

COGNITIVE DEVELOPMENT NEWS

brought to you by the Cognition Learning And Development (**CLAD**) Lab at Notre Dame

FALL 2017



What's new in the CLAD Lab?

Fall fun and prepping for a new NSF-funded study

The CLAD Lab team enjoyed hosting a booth with the Infant Studies Lab and the Shaw Center for Children and Families at Zoo Boo this year. We had so much fun passing out candy to trick-or-treaters and talking to so many families about our research.

We've also been super busy working on some exciting new projects! Our

lab director, **Prof. McNeil**, was awarded a grant from the National Science Foundation (NSF) to begin a new project studying the types of counting books that are best for promoting children's understanding of counting.

Connor O'Rear, *grad student*, joined Prof. McNeil at the biennial meeting of the Cognitive

Development Society (CDS) in Portland, OR. They shared their findings on how small changes in counting books can lead to big differences in learning. They ran into several former CLAD Lab members at the conference, including Caroline Byrd Hornburg, Brianna Devlin, Cristina Carrazza, Casey Hall, and Emily Fyfe!

Being part of a group increases motivation in STEM tasks

Educators are always looking for ways to increase children's motivation and achievement in science, technology, engineering, and mathematics (STEM). Researchers at the University of Washington examined how the sense of belonging to a STEM-linked social group may increase engagement in preschool children. Children completed two developmentally appropriate STEM tasks, one in a group condition and one as an individual. When preschoolers completed the task as part of a group, they persisted longer, had higher accuracy, reported higher self-efficacy, and were more interested in the STEM activity compared to when they completed the tasks as individuals.

The striking thing about these results was how easy it was to get children to identify as part of a group. The children never interacted with other group members. Instead, they were simply given a green t-shirt to wear and were seated at a green table where they could see a poster depicting other children in green t-shirts. They were told that "the green group" does this activity. This subtle manipulation was enough for them to identify as a member of the green group, and this group membership affected their beliefs, attitudes, and behaviors towards the STEM task. When someone identifies with a group, they become motivated to help the group achieve its goals. An increase in motivation is often accompanied with an increase in learning, which can lead to sustained motivation and achievement over time. These results suggest that educators may be able to boost motivation to learn math by creating group identities tied to math learning.



Featured CLAD Lab Study: Learning to label set sizes without counting helps children understand counting

It can take a year and a half or longer after children first learn to count from 1-10 before they understand why they're counting and what it means. CLAD Lab graduate student **Connor O'Rear** conducted a study to see if children's development could be accelerated by teaching them to label set sizes (1-6) without counting. To do this, he and other CLAD Lab tutors worked with preschoolers over the course of six weeks. Children were randomly assigned to one of three conditions. In the *counting book only* condition, children spent the entire six weeks reading counting books where they counted and labeled each set on the pages. In the *set-labeling-before-counting-book* condition, children spent the first three weeks learning to quickly label 1-6 dots presented in familiar patterns (e.g., like those on dice) on flashcards without actually counting them. They then spent the second three weeks in the typical counting book practice. In the *control* condition, children read storybooks with a focus on improving their early print and alphabet knowledge.

Not surprisingly, children gained more understanding of counting from the two counting conditions and more alphabet knowledge from the storybook condition. Moreover, children's ability to quickly identify and label sets without counting was best after the *set-labeling-before-counting-book* condition, followed by the *counting-book-only* condition, and finally the *storybook* condition. Importantly, the improvements in labeling sets without counting led to improvements in children's conceptual understanding of counting, suggesting that children's understanding of counting can be improved by activities that do not involve counting.

Children learn from gestures while they listen to stories

We all use different types of hand gestures when we speak, so how do teachers' gestures influence children's learning? Researchers from Macquarie University found that the specific types of gestures teachers use when telling a narrative can influence how children understand the story.

Every child in the study heard the same story from the narrator who was sitting at a table with a visual display depicting a park and a family home. The only thing that differed between the conditions was the type of gesture used during the narration. For example, consider the following sentence from the narrative: "On the way home they were lucky enough to see a colorful animal." In one condition, the narrator pointed at the bird in the display. In another condition, the narrator joined his thumbs and made flapping motions with his hands. In a third condition, he just moved his hands in rhythmic nature without using them to convey any meaning. In a final condition, he kept his hands still on the table. After completing a short distracter task, the children were asked a series of questions about what they remembered about the narrative.



Results showed that children in the conditions where gesture conveyed additional conceptual information (the pointing and flapping conditions) were able to recall more of the narrative than children in the other two conditions. Children in the two meaningful gesture conditions were also able to detect and integrate the non-verbal information provided from the gestures (e.g., they recalled the bird, even though that detail was not provided verbally in the narrative).

These findings suggest that children are in fact watching while listening to narratives and that both streams of information combine to help them better understand the story.

Current opportunity to participate in studies

Babies and Toddlers - Prof. Jill Lany and the *Infant Studies Lab* are always looking for infants from birth through 30 months to participate in language studies! If you and your baby are interested in participating, email babylab@nd.edu or take [this survey](#) for more information.

All ages - *The Shaw Center for Children and Families* is a dynamic facility which is home to many different research projects. Their projects are diverse but they all have one thing in common, which is to help support and build stronger families. If your family is interested in participating, you can see a list of their current projects at shaw.nd.edu/community-resources/ or email shawcenter@nd.edu for more information.

CLAD team updates

Three new members joined the CLAD Lab this fall. **Megan Miranda**, *research assistant*, is a graduate of the College of the Holy Cross in Massachusetts and is helping with our new NSF-funded counting book project. **Patrick Kirkland**, *graduate student*, is an ND grad and former middle school math teacher who is beginning his first-year project investigating how middle school students' problem solving is influenced by different types of math word problems. **Alice Felker**, *sophomore*, has completed the lab training and is now helping with on-going projects in the lab.

Connor O'Rear, *graduate student*, successfully defended his Master's Thesis on how labeling sets without counting helps children understand counting (see p. 2). He also married fellow psychology graduate student Andrea O'Rear (née Kalchik) this summer. Congratulations, Connor and Andrea!

Regina Ekaputri, *senior*, is conducting a senior thesis to test whether a series of open-ended discussions about visual arts might increase critical thinking and mathematical reasoning abilities among college students.

Zosia Zdanowicz, *senior*, is working on an honors thesis examining how differences in the hand gestures performed by children from families with high versus low socioeconomic status may affect their learning and understanding of early mathematics concepts.

Rachel Iverson, *senior*, is working on her honors thesis, which examines how the order in which preschoolers count can predict growth in a variety of other counting and early math skills.

Jenna Galuska, *senior*, is conducting her honors thesis on how women in different STEM majors experience gender-based stereotypes about their math abilities.

Sarah Sun and **Wiktoria Kozłowska**, *juniors*, are helping to wrap up the coding of our previous counting studies and are preparing for our new NSF-funded counting book studies.

Nicole McNeil, *lab director*, is scheduled to give two invited talks in the coming weeks. One in December will be at the ND Institute for Advanced Study, and one in January will be at the University of Chicago.



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