

EXECUTIVE FUNCTION IN CHILDREN

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What is Executive Function ?

- ◊ A **cluster of behaviors** not readily assessed with standardized tests, but affect our daily lives particularly in an educational situations.
- ◊ There is **no universal definition** of the various executive functions
- ◊ These aspects of behavior are **not easy** or straightforward to observe, measure, or define

Other definitions

- ◊ WebMD: "A set of mental skills that help you get things done. These skills are controlled by an area of the brain called the frontal lobe."
- ◊ LDOonline: "A term used to describe a set of mental processes that helps us connect past experience with present action."

Neurobiological Basis

- ◊ WebMD: Frontal Lobe
- ◊ Hosenbocus et al.: "The Executive system is mediated in various networks in the frontal, parietal, and occipital cortices, the thalamus and the cerebellum. The prefrontal cortex is the primary site of cortical activity during tasks involving EF"

Neurochemistry

- ◊ Hosenbocus et al. 2012: "**Dopamine** is the main neurotransmitter of the ES, and plays an essential role in the frontal cortex in mediating EF." These neurons influence the modulation of expectation, reward, memory, activity, attention, drives, and mood. Disturbances form the basis of many psychiatric illnesses.

Why look at Executive Functions?

- ◊ Children we see with **various disorders** also exhibit executive dysfunction, which can help define and explain behaviors that are closely related
- ◊ Is there a **behavioral component** that might suggest an attention or some other disorder?
- ◊ Provides information that is **not on standardized tests**
- ◊ **Makes you a better clinician**

Important Aspects

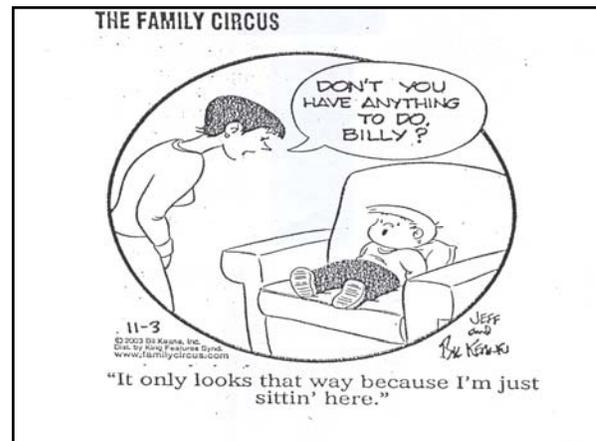
- ◇ EFs are **NOT brain structures**, but processes that **CUE** frontal mechanisms responsible for voluntary control and delayed gratification
- ◇ **Maturity** is independent of brain structures and there is variability in development among individuals

Developmental Aspects

- ◇ Develop over time
- ◇ Start in first year of life
- ◇ Significant shift starting in adolescence
- ◇ Natural maturational delays and lags in development not uncommon
- ◇ EFs do not develop evenly
- ◇ Great variation relative to chronological age
- ◇ Particularly evident in individuals with ADHD

Relationship to Brain Function

- ◇ Associated with the **prefrontal cortex** of the brain, a region referred to as the frontal lobes
- ◇ Not a unitary concept
- ◇ Specific areas are activated when a specific EF is engaged
- ◇ Executive Functions are **DIRECTIVE**
- ◇ Neuromaturational in nature



Stuss & Benson, 1986

Model distinguishes

"Basic" cognitive functions (language, visual-spatial, memory abilities)

From

"Executive functions" or directive, cognitive control functions

Importance of EF in Human Development

- ◇ "Crowning achievement of **human development**"
- ◇ **Separates** us from animals
- ◇ Allows us to **think about** ourselves, social relationships, and what future may bring
- ◇ Allows for **planning and delayed gratification**

What conditions are most at risk for Executive Dysfunction?

