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Executive Functioning

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SECAC Meeting

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Objectives:

1. What is Executive Functioning and how it relates to brain development?
2. How do you assess Executive Functioning in children and adolescents?
3. What Interventions work for students with Executive Functioning deficits?

What is Executive Functioning?

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- “Executive Function is a term used to describe a set of mental processes that helps us connect past experience with present action. We use executive function when we perform such activities as planning, organizing, strategizing and paying attention to and remembering details”.
- Steven Feifer, a prominent school neuropsychologist, suggests that “executive functioning can also be thought of as a set of multiple cognitive processes that act in a coordinated way to direct cognition, emotion, and motor functions”.

What is Executive Dysfunction?

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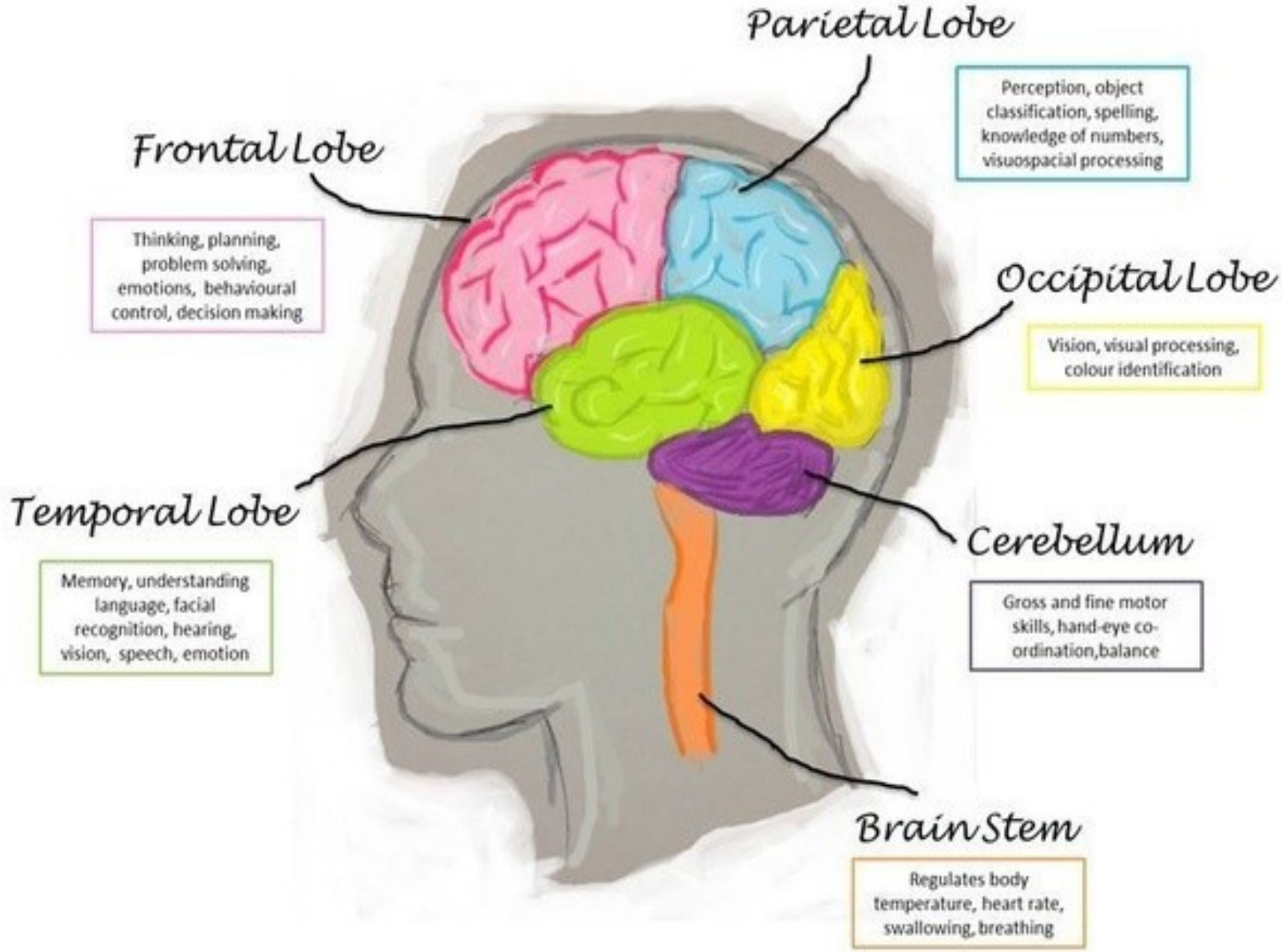
- “People with executive function problems have difficulty with planning, organizing and managing time and space. They also show weakness with "working memory", which is an important tool in guiding one's actions.”
- Disorders in executive function can run in families.
- Problems can be seen at any age but tend to be increasingly apparent as children move through the early elementary grades; the demands of completing schoolwork independently can often trigger signs that there are difficulties in this area.

