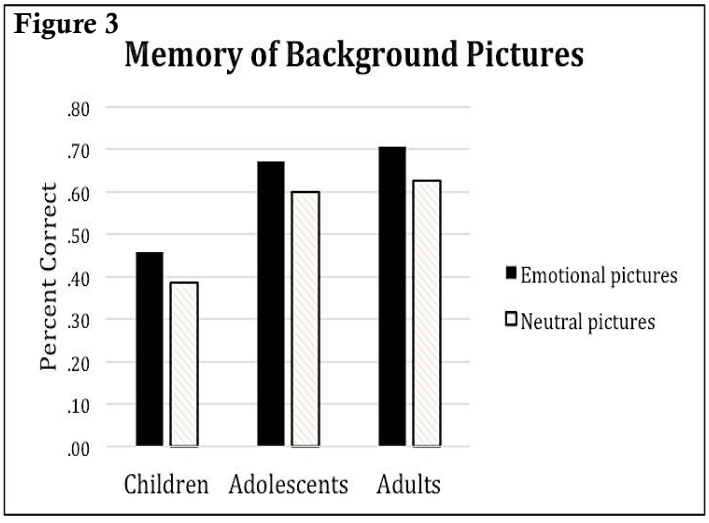
We found that all ages showed better memory for the background picture when it was positive or negative instead of neutral (Figure 3). This suggests that the effect of emotion is in place by 8 years of age, and is relatively stable over time. We also found that adolescents and adults had better memory for all pictures than children, regardless of the background picture that the neutral item was paired with, which is consistent with previous research documenting memory improvements with age.

– Neurocognitive Development Lab

Announcements from Psychology

- Graduate student, Leslie Rollins, completed her Ph.D and is now an Assistant Professor at Christopher Newport University.
- Graduate student, Brandon Terrizzi, presented a poster at the International Society for Infant Studies Conference in Berlin.
- The Developmental Social Cognitive Neuroscience Lab won 3 People's Choice poster awards at the Society for Social Neuroscience

Figure 3



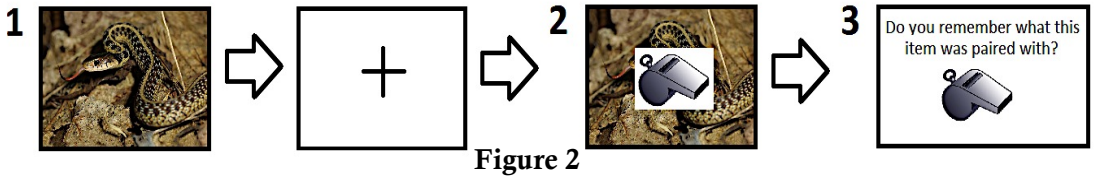


Figure 2

Children's brain response for remembering who toys belong to

Our previous research suggests that children's brain activity differentiates old from new items, even when children are not actively trying to remember. However, this previous study only looked at memories for individual items (i.e., a specific toy). Most of our memories include not only memory for items (a specific toy) but other details as well (i.e, who they played with, how they played, etc.). In a new study we wanted to determine if children's brain activity would show evidence of memory for these types of 'contextual details' (i.e., who and how), even when children were not explicitly asked to recall this information.

To see if children's brains passively retrieve such contextual details, we asked 4- & 5-year-old children to play with numerous toys in 2 different rooms with 2 different experimenters. Then we recorded children's brain activity while they viewed pictures of both toys they had played with and new toys. In one group children were asked to actively retrieve a detail about the toys, such as which experimenter the toy belonged to. In the other group, children were not asked to do anything except passively view the pictures of the toys. After brain activity was recorded, this second group of children was shown all of the toys again and asked to remember the details that went with them.

Both groups of children did well at remembering which toys they played with AND the details that went with the toys. When we compared brain activity, however, differences appeared between the groups. Specifically, children's brain activity showed different evidence of memory for contextual details when children were explicitly trying to recall this information. These results are consistent with the idea that there are two processes responsible for memory. 1) basic processes necessary for item memory, and 2) strategic processes necessary for remembering details. Findings from our previous study on item memory may reflect basic memory processes, whereas findings from this second study may reflect strategic memory processes that do differ as a function of "effort". *– Neurocognitive Development Lab*

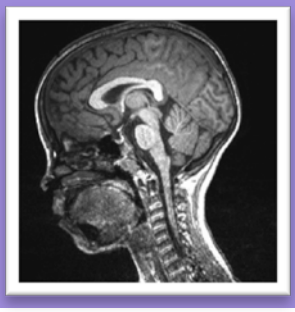
Understanding helping behaviors

As young children develop, they are often exposed to a variety of people. Exposure to others will require children to evaluate others as social partners. But how do children figure out what qualities make for a good social partner? One way children can evaluate potential social partners is to watch how they interact with others.

In the Lab for Early Social Cognition, researchers are investigating how children ages 22-26 months and 32-36 months distinguish between people who have been helpful or unhelpful towards others. Additionally, how will these evaluations influence children's own feelings toward helpful or unhelpful people? For instance, if a child sees another person needing help reaching for a toy but had previously seen this person act in an unhelpful manner, will they help them get the toy? Or whom would a child help if two people were reaching for the same object, but one person had previously acted unhelpful while the other person had not? These questions are particularly intriguing considering recent research as shown children as early as 2 years old have a strong impulse to act prosocially. *-Lab for Early*

How are changes in the brain in early childhood related to improvements in children's memory ability?

- Children 4-8 years old (typically-developing) participate in memory activities and brain scans
- Children receive $60 compensation, a toy, and a picture of their brain on a T-shirt



If interested in participating, please call or email the Neurocognitive Development Lab at (301) 405-5922 or kidbrainstudy@umd.edu

Spring 2015

Infant & Child Studies

At the University of Maryland

Thank you for your participation!

Our research would not be possible without families like you!

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