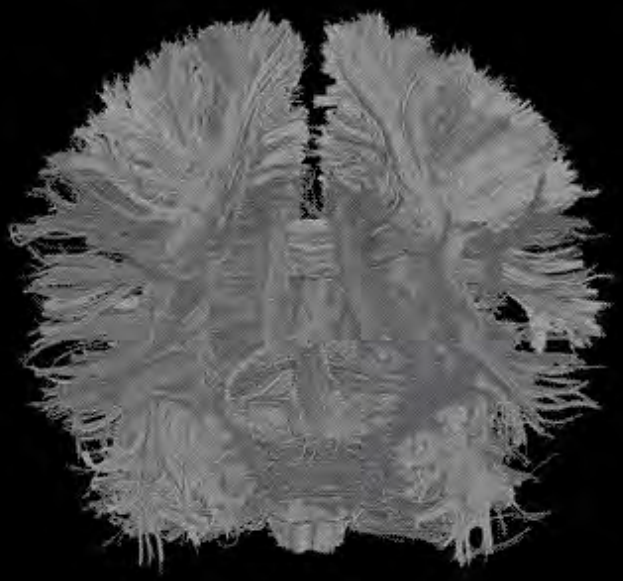
Homeschooling 101: What Every Parent and Educator Should Know About How Children Learn



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AGENTS OF CHANGE
2018 TEACHERS

SHE'S A TEACHER, POWERLIFTER & BODYBUILDER
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TEACHING & LEARNING

Kenneth Wesson & The Science of Learning

BY EDUCATOR NEWS
December 20, 2018

Leave a Comment

Here's a provocative question: If it's your job to develop the mind, shouldn't you know how the brain works? Hear the answer from the keynote speaker at an upcoming CTA event — meet Kenneth Wesson.

Kenneth Wesson says that understanding how the brain works and learns can make you a better teacher.

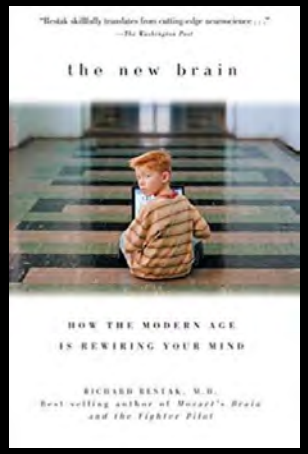
Wesson, a former higher education faculty member and administrator, is a proponent of using neuroscience to improve education. By developing an understanding of how the human brain works and how the brain learns, he says, educators can reach more students, not just those who have traditionally been successful.

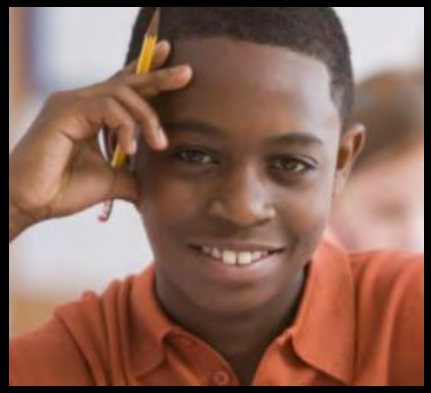
"You cannot talk about learning without discussing what's happening inside the brain," says Wesson, who will speak at CTA's Instruction & Professional Development pre-

Abandoning Our Cognitive Frames

The illiterates of the future are not those who cannot read or write, but those who cannot learn, *un*-learn, and *re*-learn.

--Alvin Toffler





Homeschooling 101: What Every Parent and Educator Should Know About How Children Learn

Focus: the research from educational psychology, learning theory and cognitive science targeting…

1. **how does the brain *learn* and are there particular strategies and practical tips to make learning easier at home (math and ELA)?**
2. **which *"Brain-considerate learning"* practices (PERC^{3}S) are effective for *all* students *everywhere*?**
3. **how can parents reinforce the underlying thinking strategies behind math, ELA, and science *at home* so our students will excel (or at least will not fall behind) at we "shelter in place" away from their classrooms?**


Research
Practice
A significant feature of American education is that we are often research rich, but practice poor.

Brain basics and homeschooling basics (101) for parents and teachers

Do you know your brain?

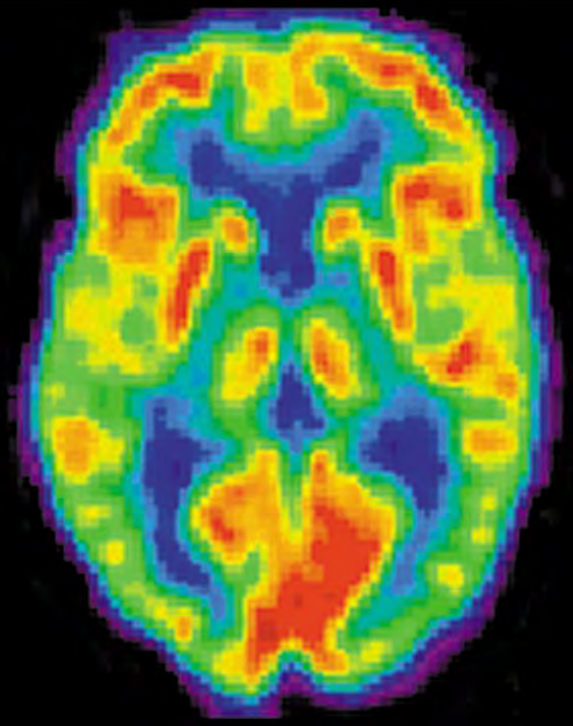
What percent of our brain do we use?

a. 10%

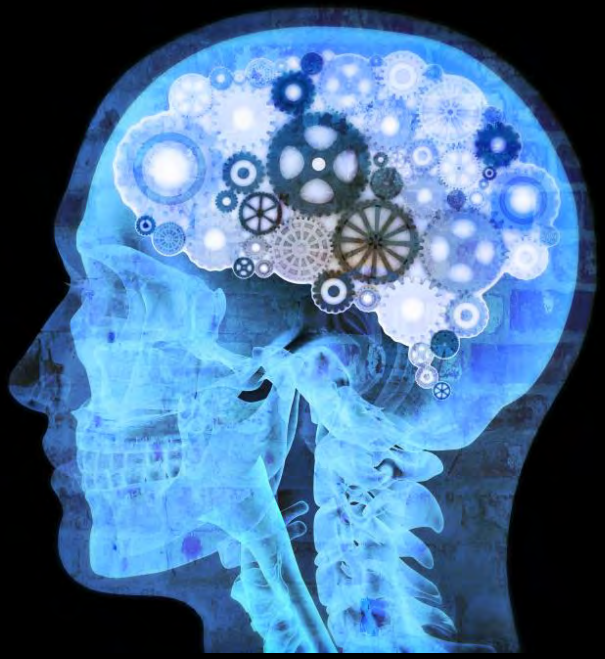
b. 20%

c. 50%

d. 100%



Exactly *how* does the human brain work? Learn? And *"learn best?*



Radiator
Clock
Machine
Computer

Expanding the Traditional Model of Thinking and Learning

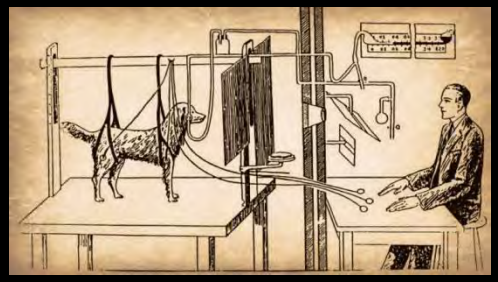
Does the name "Pavlov" ring a bell?

Stimulus → Response

S → R

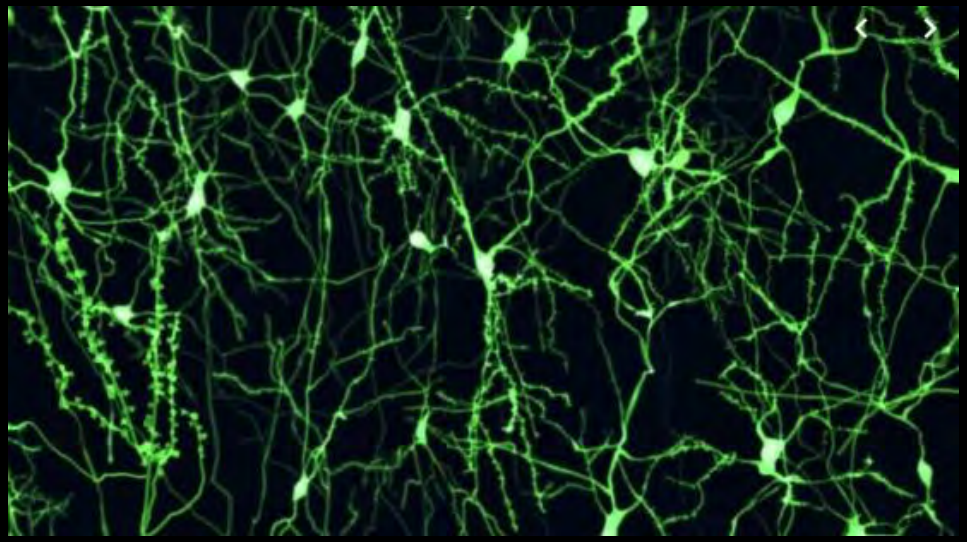
Teaching → Learning

Learning is a *neurobiological* processes occurring inside the brain, just as digestion takes place in the pancreas and the stomach.



The Universe We Reside In

"The 3-pound Universe" that resides in our cranium

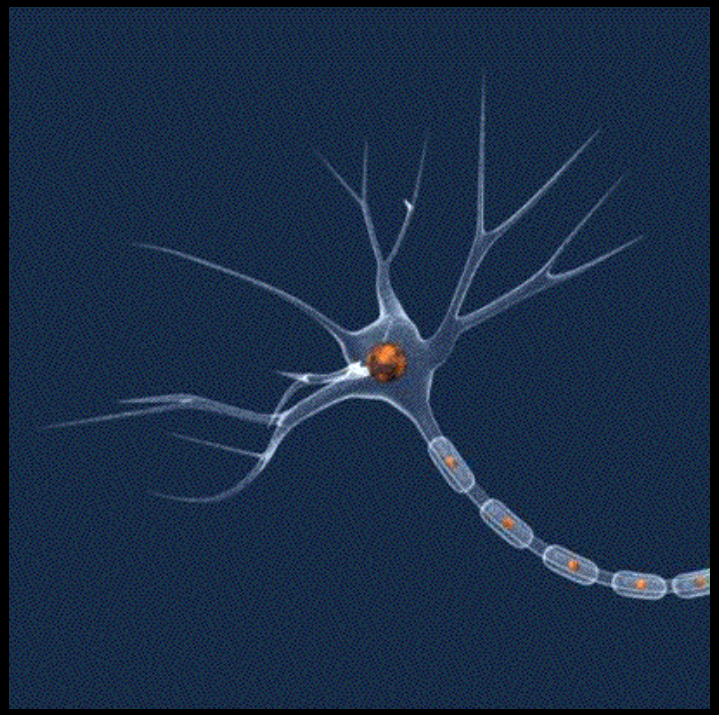


Good thinking is a matter of **making connections,** and knowing what ***kinds*** of connections to ***make.***

--David Perkins

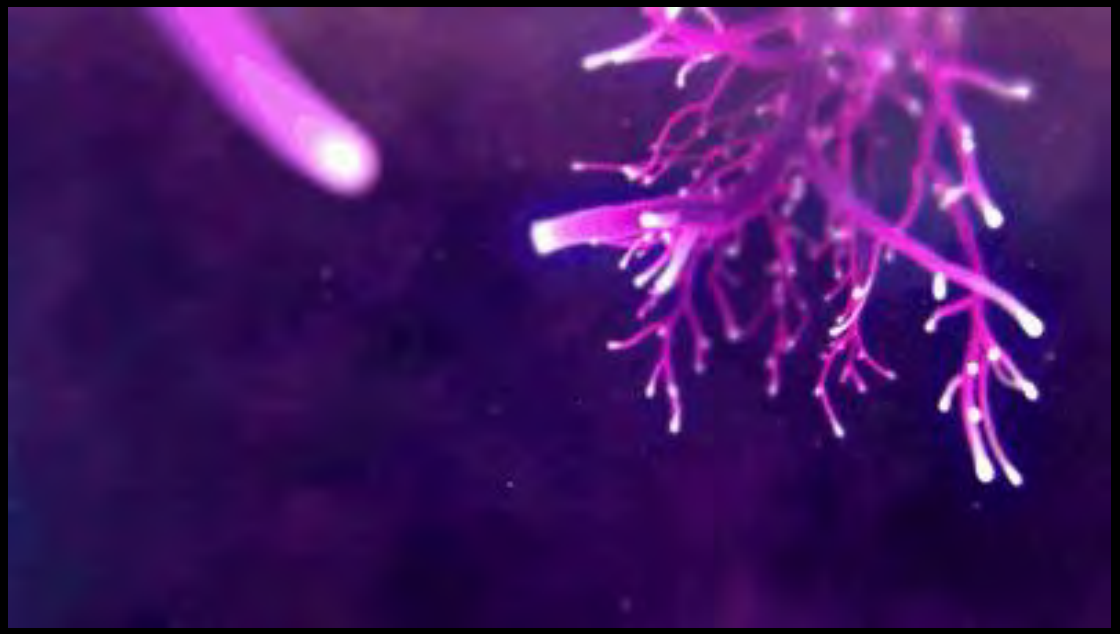
The neural basis of cognition rests in the work of the neurons.