- ADHD
- AUTISM SPECTRUM DISORDER
- FETAL ALCOHOL SYNDROME

Other Psychiatric Conditions manifesting EF problems

- ◇ Depression
- ◇ Bipolar Disorder
- ◇ Schizophrenia
- ◇ Obsessive Compulsive Disorder
- ◇ Anxiety Disorder

Additional Conditions

- ◇ Traumatic Brain Injury
- ◇ Central Auditory Processing Disorder
- ◇ Language Processing Disorder
- ◇ Learning Disabled
- ◇ Weak cognitive functioning

Theories of Executive Function

Neuropsychological Approach

- ◇ Domain-General Control Processes (Denckla)
 - Set of **domain-general control processes** that involve inhibition and delay of responding for the goal of organization and integration of cognitive and output processes over time.
 - Sensation (How we perceive things)
 - Emotions (How we feel about them)
 - Thought (How we think about things)
 - Action (How we act on things)
 - Model emphasizes **primarily cognition**... not social, emotional, motivational, or personality aspects of Executive Functions.
- ◇ Working Memory (Pennington, Bennetto, McAleer, and Roberts)
 - Ability to maintain an appropriate **problem-solving** set for attainment of a future goal involving working memory (computational area for maintaining constraints leading to problem solving and goal attainment)

Behavioral Self-Regulation Approach

- ◇ Behavioral Analysis (Hayes, Gifford, Ruckstuhl)
 - **Rule based** approach focusing on verbal self-regulation thinking about and guiding one's behavior responses
- ◇ Self-Regulated Strategy Development (Graham and Harris)
 - **No formal definition** but includes elements of metacognition, planning, verbal self-regulation, attention and memory, explicit and implicit learning, and self-control and **do not view EFs as an isolated domain for intervention**

Integrated Approach

- ◇ Information Processing via Cognition and Metacognition (Borowski and Burke)
 - Indicated when a subject spontaneously changes a control process or sequence of control processes as a reasonable response to an objective change in an information processing task. Distinguishes **cognitive abilities from metacognitive skills** and sees EF as a coordinator through monitoring and control
- ◇ Attention (Barkley)
 - An executive response or function is a **special case of attending** behavior that functions to change the likelihood of consequences

Key Dimensions unifying theories (McCloskey)

- ◇ All address to some degree **MENTAL CAPACITIES** that **direct or cue** the use of other mental processes and/or motor processes that can be used to regulate emotions
- ◇ All address **FUNCTIONS** that have some link to activation of portions of the **FRONTAL LOBE** regions of the cerebral cortex

McCloskey's Model of Executive Function Levels and Capacities

- ◇ Self Activation
- ◇ Self Control
- ◇ Self Regulation
- ◇ Self Realization
- ◇ Self Determination
- ◇ Self Generation
- ◇ Trans-Self Generation

Self Activation

- ◇ Waking up
- ◇ "Sleep Inertia"
- ◇ Problems with school schedules

Self Control and Regulation

- ◇ 23 functional capacities that cue and direct these **functional domains**
 - Sensation (How we perceive things)
 - Emotions (How we feel about them)
 - Thought (How we think about things)
 - Action (How we act on things)

Self Regulation Capacities

- ◇ Perceive
- ◇ Initiate
- ◇ Gauge
- ◇ Focus/Select
- ◇ Sustain
- ◇ Stop/Interrupt
- ◇ Inhibit
- ◇ Flexible/Shift
- ◇ Hold
- ◇ Manipulate
- ◇ Organize
- ◇ Short Term Planning
- ◇ Generate
- ◇ Associate
- ◇ Balance
- ◇ Store
- ◇ Retrieve
- ◇ Pace
- ◇ Time
- ◇ Execute
- ◇ Monitor
- ◇ Correct

Ineffective Behaviors due to Self Regulation Dysfunction

◇ Cues

Perceive

Focus/Select

Initiate

◇ Observed Behaviors

– Does not see signs, hear directions, make use materials, or aware of emotions, thoughts, and/or actions

– Does not attend to information being presented

– Slow to get started with tasks; perceptions, thoughts, and emotional reactions seem to come slowly