Brain Structure



Brain Development

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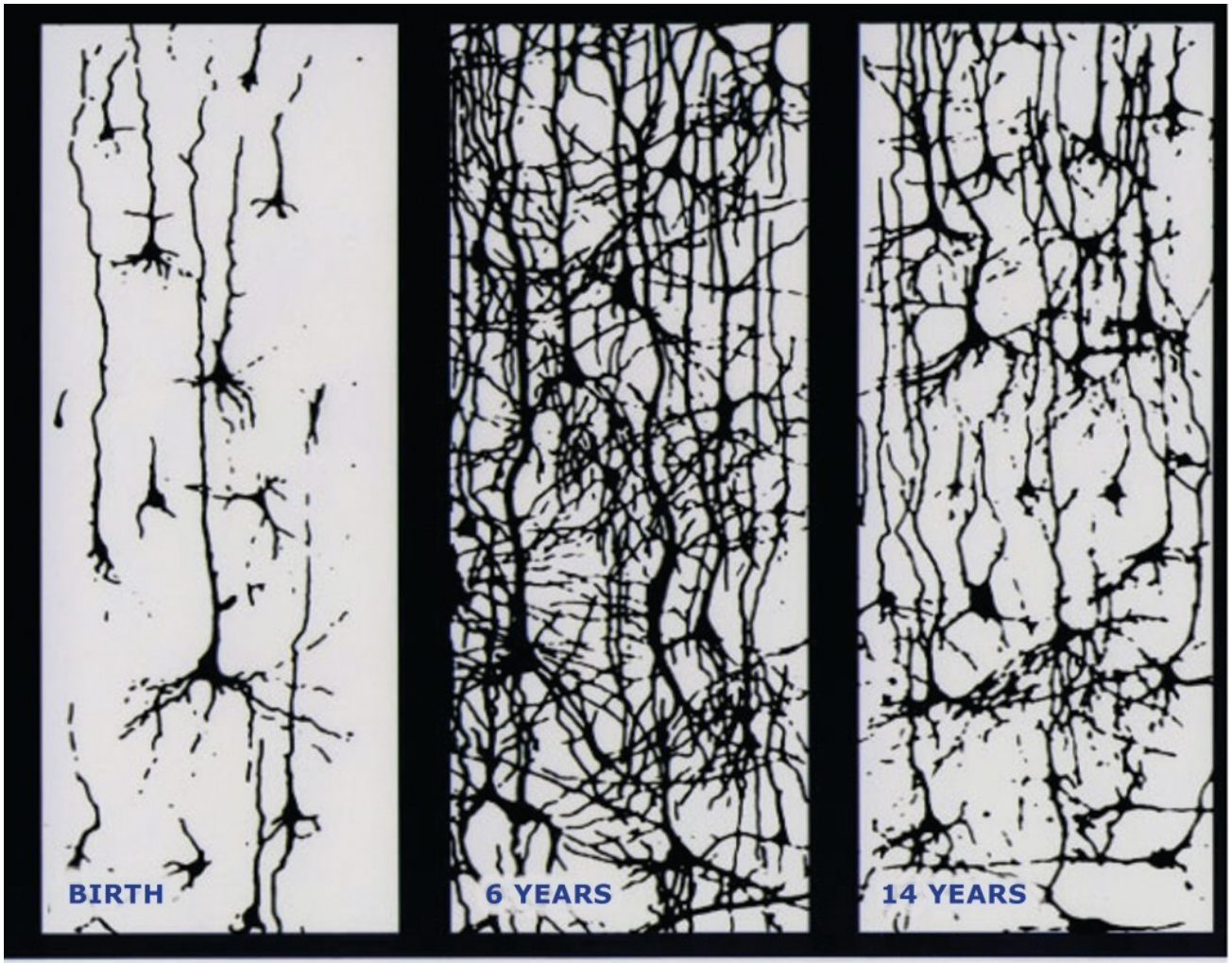
- 1 trillion brain cells at birth
- By age 6, the brain is 95% of adult size
- Gray matter grows and thickens like tree branches
- At the earliest years, the temporal areas are most dense with gray matter to acquire language(s)
- After we learn our native language, we lose the ability through pruning
- Gray matter increases in various regions of the brain until around 11 or 12 where major pruning begins.
- White matter increases during early adolescence until about age 45

