

Teaching Mathematics to Students with Significant Disabilities and Complex Communication Needs

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Alt+Shift, encompassing Michigan's Integrated Mathematics Initiative, is an *Individuals with Disabilities Education Act (IDEA)* Grant Funded Initiative through the Michigan Department of Education, Office of Special Education





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encompassing



Michigan's Integrated
Mathematics Initiative



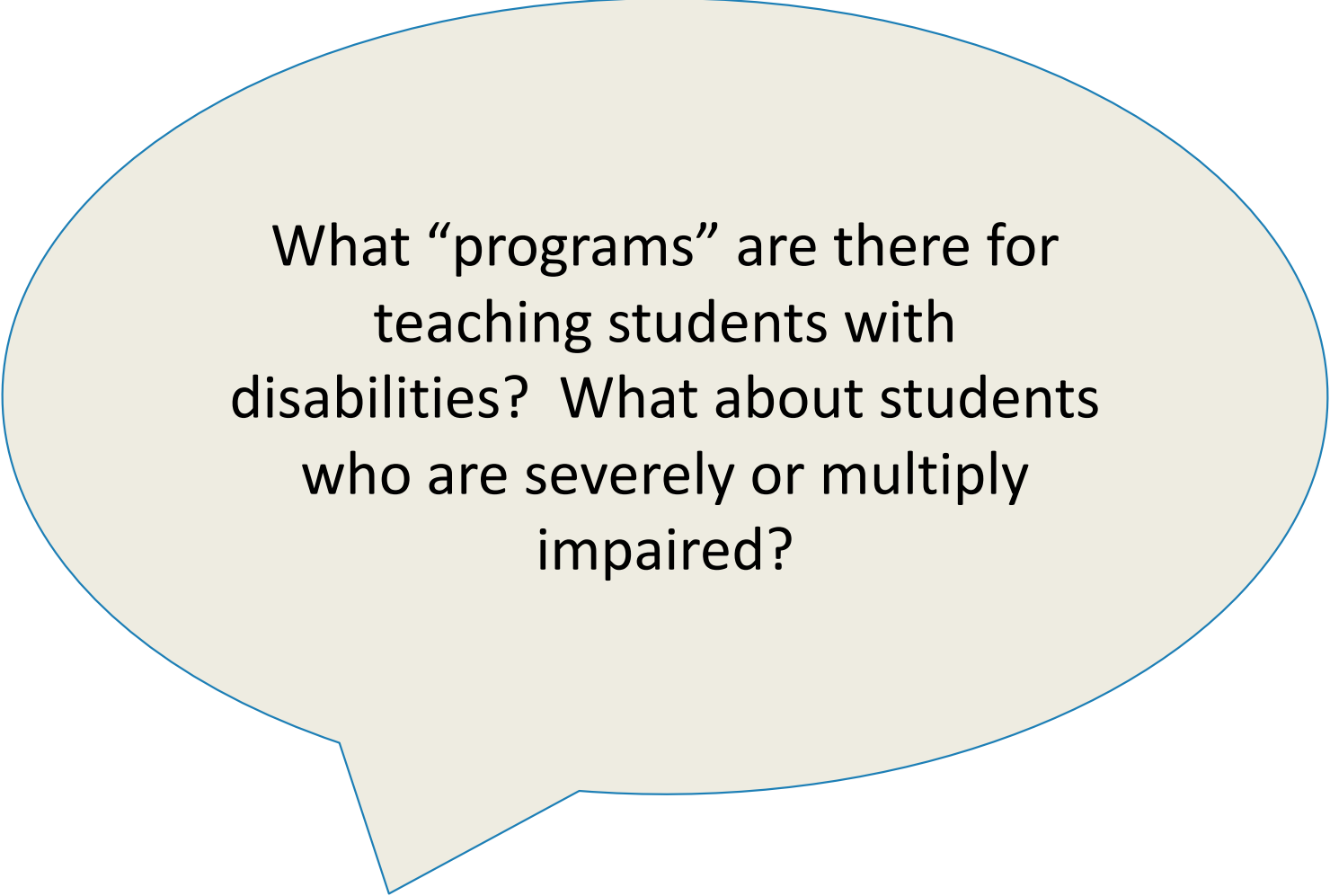


1. Communication strategies
2. Math strategies
3. Opportunity to learn more

FOUNDATIONS OF MATH

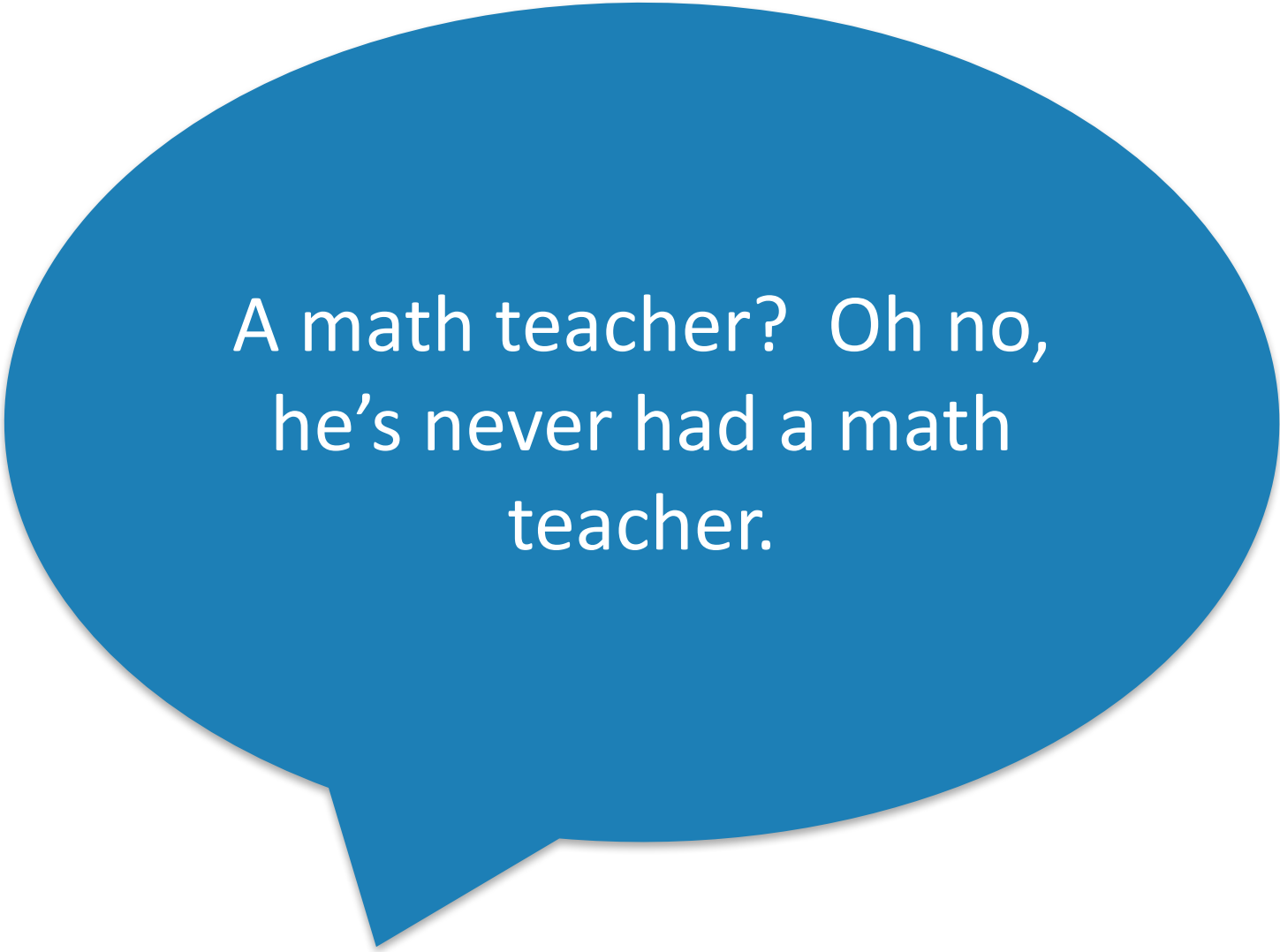
Teaching Students with Significant Disabilities





What “programs” are there for teaching students with disabilities? What about students who are severely or multiply impaired?

