THE UNIVERSITY OF CHICAGO Childhood Research Newsletter







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January 2020

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Who We Are

The Center for Early Childhood Research consists of several researchers in the Department of Psychology at the University of Chicago that share an interest in understanding how infants and children learn and develop. We investigate motor development, social understanding, language acquisition, early math and science learning, and more. Research methods include experimental studies, naturalistic observations, eye-tracking, and recording brain activity.

Laboratory Directors



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Amanda Woodward William S. Gray Distinguished Service Professor of Psychology Infant Learning & Development Lab



Katherine Kinzler Professor of Psychology Development of Social Cognition Lab



Fan Yang Assistant Professor of Psychology <u>Human Nature and Potentials Lab</u>

> Have you recently moved? Do you have a new baby? Do you have friends who might be interested in our program?

We are always recruiting new participants. We have a wide range of studies for infants and children between the ages of 5-months and 11-years-old.

Please pass on our contact info or sign up online: Phone: (773) 834-9791 Email: <u>babylab@uchicago.edu</u> Website: <u>babylab.uchicago.edu</u>

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Welcome to New Labs

Welcome back to the **Development of Social Cognition (DSC) Lab**! The lab led by Dr. Katherine Kinzler has recently moved back to the University of Chicago after three years at Cornell University.

Many studies in the lab have focused on children's perceptions of others' language and accent as a tool for finding social meaning. They also try to understand how children form ideas about social groups and categories, as well as how they make decisions in different contexts.

In one of their most recent studies, they were interested in how children learn and observe patterns of choices, and how they infer preferences from those choices. They also looked at how children use statistical information when tracking choices - for example the ratio of different items within the choice pool. In particular, they were interested in whether children learn differently or pay more attention to these kinds of choices in a social setting.

In the study, children met a raccoon puppet, who chose either toys or friends to play with. After seeing the puppet repeatedly choose one kind of friend or toy, children were asked different questions about what they think happened such as, 'Which toy or friend do you think the raccoon will play with again?'

Across studies, they've found that children closely track others' choices, specifically who they do not pick – they seem to be extra sensitive to social exclusion. These studies have important implications for how children observe others' non-verbal actions in the world. Regardless of verbal cues as to who people like, children are likely to be attending to who people choose to spend time with. These observations likely influence who children think people in their world prefer as well as which people or social groups hold power and privilege.

This spring they will be running studies for 4- to 10year-olds looking at bilingualism and children's beliefs about language. In addition, they have a study on the development of leadership ideals in kids - for example, what kinds of traits they tend to value in a leader, and how they choose leaders in an election scenario.

They are so happy to be back in Chicago and look forward to seeing you soon! Questions? Email dsclab. uchicago@gmail.com or find out more at <u>dsclab.uchicago.edu.</u>



We also welcome the **Human Nature and Potentials Lab** to the Center for Childhood Research led by Dr Fan Yang, who is a Research Assistant Professor. Dr Yang completed her PhD in developmental psychology at the University of Pennsylvania.

The Human Nature Lab considers the psychological tendencies in terms of three central aspects: morality, competence and subjective experience.

Their upcoming study aims to determine moral development of children in pursuing pleasure. What are the early moral tendencies of children to gain pleasure at the expense of another's cost (compared to their own cost)? In this study, children will be given the hypothetical choice to gain pleasure by having a costly experience for themselves or another child. Additionally, children will be asked to share their opinions about which option is the morally right thing to do.



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How Do Children's Brains Develop During Math Learning?

In an exciting new study with the **Goldin-Meadow lab**, Dr. Alyssa Kersey is using magnetic resonance imaging (MRI) to understand how children's brains develop as they learn math. MRI is a safe way to observe brain structure without using any kind of radiation or

invasive techniques. The scan requires a powerful magnet and specialized machinery that uses the powerful magnetic field along with rapidly changing local magnetic fields and radiofrequency energy to generate images of the brain. This scan results in clear pictures that show the structural details of each individual's brain.



An MRI image of child's brain taken at the Goldin-Meadow Lab

We then use functional MRI (fMRI) to generate images of brain activity. fMRI uses the same magnet as regular MRI, but during functional scans, the scanner takes multiple pictures over time. fMRI measures differences in blood volume over time throughout the brain. Increased blood flow in a brain region indicates that the region needs more oxygen and, thus, is being used for that task. Unlike the MRI scan, fMRI results in a picture of the brain with a colored map indicating areas that are active throughout the scan. We are using fMRI to study the regions of the brain that children use when thinking about numbers and math.



An fMRI scan of a child solving math problems. The areas in orange are brain regions that are important for thinking about math!