Manipulate

◇ Has difficulty actively working with information that is being held in mind

Generate

◇ Does not seem to pick up on when it is necessary to come up with a new idea or try a novel solution to a problem

Associate

◇ Does not seem to pick up on when it is necessary to make connections between information, or to know what kinds of connections between information could be made

Self Realization

◇ Self Awareness

- Result of activation in the frontal lobes of neural paths and the more they are activated, the more self-awareness develops
- Developmental, may not be age appropriate
- Deficient in Autism Spectrum Disorders

◇ Self Analysis

- Involves reflection and yields judgments
- Aids in development of awareness of strengths and weaknesses

Self Determination

◇ Goal Generation

◇ Long Term Foresight/Planning

Self Generation

- ◇ Mind-Body Integration
- ◇ Sense of Spirit
- ◇ Goes beyond daily aspects of physical and mental existence
- ◇ "Why am I here?"
- ◇ Can be independent of other EF capacities
- ◇ Does not need to be engaged in order to effectively use the lower tiers

Trans-Self Generation

- ◇ Sense of source
- ◇ Cosmic consciousness
- ◇ Research shows that the ability to experience the phenomenological state of egolessness or unity consciousness is directly linked to neural circuits heavily dependent on areas of the frontal lobes

Internal vs. External Demand

- ◇ **Internal demands** derive from internal desires, aspirations, and plans and easier to engage because it flows naturally from person's desires
- ◇ **External demands** require more mental effort and much greater capacity for control

Effects of Executive Dysfunction on Academic Development and Production

Effect on Academic Skill Development

- ◇ Learning vs. Production Disabilities
- ◇ May surface in later years
- ◇ Often first noticed by parents
- ◇ Can result in character assassination
- ◇ Greatest risk of school failure

Problems seen in Elementary School

- ◇ Written Expression
- ◇ Reading
- ◇ Mathematics

Upper Grades academic problems can appear or persist with these additional difficulties

- Organization and planning
- Planning and completing projects and homework
- Inadequate regulation of use of study skills and/or test taking skills

Assessment of Executive Functions

Assessment?

- ◊ **Formal**
 - Limitations, not a standard practice for many psychologists.
- ◊ **Informal**
 - More realistic, can aid in intervention and management

Goals of Assessment

- ◊ Identify strengths
- ◊ Identify weaknesses
- ◊ What needs to be done?
- ◊ Who needs to do it?

Formal Measures

Problems with Standardized Educational Evaluations

- ◊ Two important EF skills (*initiation and sustained attention*) are not assessed during a formal evaluation when the examiner tells the child when to start and stop and tasks are often brief so there is no demand for sustained attention.
- ◊ With an examiner present, the child *does not have to monitor* his or her own performance
- ◊ In this highly structured situation, there is *no need for planning and organization*.
- ◊ The need to complete *complex, open-ended tasks* requiring problem solving and creative or unique solutions is not required when tests are usually scored with answers that are straight forward, right or wrong.

- ◊ Complex tasks presented in testing are *less complex* than real world demands and there is no way to determine if the results of testing translate to the real world situations.
- ◊ Even good performance on "tests" of executive function doesn't mean that the child can *apply* good planning ability in daily performance at home or at school.
- ◊ Evaluations are in *structured* situations
- ◊ There is *not* a high demand on the executive functions, so they are not readily observed

Who is a Neuropsychologist?

–From Wikipedia

- ◊ Must complete 4 year undergraduate degree in psychology, and a 4 to 5 years doctoral degree
- ◊ After doctoral coursework, training and dissertation, must complete 1 year internship followed by 2 years supervised residency
- ◊ Applies to state for license in psychology
- ◊ Obtain certification from the American Board of Professional Neuropsychology or the American Board of Pediatric Neuropsychology by reviewing training, experience, submitted case samples and successfully completing written and oral examinations.
- ◊ These are "standard" but there are "other ways of achieving clinical neuropsychologist status."
- ◊ "A SMALL MINORITY OF STATES RECOGNIZE NEUROPSYCHOLOGY AND ACTUALLY DESIGNATE IT ON THE LICENSE." from www.psychologist-license.com

