

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 11 and are interested in having your child participate in one of our studies, contact **860-685-4887** or sign up online at www.wesleyan.edu/cdl.

Who we are

Directors

Hilary Barth & Anna Shusterman

Post-Doctoral Fellow

Emily Slusser

Lab Coordinators

Jessica Taggart (2012-2013)

Elizabeth Chase & Talia Berkowitz (2011-2012)

2011-2012 Research Assistants

Isabel Bernstein, Asha Bhalobasha, Adele Borden, Taylor Deloach, Emilie George, Alexander Hoyle, Shipra Kanjlia, Lindsay Kenney, Rebecca Lange, Ellen Lesser, Angela Lo, Laura Machlin, Samantha Melvin, Carolyn Mortell, Mark Nakhla, Andrew Ribner, Jillian Roberts, Jason Saltiel, Simoneil Sarbh, Ariel Schwartz, Theary Sokhom, Michaela Swee, Amy Toig, Julia Vermeulen, & Adam Watson

2011-2012 News

With the support of the families and schools in our community, the Labs accomplished many exciting things this year.

As a joint project between the Labs and Mattel, we investigated the developmental benefits of independent toy play. More information about the Power of Play Project can be found on our web site,

www.wesleyan.edu/cdl.

We also had the opportunity to present our recent findings at two Wesleyan University poster sessions as well as at the national Cognitive Development Society Conference in Philadelphia.

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
Discovery Center Preschool
Haddam Elementary School
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
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 Elementary School
Southfield Children's Center
Town & Country Early Learning Center
Wallingford Community Day Care Center

Yellow Lab studies

Children's willingness to trust & learn from others

When children learn from other people, how do they decide who is reliable? We showed 4- and 5-year-olds videos of two people naming familiar objects. One person wore a blue shirt and one wore a red shirt. One of the people named things correctly (calling a shoe a “shoe”) but the other named things incorrectly (calling a shoe a “tree”). In one version of this game, children then saw two new people, also in red or blue t-shirts. Children chose to learn new things from the new person who wore the same color shirt as the person who had correctly named the objects: they learned that one team was more trustworthy than the other team, and they used that information when they encountered two new people from those same teams. In a different version of the game, children also saw the video of two people in different t-shirts naming objects using correct or incorrect names. But these children were also given a red or blue t-shirt to wear. Were children more likely to trust their own teammate, or whichever person named things correctly? We found that when the person who was good at naming things was on the child's team, children tended to trust that person. But when the



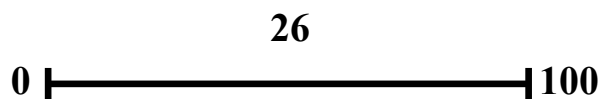
child's own teammate tended to be *wrong*, children had more difficulty identifying who was trustworthy. From these two games, we found that children are quite good at choosing whom to trust: they remember who was correct in the past and which team that person was on, though they may have more trouble when they encounter conflicting cues to trustworthiness.

Remembering locations in space

When people of all ages identify remembered locations in space, even when they are very good at remembering the right place, they make small but very systematic and predictable errors. We are trying to find out what causes this bias in people's estimates. To find out, we are playing a series of location games with kids of different ages (and some with adults too). In the version of the game designed for toddlers and preschoolers, we hide a small toy in a long thin box, distract the child for a moment so they can't keep their eyes on the hidden location, and then ask the child to find it. In the versions for older children and adults, we show a small mark on a line (either on paper or on a computer screen), and after a short pause ask the participant to recreate the mark by drawing with a pencil or by clicking the mouse. This work is ongoing with kids aged 2 through 10.

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 don't understand about numbers. In a series of games with kids of various ages, we are exploring how kids' 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. We are also investigating how a small amount of guidance can improve children's estimation accuracy. And in a related project, we are investigating preschoolers' and grade-schoolers' ability to estimate relative non-numerical magnitudes (like the sizes of individual objects). For example, we showed children a line with a very small circle on one end and a very large circle at the other end. We then showed circles of intermediate sizes and asked children to mark their locations on the line. One of the important findings that has emerged from this series of studies 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) don't think about numbers in fundamentally different ways.



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 2012-2013.



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 special navigation room that is very plain except for one interesting wall. Then children spin around with a blindfold on to lose their sense of where they are in space. When they take off the blindfold, we want to know if children will use the position of the interesting wall to help them find the sticker. With a red wall, children frequently seem unable to use the red wall to guide them to the hidden sticker.

This year, we tried two new cues. We added a giant printed landscape instead of a red wall, which provided information about the 3D surface layout of the environment – even though it was just an illusion, since the printed landscape was a flat canvas. Children used this visual cue much more readily than the red wall. To test what aspects of this scene were important for navigation, we created a second large canvas with a carousel printed on it, but no landscape in the background. This picture was also visually complex and had depth, but it lacked a sense of an environmental boundary. To our surprise, children as young as three years old readily used this cue too! We are continuing experiments to understand why red walls prove impossible to use for navigation but pictures of landscapes and carousels don't. We have many hypotheses to try out, and plan to test the role of depth information (even illusory depth), asymmetries in the visual information, and the degree of complexity of the interesting wall.



Toddlers' knowledge of the word "two"

In a series of experiments with our youngest participants yet, we look for evidence that 18-month-olds might understand the word "two." In the current version, children sit on their parents' laps and watch a display on a stage. The experimenter says "look, two!" or "look, three!" to set up an expectation in the child's mind. Then a screen is 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. We are eagerly waiting for them to show us just how clever they are – children at that age are sponges for new words and we are betting that number words are getting soaked up along with all their other vocabulary! Stay tuned!

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 what children know about the relationships between number words. For example, for a child who does not yet fully understand how counting works, does she know that six is more than five or that ten is more than six?

In several studies, we have shown that children develop a general sense of the ordering of numbers before they fully understand what number words like “five” and “seven” mean – they know that the quantity increases as one goes through the count list (“...five, six, seven...”). For example, in one study, children saw quantities presented visually – for example, a picture of five teddy bears – and were asked to place these on a number line with a blank picture (zero bears) on one end and ten teddy bears on the other. In another study examining data from 300 children that we have collected over the last several years, preschoolers showed that they understood something about estimation – they systematically guessed larger numbers for more items. Although children were not highly accurate at these tasks before they understand counting, they seem to reason about relative quantities before they understand the logic of counting.

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. Although this project is in its early phases, 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.

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 also started Kindergarten Kickstart this year, a summer pre-K program at Macdonough Elementary in Middletown. The curriculum was inspired by work in the Cognitive Development Labs at Wesleyan and other research centers, and the staffer 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