Executive Function - Your Window to Understanding Cognitive Pathways

Carlisle Area School District

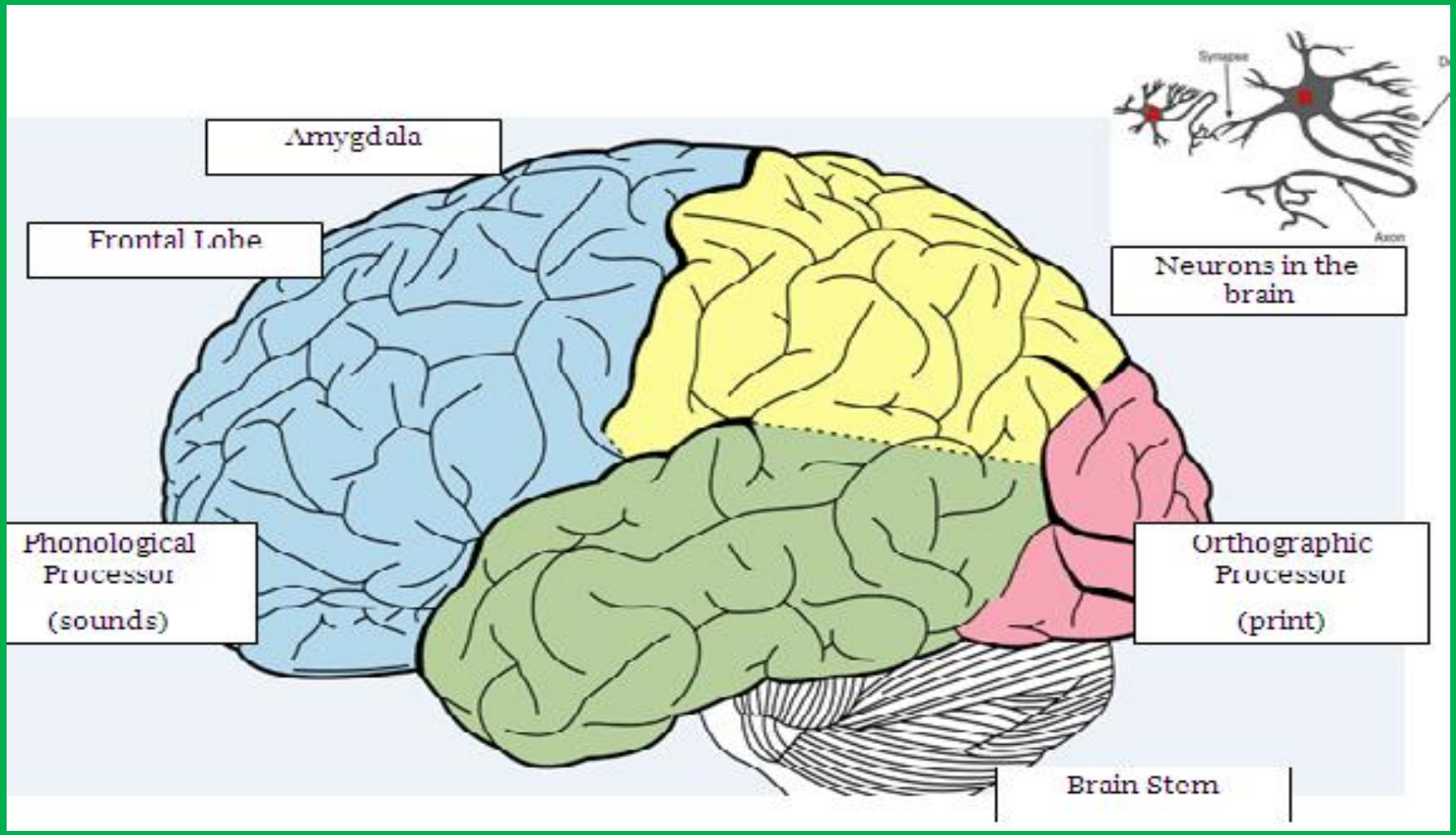
C•A•S•D

CARLISLE AREA SCHOOL DISTRICT

Agenda

1. How does the brain learn?
2. What is executive function? How do executive weaknesses impact learning for all students?
3. What are the sub skills of executive function?
4. What strategies can I use to develop students' executive functioning skills?

How does the brain learn?



What is executive function? (Does everyone have this?)

- *How did you get here today on time?*
- *Your family wants to eat dinner at 6 and you're the cook: How do you get the food on the table in time?*
- *Someone cuts you off in a traffic lane (and you have your child in the car): What keeps you from yelling "#**#!#%#!!"?*
- *The students in the next classroom are playing a very loud game while you are writing an email response to a parent, but you don't hear it. Why?*
- *You accidentally bump into someone and apologize. Why?*

What is executive function (EF)?

"Executive Function" is an umbrella term for a set of cognitive processes that are required for mental and behavioral self control.

Variety of "higher-order" mental processes and behaviors

Enables self-regulation, problem-solving and goal directed behavior

Integrates lower-level processes

Develop gradually over time

<u>Metaphors for EF:</u>
Conductor
CEO
Coach
Air Traffic Controller
Head Chef

How does executive function develop?