Infants…



100 billion = Number of neurons that we are born with (full-term)

Ensemble of neurons

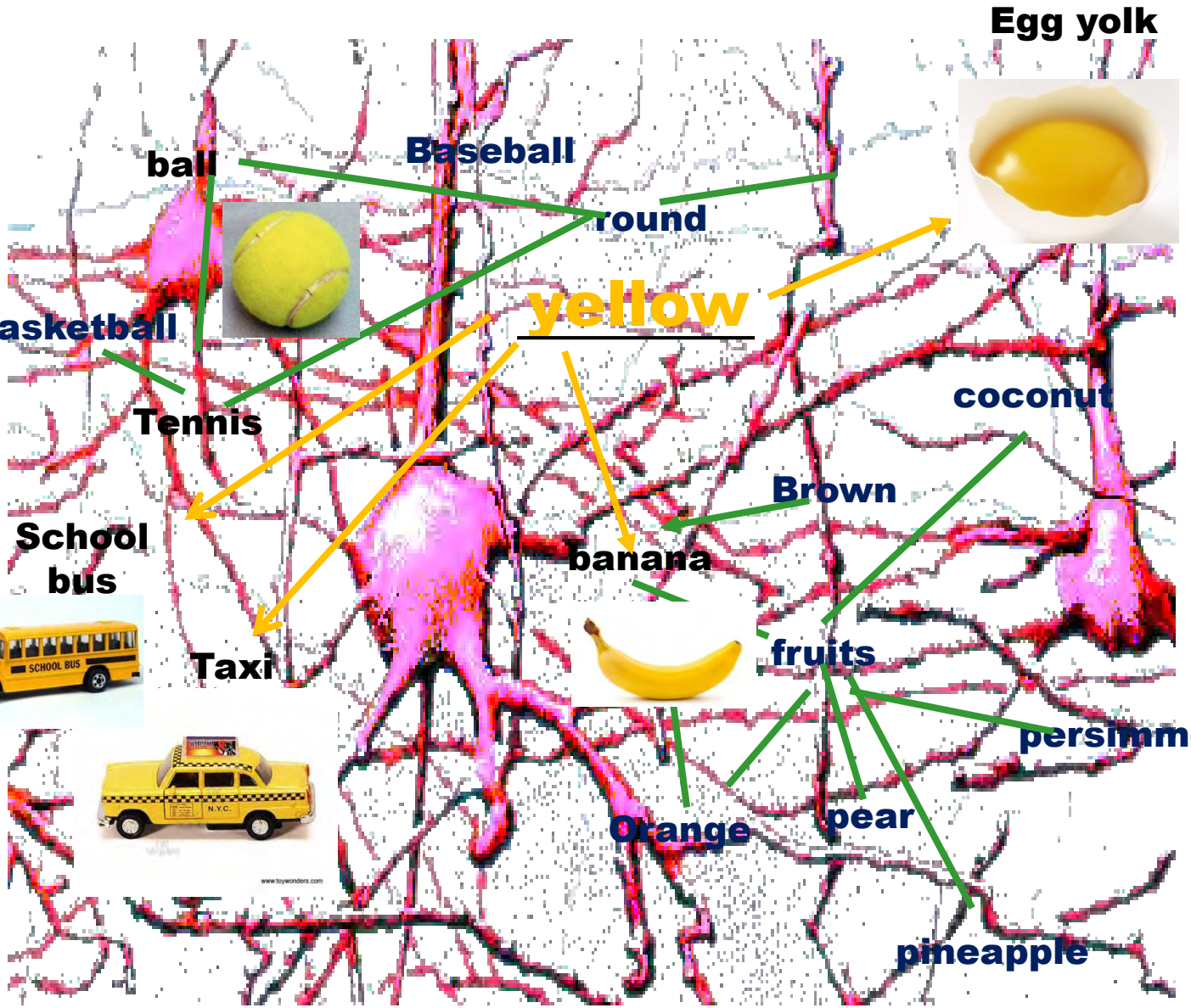


Learning = building a neural pathways to store what we have experienced → a change in brain circuitry -- 24/7

The Science of Learning: Making Connections

The senses allow for experiences. Through experiences, we build representative networks composed of the elements that make up each experience.

Learning, Memory (forgetting) & Practice



"Re-purpose" the same cells for participation on countless *related* brain circuits

Maintaining and Strengthening Memory

Bridge	Build	Extend
10%	80%	10%
Past content	New information	Preview

Connectionism (Dynamic Brain Systems)

Egg yolk

ball

Baseball

round

basketball

yellow

Tennis

coconut

Brown

School bus

banana

Taxi

fruits

Orange

pineapple

I am currently under construction. Thank you for your patience.

- Children: "I'm always in the midst of building new schemas with my prior knowledge or experiences not matter how limited they may be."
- Preconceptions and misconceptions

If you could go back and eliminate all of the errors you made in school and in life, you would erase your “self."

The best *teacher* is your last mistake.

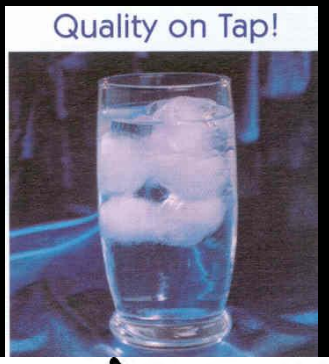
Healthy Brains = ↑ Academic Performance

What do all brains *need the most* (1) for proper functioning, and (2) for efficiently learning?

Regardless of Age, All Brains Need

3-3-3-3

Water (3 days)



Exercise

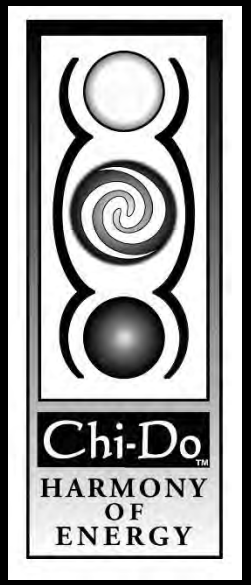
Sleep (3 days)

(stress mgt.)

Stimulating activities

Oxygen (3 mins.)

Nutrition (3 weeks)



Positive Attitude

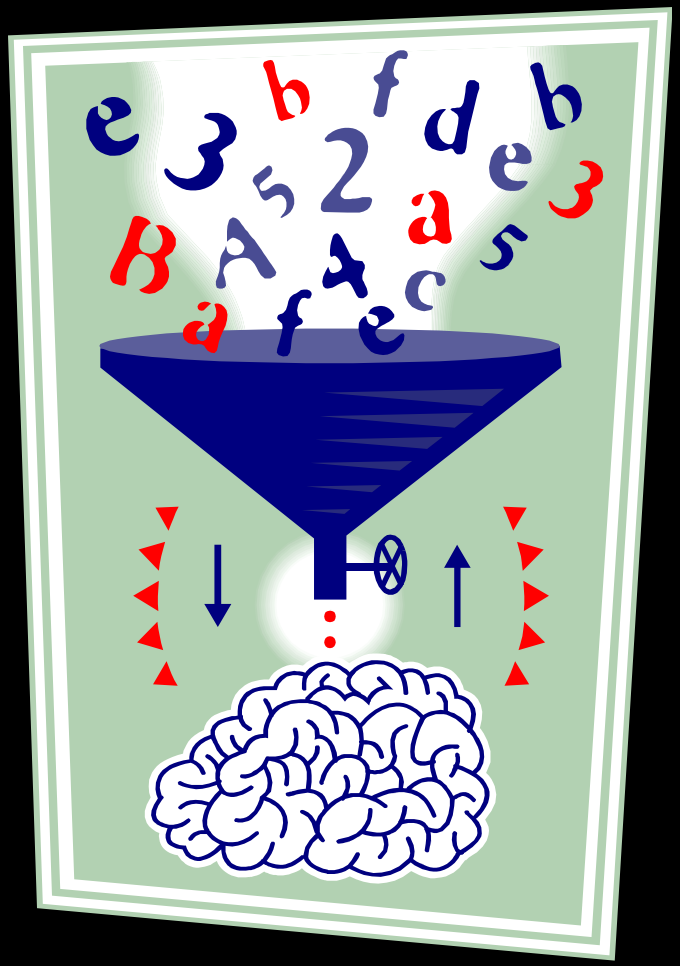
(healthy brain)

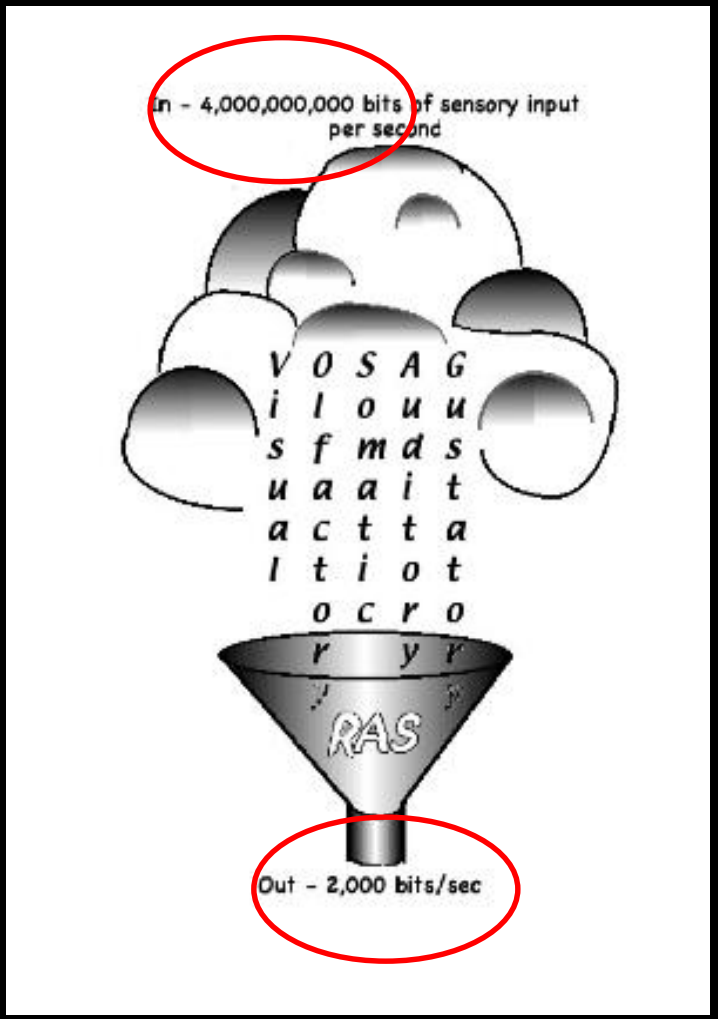
Movement

- Movement (kinesthetic learning) signals the liver to produce more glucose.
- Glucose is especially important as the primary energy source utilized by all functioning brain cells.
- Standing increases cerebral blood flow by 5%.
- Movement increases cerebral blood flow by 5 to 15%.

- More brain cells must fire actively to keep the body still than are required for movement. Keeping the brain's inhibitory neurons active requires more concentration of valuable brain resources than executing physical movements. When cognitive energies are diverted from *learning* to *keeping still*, we need to decrease our expectations for learning outcomes

Emotions, Attention and Input





Perceived *"Attention Problem"* in the Classroom

Slower-processing Brains

- **Auditory centers** process consonant sounds at **0.3** secs./per sound (normal = **0.008)** → too slow to keep up with the fast pace of oral "languaging."

- These children fall behind: hear directions, but moments later ask, **"Can you say that again?"** although they have been **nodding affirmatively.**

- They have just finished **processing the *1st* sentence,** when you begin the ***3rd*** sentence, completely missing the **2nd** sentence → teacher's instructions = disjointed information (the problem?) **-- underlying problem** lies within his/her **auditory cortex,** the neural processing centers for all sound (temporal lobe).

Attention Span:

"They cannot sit for 50 minutes in class. What is wrong with them?"

Kindergarten typically 3 – 4.5 minutes

Gr. 1-3 between 5 - 8 minutes

Gr. 4-6 9 - 12 minutes

Gr. 7-9 12 - 15 minutes

Gr. 10 -16 15 - 21 minutes

Adults ??

Stability Balls Replace Chairs In Maine Classrooms

Students in a fifth-grade class at the Zippel Elementary School work on an assignment in class where the students sit on stability balls instead of chairs while in their classrooms.

Maximize Learning with PERC^{3}S

There are five BC elements that the human brain seeks while processing incoming stimuli for personal "meaning," which makes the information "memorable" and worth remembering.

(1) Patterns (derivative of visual experience)

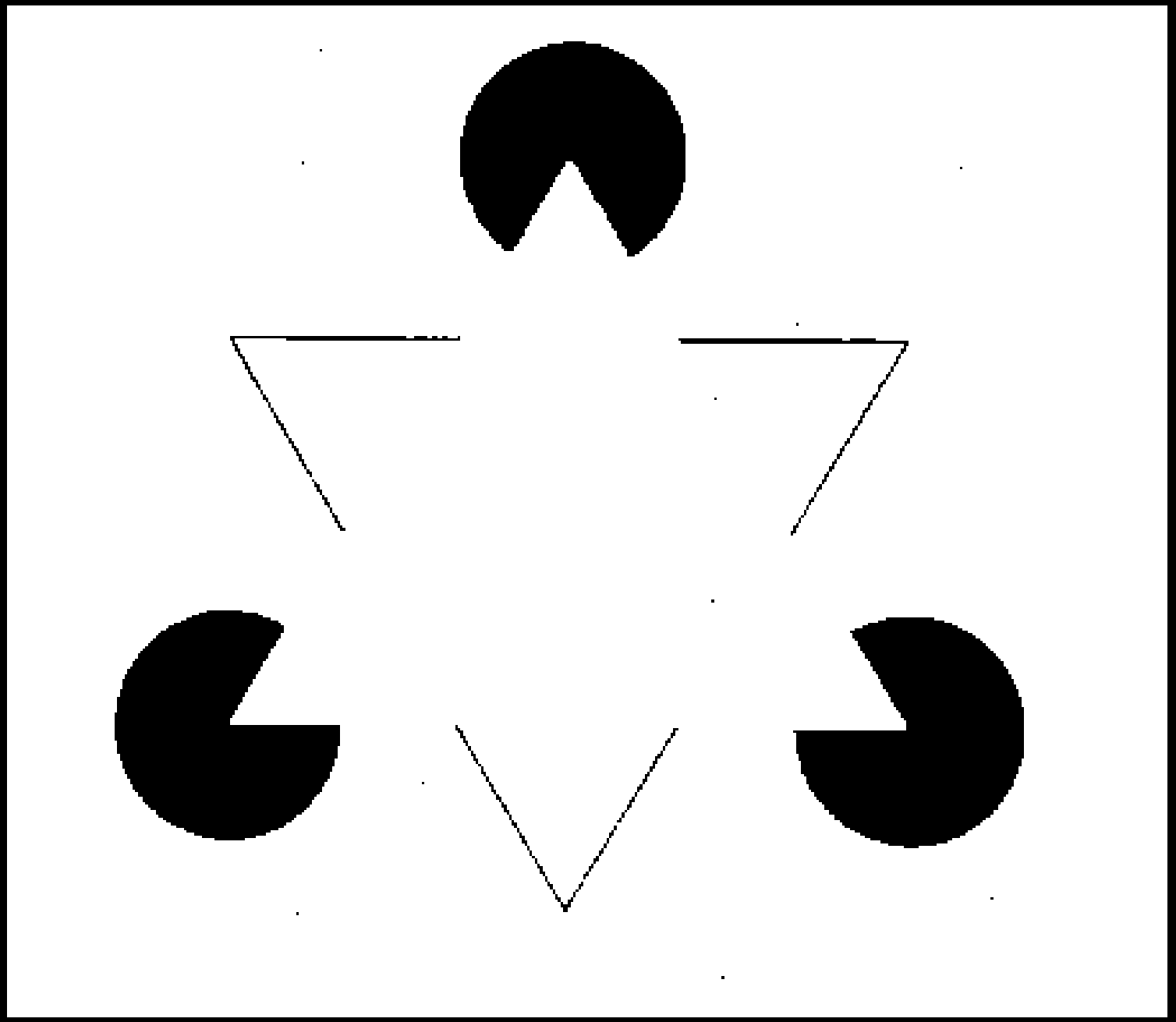
(2) Emotions

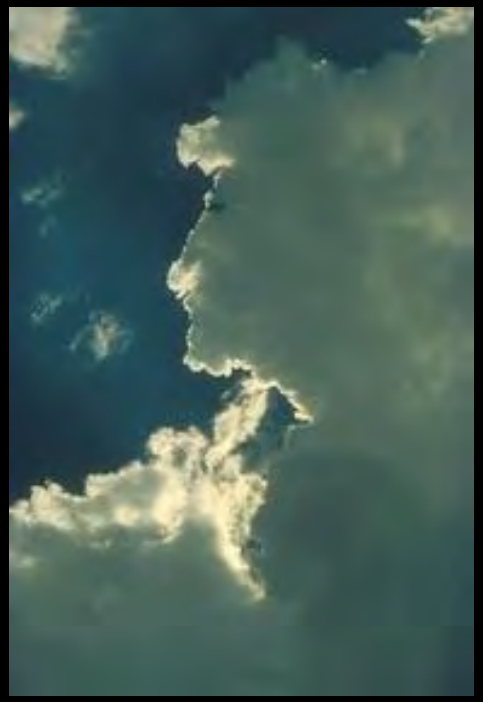
(3) Relevance

(4) Context, Content, and Cognitively-appropriate

(5) Sense-making → models and stories

The brain examines all learning experiences through the lens of PERCS → determines how much we remember, how long we remember it, and whether or not we understand it enough for subsequent *application* (transfer of knowledge)