adhd autism skills writing services develop aids professional cognitive behavior
model children educator hearing attention parents
visual
classroom therapy student
strengths language program meeting
plan emotional handicap approach individualized teachers
achievement disabled class
education public speech

A blue speech bubble with a white drop shadow, containing white text. The bubble is centered on the page and has a tail pointing towards the bottom-left.

A math teacher? Oh no,
he's never had a math
teacher.

Communication

Practical Lives

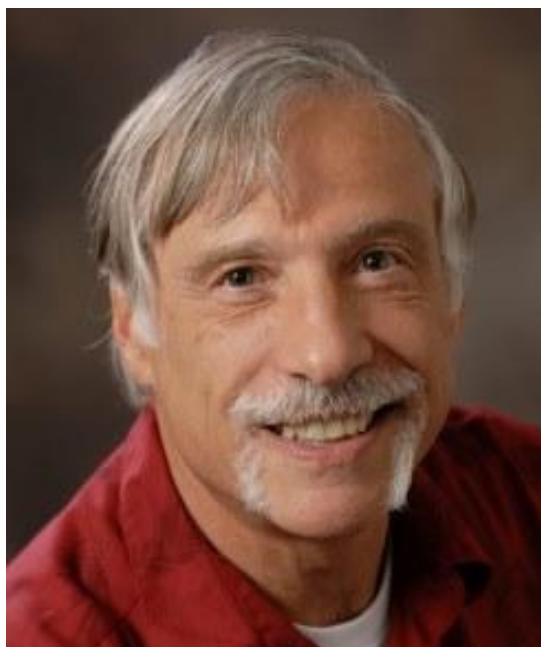
Understand
relationships

Be systematic

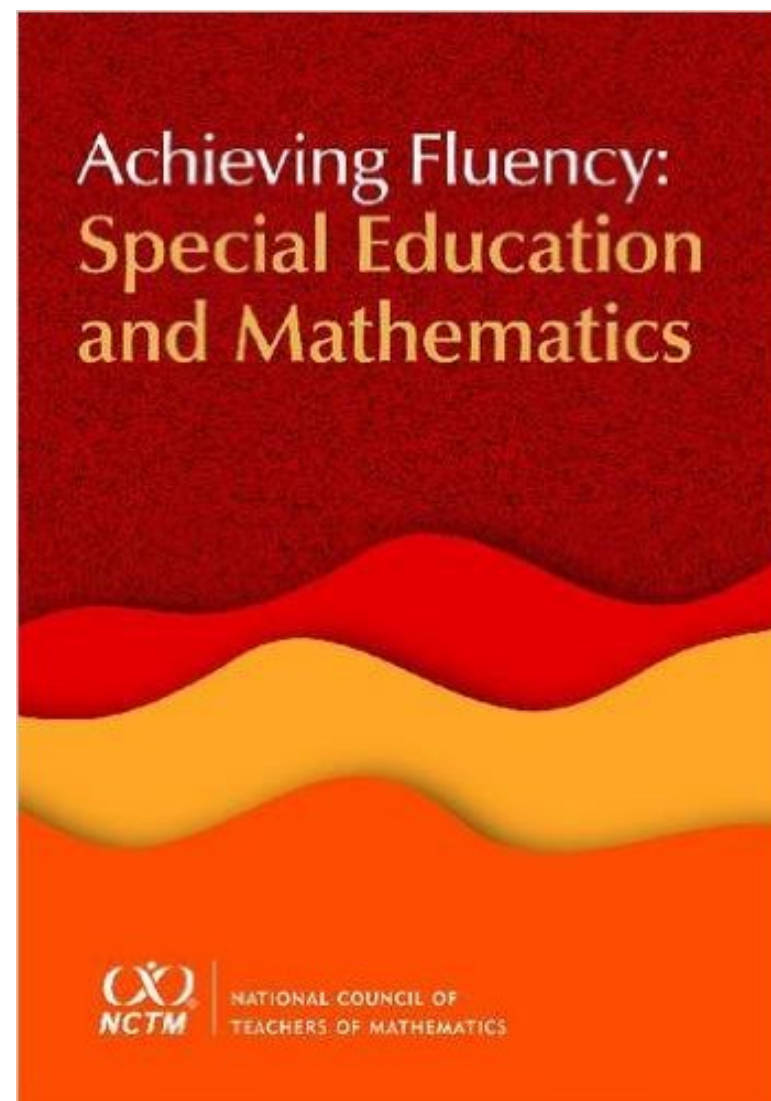
Fascinating

Imagination

Staves 2001



Arthur J. Baroody
“Learning: A Framework”



How much math instruction is happening in your program and what does it typically involve?