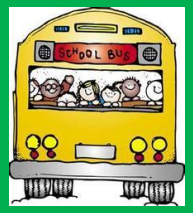
7-8 months

Demonstrates working memory

3 years

Begins ability to inhibit disadvantageous decision

6 years



Attention becomes volitional

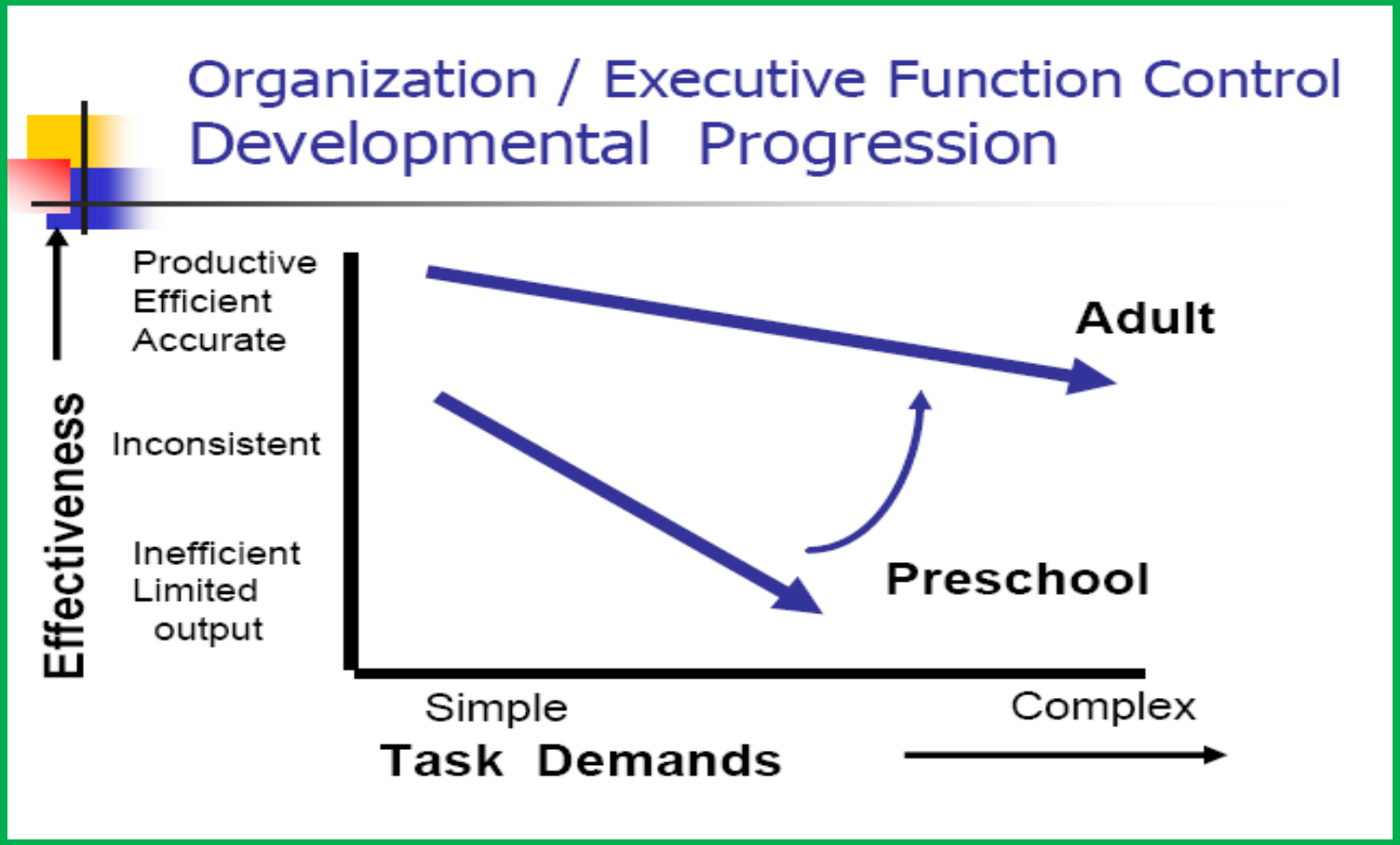
Adolescence

Manipulate and integrate complex information

Adult

Manipulate and integrate large quantities of complex information

How does executive function develop?