Neural Development



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How to build brain connections:

- Exposure
- Experience
- Doing, thinking, mirroring
- Practice (a lot of it increases myelin)

Neuron Structure

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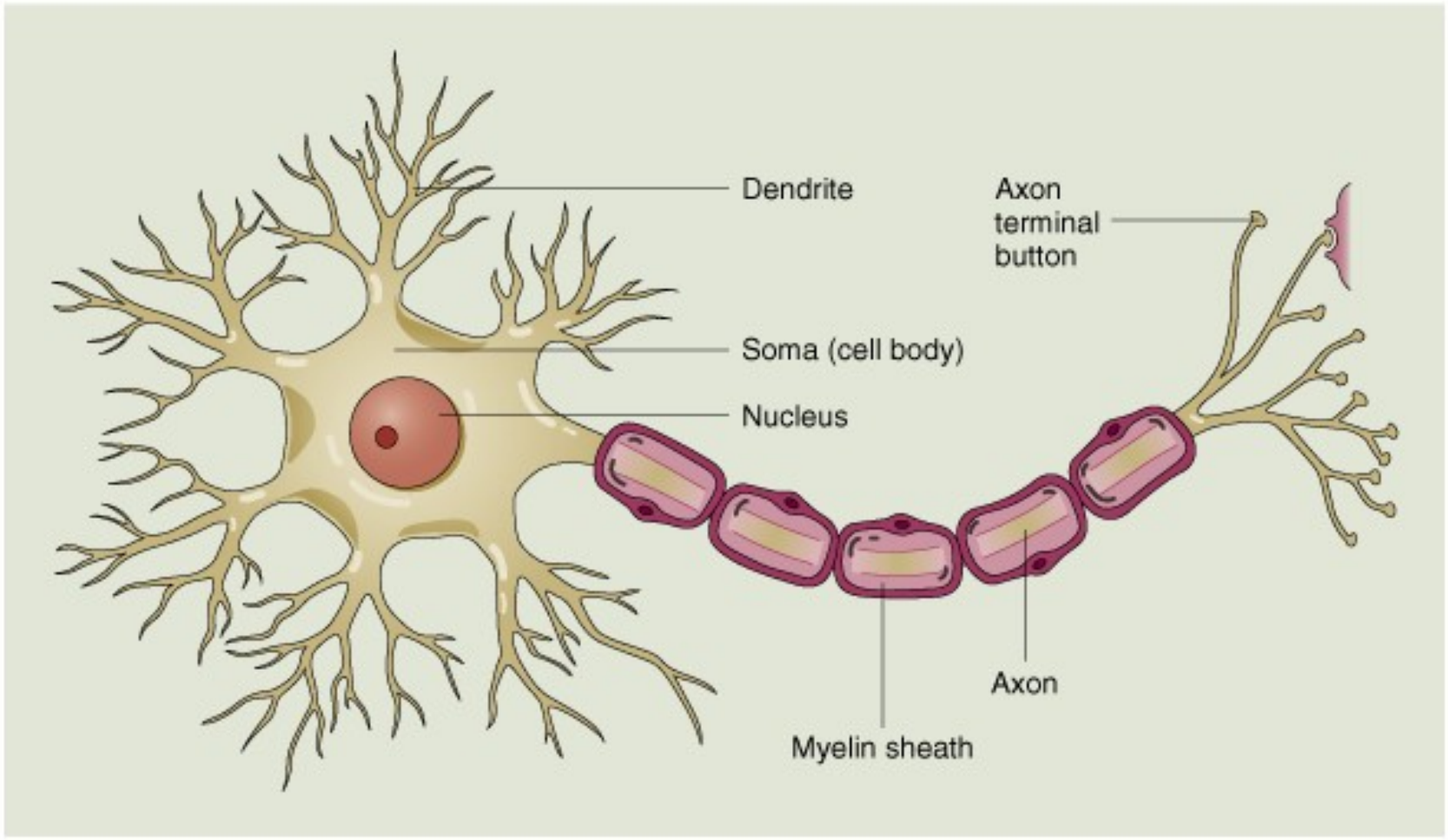

Neuroplasticity

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- Refers to the discovery by neuroscientists that the structure and functioning of the brain changes, in children and adults, due to ***experience***.
- "Cells that fire together, wire together."
- Indeed, ***learning*** can be defined as the associations between neurons that are developed through repeated neural firing.

