

Cognitive Development Labs at Wesleyan University



The Cognitive Development Labs at Wesleyan University explore how children think about numbers, space, language, and people. Through short, fun games, the Labs investigate how kids learn about the world around them.

The Labs include the Yellow Lab, directed by Dr. Hilary Barth, and the Blue Lab, directed by Dr. Anna Shusterman. Both of the Cognitive Development Labs are located in Judd Hall on Wesleyan University's campus.

Our research would not be possible without the support of local schools, daycares, and families. If you have a child under age 10 and are interested in having your child participate in one of our studies, please contact us at **860-685-4887** or sign up online at www.wesleyan.edu/cdl.

Who We Are

Directors

Hilary Barth & Anna Shusterman

Lab Coordinator

Jessica Taggart

2012-2014 Research Assistants

David Bales, Asha Bhalobasha, Alison Denzer-King, Madeline Kidd, Ellen Lesser, Ziyue Li, Angela Lo, Portia Lundie, Olivia Mason, Oprah Miles, Madeleine Oswald, John Pacheco, Andrew Ribner, Jillian Roberts, Jason Saltiel, Tawni Stoop, Julia Vermeulen, Rachel Warner

And a special congratulations to our 2013 graduates!

Isabel Bernstein, Taylor DeLoach, Emilie George, Rebecca Lange, Laura Machlin, Samantha Melvin, and Simoneil Sarbh!

2012-2014 News

The Labs partnered with the Connecticut Science Center to create a Living Laboratory on site at the science center. Visitors have been able to participate in our studies during their visit and learn more about child development research. Researchers will be at the science center weekly, so drop by and participate in one of our new, five-minute studies!

We also had the opportunity to present our research at Wesleyan University poster sessions, the Boston University Conference on Language Development, the 2013 Meeting of the Society for Research in Child Development in Seattle, WA, the Eighth Biennial Meeting of the Cognitive Development Society in Memphis, TN, the 2014 Meeting of the Eastern Psychological Association in Boston, MA, and the Selective Liberal Arts College Cognitive Development Conference at Smith College in Northampton, MA.

We are excited to share with you what we were working on this year!



Thank you to everyone who makes our research possible!

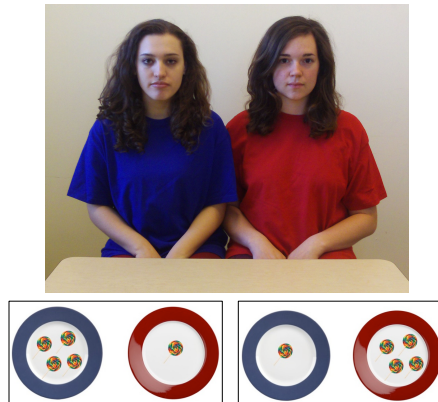
Apple Tree Children's Center
BASREP, Inc.
Bethany Lutheran Preschool
Bielefield Elementary School
Brewster Elementary School
Burr Elementary School
Carriage House Day Care
Center Congregational Preschool
Chester Child Center
Christ Lutheran Nursery School
Connecticut Science Center
Discovery Center Preschool
Haddam Elementary School
Head Start
HK Recreation Department
Island Avenue Elementary School
Jeffrey Elementary School
Kid City Children's Museum
Killingworth Elementary School

Korn Elementary School
Lawrence Elementary School
Lyman Elementary School
Madison Beach & Rec Department
Macdonough Elementary School
Middletown Cooperative Preschool
Miss Joanne's Learning Center
Moody Elementary School
My School
Neighborhood Preschool
Northwest Children's Center
Roberge Childcare Center
Russell Library
Ryerson Elementary School
SERC Family Resource Center
Snow Preschool and Elementary School
Southfield Children's Center
Town & Country Early Learning Center
Wallingford Community Day Care Center

Yellow Lab Studies

Thinking about equality when in a group

We are currently trying to find out more about how being part of a group impacts children's ideas about equality, particularly when distributing resources. In this study, 4- to 10-year-olds received a t-shirt and saw a photo of two people wearing shirts that may or may not match theirs. They then saw two sets of plates containing various amounts of candy and had to decide which plates they would like to give the people in the photo. Results suggest that children prefer to give out equal distributions when possible, but ultimately tend to give more candy to ingroup members (the person in the the same color shirt as themselves). Interestingly, while most children chose to give each person one candy whenever possible, only older children recognized that giving both recipients no candy qualifies as a form of equality.