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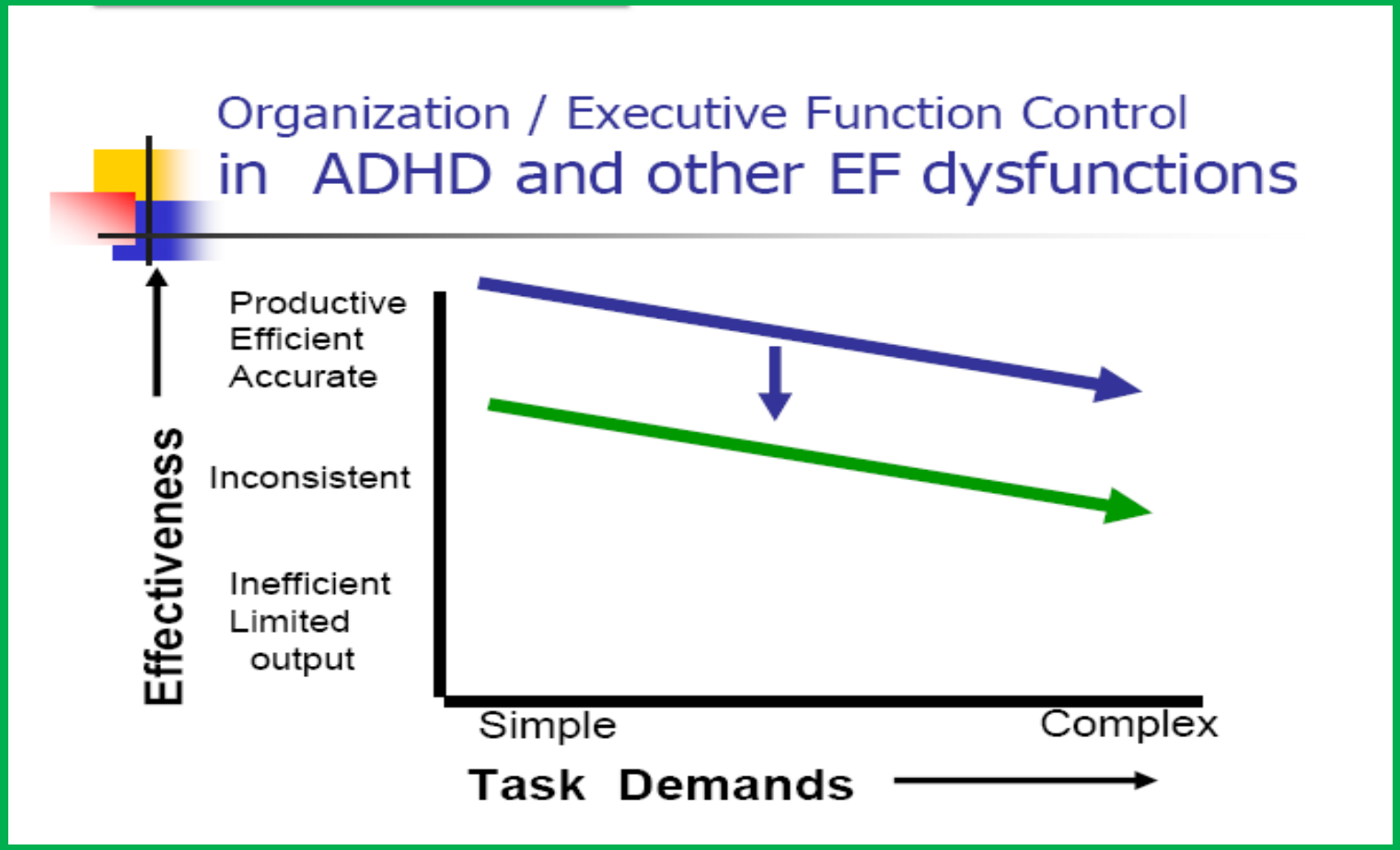

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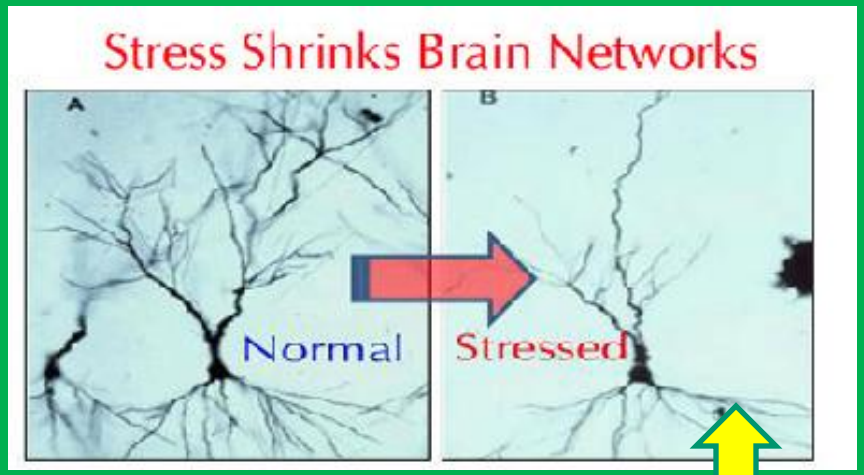
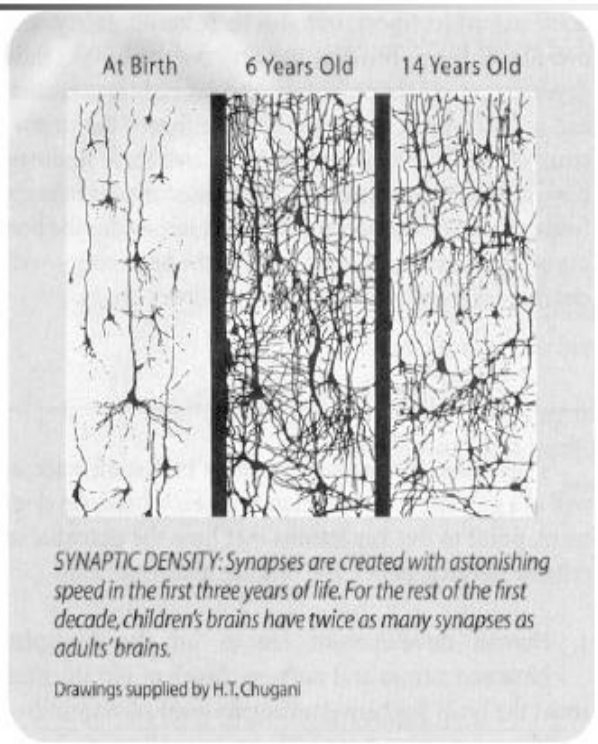


Students in poverty or in consistently stressed environments

EF:
At the interface between brain and environment



Normally Developing Neurons

How do executive function weaknesses impact learning for all students?

- Poor adaptive functioning
- Poor organization
- Poor planning
- Poor time management
- Emotional liability
- Procrastination, don’t know how to initiate tasks
- Inflexible, strong adherence to routines or patterns
- Quit, easily give up, tearful or emotional outbursts
- Cannot persist on tasks without help, lots of questions
- Poor social skills, hard time making and keeping friends
- Out of seat, climbing, fidgeting

How do executive function weaknesses impact learning for all students?

