



# RESEARCH UPDATE

Numeracy Research from the  
Count Me In Project  
2011-2012

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## Dear Parent(s) or Guardian(s):

Between September and December 2011, we conducted a research project in your child's daycare that focused on the development of early numeracy skills in children that speak different languages. Three- to 5-year-old children were tested: Over 50 English-speaking children were tested in Canada and over 80 Turkish-speaking children were tested in Turkey. In addition, some parents filled out a questionnaire. **We are very grateful to all of the parents and children who participated!**

## What was the purpose?

Our study had two main goals: The first goal of the study was to compare Turkish-speaking and English-speaking children to see if language is related to how quickly children gain early numeracy skills, specifically learning to count. Because the Turkish language is simpler than English for numbers 11 to 19, we hypothesized that the Turkish-speaking children would show more improvement in counting than English-speaking children—even when the Turkish and Canadian children had similar counting skills to start, and had the same exposure to numbers (played the same number games for the same amount of time). The second goal of the study was to see if home-based number activities are related to children's numeracy knowledge. We hypothesized that children with more home-numeracy experiences would have better numeracy skills than children with less home-numeracy experiences.

## What did we do?

All children participated in an initial testing session; they completed various tasks designed to measure their basic numeracy skills. For example, they counted as high as they could, counted objects, named numbers (digits), and performed simple addition and subtraction with toy animals. Most children were included in the second phase of the study, however some children did not participate because their numeracy skills exceeded the range that we were interested in.

In phase two of the study, children played a number or colour game for 4 weeks (Figure 1). The number game was like *Snakes and Ladders*, consisted of 20 squares numbered from 1 to 20. During each turn, children had to say each number as they moved along the board. For example, if a child was on square 15 and s/he spun a 2 with the spinner, s/he had to say "16, 17" rather than "1, 2"; this was to help children practice the number names up to 20. The children were helped with naming the numbers they did not know. The colour game was like the game "Candy Land". Children used a colour spinner to determine which colour square to move to; as they moved, children had to say all of the colours along the way.

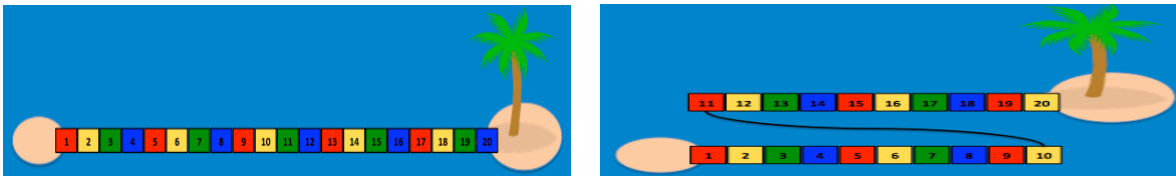


Figure 1. The Linear and Row versions of the number game (The colour version looked like the linear version without the digits on the squares)

Each week, children were first asked to count as high as they could before playing the game. Then, they played the number or color game for 15 minutes, resulting in 60 minutes of play in total. After playing the game for 4 weeks, children were tested again on their basic numeracy skills.

Some parents completed a questionnaire that asked them how often they did number and reading activities with their child. Parents also saw a list of board game names and checked off the ones that they recognized.

## What did we discover?

Canadian children who played the number game improved their counting and number recognition more than children who played the colour game—especially if they couldn't count beyond 12 at the start of the study. Children in both number games improved in their mathematical abilities, but those who played the row game improved more. The row game may have helped children learn the underlying structure of the number system.

The results were similar for the Turkish children, but they learned even more from playing the number game than did the Canadian children. These findings support our hypothesis that language is related to how quickly children gain number skills. **These findings are exciting because they show that number language might influence children's early counting. Furthermore, if children experience appropriate conditions** (in this case, counting practice during a fun activity), **their counting ability improved quickly—regardless of language.**

Home number activities, such as printing numbers, counting down, and teaching simple sums were related to children's numeracy knowledge and performance. Children whose parents reported higher frequencies of these activities had better knowledge of counting, number composition, and number recognition. Parents' knowledge of number games—which we think is a measure of home-number game play—was also related to children's numeracy knowledge. **These results were consistent with our research that shows that parents' active involvement is related to their children's acquisition of early numeracy knowledge and skills.** It is important to remember, however, that children have different interests. Some children seek out activities that involve numbers whereas others prefer to listen to a story, do active sports, or make believe. **Parents have an important role to play in their children's early experiences, but their children are active participants as well!**

### Some Recommendations

**The findings of this study suggest that number games may be an enjoyable way for children to acquire early numeracy knowledge and skills.** The list of recommendations below is based on research done at Carleton and at other universities in Canada and the US that could help you guide your child's learning.

### Counting Matters

Researchers believe that understanding counting principles and procedures is fundamental to children's success in developing arithmetic skills. Research suggests a close relation between informal counting skills that children acquire at home and the more formal requirements of school math. Just as you may teach your child sounds or read to your child to facilitate their early literacy knowledge, you can be involved in helping your child learn about counting and numbers.

- **Count everything!** Count toys, kitchen utensils, and items of clothing as they come out of the dryer. Help your child count by pointing to and moving the objects as you say each number out loud. Count forwards and backwards from different starting places. Use household items to practice adding, subtracting, multiplying, and dividing.
- **Ask your child to help you solve everyday number problems.** "We need six tomatoes to make our sauce for dinner, and we have only two. How many more do we need to buy?" "You have two pillows in your room and your sister has two pillows in her room. How many pillowcases do I need to wash?" "Two guests are coming to eat dinner with us. How many plates will we need?"
- **Practice "skip counting".** Together, count by 2's and 5's. Ask your child how far he or she can count by 10's. Roll two dice, one to determine a starting number and the other to determine the counting interval. Ask your child to try counting backwards from 10, 20, or even 100.
- **Make up games using dice and playing cards.** Try rolling dice and adding or multiplying the numbers that come up. Add up the totals until you reach a target number, like 100. Play the game backwards to practice subtraction.
- **Play "Broken Calculator".** Pretend that the number 8 key on the calculator is broken. Without it, how can you make the number 18 appear on the screen? (Sample answers:  $20 - 2$ ,  $15 + 3$ ). Ask other questions using different "broken" keys.
- **Play Board Games and Card Games.** Play board games, card games, and other activities where math happens naturally. Board games with dice provide lots of counting practice and some practice with simple addition to twelve. Counting the dots on dice and then confirming the count by tapping the squares on the board as the player moves all help the child develop familiarity with small numbers. Games that involve alternative routes (like Sorry or Chinese Checkers) also may help your child develop counting "flexibility." Older children will enjoy learning checkers and chess, which reinforce spatial skills, memory, and encourage the development of strategies. Card games that involve matching numbers or making pairs such as Crazy Eights help children practice a variety of number skills. The presence of a parent or caregiver is a big part of the value of board games and card games. Adults help to guide the children's skill development by tactfully correcting mistakes (or facilitating the process so mistakes are avoided), applauding success, and modeling the skills.

**The bottom line** is that fun activities in which parents and children are using their numeracy skills together are likely to enhance children's development in math. Parents have an important role to play in encouraging children's applied math knowledge and showing them how math is important for everyday activities.

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You can also check out our website at [www.carleton.ca/cmi](http://www.carleton.ca/cmi) for additional research findings and links to early numeracy games and activities. For more detailed information about related topics see the Encyclopedia of Language and Literacy Development at <http://literacyencyclopedia.ca/>.