Follow the Fish!

In the transition from preschool to elementary school, children must improve their ability to maintain their focus in the face of frustrating circumstances. To investigate how children stay focused when frustrated, we used a brain-imaging technique called event-related potentials (ERPs) to measure 4- to 8-year-olds' brainwaves while they played a computer game. In this game, children were asked to “follow the middle fish” in a row of five fish that were not always swimming in the same direction as the central fish. To succeed, children had to be able to ignore the side fish. During the game, sometimes the computer would appear to "freeze" and stop working, and we measured children’s responses to these mildly frustrating circumstances.

As we expected, older children were able to play the game faster and more accurately than younger children. During the “frustrating” phase of the game, girls responded more slowly than boys, but boys had larger N2 ERP waves (a negative peak measured near the front of the head) that peaked later than for girls. Girls had larger P3 waves (a positive peak measured towards the back of the head) than boys when they were frustrated. Together, these results suggest boys and girls differ in the way they manage their frustration and control their attention. These gender differences may depend on age, however, as young girls had larger P3s than older girls or boys of either age group.

We presented results of this study at the Cognitive Neuroscience Society Annual Meeting in San Francisco, CA.
Pirate Adventure Study

How do children’s abilities to control their behavior, remember information, and “switch gears” relate to each other?

To investigate the nature of the development of underlying cognitive processes (a.k.a. Executive Functions (EF)), responsible for these abilities in children, we have spent the past two years designing and piloting a battery of tasks to measure different aspects of EF. The transitional period between preschool and middle childhood is a critical time for the development of EF. Accordingly our test focuses on children aged 4-to-7 years old.

These tasks, all resembling games, have been carefully chosen to focus on measuring three separate aspects of EF: (i) ability to hold information in mind for a short period of time, (ii) ability to suppress a dominant response, and (iii) ability to switch between different features of the same stimulus.

We are proud to announce that during our piloting phase, we have managed to successfully modify a task commonly used for adults into a task appropriate to be used with young children. This task belongs to a family of tasks known as Complex Span Tasks, considered to be the “gold standard” measures of WM. However, as the name “complex” suggests, these tasks are more difficult than regular span tasks where individuals are only required to repeat a series of words in the same or reverse order. In addition, currently available complex span tasks are often not engaging for young children. After going through four iterations of modifying the task, we have finally managed to adapt it to a level that is both understandable and engaging for young preschoolers.

Mahsa Khoei presented the results of these modifications at the 27th Annual Royce Conference. The response from other researchers has been extremely positive.

Thanks to the cooperation of our participants and their families, we have finished the piloting phase of this study in June and have been testing participants for the full study since.

If you are interested to participate or like to get more information, please contact ABCD Lab and ask to speak to Mahsa Khoei or Tieghan Baird at (780) 492-1277 or abcdlab@ualberta.ca

Did you know that:
♦ Your brain is awake and working while you are sleep!
♦ Your brain can produce enough energy to power a light bulb!
♦ The left side of your brain controls speech! Similarly, the left side of the brain in birds controls song!
What are Graduate Students up to?

A Robot Journey into Child Development

How do children with physical disabilities learn about the world around them? Can robots provide an opportunity for them to explore and manipulate objects? Liliana Alvarez, a PhD Candidate at the faculty of Rehabilitation Medicine, is conducting an study to explore how typically developing children and children with physical disabilities develop cognitive skills and how robots can help them in the process!

For more information contact Liliana Alvarez at 780-218-3498 or lalvarez@ualberta.ca

Attention on the Brain

Graduate students Sarah Elke and Aishah Abdul Rahman are conducting a study to investigate the development of attention regulation across the transition to school. Their research will explore how children control their attention when asked to pay attention to different aspects of the same stimuli (colour and shape) and the effect of including emotional stimuli (faces). Children will play two different games while their brain waves are recorded.

For more information contact Sarah or Aishah at 780-492-1277 or abcdlab@ualberta.ca

Research in Daycare/Preschool Settings

Two of our Honors Psychology students are testing children in daycare or preschool settings for their honors theses. If you think your child’s daycare or preschool director may be interested in collaborating with our team, please as them to contact us at 780-492-1277 or abcdlab@ualberta.ca

Sorting Cards and Swapping Chairs

To answer the question of how a change in body position can affect how well children sort cards by different rules, we’ve decided to play some musical chairs. In this study children sort cards based on shapes and colors. However, when the rule changes, the child may have to swap chairs with the experimenter and then continue playing. We are recruiting 3-3.5 year old children through various daycares around the city.

Experimenter: Justin Witzke

Tackling Temptation

How do children learn strategies to help them delay gratification? One study is looking to explore this question by asking children about the strategies they might use to wait for a treat. We are recruiting 4-6 year old children through various daycares around the city.

Experimenter: Breanna Steinke

Awards

Liliana Alvarez was selected to receive the Commended distinction, “Young Researcher Award,” from the Association for the advancement of Assistive Technologies in Europe 2013. This is a distinction attributed to the best contribution by a young researcher in the field of assistive technologies.

Sarah Elke was awarded The Alexander Graham Bell Canada Graduate Scholarship- Master’s level. This scholarship is awarded by the Natural Sciences and Engineering Research Council of Canada to students demonstrating academic excellence, strong research potential, and good interpersonal and collaborative skills.
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.