- Behavior is not guided by mental events about time – it is always NOW
- Display lots of task-irrelevant behavior
- Too little purposive, future-directed action
- Too little complex, hierarchically organized behavior (e.g., writing an essay is challenging)
- Little self-improvement by vicarious learning (get in trouble for doing what brother just did)
- Problems inventing more novel, complex actions (forget math book – now what??)
- Too little goal-directed persistence (easily de-railed)
- Poor task reengagement (cannot get them back on track)
- Insensitive to feedback (make same mistakes)
- Poor time management (time-blindness)
- Reduced sensitivity to errors (proofreading, double checking)
- Emotional tolls – anxiety, depression, feeling worthless or ineffective, low self-esteem….

Executive Dysfunction:

- Illness and fatigue
- Attention Deficit Hyperactivity Disorder
- Autism Spectrum Disorders
- Learning Disability
- Fetal Alcohol syndrome
- Side effects of medications
- Drugs or alcohol
- Brain Injury (traumatic or acquired)
- Brain disorder (e.g. dementia, tumors)
- Partial complex epilepsy, frontal origin
- Mental illness (e.g. schizophrenia, depression, bipolar, OCD)
- Tic disorders
- Genetic disorders

Executive function weakness:

All cases of EF are NOT the same! The specific profile of strengths and weaknesses will vary considerably from person to person!

It is important to understand the child's profile. You can refer for formal neuropsychological testing, at times that is necessary, but it can also be less complicated than that. There are interventions for teachers, parents, and students.

What are the categories of executive function?

Emotional Aspects of EF

"Self-Regulation"

- Impulse control
- Use of "Social Filter"
- Self-monitoring social behaviors
- Tolerance
- Delay of immediate gratification
- Establishing attention & filtering attention

Cognitive Aspects of EF

"MetaCognition"

- Organizing time, materials, projects
- Prioritizing
- Attention shifting
- Risk-assessment
- Informed decision making
- Use of Verbal & Non-Verbal Working Memory

What are the sub skills of executive function?

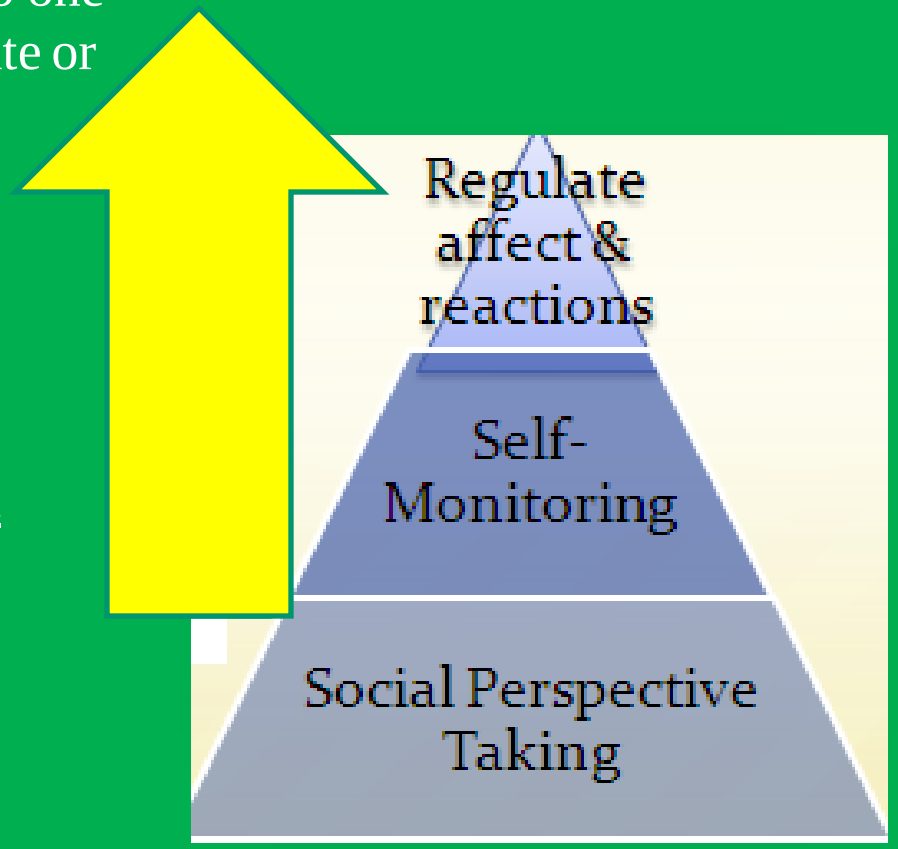
1. Impulse control
2. Task Initiation/Self Monitoring
3. Cognitive Flexibility
4. Sustained Attention
5. Working Memory
6. Organization
7. Planning

