

# MATH TALK BOOSTS EXECUTIVE FUNCTIONING



Children with hearing loss need intentional work to develop executive functioning. One way to boost executive functioning skills is to purposefully integrate the language of pre-number and number concepts into routines of daily living. Start “Math Talk” in infancy! Many research papers have offered evidence that children who have good mathematical skills have higher-order executive functions.

**Executive Functions** are a collection of neurological processes that are responsible for guiding, directing, and managing cognitive, emotional, and behavioural tasks, especially during novel problem-solving.

**Mathematics** is the science that deals with the logic of shape, quantity, and arrangement. Math is all around us in everything we do. Math concepts form the foundation of daily activities such as cooking, washing clothes, building a house, engaging in art creation, managing money, and even playing sports.

Math language is used even when speaking with babies. For example, while feeding her baby, the mother asks the child, “Do you want **more**? Oh! The milk in the bottle is **finished**.” This resource will offer examples of how to notice and sprinkle “Math Talk” into routines of daily living beginning in infancy.

Some of the Listening and Spoken Language Strategies that can be used to facilitate “Math Talk” are:

- ★ Creating an optimal listening environment
- ★ Using Parentese/Motherese while working with babies and toddlers.
- ★ Practicing turn-taking skills
- ★ Involving your child in observing day-to-day activities that offer distinctions in quantity and shapes around the home and in school.
- ★ Noticing real-life examples of math concepts during everyday routines.
- ★ Following the child’s lead and having fun!

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## MATH TALK WITH INFANTS

Babies grow and change at an astounding pace, and every month reveals new and exciting developments. It's important to remember that all babies develop at their own pace. There's a fairly wide "window" for when it is normal for a baby to reach a particular developmental stage. For example, some babies may say their first word at eight months, while others won't talk until a little after the one-year mark. The first three years of life are critical for foundational brain development. The child's neural connections are completely dependent on environmental experiences. Following are examples of how to integrate "Math Talk" into conversations with babies to lay the foundation for executive functioning:

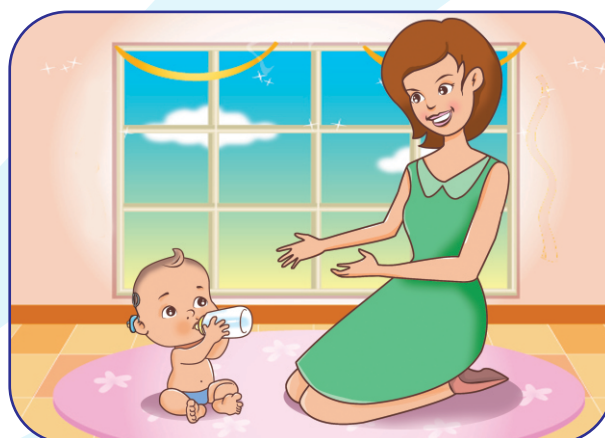
- Notice and predict the **sequence of events** that define an activity (*like running water means bath time*)
- **Classify** items and events in simple ways (*some toys make noise and some don't*)

Parent/Caregiver: Let the baby experience the shaking of rattles to hear different sounds, and observe that some soft toys don't make a sound.

- Begin to understand words that describe **quantities** (*more, less, enough, finished*)
- Start to understand **relative size** (*baby has small hands, mama has big hands*)
- Parent/Caregiver sing and play with baby by moving baby's hands or legs and describing that you have **two little hands** and Mummy has **two big hands**
- Read stories that use mathematical language.



Parent/Caregiver: "I hear something! You hear that? That's the sound of the water. It's bath time. The tub is being **filled**."



Parent/Caregiver: "Do you want more milk? I will get some **more**. The milk is **finished** in your bottle."



Parent/Caregiver: Singing, "**Two** little hands go clap clap....etc"



Parent/Caregiver while reading, "The hungry caterpillar ate **one whole** apple, yet he wanted **more** to eat!"