Examples of Standardized Tests of Executive Function by Neuropsychologists

- ◇ **The Stroop Test** (Inhibition)
- ◇ **The Wisconsin Sorting Test** (Change categories)
- ◇ **Tower of Hanoi** (Planning)
- ◇ **Tapping Test** (attentional control, inhibition of imitative action, and switching solutions to auditory stimuli)
- ◇ **Rapid Alternating Stimulus-Test** (Sustained attention and ability to switch contexts rapidly during a verbal naming test)
- ◇ **Block Sort** (Problem solving shift)
- ◇ **Visual Search Test** (attentional control and switching motor responses)
- ◇ **Trail Making Test** (mental flexibility)
- ◇ **Key-Osterrieth** (copy complex geometric designs to assess ability to organize complex information)

Issues with Standardized Tests

- ◇ Vague **definition** of EF and lack of technical clarity in research
- ◇ **Multiple abilities** are required to perform tests and there could be several alternatives for a deficit in test performance
- ◇ Example: Many tests of EF place considerable demand on **spatial analysis** or **concept formation**

- ◇ Highly competent individuals find ways to **compensate**
- ◇ Poorer performance may be due to **language or perceptual motor disorders** rather than attention or executive function difficulties
- ◇ **Age** or exposure to test procedures?

Diagnostic Criteria?

- ◇ No separate diagnostic category in the DSM-5
- ◇ Existing category: Closest to ADHD, but not all who have EF difficulties are ADHD and do not meet criteria for ADHD

Other Issues with Standardized Testing

- ◇ Not yet standard practice for many psychologists
- ◇ Standard practices focus almost exclusively on the **Symbol System** Arena ignoring the Intrapersonal, Interpersonal, and Environmental Arenas
- ◇ Tests are narrow in scope and do not address **APPLICATION** in real life situations
- ◇ Should not overgeneralize findings
- ◇ Standard Psychoeducational Evaluations do not place much demand on executive functions

Using Task Analysis (McCloskey)

- ◇ **Cascading Production Decrement** Analysis
 - Production decreases due to need for use of self-regulation cues
- ◇ **Cascading Production Increment** Analysis
 - Less common...more difficult to orchestrate using direct formal assessments, where assessments are not constructed to reduce executive demands

Production Decrement Example

- ◇ Difficulty with Self-Regulation comparing test performance on similar skills involving word reading
- ◇ *Process Assessment of the Learner (PAL) v. KTEA II Letter and Word Recognition vs. Test of Word Reading Ability (TOWRE)*
- ◇ Adequate performance on word recognition tasks, decoding tasks, and rapid naming tasks on process tests and average performance on KTEA II skill test
- ◇ Deficient Performance on the TOWRE

Why?

- ◇ Process and skill ability tests yield average scores but the **TOWRE which is a skill+ executive function** of self-regulation test reveals a poor quality of word reading and decoding efforts as children struggle to read quickly. Children must first read a list of sight words quickly and then decode a list of unfamiliar words quickly.
- ◇ Process and skills scores could be at 50th percentile with the TOWRE score at the 4th

Psychoeducational Test Results

- ◇ Can get it together for these tests
- ◇ Often do not demonstrate "Learning Disability"
- ◇ Still using the discrepancy model
- ◇ Don't "qualify" for services
- ◇ Must look under the right lamp post
- ◇ Stop thinking of children as lazy

Informal Measures

McCloskey's Observation Form of Self-Regulation EFs

- ◇ Perceive
 - Does the student see, hear, and/or touch things when necessary without needing to be prompted to do so?
 - Does the teacher prompt for engagement when necessary?
- ◇ Initiate
 - Does the student immediately begin tasks as requested without needing to be prompted to do so?
 - Does the teacher prompt for engagement when necessary?
- ◇ Add space to record notes

- ◇ Argumentative
- ◇ Obsessive
- ◇ Impulsive
- ◇ Easily distracted
- ◇ Forgetful
- ◇ Easily upset by new situations
- ◇ Easily frustrated
- ◇ Restless with problems sitting still
- ◇ Disorganized
- ◇ Does not complete assignments
- ◇ Has difficulty following directions
- ◇ Lacks self confidence
- ◇ Has school or other anxieties

The Behavior Rating Inventory of Executive Function (B.R.I.E.F.)