Head
Shoulders
Knees and
Toes
Summary

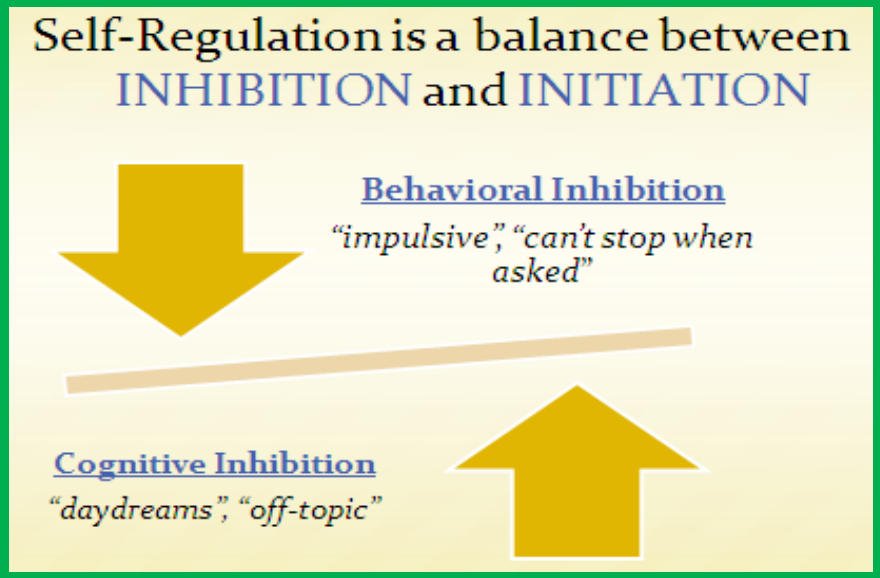
Impulse Control

The ability to resist a strong inclination to do one thing, and instead do what is most appropriate or needed.

- Acting on impulse
- Difficulty matching the demands of the situation-sometimes inhibiting, sometimes motivating- **Stop and Go functions are not always used**
- Staying focused on what is important
- Difficulty thinking before you act, resisting temptation, avoiding jumping to conclusions.



Impulse Control



What strategies can I use to develop students' executive functioning skills?

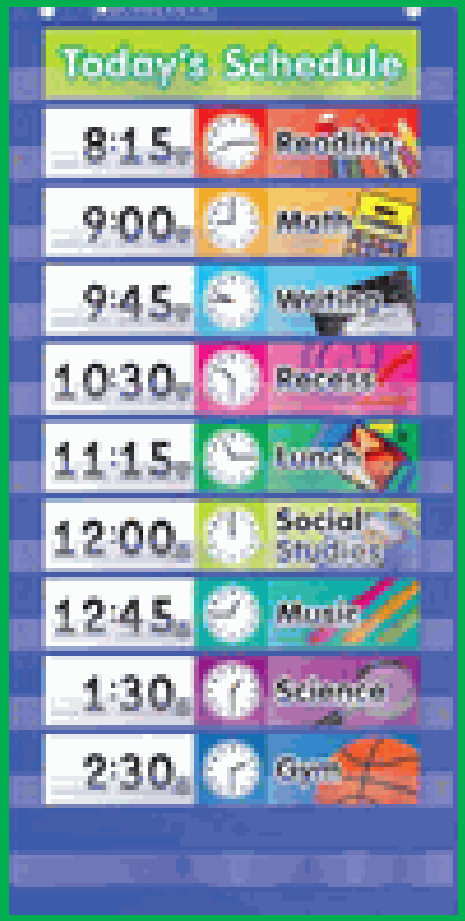
How to help students with impulse-control:

Breathing Buddies

Organization

Difficulty organizing materials, time, space, and tasks

Difficulty using and maintaining a system of organization



Planning

- Difficulty setting and achieving goals
- Difficulty breaking tasks into manageable chunks

Idea or Task
Imagine an end product – what you want, or need to get done

Sequential PLAN
Create a Plan with materials, time management, sequence

Execution
Execute the plan (with self-monitoring)

Evaluate
Evaluate the plan and end product – is this what I imagined?

Design a course of action….

Working Memory

Working Memory

Planning largely involves WORKING MEMORY: this is your "desktop" or "sketchpad" – hold information In your memory long enough to do something with it.