In this study, we are interested in how children learn during a math lesson, and how their brains change after learning. We are using MRI and fMRI to take pictures of children's brains while they solve math problems, watch movies, and play games. Participants are 8- to 10-years-old and take an initial math test to be sure they are at an appropriate math level for the study. The study consists of three sessions. The first baseline session involves a practice scanning session to familiarize the child with the MRI environment. During the practice scanner session, we play recordings of the sounds the real MRI makes and children practice lying still and playing games in our mock or "pretend" MRI scanner. Once we know that they are comfortable and are at the right math level for the study, we schedule two more sessions one week apart from each other for the real MRI. The games played during the real MRI are very similar to the mock MRI sessions, but last a little longer. After the first MRI scan, children participate in a math lesson. When they come back for the second MRI scan, we can see how their brains have changed. After the second MRI scan, we send a copy of the child's brain picture to their parents (if they are interested)!

We hope that this study can help researchers understand brain activity associated with learning math and identify teaching strategies that are the most effective way to teach particular math concepts. We are still recruiting 8- to 10-year-olds to participate, so please call or text the Goldin-Meadow lab at 312-574-0757 if you and your child are interested in participating.

Race, Social Decisions and Moral Reasoning

The Child Neurosuite is currently running a study to better understand how children's prosocial decisions are shaped by intergroup contexts. The study, led by PhD student Elizabeth Huppert, sheds light on how children's racial identity relates to their moral reasoning, empathetic concern, sharing behavior, and fairness preferences.

Children are given the opportunity to keep or share toys of varying value with an anonymous other child who is of the same race or a different race. Children are told that this anonymous recipient is another boy or girl who would not receive any toys otherwise, and is sad not to receive toys. An electroencephalography (EEG) session helps our researchers understand how the child's decision of whether or not to share toys of varying value with the sad recipient relates to empa-





thetic brain regions. EEG is a tool that measures brain activity in real time, down to the millisecond. During the EEG session, children see pictures of other children of the same or different race with neutral or sad

expressions. We are interested in children's responses to same and different race recipients with sad and neutral expressions, and this EEG data has the potential to provide insight into the brain's response to so-

EEG is a passive, child-friendly method to record brain activity. It uses a stretchy net with sponges to pick up brain waves.

cial cues. Furthermore, we are interested to see if these responses to varied facial expressions differ and how they may relate to social decision-making during the sharing game.

What Types of Books Best Support Number Learning ?

Parents often engage in learning activities with their young children. In fact, parents are commonly called their children's first teachers. But parents tend to emphasize learning in some domains more than others. Notably, they are much more likely to support children's language and literacy learning than their math learning, even though both are important for academic achievement, and math knowledge at kindergarten entry has been shown to predict long term academic achievement. Building on these findings, we conducted a study to see whether adding math into shared book reading increases young children's math knowledge. We focused on whether the book reading improved children's understanding of cardinal number knowledge, a foundational math concept. Understanding cardinal number goes beyond reciting the number words in order. It taps children's understanding that particular number words corresponded to particular set sizes for example, that "two" refers to sets of two objects.

Commercial counting books present number information in a variety of ways, yet it is not clear which types of number books best support children's number learning. The current project, led by graduate student Cristina Carrazza and Dr. Susan Levine at the **Cognitive Development Lab**, asked whether different kinds of books were effective in supporting young children's early math learning. We contrasted the effects of two different kinds of counting books available to parents – books where the numerical information was embedded in a goal-based story with related, visually complex scenes versus books with simple visual representation of sets that only highlight counting and set size. Notably, the numerical information in both kinds of number books was identical. A third condition received books that were similar to the visually rich books but had a story that highlighted color rather than number. Additionally, these books included only one object per page.





Simple book example

Three-year-olds and their parents participated in three sessions at the Center for Early Childhood Research over the course of four weeks. At the first session, the caregiver and child received one of three types of books and were asked to read them at home. We found that children who read the rich counting book at home improved in in their understanding of early number concepts at the end of the four-week intervention significantly more than children in both the simple number book and color conditions. Further, the children in the simple number condition showed greater improvement in their number knowledge than children in the color condition.





These findings suggest that shared reading of number books is an effective way to support math learning in the home. They also suggest that some kinds of number books are more effective than others in supporting children's early numerical development. Specifically, goal-based stories with supporting pictures are more effective in promoting children's understanding of cardinality than simpler counting books without a story.

Perspective Taking Skills in Young Children

Putting yourself in someone else's shoes is an important social skill children develop early in life. But, this can be tricky for children. For example, have you played hide and seek with your child? Sometimes, children make funny mistakes when they hide – they think they're fully hidden behind a couch cushion, but really their arms and legs are visible! Children don't always understand what other people can see.

This **Infant Learning and Development Lab** project helped us figure out how 3-year-olds think about other people's points of view, or how they use "perspective-taking" skills. For this study, children played a game where their job was to hand a researcher different toys. Sometimes, the researcher could see the toy, and sometimes the toy was hidden from her sight. We



tested whether children gave the researcher the correct toy when asked to hand the toy she could see or the toy she couldn't see. We also saw which toy children looked at to measure whether they looked longer at the correct toy.

