

Language, Reading & Math in Children

Studying skills that support children's learning

Investigators: Drs. Lisa Archibald, Marc Joanisse, Daniel Ansari, and Janis Cardy
 School of Communication Sciences and Disorders and the Department of Psychology
 The University of Western Ontario

OUR RESEARCH TEAM



From left to right: Drs. Lisa Archibald (larchiba@uwo.ca), Daniel Ansari (daniel.ansari@uwo.ca), Marc Joanisse (marcj@uwo.ca), Janis Cardy (joramcar@uwo.ca).

Our group is interested in understanding children's learning of oral language, reading, and math. By investigating the brain processes that support learning across these areas, we will develop a better understanding of why some children struggle to learn.

FIND OUT MORE!

Follow the links to find out more about our work:

Our past newsletters:
<http://www.uwo.ca/fhs/lwm/newsletters.html>

Podcasts about our research:
<http://www.uwo.ca/fhs/lwm/index.html>

Some of our research papers:

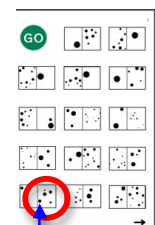
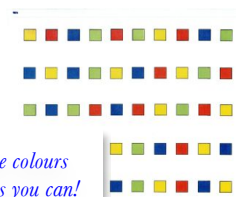
Language, Reading, and Math Learning Profiles in an Epidemiological Sample of School Age Children
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0077463>

A Two-Minute Paper-and-Pencil Test of Symbolic and Nonsymbolic Numerical Magnitude Processing Explains Variability in Primary School Children's Arithmetic Competence
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0067918>

OUR NEW STUDY!

EARLY SCREENING OF CHILDREN'S LEARNING

In our previous studies, we identified profiles of learning patterns in children ages 6-to-9 years of age. In our new study, we're looking for clues about a child's learning even before they've started to learn to read and do math in school. Here are some of the activities the children in this study will do:



Mark the one with more!

Past research tells us that these activities, and others like them, are closely related to language, reading, and math learning. By examining skills linked to learning in all of these areas in the same children, we'll gain a better understanding of the skills children need to support learning.

WORKING MEMORY AND LANGUAGE TRAINING

We've been working with children who struggle with working memory or language skills in a recent study. Some children did 5 weeks of memory training activities. They were asked to remember lists of numbers or patterns of dots or shapes. And the lists just kept getting longer! It was hard work for their memory!



Other children worked for 5 weeks on language activities. They told stories, learned new words, found the hidden meanings, and practiced using longer sentences. There was a lot of thinking and talking in those sessions! We're still working on understanding all of the results, but our early findings suggest that all children made some progress on the activities they worked on!

OUR NEW TEAM MEMBERS

For our study examining early screening of children's learning, we've teamed up with two colleagues from Research and Assessment Services at the Thames Valley District School Board:



Dr. Steve Killip



Dr. Christine Stager

WRITING TELLS!

In one study, we compared written stories and essays by students with and without Autism Spectrum Disorder (ASD). In stories, the students with ASD tended to have difficulty with including all the elements of a good story, developing rich characters, and representing the motivations and intentions of their characters. In essays, students with ASD tended to have difficulty organizing their ideas; they tended to use shorter and simpler sentences, and use unclear language. We also found that some students with ASD were just as good at writing as their peers. Increasing our knowledge about how autism may lead to weaknesses in written expression is very important to help teachers develop effective interventions.

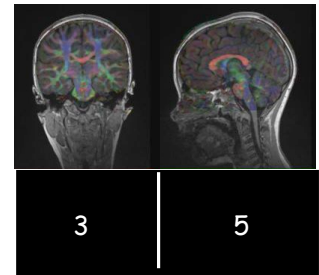


SPECIAL THANKS!

Thank you to all of the school personnel, parents, and children who make our studies possible. Thanks, too, to the talented graduate students working on these projects: L. Pauls, N. Noonan, A. Matejko, Dr. Jeff Malins, H. Brown.

MATH AND THE BRAIN

Grade 1 is a critical period for children to develop math and reading skills. It is when children learn foundational skills like adding and subtracting, which become building blocks for more advanced topics like algebra in later grades. We are currently looking at whether there are individual differences in the way children learn these skills over the course of Grade 1 and whether brain imaging can be used to predict which children will excel or struggle. Magnetic Resonance Imaging (MRI) is used to take pictures of a child's brain while he or she is playing number and word games at the beginning of Grade 1. This tells us what regions of the brain are active while they are thinking about numbers and words. Also, we will examine whether math and reading skills can be predicted by how well-connected children's brains are. The children in this study have already had their brain scanned in September, and we will meet them a few more times throughout the year to see how they have learned. If you want to learn more about this study, you can read about it in a feature article in *The Globe and Mail* ("*The root of the problem: This is your brain on math*" October 26, 2013).



INTERNATIONAL COLLABORATIONS – LEARNING TO READ CHINESE –

One focus of our research group is studying how children learn to read, and why some children struggle in their reading development. Most work in this area has been on alphabetic languages like English and French. However, we know much less about how this takes place in Chinese, where separate symbols indicate each word. One idea is that young readers of Chinese do not 'sound out' individual words, because the written Chinese symbol is often not related to the sound of the word. To study this, members of Dr. Joanisse's laboratory recently travelled to China to begin collaborations with scientists at Beijing Normal University. We are using neuroimaging techniques like event-related potentials (ERPs) to examine children's brain responses to words, both in typical reading development and in children with dyslexia. Our earlier studies of English readers show that brain responses to a spoken word are closely related to reading in children. Our current study will extend those findings by also examining if this relationship is different in languages like Chinese.

EARLY AND LATE

Understanding and using language can be challenging for different reasons. In this study, we asked children with weak language or memory skills to decide if a sentence was grammatical or not. The errors occurred either early or late in the sentence. Children with weak language skills had trouble judging all the sentences. Children with weak memory skills only had trouble when the error occurred late in the sentence. By understanding why some children struggle with language tasks, we can work on finding better ways to help!