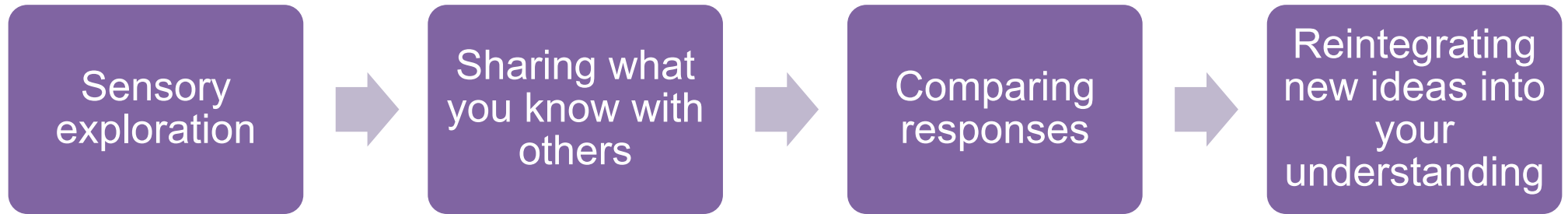


- How do we make sense of **mathematics goals** for our classrooms?
- How do we **maintain rigor** for our students and maintain functional goals?
- How do we **teach a subject** that we may feel unprepared to teach?

First Things First: Communication



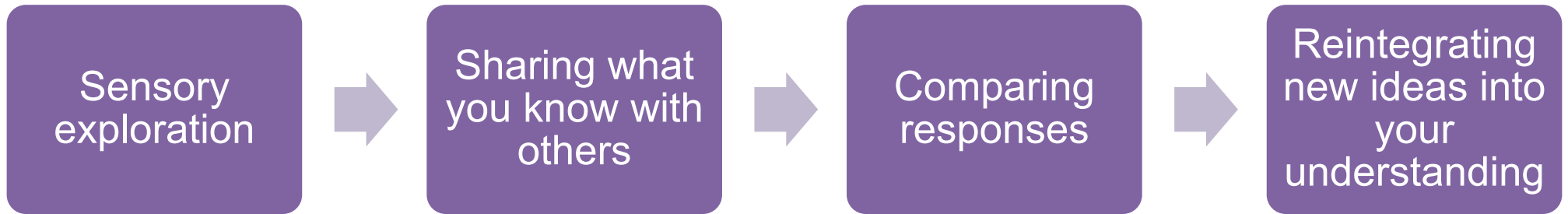
Early learning



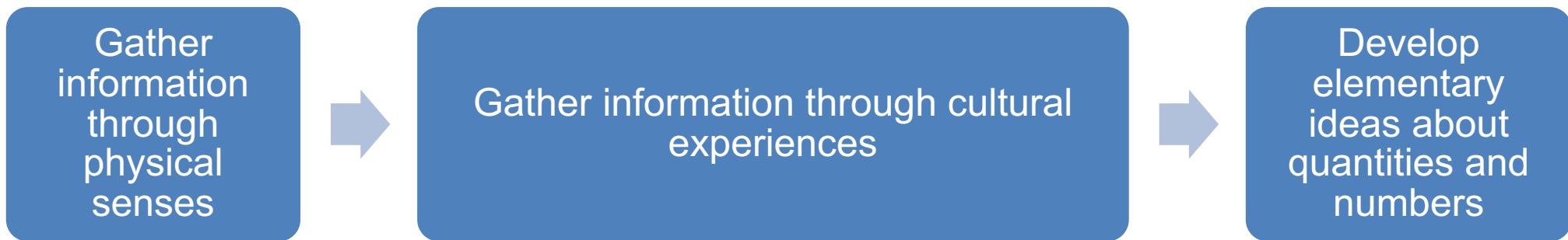
Assimilation and Accommodation

Staves 2001, Butterworth 1999

Early learning



Assimilation and Accommodation



Number module brain circuitry

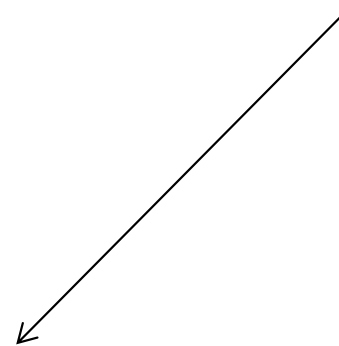
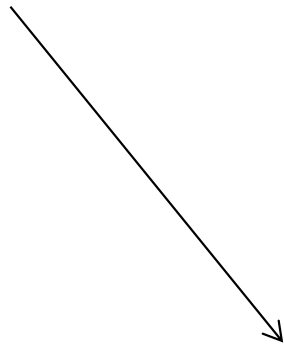
Staves 2001, Butterworth 1999

Personal Math
(sensory and observation)

Social Math
(communication with others)

Personal Math
(sensory and observation)

Social Math
(communication with others)



Numeracy

Staves 2001

Without communication,
there is no teaching or learning.

