Message from the Director

This has been another busy year for the lab. In this issue of the newsletter we summarize the initial findings of several recently completed studies and provide a preview of upcoming projects, most notably new collaborations with Dr. Wendy Hoglund in Psychology and Dr. Valerie Carson in the Faculty of Physical Education and Recreation!

Several lab members achieved major milestones this year. Liliana Alvarez completed her PhD in Rehabilitation Science and is now at the University of Western Ontario on a postdoctoral fellowship. Sarah Elke completed her Master’s and started the PhD program.

Last but not least, this summer we said farewell to longtime lab coordinator Mahsa Khoei as she left Alberta for Ontario to pursue her studies in chiropractic.

We also welcomed new faces to the ABCD Lab. Naaila Ali is the new study coordinator for the Longitudinal Executive Function study, Daphne Vrantsidis joined us as a Masters student, and Megan Pinkoski and Connor Stewart are our new third-year Honors students.

We extend our thanks to all the families who have participated in our studies—our work would not be possible without you!

Dr. Sandra Wiebe
Assistant Professor
Psychology Director
ABCD Lab

Under the Sea

A theme of the ABCD Lab’s research is the development of children’s ability to use top-down control. In everyday life, we control attention in two ways: reactively, where we direct our attention to things in the environment as they happen (e.g., noticing ajaywalker just in time to hit the brakes), and proactively, where we direct our attention in advance (e.g., looking ahead to see if a traffic light is red). For her master’s thesis, Sarah Elke investigated age differences in children’s use of these two types of control using event related potentials (ERPs), brainwaves recorded at the scalp. Younger (4-5 years) and older (7-8 years) children played a sorting game while they wore a special cap that recorded their ERPs. Children were asked to sort seashells and starfish by their shape or colour. They first saw a cue, a colourful octopus (for colour) or a plain grey dolphin (for shape), followed by a purple or green seashell or starfish. Sarah wanted to find out whether children prepared to sort the pictures in advance (i.e., proactively) or waited to prepare until the pictures were presented to do so (i.e., reactively). Older children showed more efficient cognitive processing: they responded more quickly and accurately than younger children and their ERP responses to the seashells and starfish peaked faster than younger children’s. ERP patterns in both older and younger children showed patterns consistent with reactive control: children’s brainwaves didn’t differentiate between “switch” trials (when they switched between sorting rules) and “stay” trials (when they repeated the sorting rule from the previous trial) until they actually saw seashell or starfish. Both age groups seemed to approach the task the same way, but older children were more effective at doing so.
A Robot’s Journey into Cognition

Robots can be used to give children with motor disabilities an opportunity to independently manipulate objects in their environment and reveal what they know. But using a robot to manipulate is not the same as using our hands. Dr. Liliana Alvarez, who recently completed her PhD in the Faculty of Rehabilitation Medicine, partnered with the ABCD Lab to conduct a study that compared how toddlers respond to game-like cognitive tasks when they interacted with toys using their hands versus when they used a small robot to do so. Children in the study had lots of fun finding hidden toys at certain locations with Sammy the robot. She found that using the robot to retrieve the toys was harder for children than using their own arms and hands. However, because children simply had to hit buttons to activate the robot’s movements, young children actually benefited from using the robot in that they were better able to focus on the cognitive challenge of finding the toy and following the clues. Interestingly, children indicated that they thought the robot was independent and often expected the robot to move or do things by itself. Analyses of children’s brain electrical activity while they played the games showed that children show different patterns of activity when the game involves responding with the robot versus when it doesn’t. For the child, using the robot changes the game, and for younger children who are not yet very skilled in their fine motor skills, it makes it easier and more fun. These results are promising because they suggest that young children with motor disabilities could benefit from early exposure to robots and this could help them further develop their cognitive skills. Liliana and Samantha the robot hope to continue exploring more adventures together that can help children with disabilities learn and enjoy their world!

Can you spot the 5 differences?

http://www.nil.wustl.edu/labs/petersen/Braingames.html
http://www.kidsfront.com/spot-differences/2.html

Alberta Brain and Cognitive Development Lab Newsletter
**Brain Facts!**

"Sphenopalatine ganglioneuralgia" is the scientific name for brain freeze!

Your brain keeps developing until your late 40s!

Your brain uses 20% of the total oxygen and blood in your body!

When awake, the human brain produces enough electricity to power a small light bulb!

The smell of chocolate increases theta brain waves, which triggers relaxation!


**Brain Joke!**

Q: What does a brain do when it sees a friend across the street?
A: It gives a brain wave!

