Lab Update

The ABCD Lab has had a productive year. We completed data collection on two studies and started several new projects. Lab members presented our study findings at several local and international conferences—study findings are summarized in this issue.

We are delighted to welcome several new graduate and undergraduate students to the lab. Sarah Elke is completing her M.Sc. in Psychology and is studying neural correlates of self-regulation in early and middle childhood. Aishah Abdul Rahman is completing her M.Sc. in Neuroscience, and is interested in executive function.

We sincerely thank the families who have participated in our research—our work wouldn’t be possible without you!

Sandra Wiebe, Ph.D
Assistant Professor,
Psychology
Director, ABCD Lab

Mapping working memory in young preschoolers

Working memory is the ability to hold information in mind to help you complete a task—for example, remembering directions while you navigate in a new city. Previous research has shown that preschool children’s working memory skills predict later outcomes like their reading and math achievement in elementary school.

Unfortunately, most of the working memory tests that are currently available are not ideal for young children—they are not sufficiently engaging to capture what children are truly capable of, and they are not as precise or accurate in the lower working memory ranges.

We conducted a study with the goal of developing and testing the validity of a new task, the “Map Task” (shown in the picture). It has a game-like format: children move a Little People character around a playground map in the same or opposite order as the experimenter. Children also completed 2 existing working memory tasks.

The pattern of correlations between the Map Task and existing tasks suggested that the Map Task is a valid measure of preschool working memory span, and there were indications that this task is a more sensitive measure in younger children with more limited working memory capacity.

Mahsa Khoei presented the results of this study at the biennial meetings of the International Society for the Study of Behavioral Development, held in Edmonton in July 2012. We also presented preliminary findings at the 2011 Society for Research in Child Development meetings in Montreal. The response from other researchers has been very positive!
Separating the fish from the sharks

In the preschool years, children get much better at remembering to “stop and think” rather than responding automatically. However, few studies have looked at what is going on in the brain to make this possible. We used a child-friendly brain imaging method called event-related potentials (ERP) to record 3– to 6-year-olds’ brainwaves while they played a fishing game. Some children had to press buttons to catch fish but avoid pressing sharks, while other children had to avoid catching fish with particular characteristics (e.g., spots or scales).

Overall, older children were better at the game and showed faster P3 ERP responses (a positive brainwave peak observed at electrodes near the back of the head—see picture). The N2 ERP component (a negative peak observed at electrodes near the front of the head) was related to how well children followed the rules of the game, but the brain seemed to be doing different things depending on the rule they had to follow. A bigger N2 component was related to catching more fish when the distracters were sharks, but fewer fish when the distracters were other fish (that is, children had to pay more attention to subtle differences to avoid getting confused).

We presented this study’s findings at the meetings of the Association for Psychological Science in Washington, D.C.

New & Upcoming Studies!

- **“Pirate Adventure” Study:**
  How do children’s abilities to control their behaviour, remember information, and “switch gears” relate to each other? In this study, we are studying cognitive development in the transition from preschool to school age (4 to 7 years old). Children will complete pirate-themed game-like tasks during 2 sessions separated by about a year. *Experimenter:* Mahsa Khoei and Aishah Abdul Rahman

- **“Oreo Game” Study:**
  What factors influence preschoolers’ self-control? We are looking for 4-year-old children and their parents. Children first play a game where they name pictures on a computer screen, and then they are asked to choose between one cookie now and two cookies after a delay. *Experimenter:* Breanna Steinke

- **“Follow the Fish” Study:**
  How do children’s developing ability to control attention and emotions relate to brain development? In this study, we use a non-invasive brain imaging technique called ERP to measure how preschool (4-5 years) and elementary-age (7-8 years) children brain responses differ while they “follow the fish” in a computer game. *Experimenter:* Sarah Elke and Aamena Kapasi

- **Cross-Cultural Parenting Study:**
  How does parent-child communication fosters children’s cognitive development in Canada and in Japan? We are looking for 7-to 9-year old monolingual English speaking children and their parents. For more information please contact Sawa Senzaki at senzaki@ualberta.ca or 780-492-0036.

If you are interested in any of the following studies or like more information please email us at abcdlab@ualberta.ca or call 780-492-1277.
Transitions and Awards

Congratulations to all the ABCD Lab students who graduated in the last year: Jennifer Almond, Emily Armstrong, Michelle Chornell, Sarah Karesa, Victoria LaRoche, Laura Ritzen, Corbin Rose, Wendy Tran, Rebecca Visscher, Kelly West, and Courtney Wilkes. To all of our grads, best wishes in your future endeavors, and thank you for all of your help!

Diya Shi, a second-year honors student in Neuroscience, was awarded a Summer Studentship by the Women & Children’s Health Research Institute (WCHRI). She spent the summer helping on a study of children’s self-regulation in early and middle childhood, and presented her preliminary results at the annual WCHRI research day in November!

Fun Facts About Your Brain!

- The left side of your brain is usually more involved in language, solving problems, and math.
- The right side of the brain is usually more creative and helps you with art or music.
- Most of us can hold 7 pieces of information (give or take 2) in our working memory at any given time.
- Getting plenty of sleep helps keep your brain healthy.

Join the dots!

http://www.mathworksheetscenter.co

Spot the 10 Differences on the Pirate Ships

http://www.lucylearns.com/pirate-printables.html
The Alberta Brain and Cognitive Development Lab is a research lab in the Department of Psychology at the University of Alberta. Our research examines how children develop the ability to regulate their behaviour, attention, cognition, and emotions. Typical research questions that the ABCD lab asks include:

- How do these abilities emerge and develop in the infant, toddler, and preschool years?
- How do changes in behaviour relate to brain development?
- What factors put children at risk for developing problems with self-regulation?

To study these questions, we use game-like tasks, sometimes combined with neuroimaging methods like event-related potentials (ERPs), in which we record small ongoing changes in voltage at the scalp that reflects underlying brain activity.