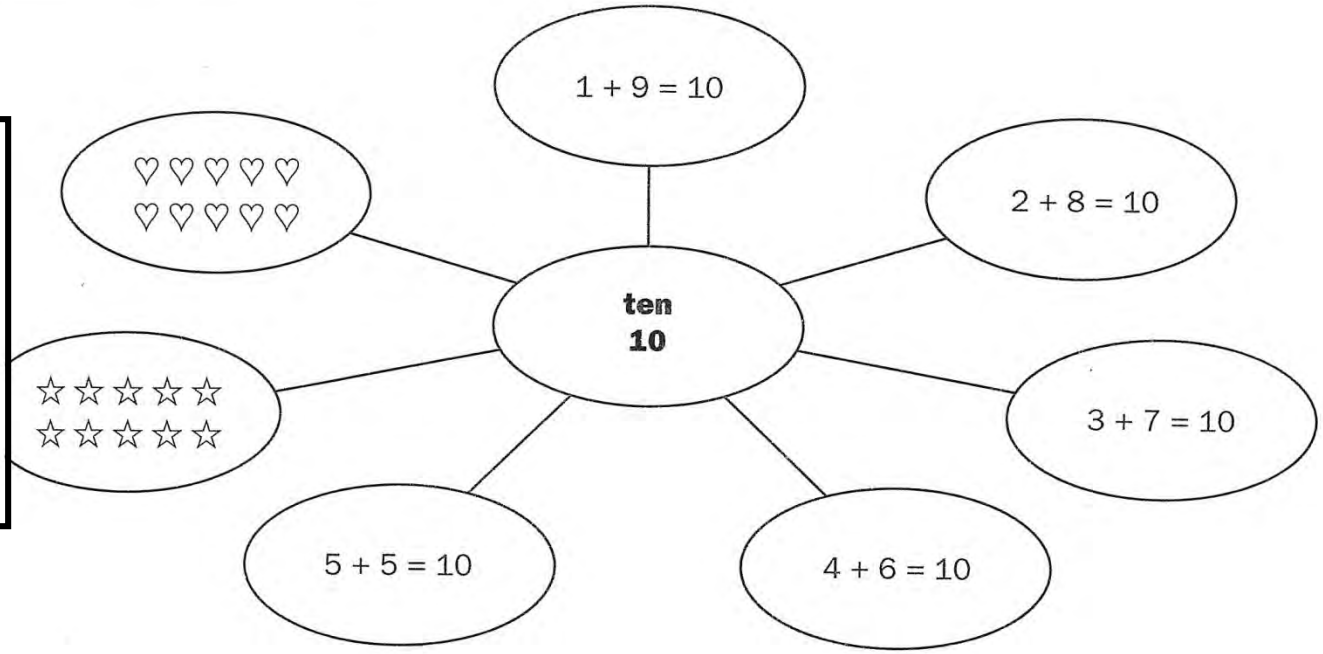




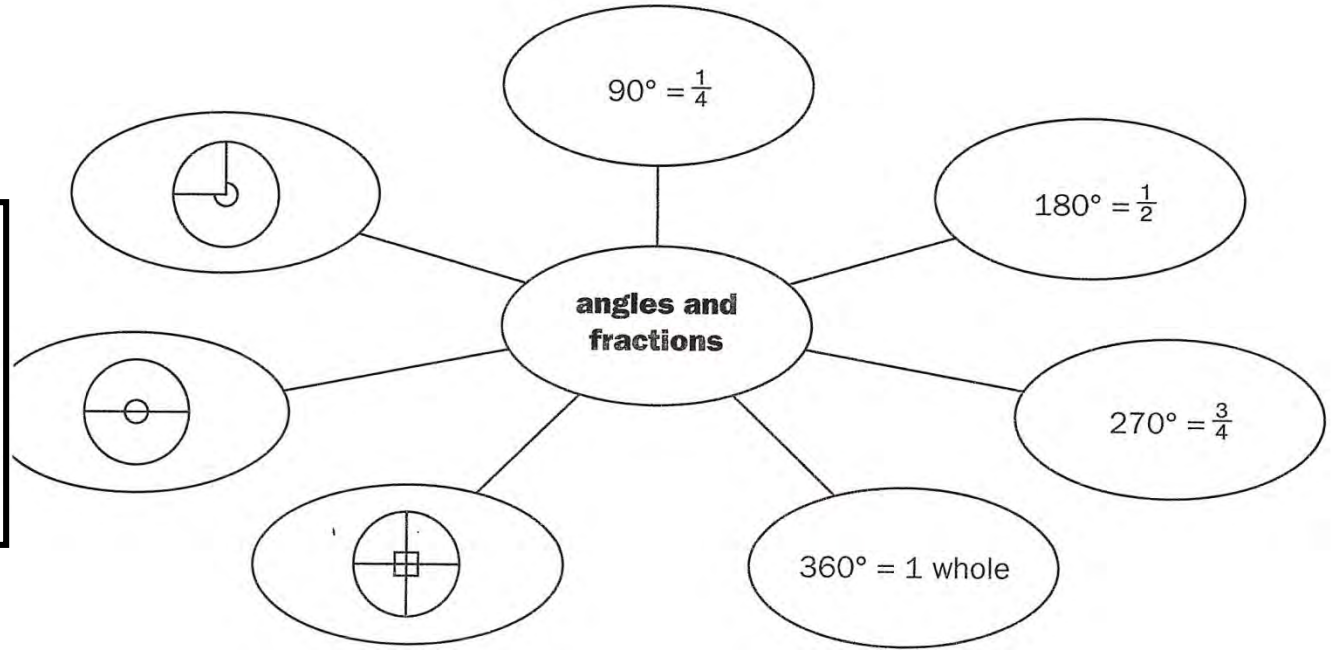


“Pareidolia” – the mind perceives a familiar pattern of something where none actually exists.

Ways To Make Ten



Parts, Wholes, Fractions, and angles



What should parents and educators keep in mind about "best practices" for learning at home?

Brain development occurs via an on-going and cumulative "dance" between nature (genetics) and nurture (experience)

- *A male kid (baby) goat was placed into a pen with an adult female sheep. The sheep nursed and reared the male goat all the way into his adulthood.*

- ***Question:*** *When the male goat became an adult, was he attracted to*
  - *a. female **sheep** (experience)*
  - *b. female **goats** (genetics)*
  - *c. both?*

Development results from an on-going and cumulative "dance" between nurture and nature

Experience

Protective and Personal
(versus Insecure and Impersonal)

Brain Development

Alterations in Brain Structure and Function

Epigenetic Changes

Bi-directional alterations in the way the genetic program is read

The "mind" is what the body-brain does

Behavior

Adaptive or Healthy Coping Skills
(vs. Maladaptive or Unhealthy Coping)

The human brain has *evolved* to learn most efficiently through "*doing*" *whether at home or at school*

(not as much by listening, watching or keyboarding)

CONE OF LEARNING (EDGAR DALE)

After 2 Weeks
we tend to remember

Nature of Involment

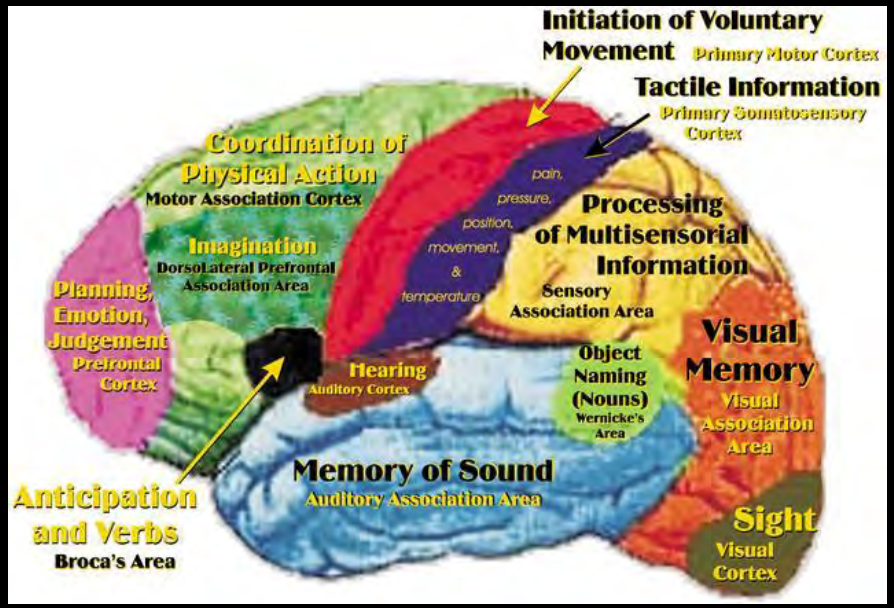
10% of what we READ	Reading	Verbal Receiving
20% of what we HEAR	Hearing Words	
30% of what we SEE	Looking at Pictures	
50% of what we HEAR & SEE  	Watching a movie Looking at an Exhibit Watching a Demonstration Seeing it Done on Location	Visual Receiving
70% of what we SAY	Participating in a discussion Giving a Talk	Receiving/ Participating
90% of what we SAY & DO	Doing a Dramatic Presentation Simulating the Real Experience Doing the Real Thing	Doing

PASSIVE

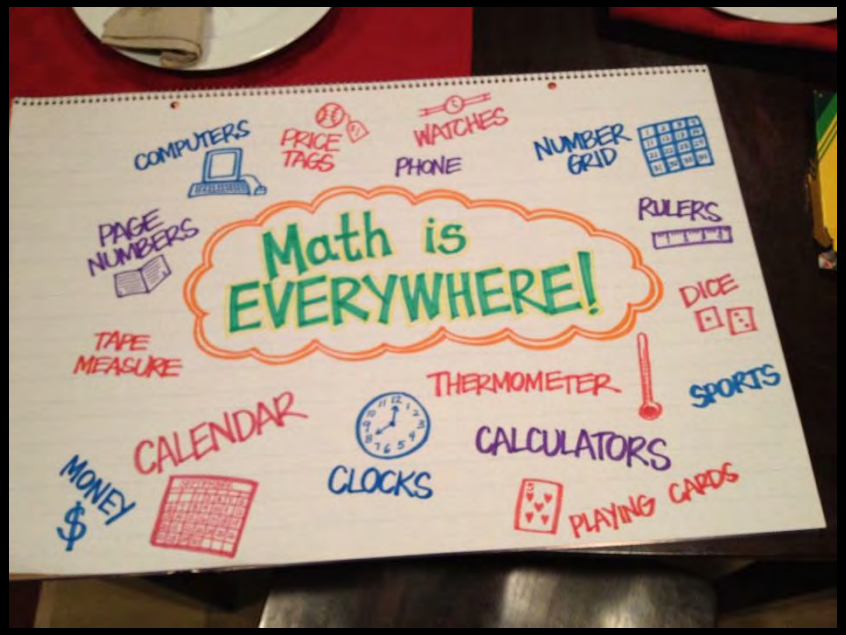
ACTIVE

ST²REAM

There is a **cognitive advantage** to having **numerous parts** of the brain involved in processing and storing **different** ***aspects*** of a single event in **several different** ***regions*** of the brain.



Math at home

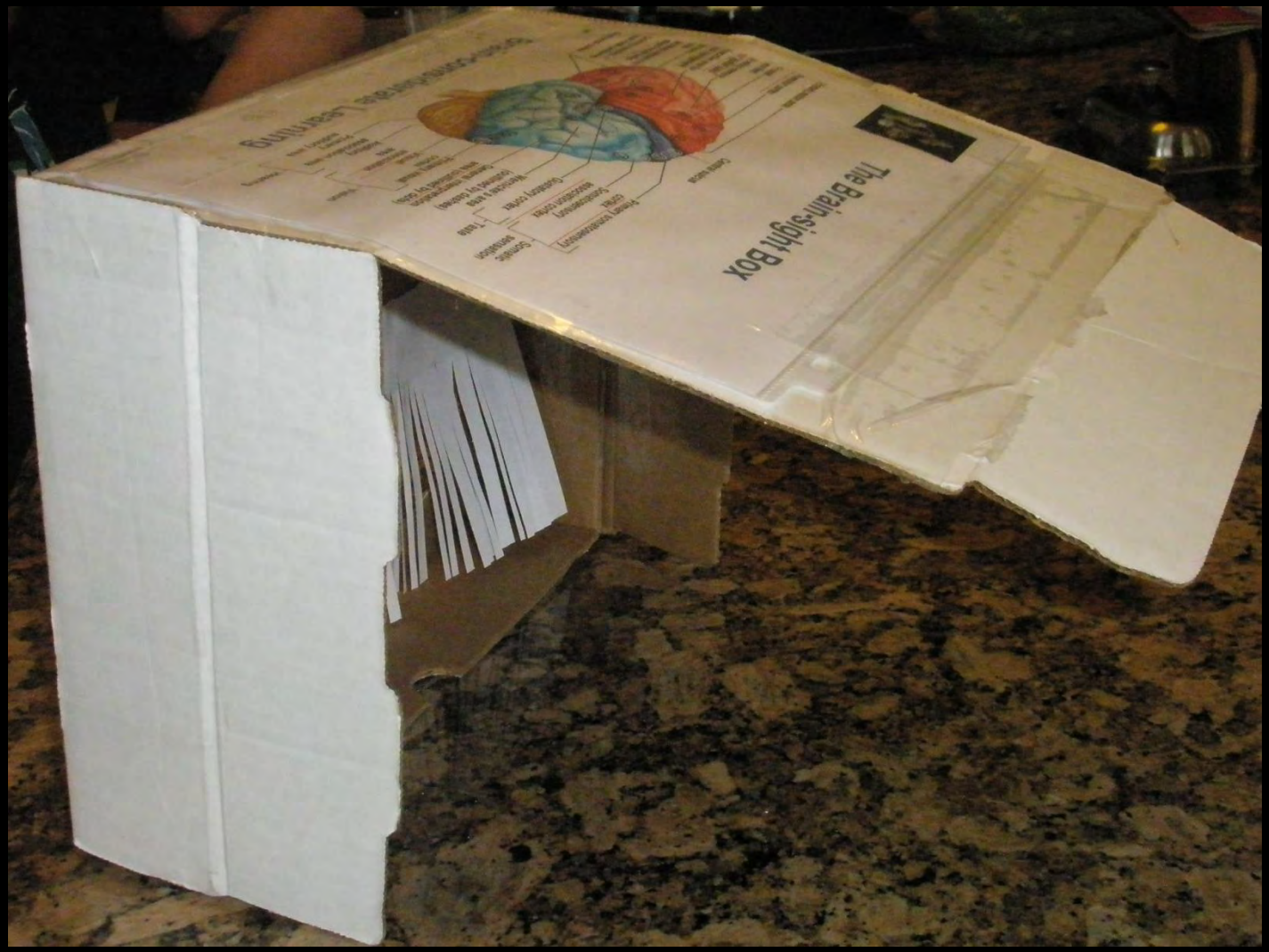


"Math is everywhere"
(observations, discussions, activities)