Communication Strategy #1: Collaborate

**Communication Strategy #2:
Provide a reason and means to
communicate**

Communication Strategy #3:
Provide a means for
communication everywhere,
all the time

Communication Strategy #4: Stick with it

Important:

The staff AND the student
need to know how to
communicate via the AAC
device or system

4 Communication Strategies

- Collaborate
- Provide a need and means for communication
- Provide means for communication everywhere all the time
- Stick with it

Next Things Next: Evidence-informed Mathematics Instruction

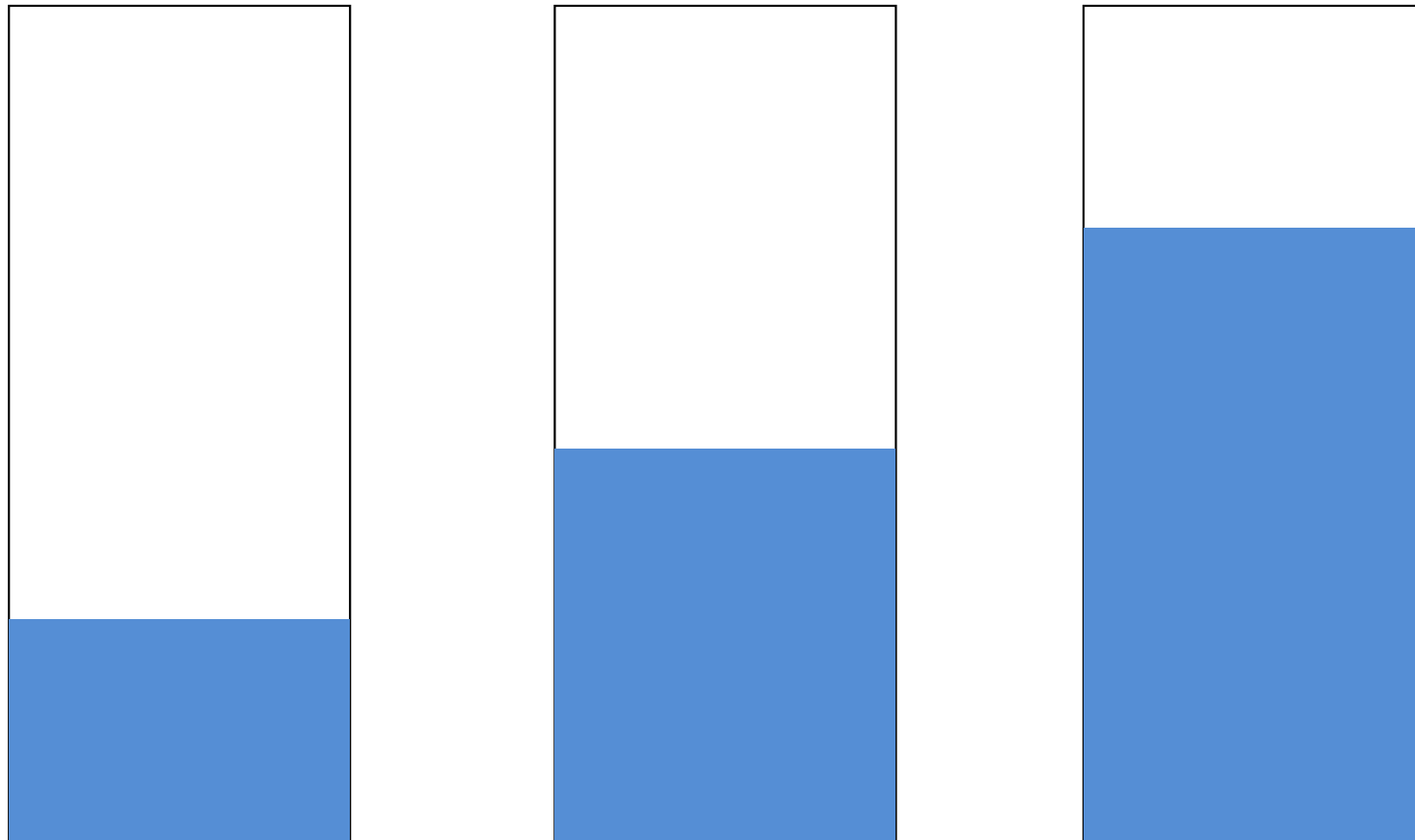


Math Strategy #1:
Teach to the analog brain

We teach *digitally*
but we ALL have
analog brains!