Age of Typical Development

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- Between the ages of 5 to 8, children demonstrate concept formation, set shifting, and rudimentary planning skills
- Between 7 and 9 years of age , development of cognitive flexibility, goal setting, and information processing efficiency
- Major increase in all areas is observed during the age 8-11 period
- Smaller increases were identified in the 11 to 14-age range
- Ages of 14 to 17, even less change
- There is a range and does not appear to be fixed
- Gains in EF can be observed throughout an entire lifespan

Executive Functions

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- Self-Regulation
- Inhibition of Impulses
- Sustaining Attention
- Cognitive Flexibility
- Emotional Control
- Initiating Activity
- Working Memory
- Planning
- Organization of Material
- Self-Monitoring
- Time Management

What We Assess and Why We Assess It

- Speed of processing
- Sequencing (visual and auditory)
- Planning (motor and conceptual)
- Inhibition
- Decision making/problem solving
- Mental flexibility/set shifting
- Memory
- Being goal oriented in light of distractions

Tools Used to Asses Executive Functioning

- Individual testing

  IQ tests (e.g. WISC-V, Stanford Binet-5)

  Delis Kaplan Executive Function System (DKEFS)

  Developmental Neuropsycholgical Assessment (NEPSY-II)
- Rating Scales

  broad band rating scales (e.g. Behavior Assessment of Children (BASC-2) or Achenbach

  narrow band scales (e.g. Behavior Rating Inventory of Executive Functioning (BRIEF) or Brown ADD Scales.
- Clinical observations

Self Regulation/Impulse Control

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- At age 4 “marshmallow” and cookie studies have illustrated the predictive power of self control and delaying gratification.
- These are the earliest and by some the most important skills to emerge.
- Other EF skills build on self-regulation
- If self-regulation is compromised then so will all other EF and cognitive processes

Intervention Strategies: Self Regulation/Impulse Control

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Strategies for younger children:

**Note: these are helpful for understimulated kids

- Practice the motor sequences (e.g. standing in line, or arms out to ensure boundaries)—practice increases myelin!
- Use positive corrective feedback ("I like how Peter is waiting patiently")
- Post and review rules regularly
- Eliminate environmental triggers (are there antecedents to a given behavior?)
- Frequent rewards throughout the day

Intervention Strategies: Self Regulation/Impulse Control

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Strategies for younger children:

**Note: these work better for overstimulated kids

- Teach and use calming skills (breathing, yoga, use of calming music, mediation)
- Mindfulness and relaxation strategies -e.g. “what do you hear in this room right now” and Rainbow strategy.
- Use energy release skills (jump rope, trampoline, jumping jacks)
- Slow them down

Intervention Strategies

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Helping children "do as expected" takes previewing and planning:

1. **Tell the children what is about to happen**. "We are going outside to play. We will quietly get in line, stand helicopter distance from one another and keep our voices quiet."
2. **Tell them what they can do with their hands and their bodies**. "While you are on the playground, keep your hands to yourself as you run, jump and play."
3. **Tell them how they will know the activity is over.** "When you hear our 'secret signal', you will line up at the red door and we will slowly walk back inside.

Social Skills Books for Younger Children

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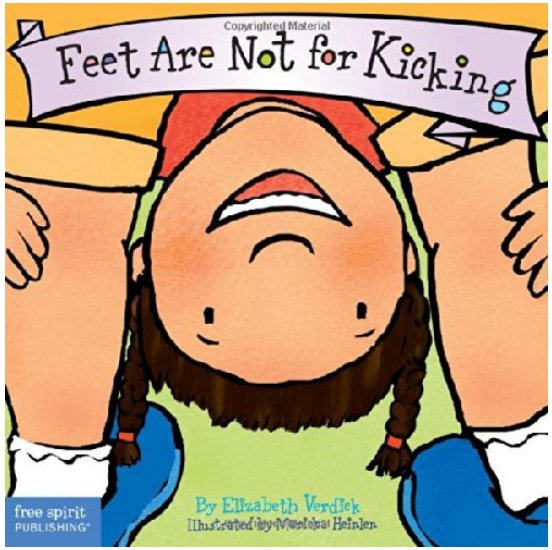