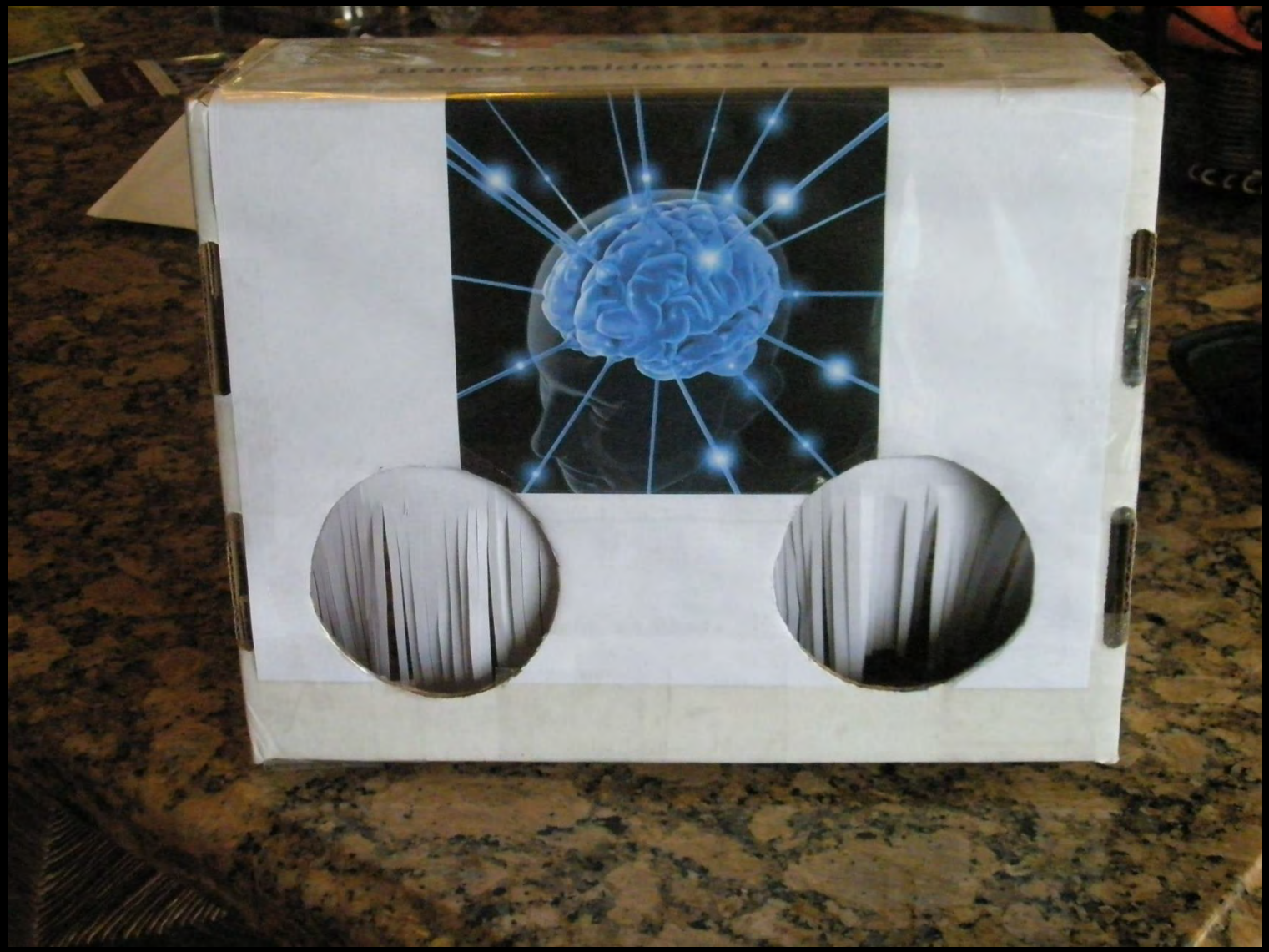
“Brain-sight” Box

3 + 2 =

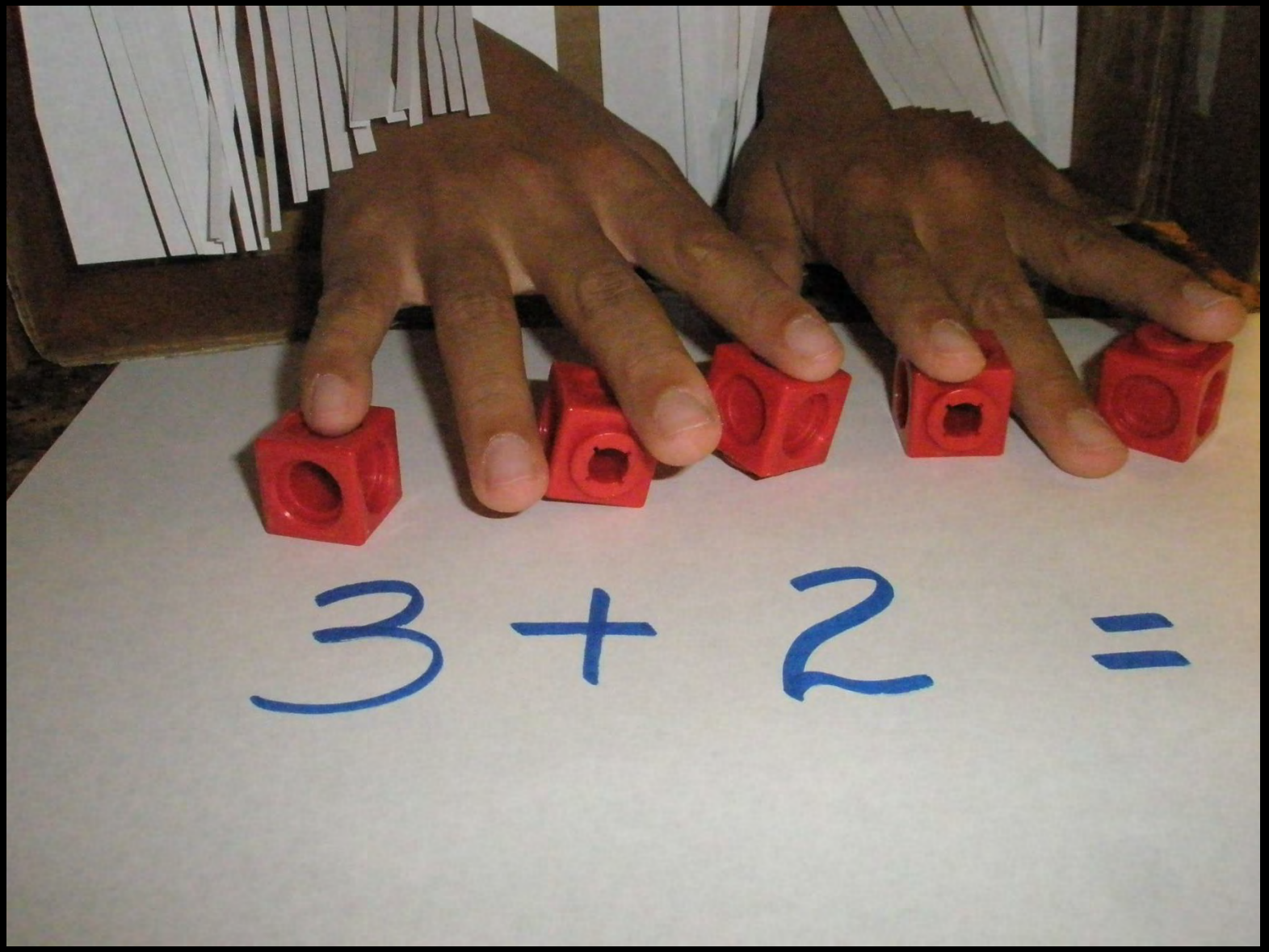
“Brain-sight” Box



“Brain-sight” Box



“Brain-sight” Box



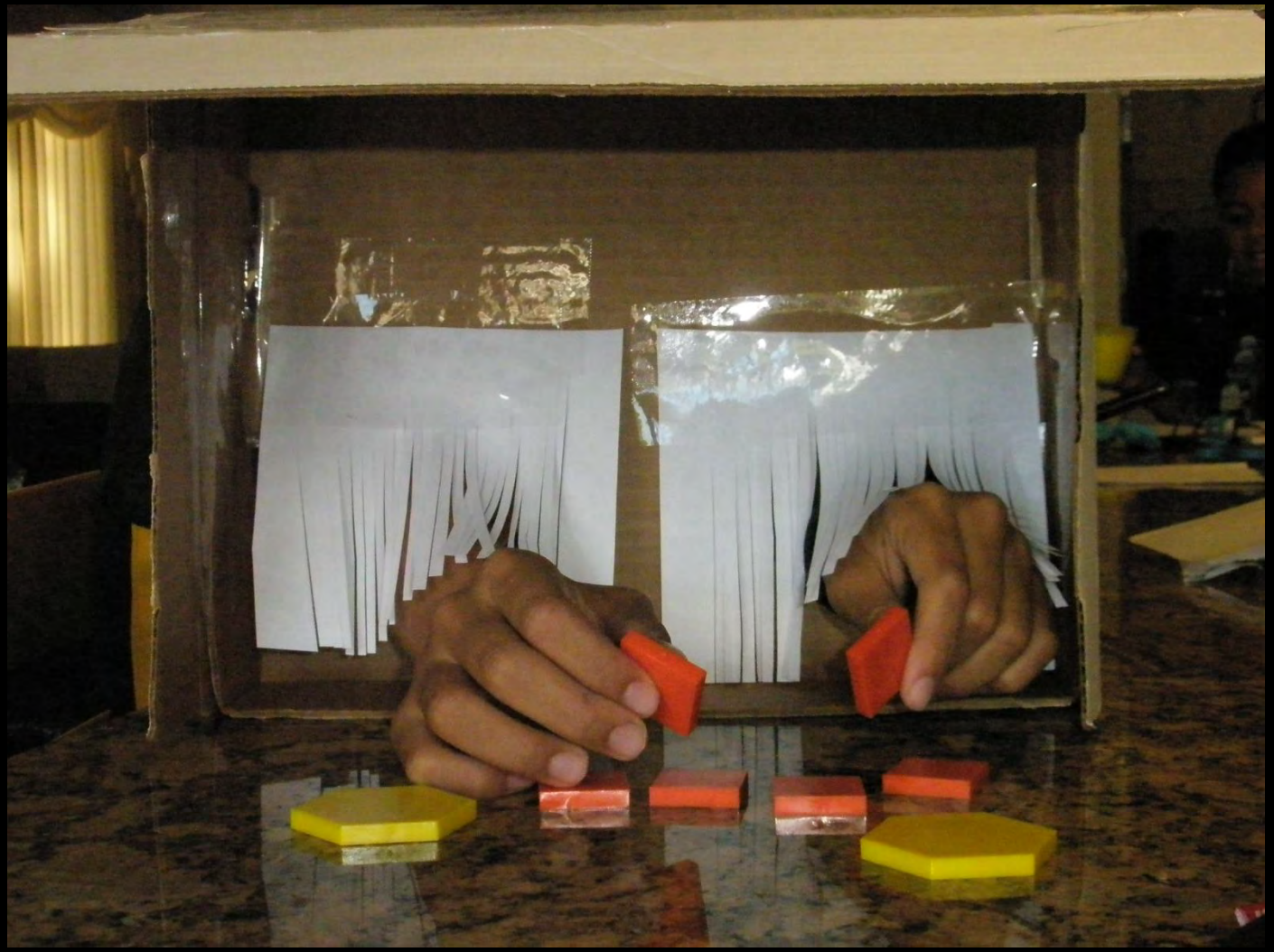
“Brain-sight” Box

Ask the child

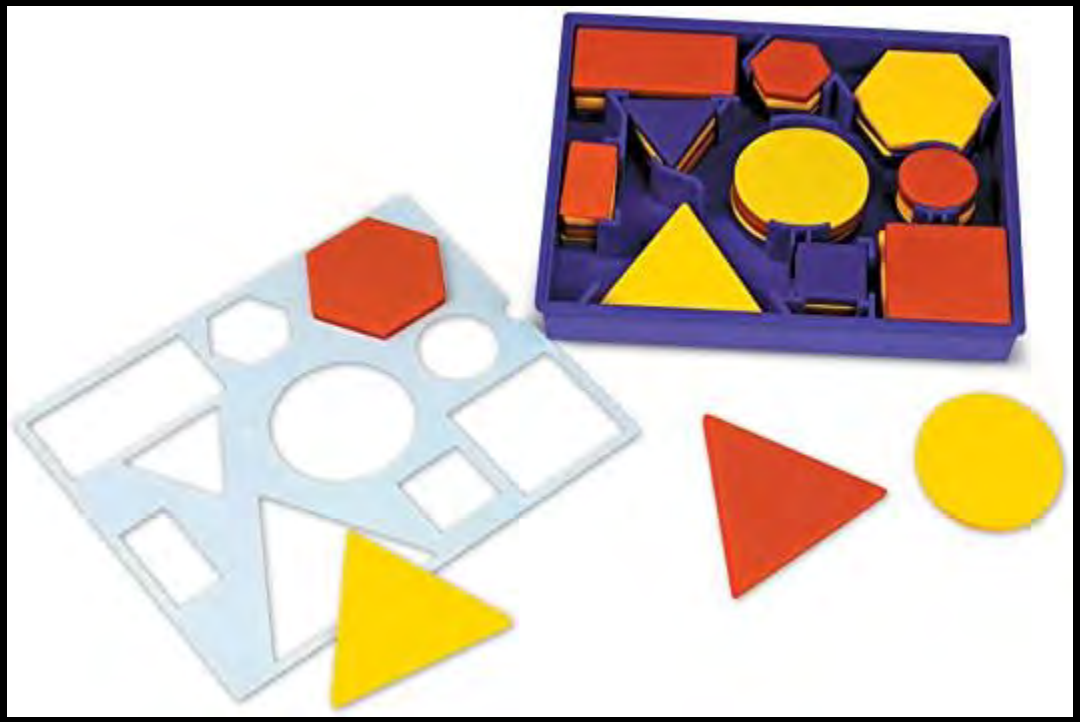
- **“Can you show me five objects?"**
- **“Can you show me *two less than* five?"**
- **“Can you show me three objects *plus* two objects?"**
- **"Which object is a circle?"**
- **"Which object is a square? “…a rectangle?"**
- **"Which object is a triangle?“**
- **"Which object has four sides?"**

When a child can perform simple arithmetical operations (+ / -) inside the “Brain-sight box,” present the same mathematical problems for him/her on paper -- the transition will be surprisingly easy.