Dehaene 1997

The Accumulator Model: Our Analog Brain



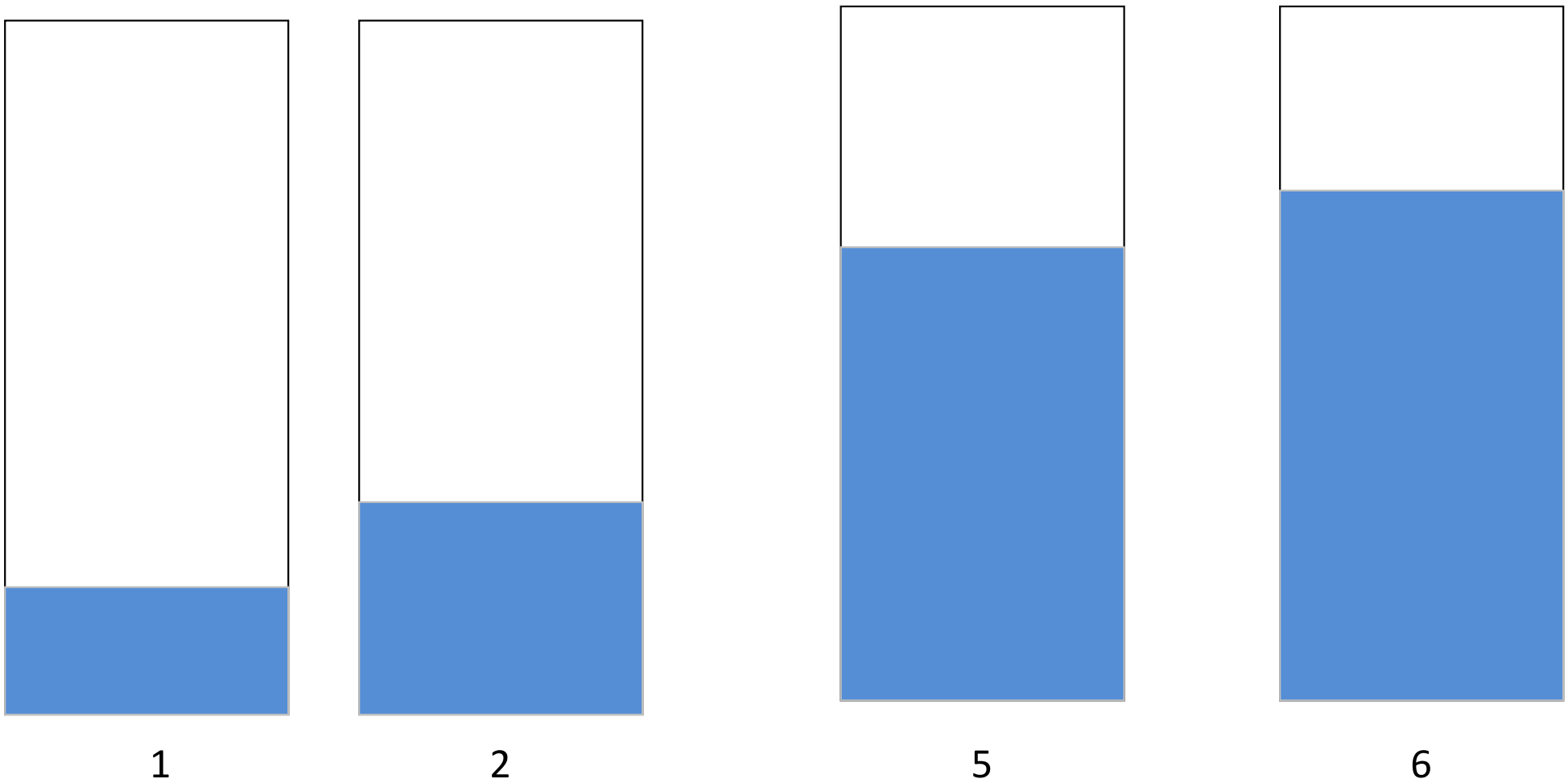
1

2

3

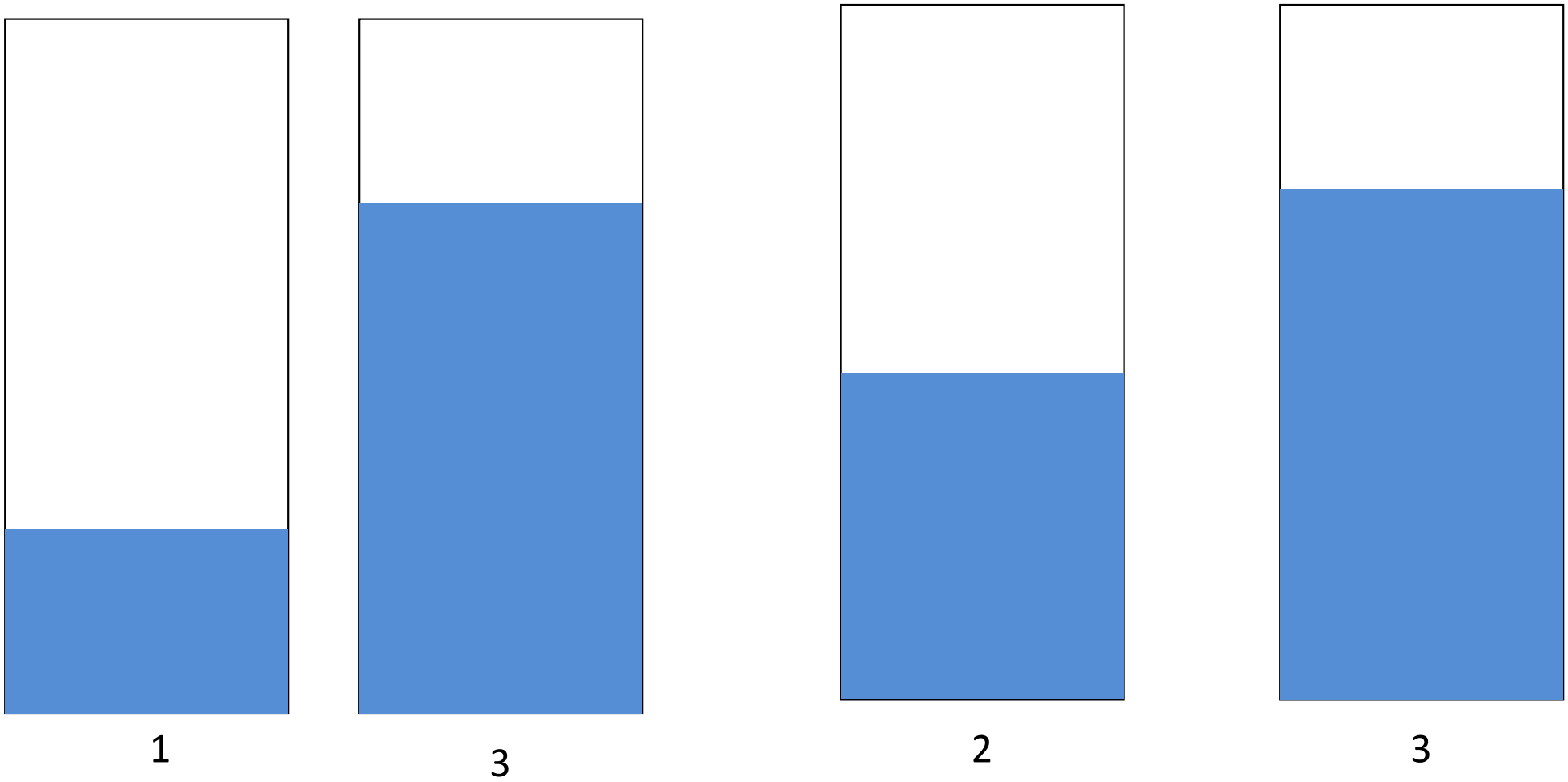
Dehaene 1997

The Magnitude Effect



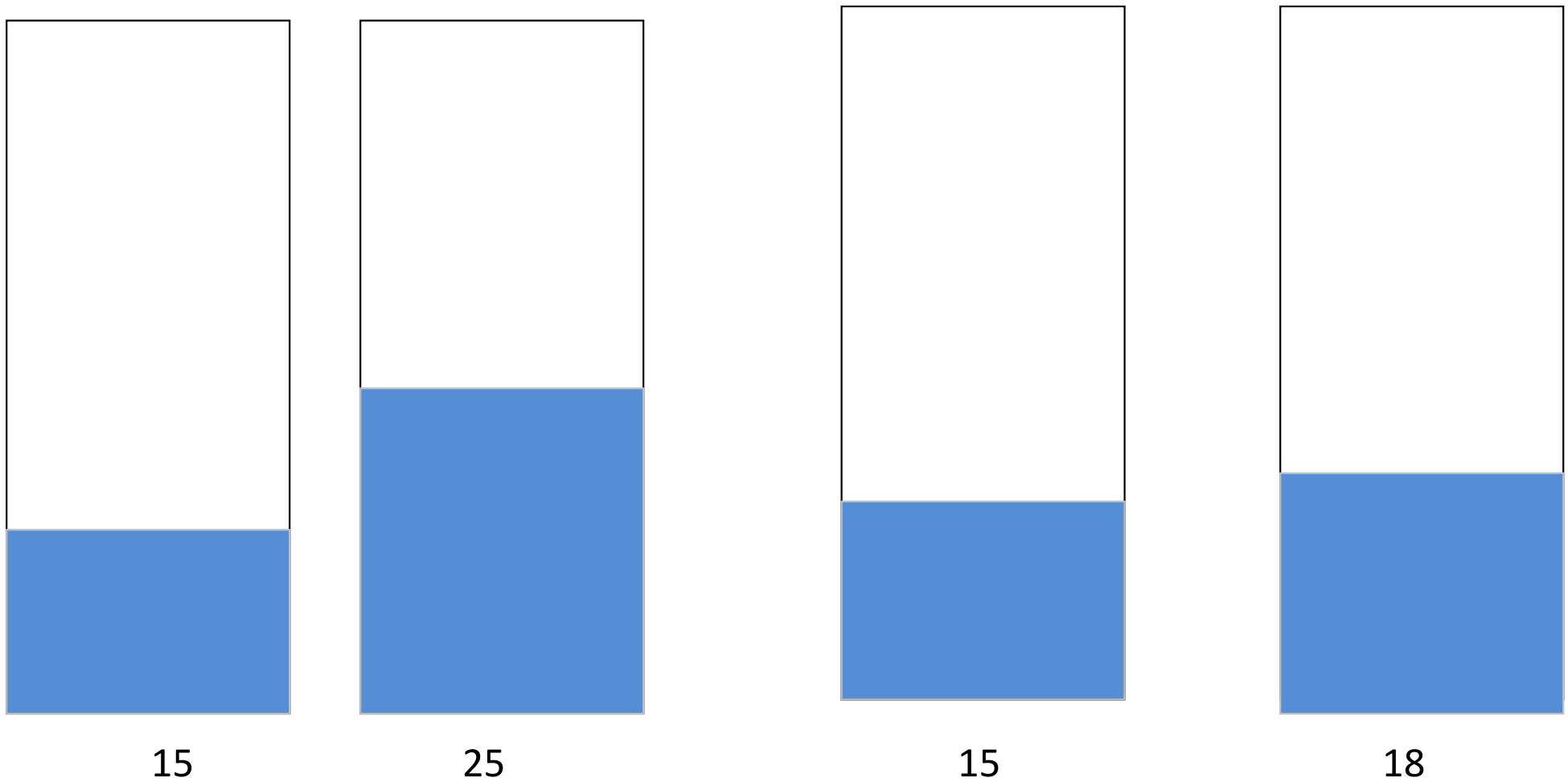
Dehaene 1997