- ◇ A reliable and valid behavior **rating scale** of executive functions in children and adolescents
- ◇ Assists with **treatment** and educational **planning**

Versions

- ◇ BRIEF-P for 2 to 5.11 years
- ◇ BRIEF for 5-18 years
- ◇ BRIEF-Self Report for 11-18 years
- ◇ BRIEF-Adult for 18-90 years
- ◇ BRIEF Computer Scoring for BRIEF and Self Report
- ◇ **From Psychological Assessment Resources**
- ◇ www.parinc.com

What is the BRIEF?

- ◇ Measures different **aspects of executive functioning** including theoretical, derived scales that measure different aspects of Executive Function
- ◇ Enables professionals to **rate** executive functions in the home and school environments
- ◇ Includes separate **questionnaires** for parents and teachers as well as a self-assessment for children of at least 11 years
- ◇ Designed for broad range of **ages**
- ◇ Takes about **15 minutes** to complete

Instructions and Scoring

- ◇ Parents and Teachers are asked to indicate if a particular behavior is **never** seen, is **sometimes seen**, or is **often seen**
- ◇ Older children are asked if stated behaviors have **never, sometimes, or often been a problem in the last six months**
- ◇ Each scale is scored and the raw score is converted to a **T-score**.
- ◇ **T-scores greater than 65** are elevated and considered significant
- ◇ **Separate norms** for boys/girls and parent/teacher/self report forms
- ◇ There are additional **Indexes** for further interpretation

BRIEF PRESCHOOL

Same form is used by parents and teachers

- ◇ SCALES
 - Ability to **Inhibit** responses
 - Ability to easily **Shift** attention
 - Ability to maintain **Emotional Control**
 - **Working Memory**
 - Ability to **Plan and Organize**

Additional Information

- ◇ Expressive Language
- ◇ Socially Appropriate Behavior

Preschool Indexes

- ◇ **Inhibitory Self-Control** is fundamental to emerging problem solving
- ◇ **Flexibility Index** is a component of behavioral regulation
- ◇ **Emergent Metacognition** is the development of the ability to initiate, plan, organize, implement and sustain future-oriented problem solving

Parent/Teacher BRIEF Scales for 5-18 years

- ◇ Behavioral Regulation Index
 - Ability to *Inhibit* responses
 - Ability to easily *Shift* attention
 - Ability to maintain *Emotional Control*
- ◇ Metacognitive Index
 - Ability to *Initiate* tasks
 - *Working Memory*
 - Ability to *Plan and Organize*
 - Ability to *Organize Environment*
 - Ability to *Monitor* self

Information from the BRIEF

- ◇ Parent and Teacher scores are **separate**
- ◇ Obtain **Negativity Score**
- ◇ Obtain **Inconsistency Score**
- ◇ Compare responses to children diagnosed with **ADD/ADHD**

Negativity Score

- ◇ Measures the extent to which the informant answers selected items in an **unusually negative manner**.
- ◇ Can indicate if there is an **excessively negative perception** or there is **substantial executive dysfunction**
- ◇ Score is **acceptable, elevated, or highly elevated**

Inconsistency Score

- ◇ Indicates extent to which informant answers questions in a **consistent manner**
- ◇ May answer **never** in response to one item and **often** in response to a similar item
- ◇ Score is classified as **acceptable, questionable, or inconsistent**

Examples

- ◊ Has explosive, angry outbursts
- ◊ Needs help from adult to stay on task
- ◊ Acts wilder or sillier than others in groups
- ◊ Has outbursts for little reason
- ◊ Has trouble concentrating on chores, schoolwork
- ◊ Becomes too silly