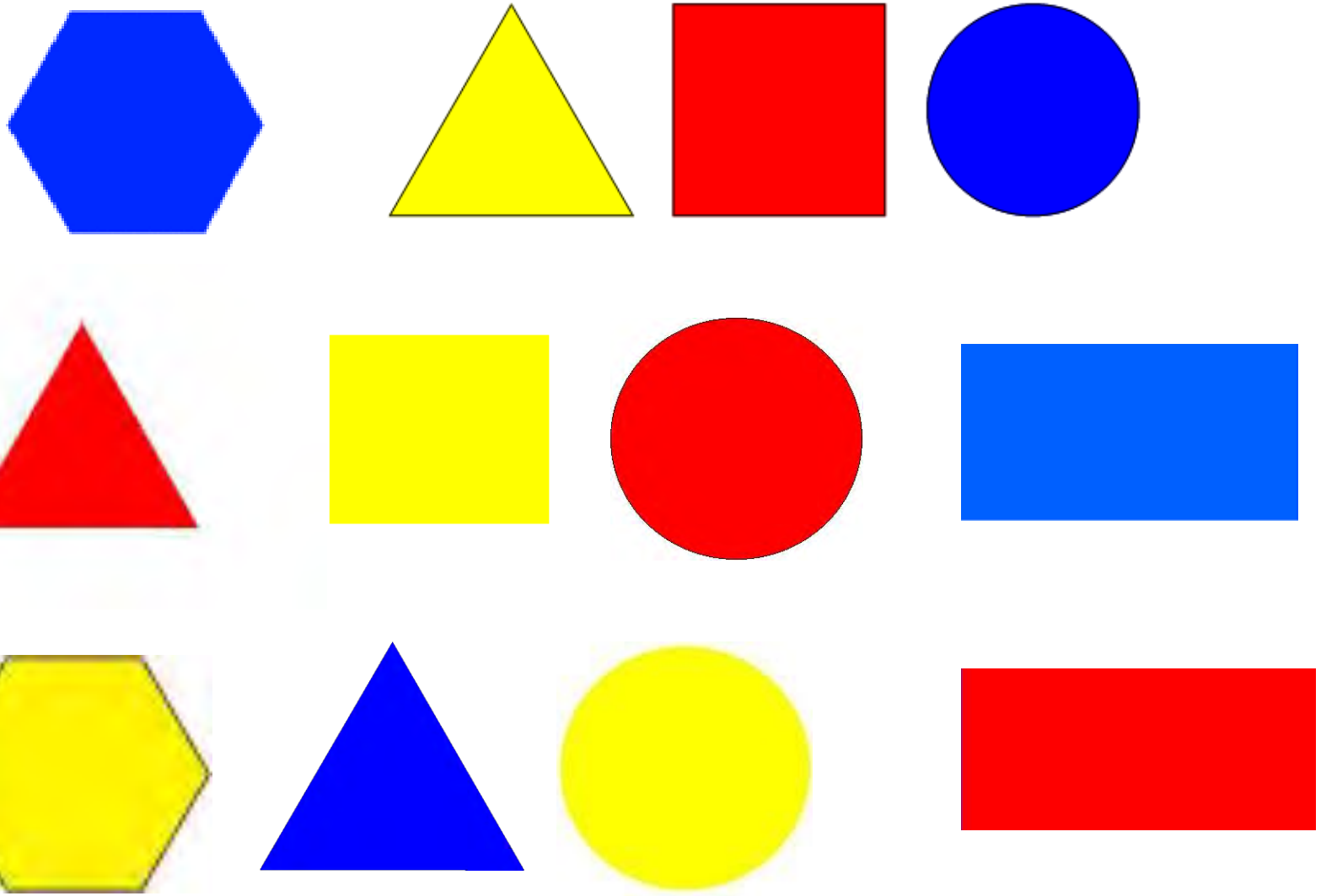
Mental Images on the "Visuospatial Sketchpad"



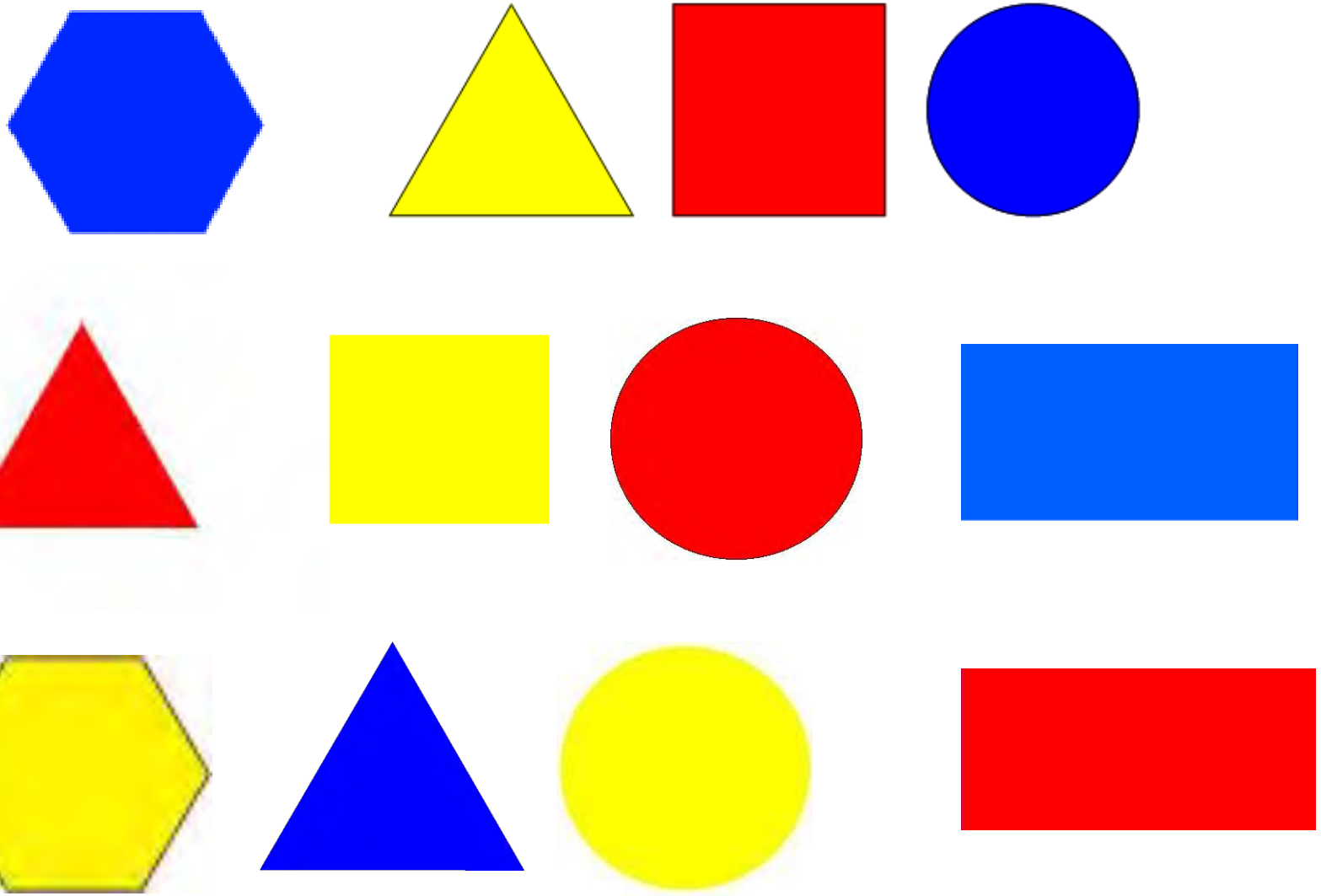
“Brain-sight” Box



Math = Patterns and Relationships:
How are these objects alike?
How are they different?



How would you organize these objects?
In how many *different* ways could you do so?



The focus is on a single trait:

large small

red yellow blue

thick thin

square triangle rectangle circle hexagon

How *could* you…

group these objects, based on color?
group these objects, based on shape?
group these objects, based on size?
group these objects, based on thickness?

How *could* you??

How could you…

Group only those same objects with

… “3 sides or more?”

… “4 sides or more?”

Group only those same objects with right angles?

Group only those objects with without any angles?

Group only those objects with that are triangles and hexagons?

The relationship involves *two traits:* (size, color, shape, and/or thickness)

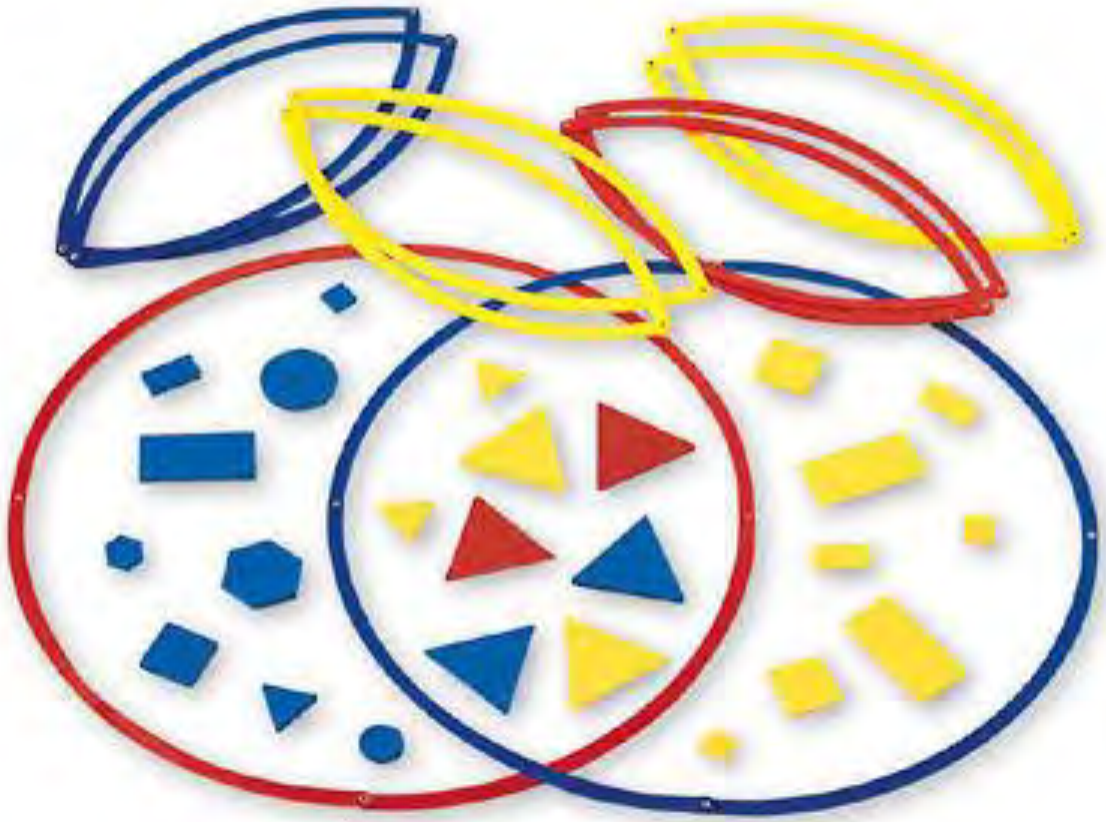
How *could* you group these objects, based on

- **size and shape**
- **shape and color**
- **shape and thickness**
- **color and size**
- **color and thickness**
- **size and thickness**
- **thin and triangular**
- **thick and triangular**

How *could* you??

How could you group these objects, based on the trait

…“triangular in shape”?



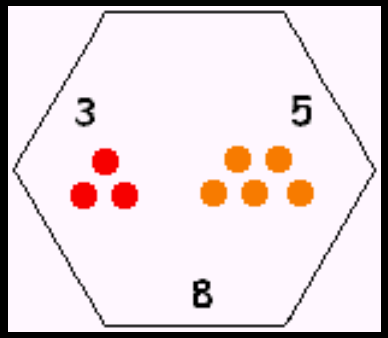
Organized by

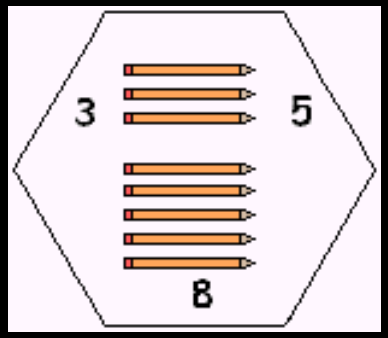
1. Color

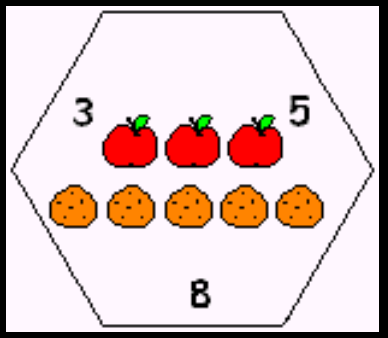
2. Shape

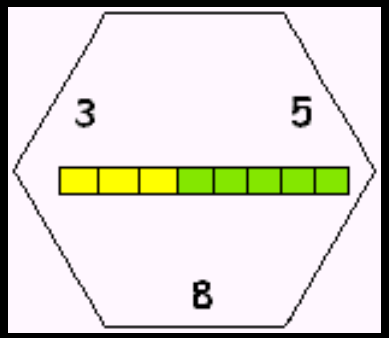
Membership can be in more than one group

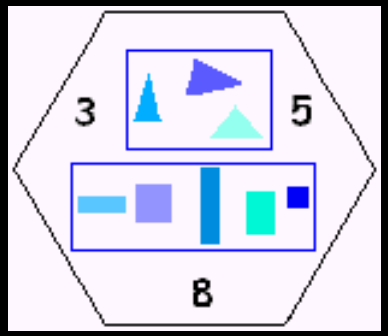
Math Fact Families: Draw











Drawing *does for the brain during the* ***day,*** *what* ***dreaming*** *does for the brain at* ***night.***

Discourse: Language in Mathematics

Students add or subtract to find the difference or amount of the items being compared.

There are 21 hamsters and 32 kittens at the pet store. How many more kittens are at the pet store than hamsters?

"Comparing" problems involve mental imaging -- visualization

Use Visual Cues

Source: Assisting Students Struggling with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools. What Works Clearinghouse

Presenting Answers Verbally & Mathematically

1. When solving a_____ problem, I would first, _____ because_____.

2. Second, I would, _____ because_____.

3. I can check for *the reasonableness* of my answer by_____.

5. I check my *accuracy* by_____.

6. Last, I would_____, because_____.

7. The analysis of errors: I can check my work for errors by_____.

$$
\begin{array}{r}
4 \\
4 \\
\hline
98 \\
\times\ 56 \\
\hline
588 \\
+\ 490 \\
\hline
5488
\end{array}
$$

Procedural Math

```
   4
   4
    98
  x 56
   588
+ 490
  5488
```

6 x 8 = 48

6 x 90 = 540

50 x 8 = 400

50 x 90 = 4500

5488

Sense-making

Goal: Recognize

- **the patterns**
- **the relationships**
- **the parts making up the whole**
- **Mathematical different strategies**

***Not* merely the rote procedure**

The Ten Worst Human Fears
(in the U.S.)

10. Dogs
9. Loneliness
8. Flying
7. Death
6. Sickness
5. Deep water/drowning
4. Financial problems
3. Insects and bugs
2. Heights
1. *Speaking in front of a group*

$$X + Y =$$

$$2X + 2Y =$$

$$3X + 4Y =$$

$$5X + 3Y =$$

$$4X + Y =$$

$$3Y + 4X =$$

Caps and Umbrellas

Caps = X
Umbrellas = Y

X + 2Y = 80

2X + Y = 76

= $80

1.

= $76

Double the 2nd equation

= (2 X $76) $152

= $80

1.

Subtract the 1st equation from the *doubled* 2nd equation…

} = $152

= $80

1.

Eliminate the *like* properties from the two equations

} = 152

-80

72

Leaves…

1.