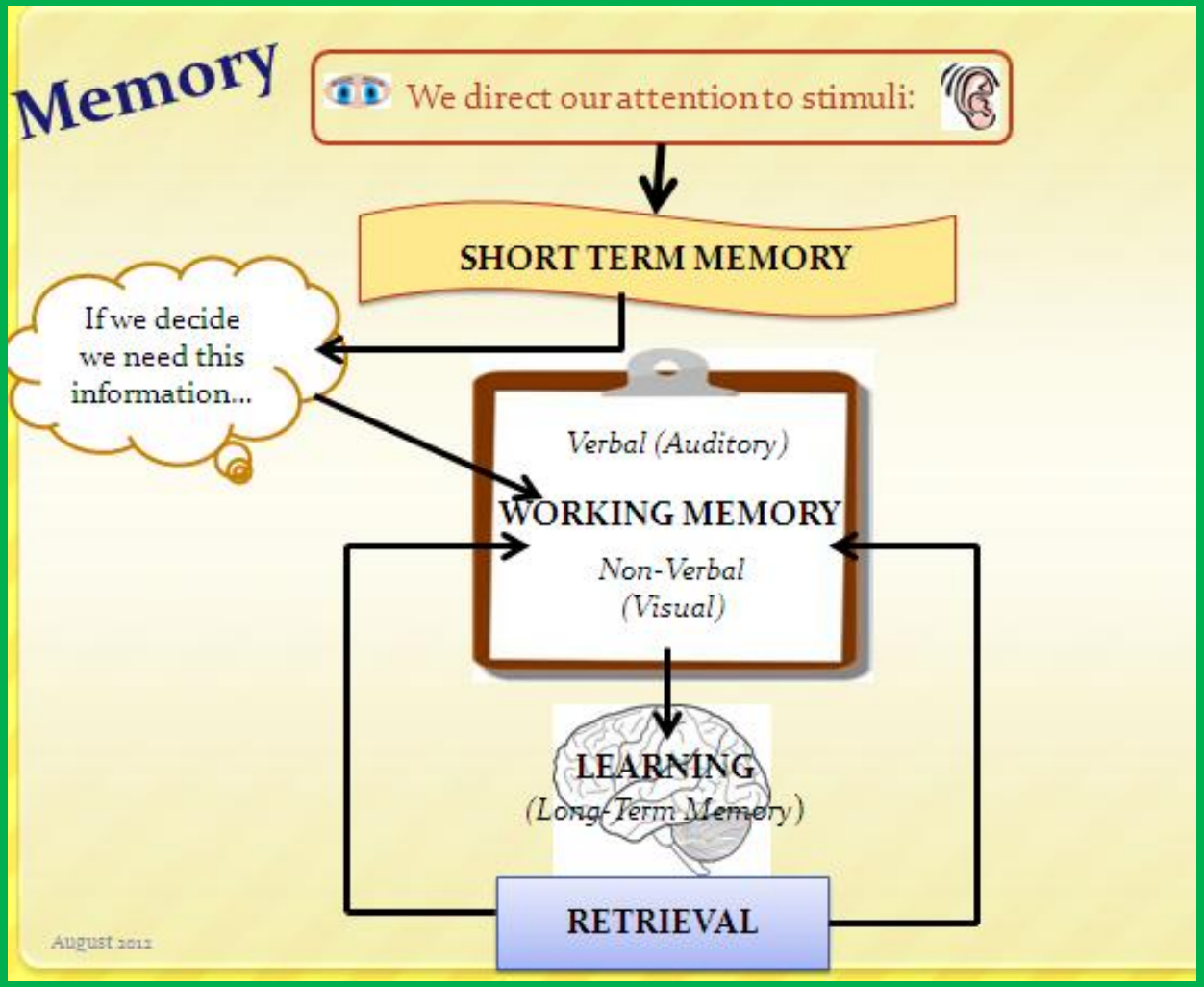
Non-Verbal Working Memory

- *Enables*: sense of time, see mental visual representations, ability to see in hindsight & have foresight

Verbal Working Memory

- *Enables*: ability to hold language "online" while talking, "self-talk", self-questioning

Working Memory



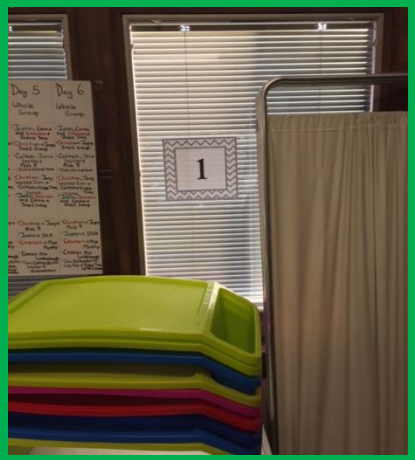
What strategies can I use to develop students' executive functioning skills?

How to help students who seem lost in the classroom: Ready. Set. Go!

What strategies can I use to develop students' executive functioning skills?

How to help students who seem lost in the classroom:

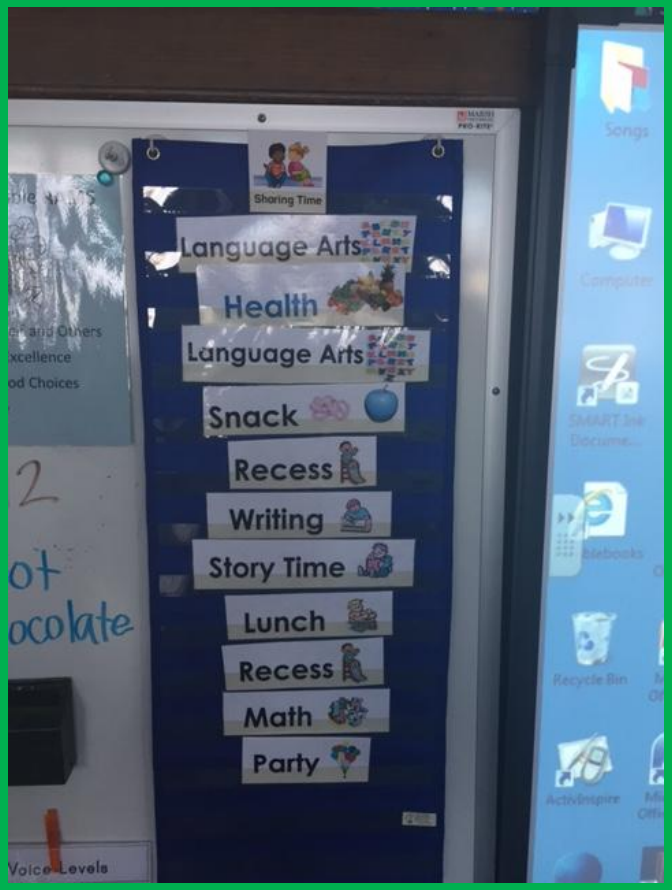
Routine Spots

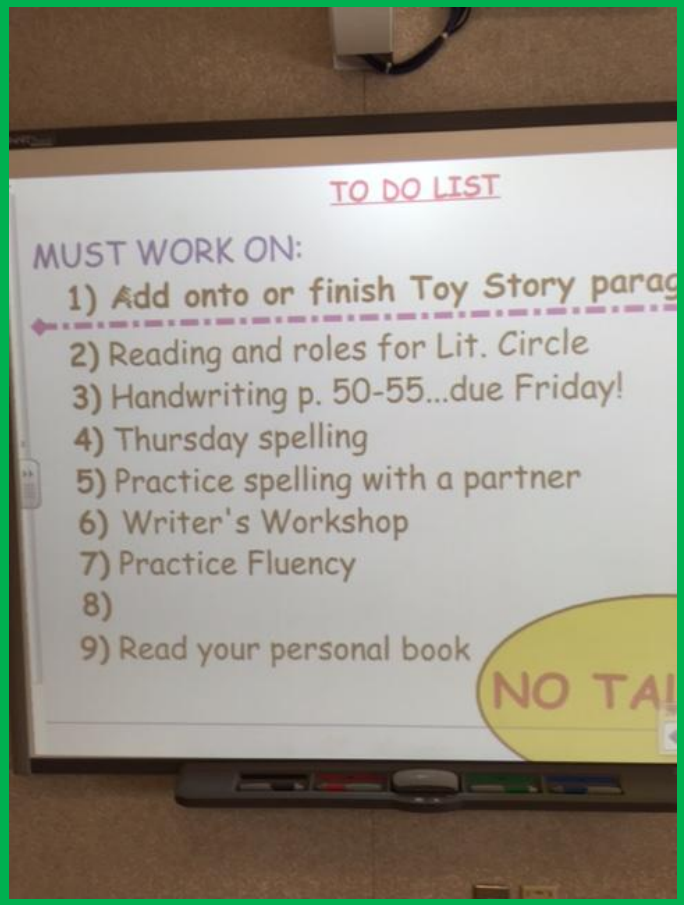


Routine Spots

Routine Spots

Working Memory





Sustained Attention

Activate & Initiate Attention

- Arouse the effort and motivation to attend
- Target the prominent stimuli to attend to

Sustain Attention & Filter

- Maintain alertness
- Filter out extra stimuli that competes for attention
- Resist distractions

Shift Attention

- Shift too quickly - "distractible"
- Shift too slowly – "inattentive"
- Can't Shift – "perseverative-rigid"

What strategies can I use to develop students' executive functioning skills?

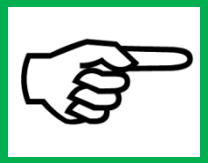
How to help students sustain attention:

H: HALT

E: Engage

A: Anticipate

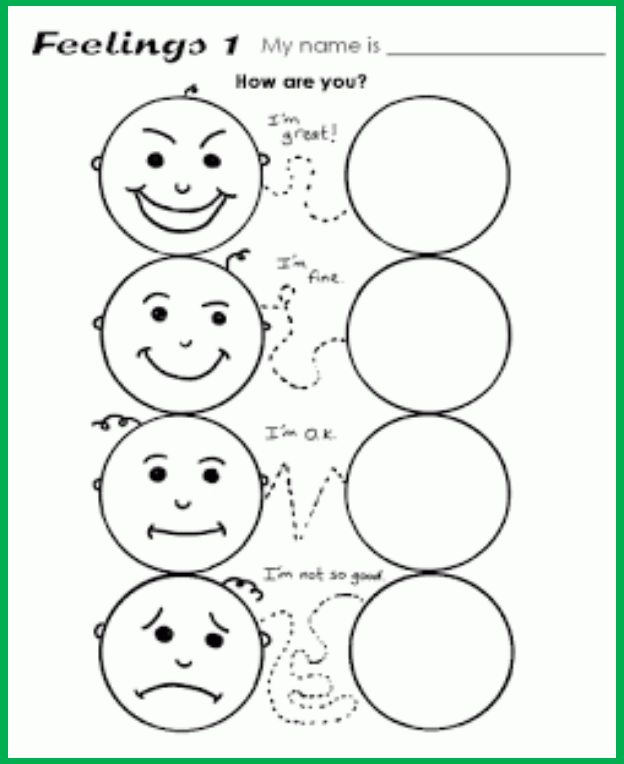
R: Replay

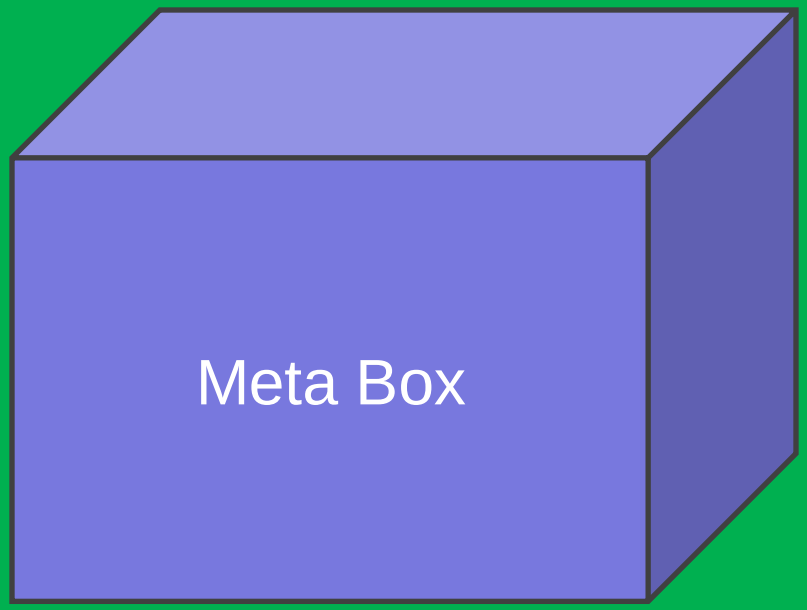


What strategies can I use to develop students' executive functioning skills?

How to help students sustain attention:

Get Meta!!