Thinking and learning about numbers and quantities

Number lines are a great way to teach children about numbers and math in school. They can also tell us a lot about what children do and do not understand about numbers. In a series of games with children of various ages, we are exploring how numerical reasoning develops. We have found that using number lines to estimate the sizes of numbers requires a collection of skills that are important for a good understanding of math. These skills include specific knowledge of the magnitudes of particular numerals, the ability to reason about relations between numbers, and a broader ability to reason about proportions. With increasing age, children also gain the ability to divide number lines into portions, using the midpoint of the line as a reference point, a strategy that leads to greater estimation accuracy. And in a related project, we are investigating preschoolers' and grade-schoolers' ability to estimate relative non-numerical magnitudes (like the location of a dot on a line). One of the important findings that has emerged is that although children's numerical thinking does change as they grow and develop, as does their ability to reason proportionally, younger and older grade-school kids (and adults) do not think about numbers in fundamentally different ways.

Relating multiplication and division

Even before they learn about arithmetic in school, children have surprisingly good intuitions about how it works. They can make good approximate guesses about the results of addition, subtraction, multiplication, and division. They even understand some of the rules of arithmetic: for example, they know that addition and subtraction “undo” each other. We continued our collaboration with the Barnard Cognitive Development Center to learn more about children’s understanding of arithmetic rules. In this game, 7- and 8-year-olds saw a simple cartoon in which a magic wand changes the number of shapes in a set by dividing or multiplying it. We ask children to make guesses about the sets after they change. We have found that children do not know that multiplication and division “undo” each other before they learn about it in school. However, they are still very good at performing multiple-step multiplication and division problems and provide correct answers more often than would be expected if they were simply guessing!

Understanding spatial language in the context of time

As adults, we often use spatial words to talk about time. We might say, “I moved the meeting *forward*” or “That took a *long* time.” Previous research has shown that the use of a spatial prime can influence adults’ perception of time; when adults were asked, “Next Wednesday’s meeting has been moved forward two days. What day is the meeting?” those who imagined moving toward an object were more likely to respond with Friday, while adults who imagined pulling an object toward them were more likely to respond with Monday. In this study, we provide children with a spatial prime similar to those found in previous studies with adults. We are interested in seeing how this spatial prime influences their responses, and if they respond the same way that adults do. Stay tuned!

Understanding probability and making decisions

In collaboration with the Wesleyan Reasoning and Decision Making Lab, we have been conducting a series of studies exploring how people use probability information when they make simple decisions about hypothetical gambles, and how people’s numeracy levels might be connected to their use of probability in decision making. Upcoming games with kids will explore these questions in a child-friendly form – keep an eye out for these new studies in 2014-2015.



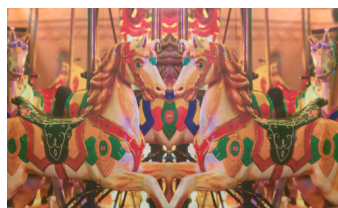
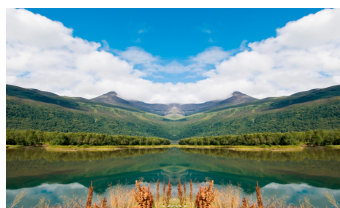
Blue Lab Studies

Navigation with landmarks and maps

Adults can use many different kinds of spatial information, including maps, landmarks, and natural landscapes, to find their way around. How do these abilities develop in children? Our studies focus on children's ability to use salient visual cues for navigation. In the study, children watch as a sticker is hidden in one corner of a special navigation room that is very plain except for one interesting wall. Then children spin around with a blindfold on to lose their bearings. When they take off the blindfold, we want to know if children can locate the sticker in relation to the interesting wall: either to the left or right of it, or on the other side of the room from it.