 = $72

$72 ÷ 3 (caps) = $24 (1 cap)

Caps and Umbrellas

5						
4						
3	**84**					
2	**56**	**80**				
1	**28**		**76**			
0		**24**	**48**	**72**		
	0	*1*	*2*	*3*	*4*	*5*

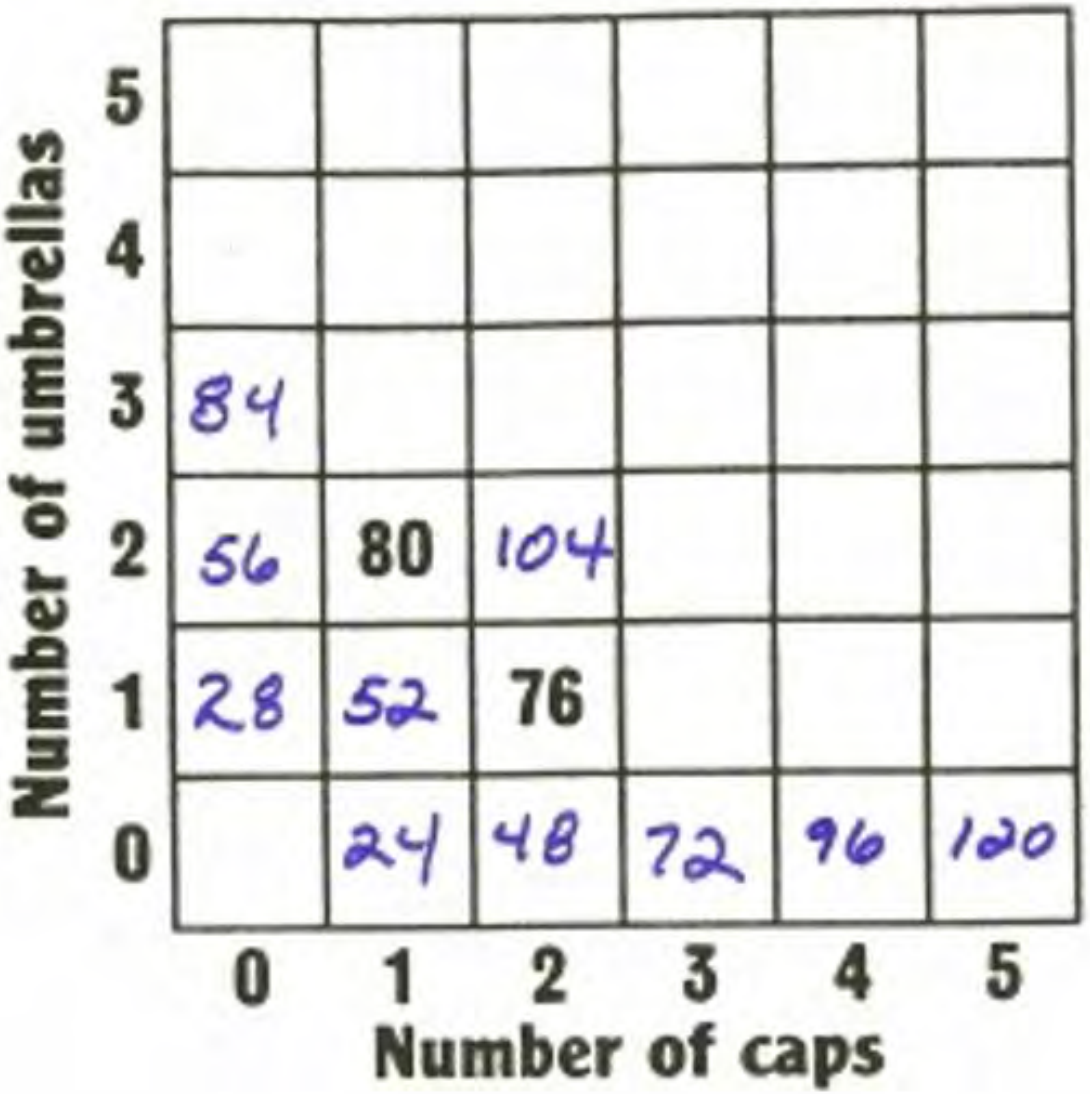
Number of Umbrellas (Y)

$\frac{84}{3} = 28$

$\frac{72}{3} = 24$

Number of Caps (X)

Caps and Umbrellas



Caps and Umbrellas

Number of umbrellas						
5	**140**	**164**	**188**	**212**	**236**	**260**
4	**112**	**136**	**160**	**184**	**208**	**232**
3	**84**	**108**	**132**	**156**	**180**	**204**
2	**56**	**80**	**104**	**128**	**152**	**176**
1	**28**	**52**	**76**	**100**	**124**	**148**
0	**0**	**24**	**48**	**72**	**96**	**120**
	0	*1*	*2*	*3*	*4*	*5*

Number of caps

Equations Represent Relationships

(not really about the caps and umbrellas)

$$X + Y = 52$$

$$2X + 2Y = 104$$

$$3X + 4Y = 184$$

$$5X + 3Y = 204$$

$$4X + Y = 124$$

$$3Y + 4X = 180$$

Number of umbrellas						
5	140	164	188	212	236	260
4	112	136	160	184	208	232
3	84	108	132	156	180	204
2	56	80	104	128	152	176
1	28	52	76	100	124	148
0	0	24	48	72	96	120
	0	1	2	3	4	5

Number of caps

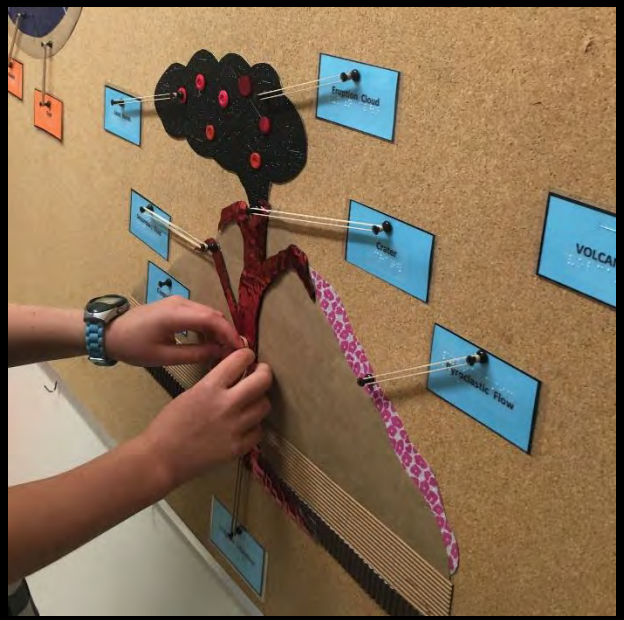
Mathematics is…The study of patterns and relationships

…fractions, decimals, percent, and fractional parts of a circle, all represent the same part of a whole

May 13th
Science at home

At-home investigations
Observations, conversations & writing

Developing literacy at home



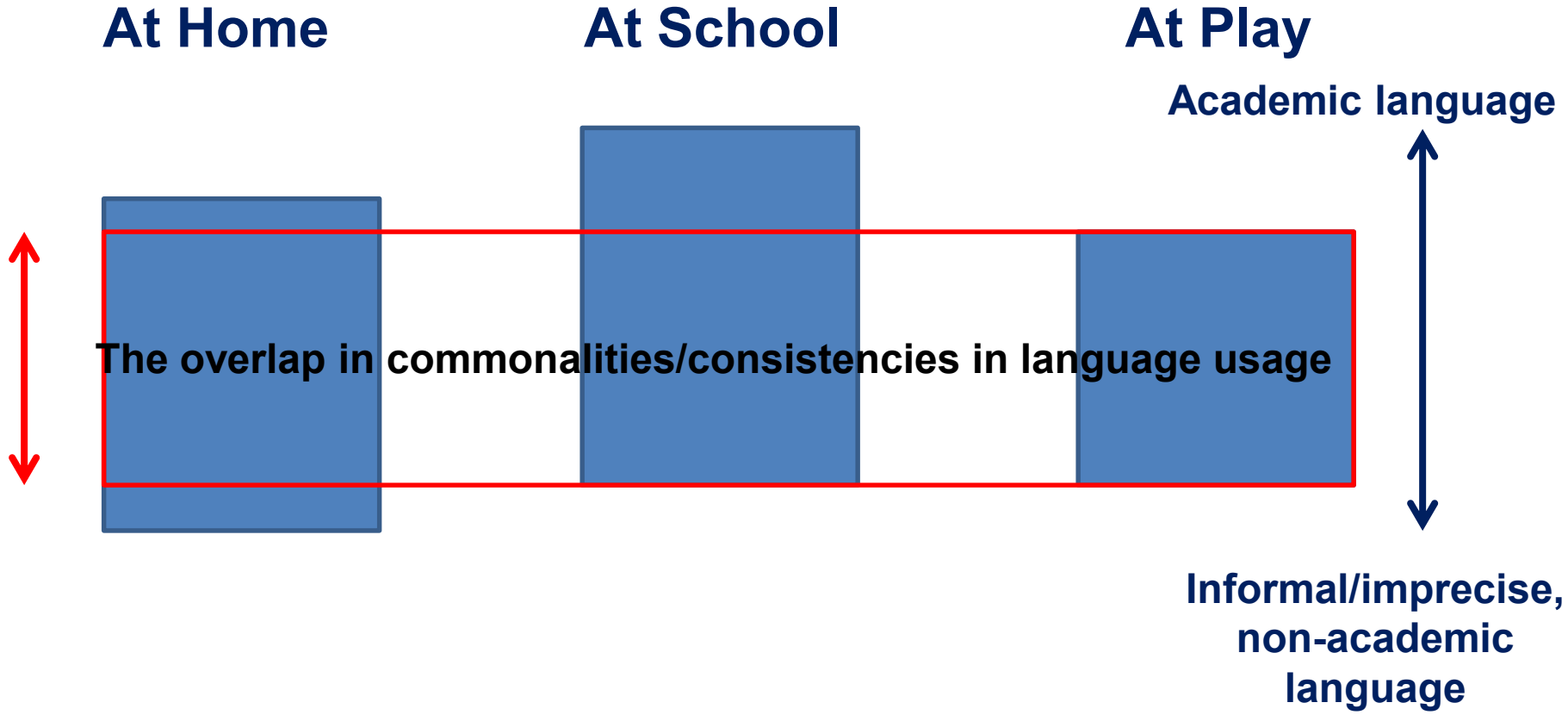
Language Background Experiences

- Many of the students in the US who perform poorly in school have been raised speaking, reading, and/or writing a non-English language or a variation in standard English that differs from that of mainstream teachers and the curriculum used (Ovando & Collier, 1998).
- The school experience is governed by AL, and requires new ways to talk, new ways to think, and unfamiliar words to use.

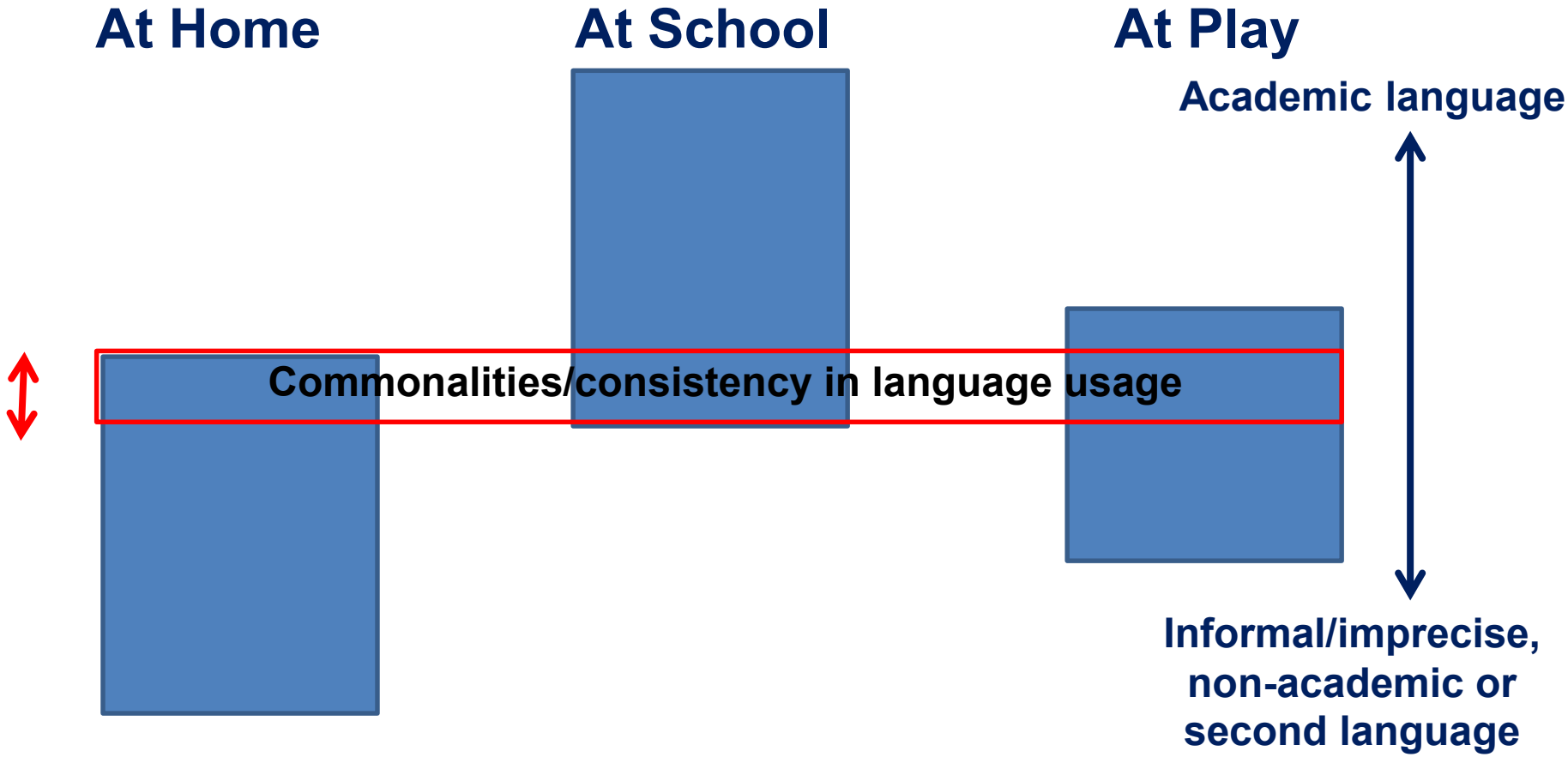
Linguistic Capital Experiences

- Non-mainstream students have not had the same conversations or literacy experiences (books and movies) that their mainstream middle-class peers have had.
- Middle-class students have had more school-aligned language experiences, rendering the language found in texts and classroom lectures more familiar. ("Disadvantaged" students – language disadvantage hurts them more than any other)
- When language mismatches occur, students struggle to learn the new rules of talk, content, and literacy, because the rules are sometimes implied or even invisible to them.

Linguistic Capital: Higher SES



Linguistic Capital: Lower SES



Linguistically-responsive instruction includes addressing these disparities in language experiences (drastically fewer EL "connections")

BBK - *Then* Reading

- **Struggling readers** focus their **attention on decoding** and accessing the meaning of individual words, thus leaving little attention free for reading comprehension.

