

# Language, Reading & Math in Children

*A study of the skills that support children's learning*

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## LET'S RECAP!

Our main study ran from the Fall of 2009 to the Spring of 2011. We screened over 1500 children, and followed nearly 400 for over 1 year. We've been looking at how language, memory, reading, math, thinking, and other skills change over time. Since then, many children have been participating in on going studies either at school or at Western University.

Please note: If you have not participated in one of our studies in the last 3 years, this will be the last newsletter you will be sent automatically. To register to receive our newsletter on an on going basis, please email [screening09@gmail.com](mailto:screening09@gmail.com).

Past newsletters are available at: <http://www.uwo.ca/fhs/lwm/newsletters.html>

## STUDY PODCAST!

Watch podcasts about our research available at:

<http://www.uwo.ca/fhs/lwm/index.html>

## THE RESEARCH TEAM



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

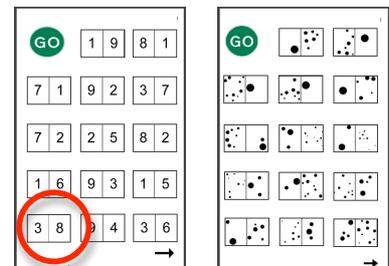
## SUPPORTING STUDENT LEARNING

In one of our studies, we spoke to primary teachers about how they help students who have a difficult time remembering things. Often, these students were struggling with reading, writing, math and attention. Teachers shared several strategies they used to help these students including: giving only one chunk of information at a time, extra practice of skills, working with students one to one or in small groups, and using lessons that are play-based and engaging. These strategies help support recall in students with memory weaknesses.

## MATH TOOLS FOR THE CLASSROOM

We know that basic number skills like the ability to judge which of two numbers is larger is important for learning math. Children's ability to decide which set has more when comparing numbers (i.e., symbols) or groups of dots (i.e., nonsymbolic) is related to their math achievement at school. In other words, children who are good at number comparison also receive high scores when solving math problems. Currently, there is a lack of classroom assessments available to teachers that measure this basic yet important skill. We designed a quick (2

minute) pencil-and-paper tool asking children to decide which was larger when comparing two numbers or groups of dots. Results from a group of 160 children from grades 1-3 revealed a strong relationship between our task and arithmetic achievement. Students who received high scores on our test also received high scores when doing simple arithmetic. These findings are promising because they suggest that a simple assessment of this kind may be used as part of a screening tool for identifying primary grade students at risk for future difficulties in mathematics.



*Mark the bigger one!*

## MATH ABILITIES

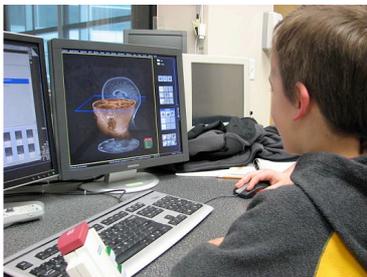
As adults, when we see the Arabic digit "3", we automatically understand that it means three items even without thinking about it. For example, when we see digits on our bank account statements, it takes little to no effort to understand whether there is a lot of money in the account or not. But, when and how do young

children develop the skills to understand and manipulate digits like adults do? We investigated this in our math abilities study.

In this study, children with high and low math abilities decided which of the two numbers was larger, judged which box held more dots, and they matched numbers they heard to numbers they saw on the computer. Our preliminary findings suggest that children with weaker math skills process digits differently than children with stronger math skills. It might be that children with lower math abilities also have greater difficulty processing Arabic digits.

## MATH AND THE BRAIN

We are also developing a new brain imaging study using a Magnetic Resonance Imaging (MRI) Scanner. The MRI Scanner is a special and safe machine that takes pictures of your brain while you play number and math activities. This machine allows us to understand how the brain processes Arabic digits and performs arithmetic tasks. We hope that using brain imaging techniques will help us design better interventions and teaching materials for educators in the future.



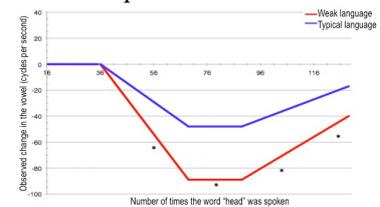
## ENGLISH AS A SECOND LANGUAGE

Some children have more trouble learning to talk than others. When children are learning English as a second language at school, it can be hard to tell whether these English Language Learners (ELLs) are having trouble learning language or just need more time to learn English. In this study, children repeated sentences, and read words and made-up words. Children who spoke only English repeated sentences better than the ELLs, but the ELL group had higher word and nonword reading scores. The word reading (but not the sentence recall) scores also helped us to know which of the ELLs were also having trouble learning language. These findings might help us better understand who is struggling to learn English, and who just needs more time.

## DO YOUR EARS DECEIVE?

When we speak, we also listen to our words to make sure we've pronounced them clearly. Sometimes, we make small changes to the way we produce our speech sounds to make them sound better. The process of listening, and making small changes, to our speech might be important to how we learn language. In this study, each child sat in our special booth with our special headphones on, and spoke words like 'head' and 'had'. Our special headphones made some small changes in the sounds the child heard, even though the child usually didn't know we'd changed the words. If the child's speech changed, we knew the child's brain had noticed the small changes we

had made with our special headphones. We found some differences in the changes made by children with weak or strong language skills. In some cases, children with weak language skills made more changes than we expected. It might be that these children have more trouble matching the way they hear their own speech to the small movements they need to make to speak.



## THE BIRD TASK

When we learn language, our brain processes quick changes in sounds. Children who are having trouble learning language may have difficulty processing sounds quickly enough. In our bird task, we asked children to decide which of two birds paused between chirps. We kept changing how quickly the two chirps were made to find the smallest gap that the children could detect. We found that longer gaps were needed for children with weak than typical language skills. This gap detection skill was related to children's listening and reading skills. It may be that processing sounds slower makes it more difficult to learn basic speech sound skills important to language and reading.

## SPECIAL THANKS!

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