Over the last two years, we have changed the interesting wall by covering it entirely with different murals that contain different kinds of spatial information. Sometimes children just saw a bright red wall. More recently, we tried images that appear 3D, like the natural scene (mountains) or the object scene (carousel) shown here, which were so detailed they looked like you could step right into them! We also made a symmetrical and asymmetrical version of each scene. By changing the wall murals, we could test how children use information about 3D depth, natural landscapes, and symmetry in their navigation and reorientation.

We found that young children could barely use the red wall to orient, though their abilities started to improve by age 6 or 7. They searched more accurately with the visually complex landscapes. The asymmetric murals were the most helpful, and even young children could use them to locate the hidden sticker. Our ongoing studies are testing whether asymmetry alone or depth information alone are more important cues for children's navigation.



Mathematical development in oral-deaf preschoolers

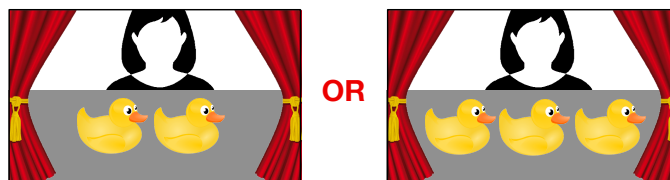
A major project in our lab examines the development of number language and concepts in children who are deaf and hard-of-hearing, and therefore experience delays in acquiring spoken language. We are beginning to see some patterns in the relationship between children's exposure to language and their development of number concepts. We are always interested in hearing from oral-language preschools for deaf and hard-of-hearing children that would like to participate in this research.

Development of early number concepts

A central series of studies in our lab concerns the development of early number concepts in preschoolers. In particular, we want to understand what children understand about quantities, numbers, and number words before and after they figure out how counting works – a development which happens around ages four or five. In one study, we are assessing whether linguistic input might influence how children generalize new number words. We compare different contexts in which children might hear a number word to see which ones might help children better generalize the number word to new situations. For example, some children might practice learning the number “three” by hearing “This picture has three rabbits,” while other children hear “This picture has three animals,” and others simply hear “This picture has three.” Children then label new sets of non-animals with number words, and we look to see whether the way they practice the number influences their ability to generalize the number word to new sets.

Toddlers’ knowledge of the word “two”

In a series of experiments with our youngest participants yet, we looked for evidence that 19- to 22-month-olds might understand the word “two.” In the most recent version, children sat on their parents’ laps and watched a display on a stage. The experimenter said, “Look, two!” or “Look, three!” to set up an expectation in the child’s mind. Then a screen was lowered, revealing either two or three objects (toy ducks or fish). If children know how many objects there should be, we expect them to stare longer if they see an incorrect number of objects appear. Indeed, infants looked longer when an incorrect number of objects appeared on the stage, suggesting that even infants as young as 19 months old have a sense of what the word “two” means!



Preschool outreach and Kindergarten Kickstart

Lastly, we have been doing a lot of preschool outreach this year! Wesleyan students, including Blue Lab research assistants, helped with Cromwell’s Family Math Night, in which kindergarten-ready families came in the spring to participate in about fifteen different fun math activities at their future elementary school. Dr. Shusterman continued Kindergarten Kickstart this year, a summer pre-K program at Macdonough Elementary and Farm Hill Elementary in Middletown. The curriculum was inspired by work in the Cognitive Development Labs at Wesleyan and other research centers, and the staff included many Blue Lab research assistants. It was a joy to start putting research findings on preschool cognitive development in action, and to see these efforts succeed! You can read all about it on our blog, <http://kindergartenkickstart.blogspot.com>.

Interested in participating?

860-685-4887 * cdl@wesleyan.edu

www.wesleyan.edu/cdl



Cognitive Development Labs
Psychology Department, Judd Hall
Wesleyan University
207 High Street
Middletown, CT 06459