We found that children did well when giving the researcher the toy she could see, but children did not always give her the toy

she couldn't see. When we tested which toys children looked at, we found that they usually looked at the correct toy, even when the researcher couldn't see it. This suggested that children might be able to think about what people can and can't see, but they might not be able to act on what they know.



The researcher can only see the toy on the yellow mat, not the toy on the red mat. In this example, the child was asked to give her the toy she can see.

This study helped us understand how 3-year-olds think about other people's points of view. We found that sometimes, it's harder to think about what other people can't see. It also might be hard for children to act on what they know about other people's perspectives. We also did this study with 4-year-olds while measuring their brain activity using EEG – look for those results in our next newsletter!

When Children Understand Hypocritical Condemnation

From the playground to the world stage, moral condemnation is an important part of the human social world. In this project, researchers in the **Developmental Investigations of Behavior and Strategy (DIBS) Lab** answer two fundamental questions about children's early social cognition: Do they infer that those who condemn actions are generally moral people and, if so, do they also scorn hypocrisy—condemning an action and then doing it anyway?

To explore this question, 4- to 9- year-old children were told a story about two characters: one who condemns stealing and one who does not. Children were then asked to predict who was more likely to steal and who they think should be punished more harshly if later caught stealing.

By 7-years-old, but not before, children predict that





someone who condemns stealing is less likely to steal than someone who says "broccoli is gross" or someone who says "sharing is good". Most surprisingly, children even predict that condemners of stealing are less likely to steal than someone who explicitly says: "I never steal". That is, condemnation is taken as a strong signal of future behavior rather than someone's explicit claims about not stealing. Finally, children also thought others should be punished more harshly for hypocrisy: if someone condemned stealing and then subsequently stole, children thought they should be punished more harshly than someone who did not condemn.

Altogether, these results suggest that by 7-years-old, children have a sophisticated sense of the social world, and understand what one's condemnation may signal about them.

When Children Do and Do Not Think Saying "Umm" Predicts Knowledge

How do children discover how much someone knows about a topic? Figuring this out helps children know who is a reliable source of information, who they should ask questions, and much more. Language provides a lot of information to judge knowledgeability: by at least age four, children think that someone who mislabels a familiar object is not very knowledgeable. In this project, we asked whether children make such inferences not only from what a speaker says, but from how they say it. In particular, these studies examined how children use so-called speech disfluencies (e.g., "uh") to infer a speaker's knowledge.

When answering a question (e.g., "What is 5 times 7?"), disfluencies indicate a delay in searching for the answer ("Um... 35"), which leads adults to infer a speaker may be less knowledgeable even if they answer correctly. The **DIBS Lab** showed 4-to 9-year-old children two characters- one who smoothly labeled a familiar animal and one who labeled a familiar animal correctly but slowly ("This one is a... uh... zebra."). When asked which person knows more about animals, children by age 4 said that the smooth speaker would know more

than the slow speaker, even though both were accurate. However, in many situations, people say "uh" not because they are less knowledgeable, but because they are nervous, distracted, etc. So, we next asked if young children always think "uh" indicates a lack of knowledge or if they understand that the situation should matter. To test this question, we ran a second study that looked identical, but now both speakers answered "I don't know" when asked about the animals, but one did so more slowly (saying, "Uh... I don't know"). Here, even 4- to 5-year-old children no longer think the slower speaker knows less about animals. Interestingly, 8- to 9-year-old children seem to infer (as adults do) that the slower speaker might actually know more about animals in this situation-- perhaps the character feels like they might know the answer, even if they said they didn't know. Overall, these studies show that by age 4, children are thinking about how someone talks to figure out how much they might know, while also understanding that the situation matters.





How Do Children Think About Different Cultures?

In this research, the **Infant Learning and Development Lab** is looking at how young children start to think about different cultures. We are specifically investigating how the language we use to describe different cultures and the neighborhood environment children live in affects their thinking about foreign cultures. In one of our studies, we found that providing a label for unfamiliar foods increased children's acceptance of these foods. In another of our studies, we are examining how children's friendship choices relate to characteristics of their social networks.

We are at the Museum of Science and Industry every other Fridays and the last Saturday of the month. You can find our booth at the Idea factory on the entrance level. Starting in January 2020, we will also be stationed at the east entrance of the Field Museum on some Saturdays. Please feel free to stop by to help out with our quick 5-minute studies!



Calling all infants between 3 and 13 months!

We are interested in how infants start to learn about social groups, like race and language. As part of a new study, your baby will watch short videos of people who speak different languages or are different races. In some babies, we will also look at their brain activity while they watch these videos. If you have a child who is 3-13 months old, we would love to hear from you!

Thank you for your participation!

Your family's contribution to our work is vital, and we appreciate every time you visit our labs. Thank you so much for your continued support of our research program!

Questions?

Please contact us or find more information on our website: babylab.uchicago.edu

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