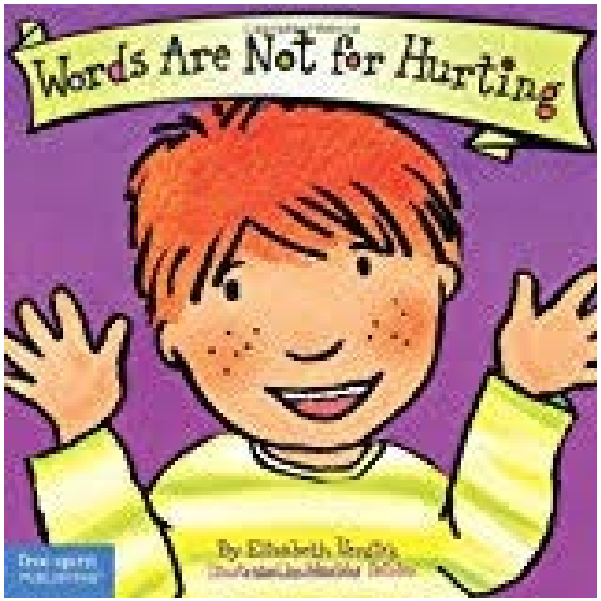

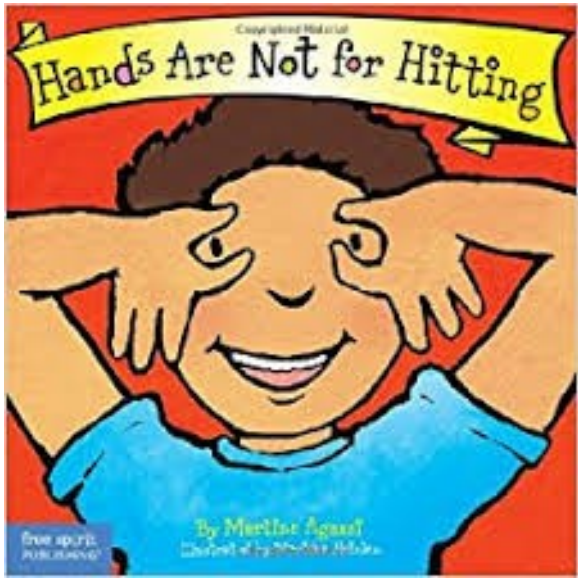

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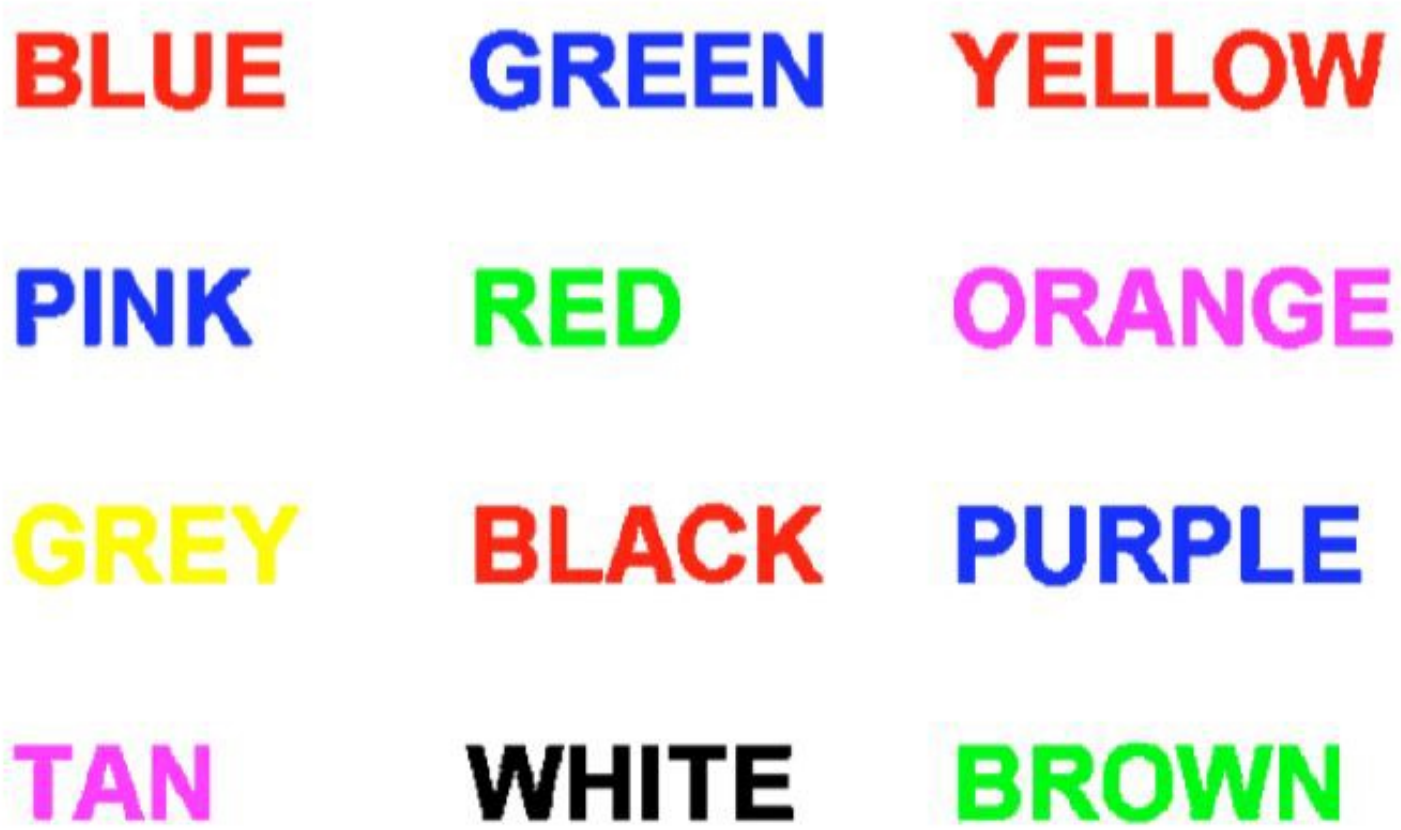
Learned Skill Inhibition



Intervention Strategies: Self Regulation/Impulse Control

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Strategies for older children/teens:

- If lower general ability, you may need to use strategies for younger children. Some children (e.g. ADHD) are 3 years or more behind developmentally.
- Biofeedback (deep breathing, guided imagery, progressive muscle relaxation)-especially when impulsivity stems from anxiety.
- Medication (e.g. stimulants, antidepressants

Intervention Strategies: Self Regulation/Impulse Control

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Strategies for older children/teens:

- Increase the power of contingencies (rewards or consequences)
- Try to make the task more enjoyable or link it to a long term desire
- Diet influences behavior
- Exercise increases dopamine in the brain
- Teach delayed gratification (e.g. how time and compound interest will make them wealthy)

Working Memory

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- The beginning of working memory may start as early as 6 months when “object permanence” is achieved. This is also when separation anxiety begins.
- Involves mentally holding in information while performing some type of operation.
- Working memory may be considered an EF or work in conjunction with EF skills.

Intervention Strategies: Working Memory

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Strategies for younger children:

- Pre-teach
- Verbal mediation
- Break up lengthy tasks
- Motor breaks
- Readiness to listen
- Sleep

Intervention Strategies: Working Memory

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Strategies for older children/teens:

- Promote active manipulation
- Multimodal approaches
- Technology (e.g. Cog med)
- Mnemonic strategies
- Patterns
- Association
- Images
- Categorize, Alphabetize
- Chunk
- Visualize
- Tell a story

Sustained Attention

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- Involves maintaining attention despite distracters, fatigue, or boredom.
- Some individuals possess more “grit” than others
- Promoted or hindered by dopamine levels
- Common weakness in ADHD/ADD (along with self-regulation

Intervention Strategies: Sustained Attention

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Strategies for younger children:

- Break up lengthy tasks
- Phrase the task as more fun—make a game out of it
- Be realistic as to what constitutes reasonable sustained attention
- Use a timer and build endurance and couple with rewards.