# MATH TALK WITH TODDLERS

## If parenthood came with a GPS, it might just say.....Recalculating.

Toddlers are like little explorers. The toddler years are a time of rapid speech, language, cognitive, emotional, and social development. Following are suggested ways to facilitate the expansion of these skills in your toddler.

- Provide opportunities for your child to play with others. Playing together is a great way to make friends and to learn social skills.
- Encourage self-help skills like putting on socks and using a cup. These skills involve both small and large muscle movements and also stimulate your toddler's ability to think.
- Have conversations with your toddler to increase their language and vocabulary knowledge.
- Read stories to your child to encourage imaginative skills while expanding auditory attention and auditory memory.
- Let your toddler help you with cooking. Cooking might interest them in developing a preference for healthy foods.
- Provide opportunities in routines of daily living for your toddler to experience and practice pre-number concepts, such as:
  - light and heavy
  - short and long
  - wide and narrow
  - thick and thin
  - few and many
  - one and all



Parent/Caregiver: "Look, your ball has rolled **under** the table."  
 "Daddy is hiding **behind** the curtain."  
 "I arrived **first** because I ran the **fastest**."



Parent/Caregiver: Involving the child in baking; cutting bread into **shapes** (circle, triangle, square) and making sandwiches or burgers or pizzas.

## Some daily play activities that lend themselves to the development of pre-number concepts include:

- Using words that compare and measure activities and items: (*under, behind, fastest*)
- Reciting **number rhymes**:
- Matching basic shapes (triangle to triangle, circle to circle)
- Developing the concept of "**two**":
- Parent/Caregiver: **Counting body parts**, singing rhymes related to body parts like my two little eyes go open and shut, my one little head goes side to side...
- Exploring **measurement** concepts by filling and emptying containers; Playing in sand, and playing with clay dough
- Noticing **patterns** that occur during activities of daily living and in objects such as floor tiles
- Explaining that numbers mean "how many" (using fingers to show how many)  
 Parent/Caregiver: **How many** smarties do you want to eat -- **two or three**?



Singing along with parents:  
 1,2,3,4,5...Once I caught a fish alive;  
 1,2 buckle my shoe; 3,4, shut the door, etc.



Parent/Caregiver: Talking about the **pattern** on the child's dress; describing patterns on the curtains; categorizing pillowcases or bedsheets, etc

## MATH TALK WITH PRE-SCHOOLERS –

During the pre-school stage of development, children learn to solve problems and communicate and socialize with others. They build their language and confidence to support more advanced learning when they transition to a “big school” under the guidance of trained and qualified teachers. Parents/caregivers can enrich their child's development by incorporating mathematical concepts into daily routines such as:

- Recognizing shapes in the real world – A door is rectangular in shape.
- **Sorting** items by categories such as color, shape, size, or function.
- **Comparing** and **contrasting** the classifications of height, size, or gender.
- Counting up to at least 20, and accurately pointing to and counting the number of items in a group.
- Learning that **numerals** stand for number names (5 stands for *five*).
- Using **spatial awareness** to put puzzles together
- Predicting **cause and effect** (such as, What will happen if a toy is dropped into a tub full of water?)



“I have eight slices of cake. If I give away four slices, how many slices will be **left** on the plate?” “You have two chocolates. If I give you three more, how many chocolates will you have **altogether**?”

“Mom is **shorter** than Papa”.  
“An airplane goes **faster** than a car”  
Understanding basic mathematical computations.



“Today is the 22<sup>nd</sup>. How many days are **left** until we reach Christmas on the 25<sup>th</sup>?”



**Conclusion:** Young children's experiences with 'Math Talk' at home and at school can help boost their executive functions, resulting in growing their skills in problem solving and planning and initiating tasks. Nourishing these capacities at an early age in young children with hearing differences, will support them as they develop into academically strong and independent individuals.

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