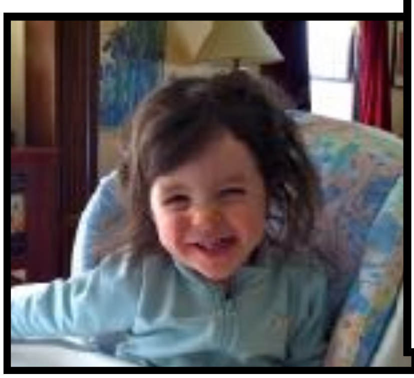
Wesleyan
COGNITIVE DEVELOPMENT LABORATORY
Spring 2011

Hello from Wesleyan's Cognitive Development Lab!

Here are the latest updates and research findings from our labs.



About Us:

We study how children think and learn about the world – about language, numbers, objects, space, and people. We design games to gain insight into children's thinking and how it changes throughout

The Blue Lab

Directed by

Dr. Anna Shusterman

(4th floor of Judd Hall)

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The Yellow Lab

Directed by

Dr. Hilary Barth

(2nd floor of Judd Hall)

News & Updates

Lab members presented our work on the Number Line Game, T-shirt Game, Puppet Sharing Game, and Navigation Game at the 2011 Meeting of the Society for Research on Child Development (SRCD) in Montreal, Canada.

Dr. Emily Slusser joined us in July 2010 as a post-doctoral fellow. Emily is working on projects investigating children's mathematical cognition, funded by the National Science Foundation (NSF) and by Wesleyan's Collaborative Postdoctoral Scholarship Program (CPSP).

Drs. Anna Shusterman, Hilary Barth, and Emily Slusser **were awarded one of the first four Mattel Play Research Grants**, as part of a new initiative by Mattel Philanthropy Programs. The grant will fund an investigation of toy-based play and children's cognitive development.

The Yellow lab **welcomes our new lab coordinator Elizabeth Chase** (UC San Diego '11)! Former lab coordinator Jenn Garcia now works in MDRC's Families' and Children's Development policy area.

Congratulations to our graduates: Anima Acheampong, Lauren Feld, Christian Hoyos, Julia Leonard, Mattie Liskow, Mike Sandwick, Joanna Schiffman, & Martine Seiden. You'll be missed!

Special thanks to the parents, students, teachers, staff members, and principals at the MacDonough, Lawrence, Moody, and Bielefield elementary schools in Middletown! They generously participated in an ongoing Yellow Lab project on improving children's number estimation skills. We will be presenting the outcome of this work to the schools in Fall 2011.

Special thanks also to the schools of speech participating in our research on number development in deaf and hard-of-hearing children: Clarke Northampton (MA), Soundbridge (CT) , and Su

And **thank yo** xcellent year

Our Research

How do children think and learn about numbers and math?

We study the perceptual and cognitive development of quantitative thinking and reasoning in children (in preschool and elementary school) and in adults. We're interested in finding out how intuitive ideas about numbers and quantities change throughout life, and how children connect school-based math with early-developing intuitions. This basic research may lead to improvements in children's math education and adult

How do children orient themselves in space?

We are curious about how children explore and remember their physical environment, and how they acquire language to talk about things like directions. Words like "left" and "right" are difficult for children to learn before they are about five years old and we want to better understand this challenge. We also look at the effects of learning these words on spatial reasoning and navigation. Do they affect how we think about our environment?

How do children decide whom to learn from, trust or choose as a friend?

In order to navigate the world, children need to learn a great deal about interacting with social partners. Important social skills, like sharing, friendship and trust, develop through the early childhood years. These skills may influence how young children acquire knowledge about the world around them as well as how they interact with their own social groups and with members of other

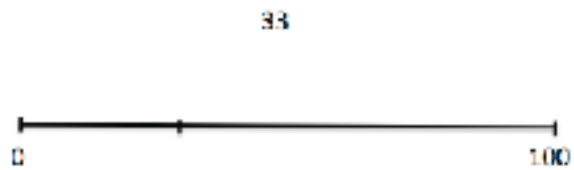
How do children figure out the meanings of counting words?

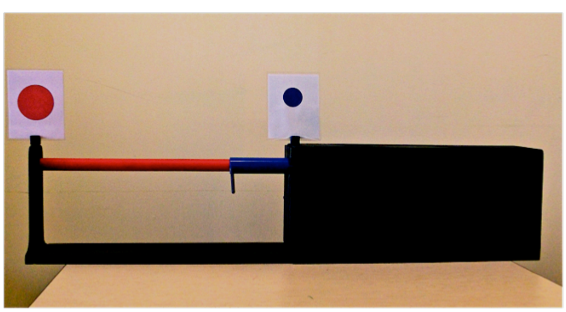
Most children learn to count sometime between their second and third birthdays. But for young children, counting to ten is sort of like reciting the ABC's – just a list of words that we say in order. How do children come to understand that the order is important – for example, that numbers coming later in the list stand for bigger quantities? In many of

Yellow Lab studies

Number Line Game Series

We're conducting an ongoing project on children's numerical thinking using many variations on the Number Line Game. In a typical version of this game, children are given a number, and mark where they think it should go on a number line. We can learn a lot about the way children think about numbers from these games. Many grade-school children of various ages played basic **Number Line Games** that helped us map out developmental changes in estimation abilities (not surprisingly, older kids do better – but we are learning a lot about exactly why that is!) Also, over a hundred second-graders recently completed our **Number Line Corrective Feedback Game**, which is helping us learn about how kids' understanding of numbers' meaning can change when they are told where some numbers actually *should* go, on the number line. Other children completed a **Verbal Number Knowledge Game** along with the typical **Number Line Game**; this combination is helping us to discover how children's knowledge of numerical facts helps them understand the relationships between numerical meanings. We also use these types of game to learn about children's proportional reasoning, which is especially important for school-based mathematical thinking. Right now we're especially looking for participants aged 4, 5, and 6!