The Distance Effect



Dehaene 1997

The Distance Effect



Dehaene 1997

Teaching to the Analog Brain

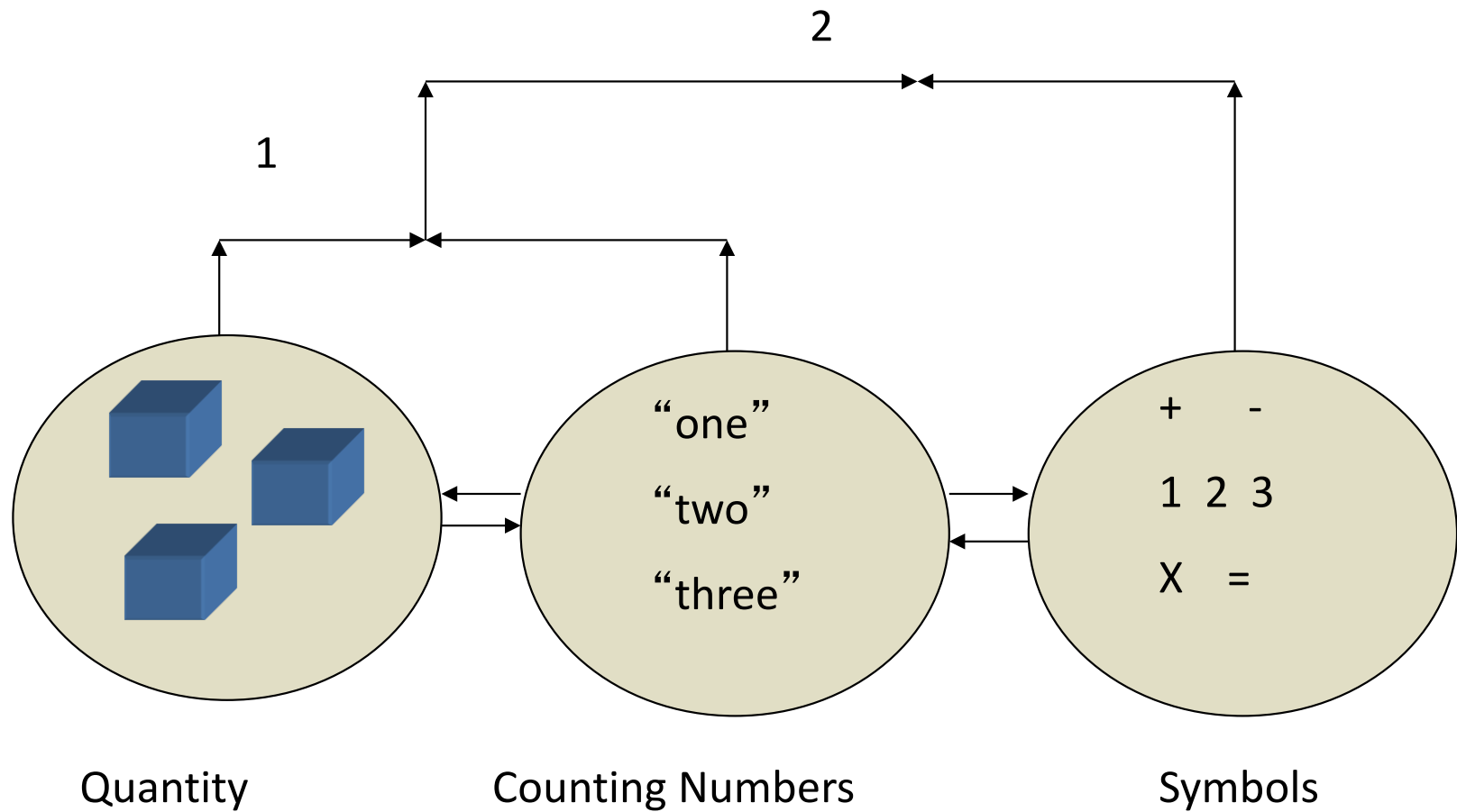
- Start with quantities
- Use manipulatives
- Talk about “How many?”
- Counting for a purpose

