MATH: NUMBER RECOGNITION AND SUBITIZING
**Math Stretches Across the ELOF Domains**

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**NATIONAL CENTER ON**

Early Childhood Development, Teaching and Learning
Math Stretches Across the ELOF Domains

- Cognition (Infant/Toddler)
  - Reasoning and Problem-Solving
  - Emergent Mathematical Thinking
- Cognition/Mathematics Development (Preschooler)
  - Counting and Cardinality
- Approaches to Learning
  - Cognitive Self-Regulation
- Language and Communication
  - Communicating and Speaking
Session Objectives

• Explain *number recognition* and *subitizing* for young children (the goal)
• Identify the *developmental progression* for number recognition and subitizing
• List ways to incorporate subitizing into everyday *educational activities*, routines, and instruction
Learning Trajectory

Three Parts:

1. Goal
2. Developmental Progression
3. Educational Activities
Part 1 of the Learning Trajectory

1. Goal
2. Developmental Progression
3. Educational Activities
LT Goal for Number Recognition/Subitizing

Children recognize and then subitize (recognize quickly) the number in a group *without counting*.

“Look! I have *three* blocks!”
Not this!
Number Recognition

• Early number recognition is not (yet!) subitizing.

• Subitizing is the *rapid* recognition of numbers without needing to count.

• Children can first recognize the number in small groups, then they get better and *faster* and can subitize.
Why Is this Goal Important?

Number recognition

• Builds upon the *earliest developing* number sense
  • Infants begin to notice the number of objects in a small group
• Supports learning how to count
  • Cardinality (knowing how many you counted)
• Supports learning arithmetic
  • Even after accounting for IQ and language
Part 2 of the Learning Trajectory

1. Goal
2. Developmental Progression
3. Educational Activities
Young Children and Number

• Infant competencies
• “Habituation” research
Perceptual Subitizing

• What is it?
  • The ability to “just see” how many objects in a small collection.

• Let’s actually do some perceptual subitizing.
  • Ready?
What did you see?
Conceptual Subitizing

• What is it?
  • The ability to see the parts of multiple small sets and putting together the whole.

• Now, let’s try some conceptual subitizing.
  • Ready?
What did you see?
What Did You See?

- How did you know?
- Think-pair-share!
• Within the first year, sensitive (dehabituates) to number, but does not have explicit knowledge of number. For infants, this begins with very small numbers (1 or 2).
LT Level: Small Collection Namer

- Names groups of 1 to 2, sometimes 3.

“Two doggies!”
LT Level: Maker of Small Collections

- Makes a small collection (no more than 4, usually 1–3) with the same number as another collection or from the number word.
Quickly recognizes collections up to 4 briefly shown and names the number.
LT Level: Perceptual Subitizer to 5

• Quickly recognizes collections up to 5 briefly shown and names the number.
• Names the total in all arrangements to about 5, when shown only briefly.
LT Level: Conceptual Subitizer to 10

- Extends to 10.
  For the advanced!

- Pre-Explicit Namer
- Small Collection Namer
- Maker of Small Collections
- Perceptual Subitizer to 4
- Perceptual Subitizer to 5
- Conceptual Subitizer to 5
- Conceptual Subitizer to 10
Part 3 of the Learning Trajectory

1. Goal
2. Developmental Progression
3. Educational Activities
Math Language

• When children make a math utterance, teachers:
  • 60% of the time ignore it
  • only 10% of the time respond mathematically

This has important implications for children, particularly dual language learners.
What To Do to Help Children Learn Subitizing

• Simple but continuous teaching strategy
  • Use small numbers in everyday talk and cultural storytelling

• You can make a huge difference
  - planned curricular experiences
  - spontaneous experiences
Support Subitizing for Children who are Dual Language Learners

1. Choose culturally meaningful and familiar materials
2. Connect math terms to child’s home language
   • Can the child can subitize in home or Tribal language?
   • Embed the child’s language in the activity.
3. Multiple representations
4. Emerging competence versus struggles with expressive vocabulary
5. Tiered levels of questions
What To Do?

Quick Images or Snapshots
• Show a set for 2 seconds or less, then hide it
• Ask children to say how many they saw

How would you need to alter these cards to play this game?
Rhythmic Subitizing

Subitizing can also be rhythmic.
Supporting Children with Suspected Delays or Identified Disabilities

• Subitizing is especially important for children with special needs.

• Follow the learning trajectory with patience!

• Use number names all day, naturally but intentionally.

• Play a lot of dice and domino games.
Supporting Children with Suspected Delays or Identified Disabilities

• Work toward use of fives and tens frames, a powerful representation (Flexer, 1989).

• For those with perceptual issues, such as visual impairment:
  • use manipulatives
  • include lots of rhythmic subitizing
Subitizing

“Subitizing is a fundamental skill in the development of [children’s] understanding of number.”

(Baroody, 1987)
Review