Intervention Strategies: Sustained Attention

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Strategies for older children/teens :

- Proper goal setting with reminders
- More powerful rewards/consequences
- Practice building endurance
- Teach goal persistence

Cognitive Flexibility/Mental Shifting

- Being able to move freely from one situation, activity, or aspect of a problem to another as the circumstances demand.
- Being flexible with problem solving.
- Switching attention between tasks and/or change focus from one task or topic to another.
- Difficulties with transitions/changes in routine (usually causing anxiety).

Intervention Strategies: Cognitive Flexibility

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Strategies for younger children:

- Visual organizers
- 2-minute warning
- Countdown from 10
- Pair any change with a good change or reward

Intervention Strategies: Cognitive Flexibility

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Strategies for older children/teens :

- Big deal or little deal?
- Implement changes slowly and gradually
- Convey your agenda before they get to!
- Medication may involve SSRIs (to reduce rumination)

Emotional Control

- May have poor emotional modulation
- May relate to amygdala-orbital connections versus pure response inhibition.
- The limbic system can override the prefrontal cortex and so the child may be less rational.

Intervention Strategies: Emotional Control

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Strategies for all children:

- Use ABC approach (Antecedent-Behavior-Consequence) with greater emphasis on the antecedent
- Process in a safe environment or remove from the situation
- Teach affective vocabulary
- Give them a script to follow

Intervention Strategies: Emotional Control

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Strategies for all children :

- Recognizing and working through escalation
  - Asking for help (I feel revved up, angry, annoyed)
  - Stopping escalation (De-escalate, Initiate calm, maintaining calm)
- Anger thermometer with an exit plan
- Deep breathing
- Slowly alter how they view antecedents and behaviors (this works best when conduct problems also occur)
- Role play and practice how to respond (this will desensitize them and reduce reactions)

Initiation

- These children struggle “getting the motor going” and struggle beginning tasks
- May be confused with poor motivation or laziness
- Procrastination is a big problem

Intervention Strategies: Initiation

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Strategies for all children:

- Prompts and priming
- Have them practice starting a task
- Provide a template
- Reward them for getting started or provide greater rewards for beginning
- Draw on successful past experiences
- Reframe motivation as initiation
- Teach self-talk (talk to yourself by name or as second person)
- Use a power phrase (e.g. I own this project!)

Planning

- Involves setting goals, using strategies, and self correcting to achieve a goal.
- It is difficult to simply give a person strategies and expect it to work for them.
- It works best to help the child/teen find their own strategies.

Intervention Strategies: Planning

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Strategies for all children:

- To facilitate planning, ask the child: “How do you think you should do it?”, “How else could you do it?”, and/or “What would you do differently next time?”.
- Increase structure and routines
- Modeling / Examples
- Verbalize plans
- Pre-organize
- Break tasks into smaller steps
- Teach use of visual plan/organize tools

Intervention Strategies: Planning

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Study Strategy 10/24/7

- **10:** rewrite notes 10 minutes after class and merge with reading assignments
- **24:** review notes 24 hours after class
- **7:** review notes 7 days later and offer to tutor someone from class

Time Management

- Poor estimation as to how long a given task will take creates large time management issues.
- Too much time leads to procrastination. Hence, if you want something done ask a busy person! Sometimes it is better to add activities and thus structure.

Intervention Strategies: Time Management

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Strategies for all children:

- Teach them to better estimate how long each task will take.
- Practice estimating the time needed and then integrate with organization strategies.

Intervention Strategies: Time Management

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ACTIVITY	HOW LONG DO I THINK IT TAKES?	HOW LONG DID IT *REALLY* TAKE?	WHAT WAS THE DIFFERENCE?
Brushing Your Teeth 			
Eating Breakfast 			
Getting Dressed and Ready for School 			
Eating Dinner 			

Global/Integrative Strategies

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Diet and Hydration

- 1 oz water per pound per day
- Complex Carbohydrates, Protein, Dairy, Fruits, Vegetables, and Whole Grains (Consult with Primary Care and/or Nutritionist for specific needs)

Sleep

- **3-5 Years** (10-13 hours recommended)
- **6-13 Years** (9-11 hours recommended)
- **14-17 Years** (8-10 hours recommended)
- **18-25 Years** (7-9 hours recommended)

Modifying the environment

- Power "On" zones for technology and power "Off" zones for homework
- Regular study time and regular study location
- Find and proactively eliminate distracters

Exercise (Martial Arts, Jump Rope, Yoga, Swimming, Sports, Hiking, Dancing, Biking…)

Resources

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Questions?

References

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Additional Sources and Resources

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