

# Family Literacy Reflections...

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## Numeracy: It's Earlier Than You Think

In this issue we feature:

- The development of numeracy in infants and young children
- Early math concepts
- Numbers and numerosity in relation to children's growing knowledge of mathematics

### Numeracy

*Rose Strohmaier*

The happy parents are talking and singing to their newborn baby. They know that their baby has been learning language from the very moment of birth, even before that, and they are providing a language-rich environment in which she will listen, recognize, imitate, experiment and finally one day, say her first words. But do they also realize that she is developing mathematical skills at the same time?

Researcher Elizabeth Spelke of Harvard University has found that three-day-old infants have a rudimentary concept of numbers, which means they can recognize the difference between collections of two and three items. You might wonder how researchers can make this claim, since newborns have no words or gestures to communicate these mathematical thoughts.

The answer lies in the phenomenon of *attentional persistence*, which has been used by researchers since the 1950s, when it was discovered that babies look longer at things they recognize as new, changed or unexpected. "For example, if you show a baby a toy

bunny over and over again, the baby will give it a shorter gaze each time. However, if you give the bunny four ears on its tenth appearance, and if the baby looks at it longer, you know the baby can discern two from four."<sup>1</sup>

Using this methodology, Spelke observed the rapid development of number awareness: at six months, babies could distinguish between groups of 8 and 16, and groups of 16 and 32. By seven months, their sense of numbers became more abstract: they could make a connection between the number of voices they heard and the number of faces they saw.

Numbers and numerosity (the number of things in a set) are only one part of children's growing knowledge of mathematics. Other mathematical concepts that help them to make sense of their world are also developing. They will come to understand that when Teddy is hiding behind the sofa, he's still there. In their second year, you will see them trying to fit simple shapes into the appropriate spaces on a puzzle board. They may spend hours filling and emptying containers with sand or water. Patterns in their environment are recognized—they now know that night follows day and they use words like 'yesterday' and 'tomorrow.' They can follow simple patterns when stringing beads. They enjoy helping sort the laundry—matching the socks and separating the kitchen towels from the bath towels.

The more opportunities that children get to explore their environment the easier it will be to make the transition to school, where these skills will be further developed in the kindergarten math curriculum areas of Number Sense and Numeration, Measurement, Geometry and Spatial Sense, Patterning, and Data Management and Probability.

Research shows that all babies learn math and that there is little or no difference between the mathematical abilities of boys and girls in the pre-



### Family Literacy Program Directory

If you have not already done so, add your Family Literacy program details to the directory that NALD is compiling by following the link to:

<http://www.abc-canada.org/fld/familyliteracydirectory.shtml>

school years and beyond.<sup>2</sup> Why then do some children encounter difficulties when making the transition from the math they so naturally and intuitively experienced in their first few years of life to the math they are faced with in school? The answer is not yet well understood, but the question provides a focus for a number of current research projects. Dr. Daniel Ansari<sup>3</sup>, Canada Research Chair in Developmental Cognitive Neuroscience, believes that the clues lie in the way those earliest math concepts develop, in infancy and in the pre-school years. Clearly, if we want to give every child the best possible start, we should be paying as much attention to numeracy development as we do to language development in the earliest years.

The numeracy-rich environment a child needs to develop his numeracy potential occurs naturally in daily life. It involves allowing a child to explore and experiment with his environment as much as possible, to interact with him, to encourage him, and most of all, to play with math and have fun.

Attitudes of parents and caregivers to math and math activities have been shown to have a significant effect on their children's success in math at school. Children who see math being used in daily life will develop a natural feel for it. Studies with older students who suffer from 'math anxiety' show that parental support and encouragement greatly reduce anxiety levels. Declaring that, "I always hated math," or "You won't need to use that in real life," will only sow the seeds for negative experiences in math classes.

It is commonly accepted that parents play a leading role in creating language-rich environments for their children. Now we know that it is equally important for children to get a good start in numeracy and to develop the skills that will help them to problem solve and enjoy school. Numeracy skills open doors to the future just as literacy skills do.

A well-rounded family literacy program offers insights into how children gain both literacy *and* numeracy skills.

### References

<sup>1</sup>Colgan, E. (2008, July 23). Learning Math Begins Early. *The Kingston Whig-Standard*

<sup>2</sup>Skwarchuk, S.-L. (2008). Look Who's Counting! The 123s of Children's Mathematical Development During the Early School Years. *Encyclopedia of Language and Literacy Development*. London, ON

<sup>3</sup>Ansari, D. and Karmiloff-Smith, A. (2002, December).

### References Cont'd

Atypical trajectories of number development. *TRENDS in Cognitive Sciences*, 6 (12)

### For More Information

Attentional persistence research lab (video):

[wjh.harvard.edu/~lds/images/babyvideo.mov](http://wjh.harvard.edu/~lds/images/babyvideo.mov)

[www.edu.gov.on.ca/eng/parents/](http://www.edu.gov.on.ca/eng/parents/) (ABC123 > Tips and Tools for Parents)

[www.pbs.org/parents](http://www.pbs.org/parents) (Child Development > Select an Age > Mathematics)

From *A Good Start to Numeracy* by Brian Doig, Barry McCrae and Ken Rowe

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- Numeracy is a core part of the early childhood years.
- A good early childhood start in numeracy is critical to later numeracy success.
- Many children have well-developed numeracy skills before they start formal education.
- Children's numeracy skills encompass more than numbers.

### Suggestions for parents:

After a task has been completed ask:

*Is there another way?*

Play *Which does not belong?* with familiar objects.

As you compare two objects, use and emphasize the terms *bigger/smaller, heavier/lighter, etc.*

Ask: *Sort these (toys, blocks) in some way. Tell me how you did it.*

Group some playthings and ask:

*How have I sorted these?*

When a model (of a building, car) has been made ask:

*Try and build one exactly the same. One a little bit like it. Very different from it.*

Always count, compare and order aloud using the appropriate language:

*I need a **bigger** pot for this soup.*