Math Strategy #2:

Connect quantity, language,
and symbols

Sharon Griffin

Core Image of Mathematics



V. Faulkner and DPI Task Force adapted from Griffin, 2003

What is this...

Cat

Adapted from Faulkner, 2012



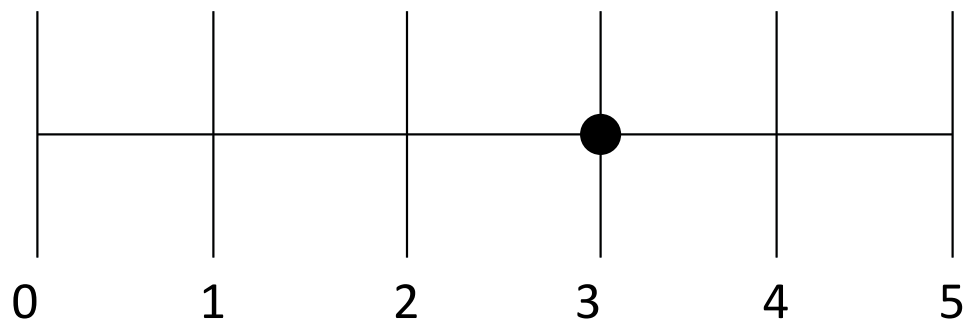
What is this...

3









Clap, Clap, Clap

word

cat



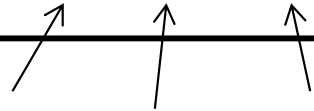
letter letter letter



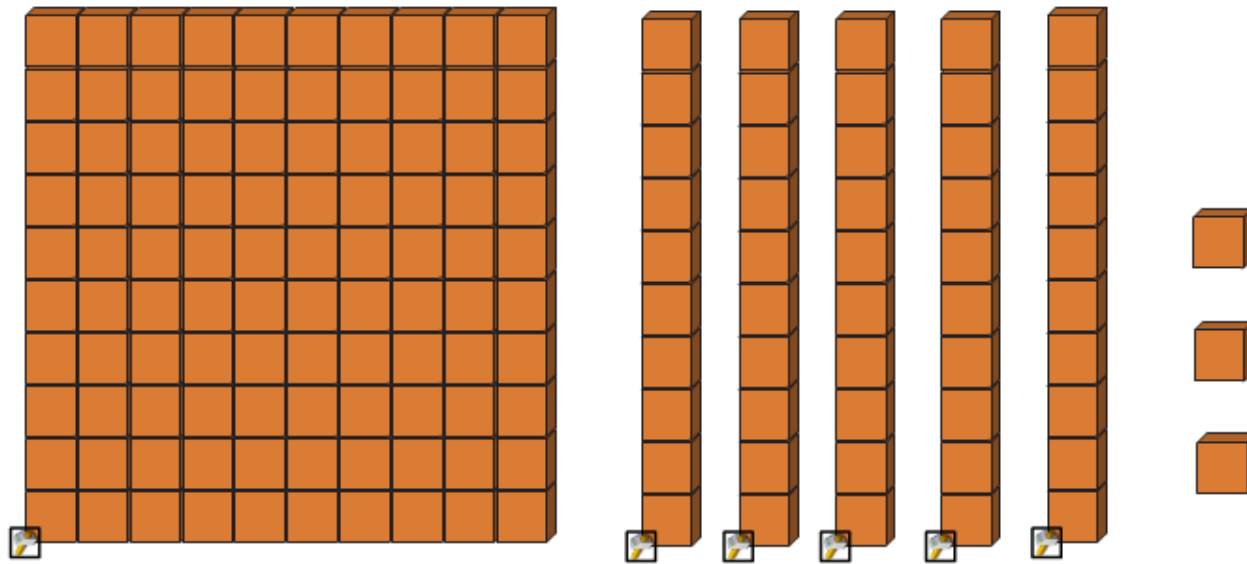
actual cat

number

153



digit digit digit



Math Strategy #3: Repetition with Variety

What should be repetitive?