- **81%** percent of struggling readers struggle with **vocabulary**

- **100%** percent of struggling readers struggle with **comprehension**

Developing Early Literacy through Active Learning

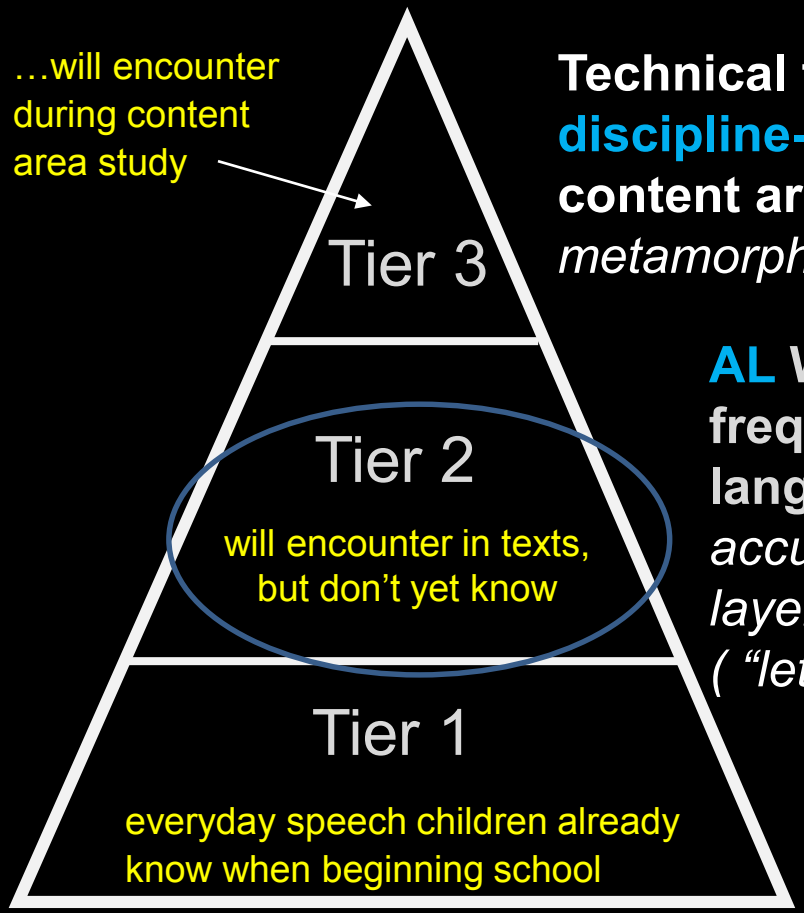
Four types of vocabulary: although we often speak of vocabulary as if it was singular, humans acquire four types of vocabulary: in descending "size" order

- **listening** vocabulary – (our **largest)** is made up of words we can **hear** and **understand.** All other vocabularies are subsets of our *listening* vocab.
- **speaking** vocabulary (the 2nd largest) - comprise of words we can use when speaking
- **reading** vocabulary (3rd largest) - words we can **identify** and **understand** when we read
- **writing** vocabulary (our smallest) - words we can use when writing
- **Reading** is heavily dependent upon a robust **listening** and **speaking** vocabulary.

- Books – Branes & Noble, Amazon = $$$
- Community book exchange (Aiken, SC) - ↑ student achievement & adult literacy
- Garage sales, thrift shop, library discards, etc.
- Goal: Bring one/take one → take one/bring it back
- ↑ Pass-around rate = greater student reading scores

Three-Tier Model for Vocabulary

CCSS, Appendix A
Originally Developed by Isabel Beck



Technical terms, seen/used with ↓ frequency, rare, discipline-specific words, not generalizable; limited to content area, AL: *lava, monarchy, allegory, agonist, metamorphic, amendment, respiration, acute, molecule*

AL Words to teach: general academic, ↑ frequency, ↑ utility across disciplines/written lang., ↓ use in spoken lang.: *vary, innovation, accumulate, cite, formulate, predict, surface, layer, evaluate, structure, adjust, function, bicker ("lethargic" rather than "tired")*

Known, basic, common, conversational/ oral vocabulary, concrete words: *clock, baby, run, book, see, tree, back, sad, animal (80% of text)*

Developing Early Literacy through Active Learning

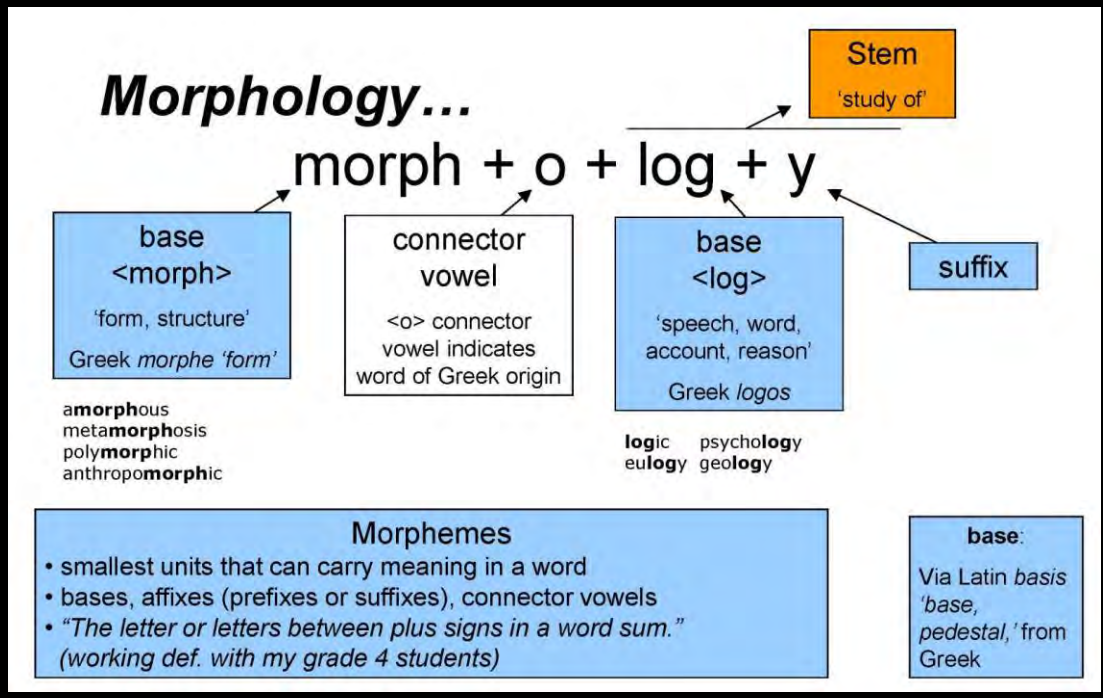
"Morphology"

morpheme = "the smallest unit of meaning"

-ology = "the study of"

Morphology = the study of the **smallest units of meaning**

-ful (full of)
-un (not)
pre- (before)
therm- (heat)
port- (to carry)
hydro- (water)



Ours is a Morphophonemic Language

Morphology promotes the use one's knowledge of word parts and structures to extract meaning from new vocabulary words.

- Breaking down and examining word parts. Teach:
- Greek (bio-, hydro-,) and Latin (aqua-, luna-) roots prefixes, suffixes, base words
- Words and their antonyms (contrast are easier to remember than synonyms)
- Focus on word associations-connections, rather than definitions to memorize. Any definition (meaning) should arises out of *experiences in context.*

Greek/Latin Language Bases

1. **Word roots** – provide the core meaning of any word
2. **Prefixes** – found at the beginning of a word
3. **Suffixes** – appearing at the end of the word

Word Roots	Definition	As In…
Aqua	water	aquatic
Aster, astro	star	Astronomy
Bio	life	biological
Geo	earth	geology
Graph	to write	telegraph
Helio	sun	heliocentric
Hydro	water	hydrocarbon
Litho	rock	lithosphere
Luna	moon	lunar
Morph	form	metamorphosis
Photo	light	photon, photographic
Sphere	round, global	atmosphere
Terra	earth, land mass	terrestrial

Language Basics for Learning Science

Prefixes – dound at the beginning of a word

Prefixes	Definition	As In…
Anti-	against	antibiotic
Endo-	inside, interior	endoskeleton
Exo-	outside, exterior	exoskeleton
Hemi-	half	left hemisphere
Hetero-	different	heterogeneous
Homo-	the same	homogenous
Hyper-	over, too much	hyperventilate
Hypo-	under, too little	hypodermic needle
Iso-	equal	isometric
Mega-	large	megabyte
Meta-	change	metamorphosis
Micro-	tiny, small	microscopic
Poly-	many	polymorph
Semi-	half	semicircle
Sub-	under	subcutaneous
Tele-	distant, far away	telescopic
Uni-, Bi- tri-	1, 2, 3	bilateral incision

Language Basics for Learning Science

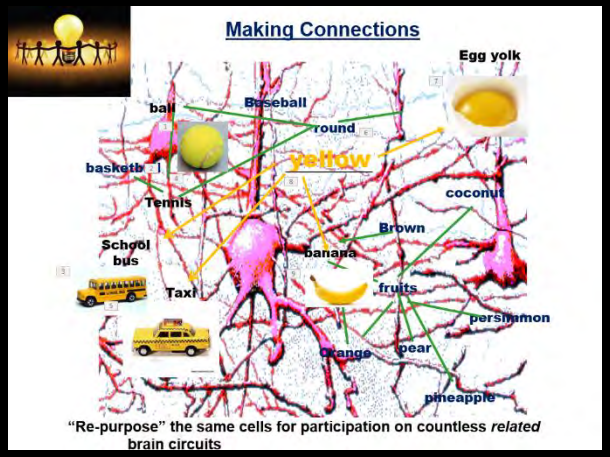
Suffixes – found at the end of the word

Suffixes	Definition	As In…
-able, ible	capable of	inedible
-gram	a record of	sonogram
-graph	written or drawn	electroencephalograph
-ic	related to	hemispheric
-ism	theory of, state of	magnetism
-ist	one who does or is	botanist
-ive	verbs → adjectives	psychoactive
-ize	noun → verbs	hypothesize
-less	without	odorless
-logy	study of	neurology
-meter	measure	thermometer
-oid	similar to	asteroid

10-80-10 Connections

NAEP: National Assessment of Educational Progress

Article on arthropods molting
(Highlights Magazine)



exo= external

Name some?

Insects, crustaceans arachnids. Why might an exoskeleton be beneficial to them?

An invertebrate animal with an exoskeleton

arthropod

Heard “arthro-” before?
= joint

arthritis

…seen a **lobster** before?

…seen a **crab**?

Key **characteristic** = **Segmented** bodies & **jointed** limbs
See them here?

Growth words (new) in Green

exo= external

Name some?

Insects, **crustaceans** **arachnids**. Why might an exoskeleton be beneficial to them?

An invertebrate animal with an **exoskeleton**

arthropod

Heard "arthro-" before?
= joint

arthritis

…seen a **lobster** before?

Key **characteristic** = **Segmented** bodies & **jointed** limbs
See them here?

…seen a **crab**?

It is easier to learn new words if you know other *related* words.

Polysemous Words: Balance “Scale”

Polysemy: the association of **one word** with **two/**more **distinct meanings.**

A **polyseme** is a **word** or phrase with **multiple meanings.**

Described as (adjective) **polysemous** or polysemic.

A one-to-one match between a **word** and a meaning is called **monosemy**.

How many definitions for the word scale?

(a verb, noun, adjective or metaphor)

Polysemous Words: Scale

1. *Noun* - analytical tool/machine for weighing
2. *Noun* - the results of a weighing
3. *Noun* - the tray or dish on a simple balance (butcher's scale)
4. *Noun* - fish scales (biology: epidermal, skin layer)
5. *Noun* - musical scale
6. *Noun* - skin (medical: mild disorder)
7. *Noun* - a rudimentary leaf ("by spring, tiny bulbs will have formed at the base of each scale.")
8. *Noun* - tile-like structures covering the wings of butterflies and moths (biology)
9. *Noun* - oxide formation on a metal
10. *Noun* - scale on suit of armor
11. *Noun* - scale on maps (social studies)
12. *Noun* - small scale (a map classification)
13. *Noun* - Large scale (a map classification)
14. *Noun* - a large drinking container (mug) for beer/alcoholic drink (South Africa)
15. *Noun* - Richter magnitude scale
16. *Noun* - scale tartar from teeth
17. *Noun* - Placoid scales (e.g., sharks)
18. *Noun* - Ganoid scales (e.g., gars)
19. *Noun* - Cycloid scales (e.g., carp)
20. *Noun* - Ctenoid scales (e.g., perch, Sunfish)

Polysemous Words: Scale

21. *Noun* - rating scale (hierarchy: “on a scale from 1 to 10”)
22. *Noun* - labial scales (snakes)
23. *Noun* - Color scale (range of hues)
24. *Noun* - Geologic time scale
25. *Noun* – a scale model
26. *Noun* - a wage scale
27. *Noun* - series of spaces marked off by lines/intervals (thermometer)
28. *Noun* - jazz scale - any musical scale used in jazz
29. *Noun* - Likert scale (most like/least like) best-to-worst
30. *Noun* - Fujita scale (wind damage)
31. *Noun* - Wechsler Adult Intelligence scale
32. *Noun* - Famine scales (social studies)
33. *Noun* - Bract scale (derived from a modified leaf)
34. *Noun* - Ovuliferous scales (seed scales)
35. *Noun* - Acoustic scale
36. *Verb* - to scale a wall
37. *Verb* – to remove scales by scraping (scaling a fish - verb)
38. *Verb* – to scale down (reduce)
39. *Verb* – to scale back (military efforts)
40. *Verb* – to scale up (increase)

Polysemous Words: Scale

41. *Verb* – to make flat rocks skipped on the water
42. *Verb* - to flake (to come off in thin pieces – “the paint was scaling from the brick walls”)
43. *Verb* - to chip
44. *Verb* – to arrange in a graduated series
45. *Verb* – to set a scale (a standard, gauge)
46. *Verb* - to shed
47. *Verb* - to draw to scale (ratio; scale drawing)
48. *Adjective* - thin coat (incrustation)
49. *Adjective* - A sliding scale
50. *Adjective* - Scaled quail (CO)
51. *Adjective* - scale insects are small insects
52. *Adjective* – comparative relationship (“… on a smaller scale”)
53. *Metaphor* - scales falling from one’s eyes (sudden awareness)
54. *Metaphor* - The scales of Justice
55. Medium scale (a map classification)
56. Meridian scale (social studies – maps)
57. Parallel scale (social studies – maps)
58. Scale variation (social studies – maps)
59. Increased scale (social studies – maps)
60. True scale (social studies – maps

Polysemous Words: Scale

61. Reduced scale (social studies – maps)
62. Long scale
63. Short scale
64. Nominal scale
65. Principal scale
66. Point scale
67. Particular scale
68. Kelvin scale
69. PH scale
70. Scale factor
71. Bar scale
72. Lexical scale
73. Spatial scale
74. Graphical scale
75. Temporal scale
76. Fitzpatrick scale – a patient's reports of how their skin responds to the sun
77. Heptatonic scale –
78. Scale length (string instruments)

Today's Reading List

colorectal
adenocarcinoma
diverticulitis
Australopithecus
microscopy
deoxyribonucleic
phenothiazine
diencephalon
epithelium
hypochondriasis
neurosarcoidosis

diatomaceous
Pachyrhinosaurus
amniocentesis
Panoplosaurus
Dimetrodon
Epacthosaurus
cholecystography
electroencephalograph
Homo neanderthalensis
phenylethylamine
phenylthicarbamide (PTC)

What is Dactyloscopy?