[https://faculty.washington.edu/chudler/jokes.html](https://faculty.washington.edu/chudler/jokes.html)

**Upcoming Projects**

**Get Ahead with Head Start!!**

The ABCD Lab is collaborating with the PEERS Lab and ABC Head Start to examine how early experiences relate to children’s school readiness in a new project led by Dr. Wendy Hoglund, another faculty member in Psychology at the University of Alberta. In the Fall of 2014, we began collecting data for the first wave of the Early Experiences Project. We are looking at school readiness, self-regulation, and socio-emotional adjustment in preschool children from low income, ethnically diverse families. There are two aims of this study. First, we are interested in which aspects of both the home and classroom environment help vulnerable children achieve school readiness as they make the transition from preschool to kindergarten. Second, we are interested in which aspects of children’s skills and behaviours at entry to preschool are most informative with regard to later school readiness. Ultimately, we hope that this project will help parents and teachers foster school readiness, and our results will help us identify which children would benefit the most from interventions such as high quality preschool settings.

**Let’s Get Physical!!**

In the new year, Dr. Sandra Wiebe and graduate student Aishah Abdul Rahman are launching a new study in collaboration with Dr. Valerie Carson of the Faculty of Physical Education and Recreation! The purpose of our study is to examine the relationship between physical activity and executive function in early childhood. Research in older children and adults has linked physical activity to better cognitive functioning, but very little research has been conducted in the early years. This research is important because, although popular belief holds that young children are always highly active, recent research findings indicate that even in the first years of life, today’s children are spending increasing amounts of time engaged in sedentary behaviour (e.g., watching television or other screen media). If you have a child between 2 and 4 and are interested in learning more about this study, please contact the ABCD Lab at (780) 492-1277 or abcdlab@ualberta.ca.
Congratulations to all of the ABCD Lab students who graduated in the last year: Justin Witzke, Evelyn Manu, Breanna Steinke, Tyler Harrison, Lucina Rakotavao, Luiza Deaconescu, Lindsay Hegstrom, Alexandra Racic, as well as Sarah Elke who obtained her Master’s of Science in Psychology and Liliana Alvarez who attained her PhD in Rehabilitative Sciences.

A heartfelt goodbye to our long time lab coordinator Mahsa Khoei, who has been with the lab since it began four years ago. She has moved to Ontario to pursue her studies in Chiropractic.

To all of our grads, and lab members beginning new chapters in their lives, we, here at the ABCD lab which you all the best in your future endeavours, and thank you for your contribution to the lab!

Congratulations to Sarah Elke and Emily Jeong for achieving distinctions over the past year! Sarah has received the University of Alberta President’s Doctoral Prize of Distinction, an NSERC Alexander Graham Bell Canada Graduate Scholarship- Doctoral, and a University of Alberta Doctoral Recruitment Scholarship.

Emily received a scholarship from the Korean Canadian Scholarship Foundation of Edmonton. Along with presenting a competitive GPA and having extracurricular activities, Emily needed to write an essay on the topic “What Makes You the Happiest?”
Focusing on Emotions—Happy Faces Help

Cognition and emotion are two separate but intricately linked entities that influence one another, especially in early childhood. Children are exposed to a whole range of emotions both at home and in school. Because both cognitive and emotion regulation abilities develop rapidly in early childhood it’s important to understand how emotion influences cognition in children.

Aishah Abdul Rahman conducted a study looking at how children’s ability to focus their attention is affected by emotional stimuli. Children performed a computer task where they saw a picture of a face between two distractor faces. Each face had a red or blue border around it (see picture), and children were asked to press a button to assign the middle face to the “red team” or the “blue team” based on its border colour. On some trials, the colour of the border around distractor faces was different from the border around the target face. To perform well, children had to focus on the target face and ignore the distractors.

The middle face was happy, angry or neutral and the main question was to examine how the emotional expressions would interact with children’s ability to focus their attention away from the distractor faces. Our results showed that children displayed greater accuracy in performance when the middle face was happy but responded slower when the middle face was angry. This indicated that happy faces helped children’s ability to focus on the task. The next step will be to examine the brain mechanisms that make this possible. We recorded children’s scalp EEG, or small voltage fluctuations related to brain activity, while they performed the task. Aishah, with the help of other ABCD Lab members, is now in the process of analyzing the specific neural markers that previous research has linked to selective attention processes.

Follow the Treasure Map: Pirate Adventure Study!

With our longitudinal executive functioning study well underway, it has been exciting to have both new and returning faces in the lab. We look forward to seeing the growth and development in all of our participants!

In Spring 2014, lab members presented preliminary results from this study at the 28th annual Joseph R. Royce Conference in Psychology, our department’s annual research day, and received encouraging feedback. 

If you are interested in participating in this ongoing study or would like more information, please contact the ABCD Lab by email at abcdlab@ualberta.ca or by phone at (780) 492-1277.
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.

**ABCD Lab Contact Information:**
P 217 Biological Sciences Building
Department of Psychology
University of Alberta
Edmonton, AB
T5J 1H8

Phone: (780) 492-1277
E-mail: abdlab@ualberta.ca
www.ualberta.ca/~abcdlab/