- The basic structure of the lesson
- The math goal of the lesson
- Repetition should not exceed 5 instances

Incorporating Variety

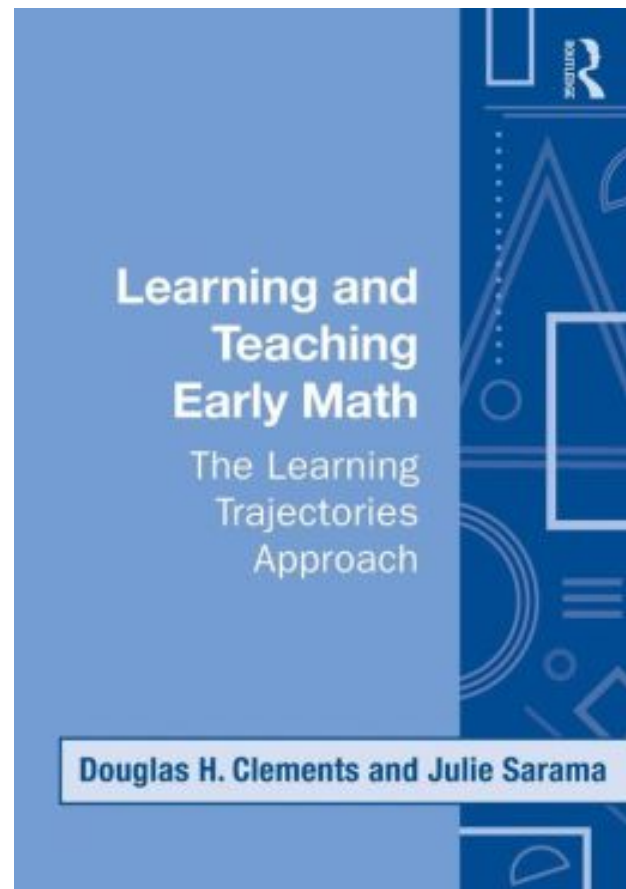
- Objects/Pictures used for counting
- Student selection of objects
- Cards/Dice/Random Drawing
- Choosing whose turn it is
- Having students create the question
- Books or video

Math Strategy #4: Teach the BIG Ideas

Burning Question



Where do I start?



Trajectories

Learning Trajectories for Primary Grades Mathematics



tinyurl.MathTrajectory

Learning Trajectories

- Saying numbers
- Rote counting to 5 then 10
- Counting collections of 5 then 10
- Creating collections of 5 then 10
- Subitizing
- Some/All
- Composing numbers to 5 then 10

Math Strategy #5: Direct Instruction

How can mathematics instruction be strengthened in your program?

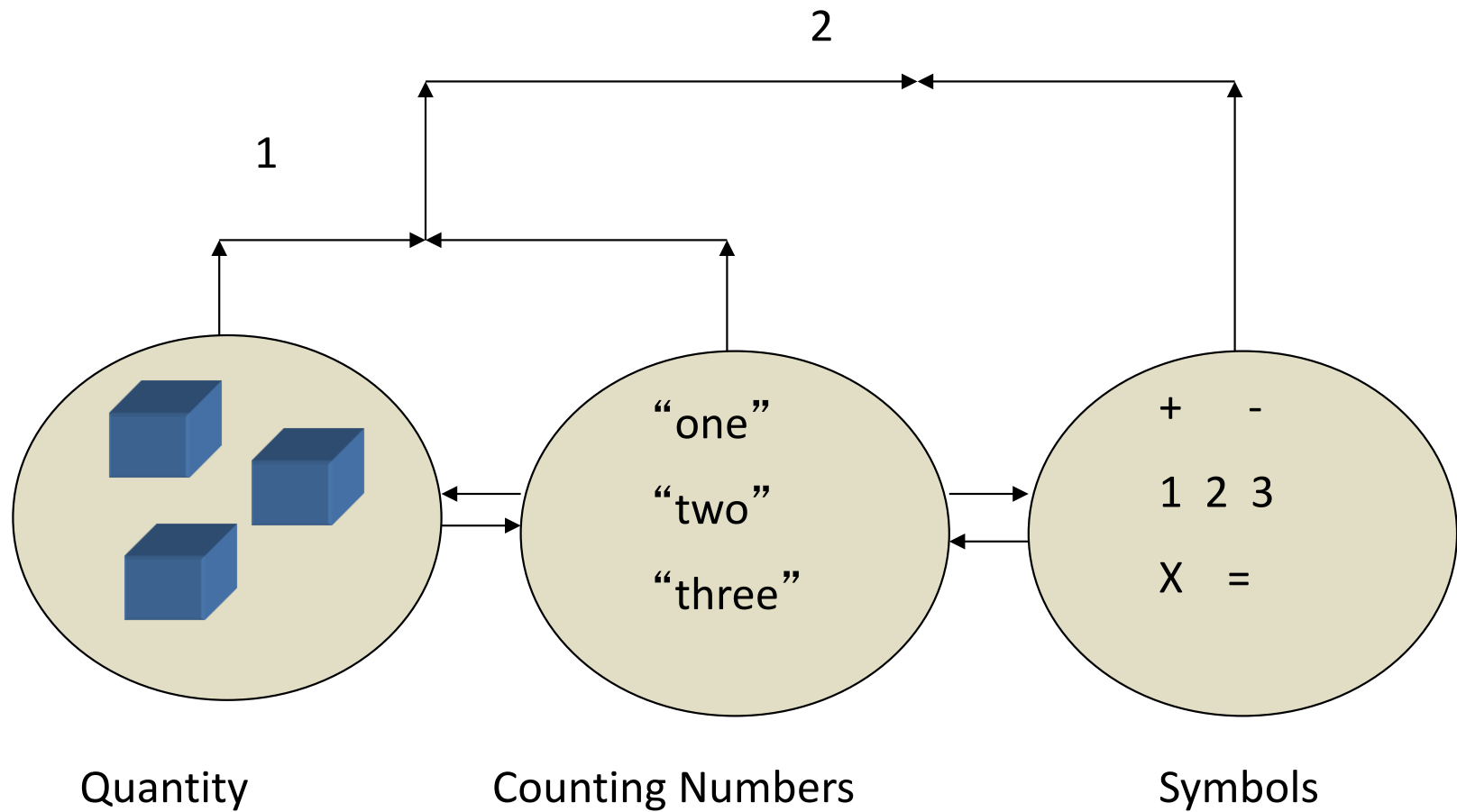
3 Major Takeaways

We teach *digitally*
but we ALL have
analog brains!

Dehaene 1997

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Core Image of Mathematics



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Communication is Key



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At our website

- Newsletter Subscription: updates on this and other professional learning opportunities
- Foundations of Math: Teaching Students with Significant Disabilities
 - August 3
 - October 4 and 5
 - November 7 and 8



mi2.cenmi.org

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