(dak-tu-los'ku-pē)

Reverse Direction Decoding

Dactyloscopy:

The practice of using fingerprints for personal identification

dak-tu-los'ku-pē

(-py) = **pē**
(-copy) = **ku-pē**
(-loscopy) = **los'ku-pē**
(-tyloscopy) = **tu-los'ku-pē**
dactyloscopy = **dak-tu-los'ku-pē**

Colorectal

adenocarcinoma

diverticulitis

australopithecus

microscopy

deoxyribonucleic

phenothiazine

Co-lo-rec-tal

A-de-no-car-ci-no-ma

Di-ver-tic-u-li-tis

Aus-tra-lo-pith-e-cus

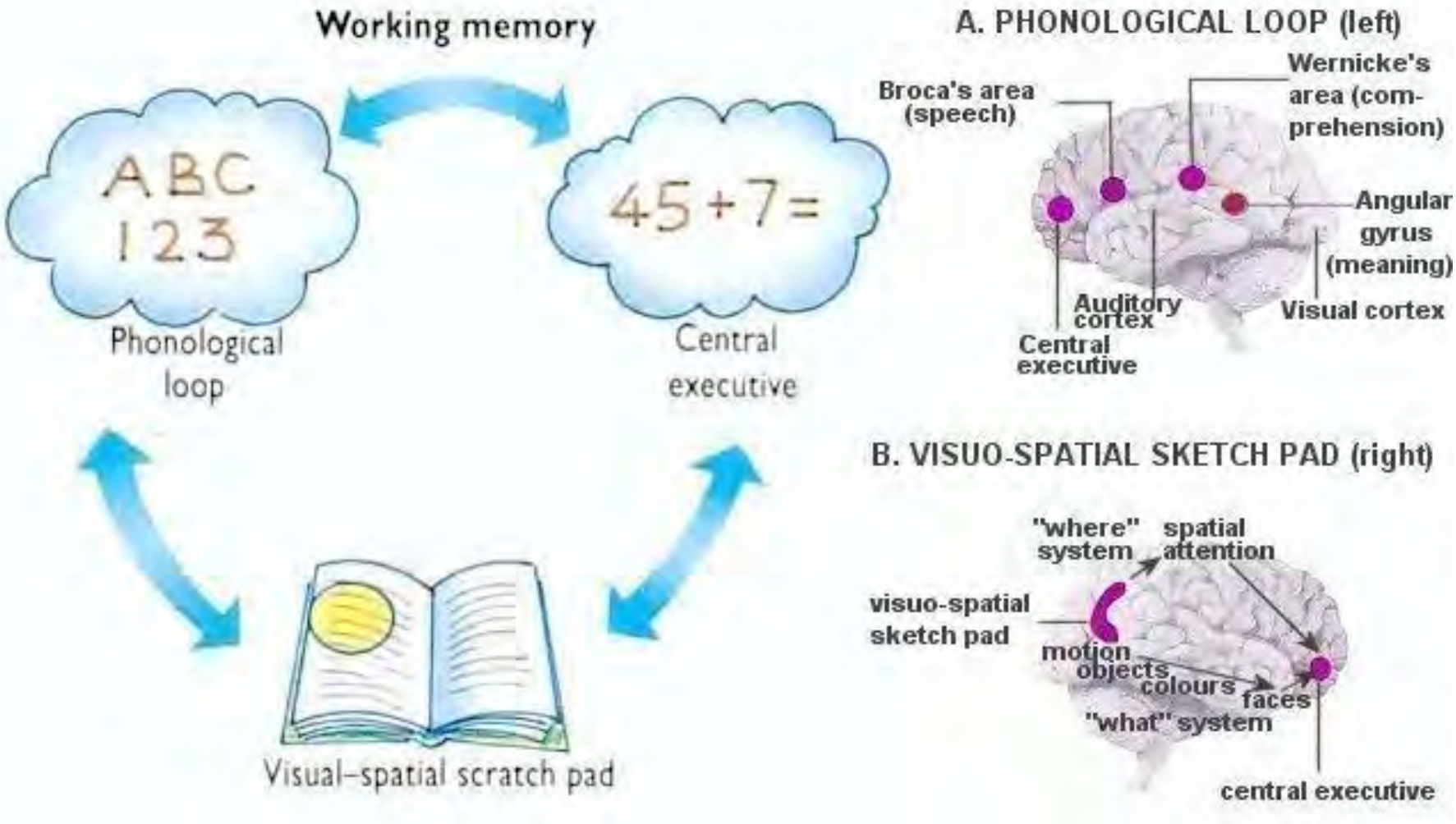
Mi-cros-co-py

De-ox-y-ri-bo-nu-cle-ic

Phe-no-thi-a-zine

Diatomaceous = Di-a-tom-a-ceous

How Reverse Direction Decoding Works



"In fact, the *automaticity* with which *skillful* readers *recognize* words is the key to the whole system…The reader's *attention* can be focused on the *meaning* and *message* of a text only to the extent that it's *free* from fussing with the *words and letters.*"

–Marilyn Adams

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REVERSE DIRECTION DECODING

Posted on December 26, 2012 by admin

Revolutionizing How We Teach Reading

by Kenneth Wesson

A short list of humankind's greatest achievements would undoubtedly include the use of tools, language and technology. Reading and writing have become so second nature to educated individuals that reading is taken for granted; but by readers only. Literacy can not only alter the success-trajectory of our lives, but the process of learning how to read "literally" alters brain circuitry, the physiology and architecture of the human brain. In addition to listening to words, we read words, use words in speech, and even think in words.

Phonics is the popular reading strategy commonly taught in preschool, primary and upper elementary grades, and sometimes still in middle schools. However, shouldn't any technique used repeatedly for almost 10 consecutive years with only modest success warrant some suspicion? Worst of all, the word "phonics" does not conform to its own rules. The mere fact that it is not spelled phonetically should have generated suspicions about the theory! It has produced millions of "phonics-damaged children" according to some researchers.

Science just got easier!

Rigor and developmentally-appropriate learning

=

(learning expectations that are aligned with a child's cognitive development)

Rigor → success

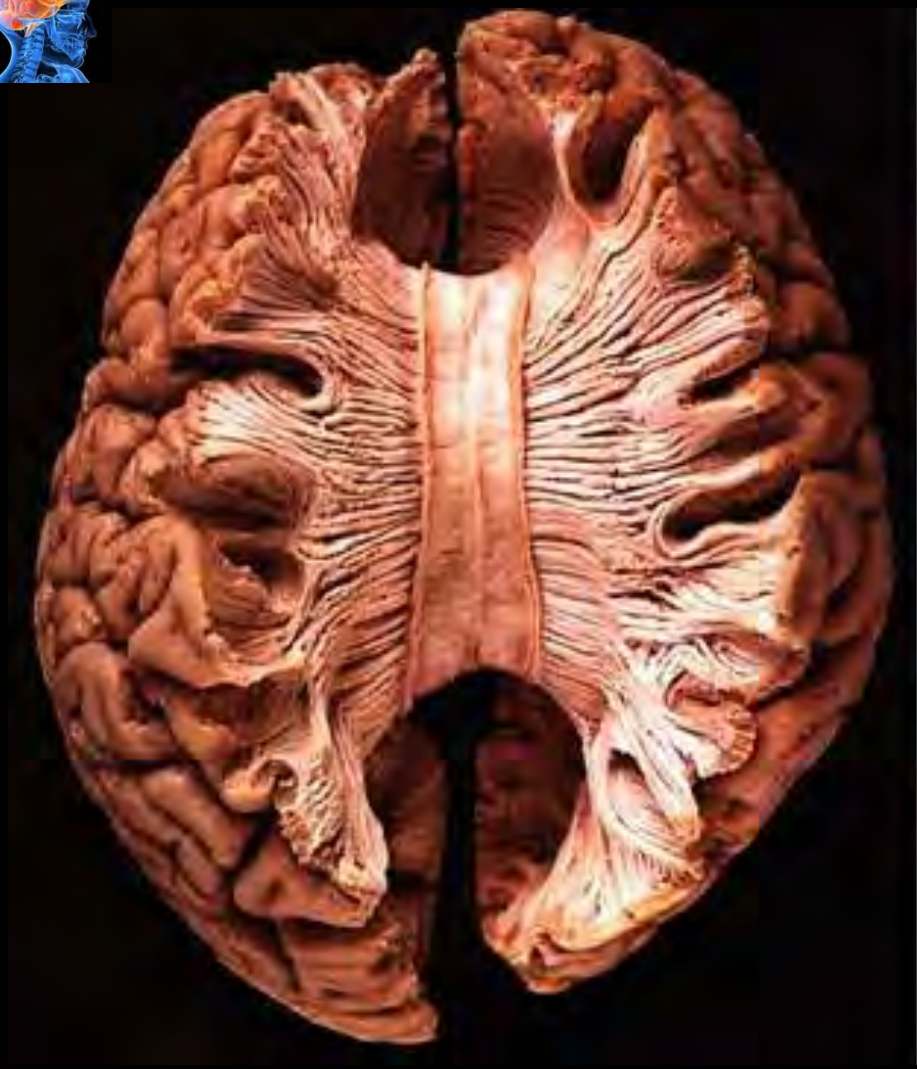
The Timing of Learning

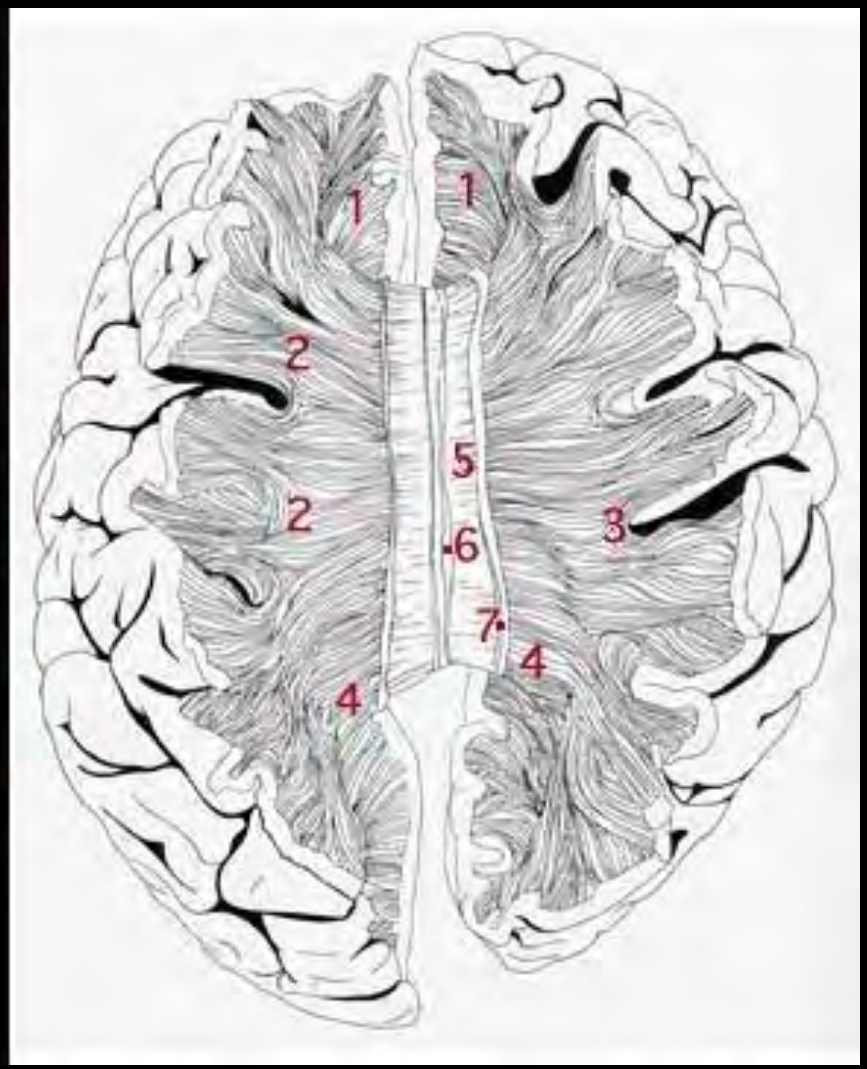
Age	Skill Development	Brain Region
3-10 months	Attention and awareness	Reticular formation
2-4 years	Language development	Temporal lobes
6-8 years	Phonemic development	Inferior parietal and temporal lobes
10-12 years	Abstract language, ethics (fractions)	Inferior parietal, FL and corpus callosum
14-16 years (25 yrs.)	Higher order thinking, judgment, decision-making, planning	Frontal lobes

The Biological Brain by the Numbers

The amazing complexity of brain function is coupled with the marvelous simplicity of brain physiology

2 = Number of hemispheres
(*L* and *R*)





Corpus Callosum: Provides a pathway for communication between the two hemispheres

Which does not belong?

Which does not belong?

a. Sun shines
b. Moon glows
c. Stars twinkle

Which does not belong?

Children ages 3 to 5 focused on the attribute of "size." (The moon and the Sun are both "*big*." So, eliminate the stars.)

a. The large sun shines
b. The large moon glows
c. The tiny stars twinkle

Which does not belong?

Most children, ages 4- 6 fixate on the concept of "number" (only *one* Sun and only *one* moon.) So, the stars do not belong, because they cannot be counted. "Zillions of 'em!")

a. **One** sun shines
b. **One** moon glows
c. **Countless** numbers of stars twinkle

Which does not belong?

Upper elementary grade students have learned that **the moon *reflects* light,** while the Sun and stars produce their own light. So, they concluded that the moon does not belong within this set.

a. The shining sun **produces light**

b. The moon glows when it ***reflects*** **light**

c. The stars also **produce their own light**

Which does not belong?

High school/university-level students (and astronomers) are aware that **the Sun actually *is* a star** in the Milky Way galaxy. So, the moon does not belong. This is a more advanced highly-informed response derived from earth-space science or thinking at a more sophisticated cognitive level.

a. The sun **is a *star*** in our solar system
b. The moon **is not** a star (Earth's satellite)
c. The stars ***are stars*** by definition

Which does not belong?

However, the test-makers found that the answer, which produced the *broadest distribution* of responses (along the ability spectrum), was that the Sun does not belong, because it is a ***diurnal*** rather than a ***nocturnal*** event.

- a. The sun is **visible during the day**
- b. The moon is **visible at night**
- c. The stars are **visible at night**

Scheduling At-home Learning

- The importance of consistency
  - a designated time
  - a designated place in the home for studying
  - Multiple children and one device
- Maintaining an environment conducive to learning
  - quiet
  - initial learning (concentration: building brain circuits)
  - reinforcement and application: elaboration
- Minimize distractions
  - Cable TV
  - iPod, iPhone, etc.: “Multi-tasking”? No, CPA.
- End-of-day ritual

Writing a "Two-Minute Paper"

Students assume a greater amount of control over their own learning by defining what they know and contrasting that with what they have yet to learn.

- **What have I learned?**
- **Were any of *my* preconceptions or misconceptions overturned?**
- **What do I still want to/need to know in order to understand this concept or skill better?**
- **What is this connected to?**
- **What do I think will come next?**

FedEx writing

D. o. K.

- "Tomorrow I will be interested to hear your ideas concerning today's discussion; that is, once you've had **time to think** about it a bit more deeply."
- **Depth of knowledge** is the highest goal of LT learning.

What is Learning and Memory?

- During "downtime," (resting, sleeping, day-dreaming, or "zoning out") the brain is actively "on-line" (1) organizing information gathered from our senses/experiences and, (2) making physical connections to represent those experiences → biological basis of human memory (classroom) .

"Understanding builds over time."→
Thinking: Contemplative Problem Solving

Contemplative p-s requires "downtime" for thinking.

Leisurely time to think → scholars and scholarship

Greek σχολεῖον "skholeîon"
Latin "skholḗ" = spare time, "*leisure*"

School is the place for "leisurely practicing problem solving" (memorizing and learning under pressure for high-stakes assessment as the goal).

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