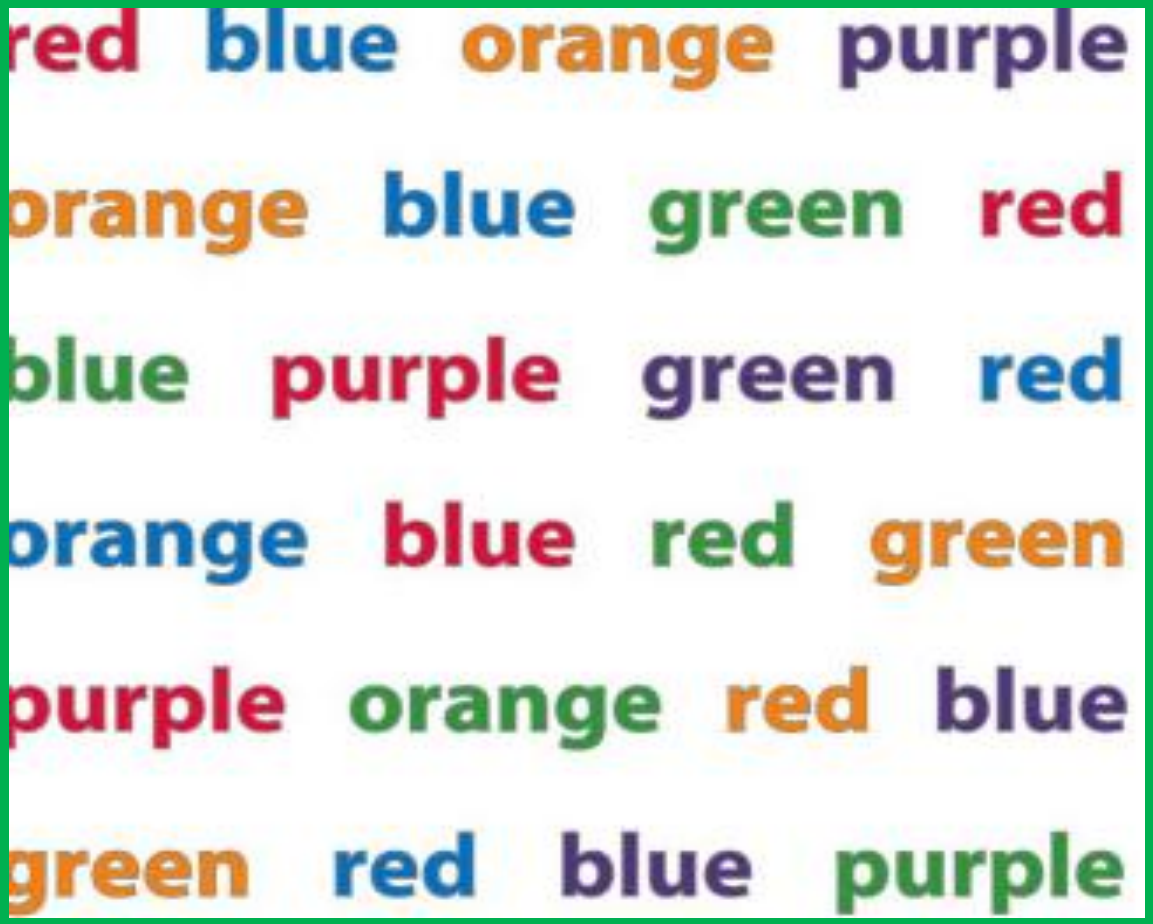


Cognitive Flexibility

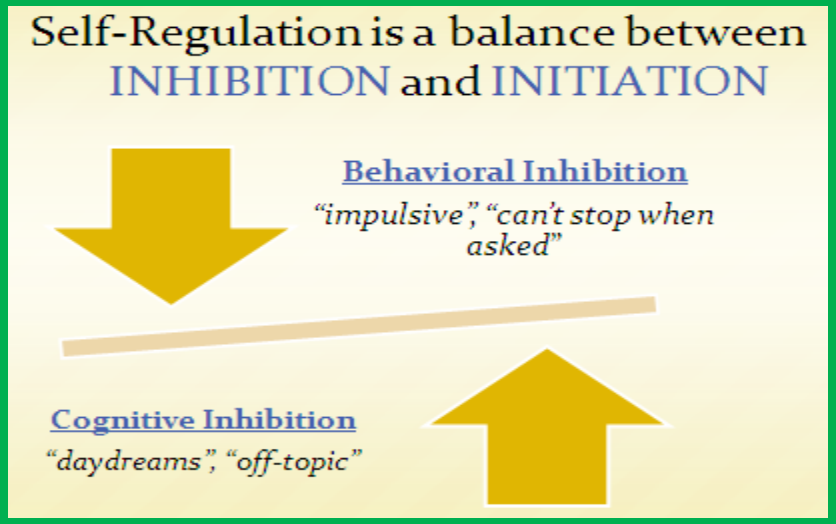
The ability to easily and quickly switch perspectives of the focus of attention, flexibly adjusting to changed demands or priorities—being able to *Think Creatively!*

- Ability to change course when what you are doing isn't working.
- Ability to adapt to change easily.
- Ability to take advantage and seize opportunities when they arise, even if it means changing course.

Cognitive Flexibility



Task Initiation/Self-Monitoring



- Difficulty getting started, or following through on a task
- In conversation – following the "conversation train" is challenging
- Feelings of helplessness and inability to change the present situation
- Often these students don't ask for help because they have difficult identifying the problem.
- Difficulty understanding why they are "in trouble."

What strategies can I use to develop students' executive functioning skills?

How to help students who seem lost in the classroom: Future Glasses

Summary of our learning!!

We have committed to try….

If at first you don't
succeed
try,
try again.

Thank You!!

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