Size Comparison Game Series

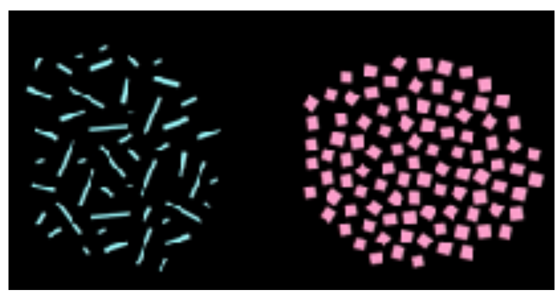
How do children compare the sizes of individual shapes, sets of objects, and other kinds of sizes? In the Size Comparison Game, we are using children's comparisons of sizes to explore their intuitive reasoning about proportions - an important foundation for later mathematical skills. In this series of studies, preschool and school-age children divide a bar or line (presented on paper, on a computer screen, or as a physical object in front of them) into two parts to "match" the sizes of two presented objects or shape, such as the two circles shown in the picture. Our current results suggest that even preschool children (Ages 4 and 5) can make surprisingly accurate judgment of proportion using these games. We are also looking at how children's responses to simple size judgments like these may relate to other kinds of intuitive

Object Naming Game Series

This game is part of an ongoing line of research on children's social cognitive development. We use it to investigate how preschool children decide to learn from others (or not). Even young preschoolers will keep track of who's been right and who's been wrong in the past, and will choose to learn new things from the person who was right. But the results from our recent **T-Shirt Game** showed that a child is less likely to choose to learn from a member of a different made-up "social group", even if that person was right! Now we are trying to find out whether preschooler's trust generalizes to other members of a group: for example, if a person wearing a red shirt was correct in the past, will the child be more likely to learn from new red-shirt-wearers in the future? We have some evidence of this from our previous **Animated Naming Game** which used cartoon characters, and we are currently following up with an updated version of this game that uses live action videos. We're currently looking for lots of 4-year-olds and 5-year-olds to participate in this one!

Division and Multiplication Game

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 are currently collaborating with the Barnard Cognitive Development Center to find out more about children's intuitive understanding of arithmetic rules. In this game, 7-year-olds see 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 are changed. We use their guesses to investigate whether children also know that multiplication and division "undo" each other before they learn about it in school. We're still collecting data from more 7-year-olds for this study, so check back in our next newsletter for our findings!



Blue Lab studies

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? Our preliminary analyses suggest that children develop a general sense of the ordering of numbers – that the quantity increases as one goes through the count list ("…five, six, seven…") before they fully understand what number words like "five" and "seven" mean. We also found that young children can reason about quantities in pictures – for example, five teddy bears – and can place these on a number line with a blank picture (zero bears) on one end and ten teddy bears on the other. Although young children are not great at these tasks, the results suggest that they can engage in some reasoning about relative quantities before they fully understand verbal numbers and the logic of counting.

We also discovered one big change that happens when children do finally figure out how counting works: they show a big change in their *numerical acuity*. Telling the difference between 16 and 32 dots is easy – but telling the difference between 16 and 18 dots is difficult and requires better numerical acuity. Children who began to understand the structure of counting during our six-month study also showed big leaps in numerical acuity during that time period. The importance of this change is not yet clear, but we suspect that the practice of counting plays a role in fine-tuning children's sensitivity to quantities.

Mathematical development in oral-deaf preschoolers

A major project 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.

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? This series of recently completed studies has focused on children's ability to use a salient visual landmark 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 giant red 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 red wall to help them find the sticker. We found that even three year olds could use the landmark in limited ways if the game was motivating enough, but this ability improved dramatically with age and was still developing even at seven years. Children were fairly good at remembering that the sticker was at or away from the red wall, but had difficulty remembering whether the sticker was on the left or right side of that wall. But, children who knew the words "left" and "right" were much better at identifying the correct location. In a related series of studies, we tested whether children could use a map to identify locations in the red-wall room. The results suggest that using landmarks to reorient oneself in space draws on different cognitive abilities than using landmarks on a map. Our ongoing studies seek to define and understand the spatial abilities involved in tasks like map-reading and navigation.

The benefits of a nurturing touch

In many schools and daycares, there is a "no touch" policy because of fear that children cannot distinguish between safe touch, like a loving hug, and an unsafe situation. But research suggests that touch is a very basic and important part of human development and interactions. In infants, massage has been shown to stimulate growth, reduce stress, and result in faster release from neonatal intensive care units. In adults, many studies have shown that a touch from a waiter or a salesperson results in higher tips and more sales. The prevalence of no-touch policies in child-centered environments may be causing a missed opportunity to reduce childhood stress and increase bonding between students and teachers.

Julia Leonard '11 decided to tackle this issue for her Honors thesis by creating an experiment in which half of the children received a brief, gentle touch on the arm as they were given a set of instructions. The children, between the ages of four and six, watched candy hidden under a cup, and the instruction was to wait for the experimenter to return to look for and eat the candy. Julia found that the children who were touch waited on average two minutes longer than the children who were not. The two groups of children were equal in other ways, suggesting that it was the touch that created the difference in waiting. Self-regulation is a critical skill for children to acquire, and it is useful to know that something as

Get in Touch!

We're always looking for families, schools, and daycare centers to participate in our research! Our studies are quick, fun for kids, and informative for parents and educators. Please contact us by phone or through our website if you may be interested in participating. We'll contact you when we have a study for your child's

Thank You!

Our research projects depend on you: local families, schools, & daycare centers.

We appreciate your generous support!

From:

Cognitive Development Lab

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