BRIEF-Self Report (11-18 years)

- ◊ Behavioral Index
 - Ability to *Inhibit* responses
 - Ability to easily *Shift* attention
 - Ability to maintain *Emotional Control*
 - Ability to *Monitor* self
- ◊ Metacognitive Index
 - *Working Memory*
 - Ability to *Plan and Organize*
 - Ability to *Organize Environment*
 - *Task Completion*

Additional Self Report Subscales

- ◊ **Behavioral Shift**
 - Ability to *adapts one's behavioral "set" or actions* in response to environmental or situational change. May be reflected in elevated Emotional Control Scale
- ◊ **Cognitive Shift**
 - Reflects the ability to *solve problems* in a flexible manner. May be rigid and stubborn in approach to problem solving

Sustained Attention problem?

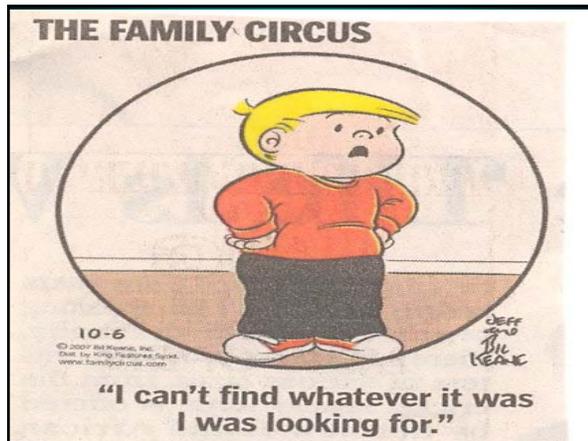
- ◊ Auditory Continuous Performance Test by Dr. Robert Keith available from Auditec of St. Louis
www.auditec.com

Important principles

- ◊ There is *no singular disorder* of Executive Dysfunction
- ◊ Common syndromes can be reflected in *patterns of elevated scores* on the various functions

Working Memory Scale

- ◊ Measures capacity to *hold information* in mind for the purpose of completing a task
- ◊ *Trouble remembering* things even for a few seconds
- ◊ *Lose track* of what they are doing
- ◊ *Forgets* what they are supposed to get
- ◊ Integral to *sustaining performance and attention*

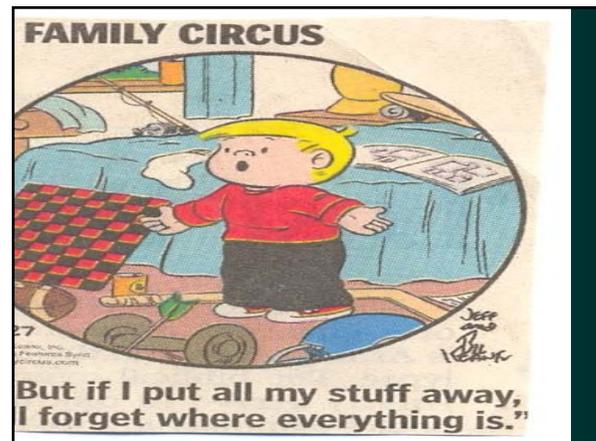


Examples of Items from Teacher and Parent Questionnaires

- ◊ When given three things to do, remembers only the first or the last
- ◊ Has a short attention span
- ◊ Has trouble concentrating on chores, schoolwork, etc...
- ◊ Is easily distracted by noises, activity, sights, etc...
- ◊ Has trouble with chores or tasks that have more than one step

Plan/Organize Scale

- ◊ Measures the ability to manage current and future oriented task demands
- ◊ Ability to anticipate future events, set goals, and develop appropriate steps ahead of time to carry out a task or activity



Planning

- ◊ Involves imagining or developing a goal and then determining the most effective steps or method to carry out that goal
- ◊ Requires sequencing

Organizing

- ◊ Relates to the ability to bring order to information and appreciate main ideas or key concepts when learning or communicating information
- ◊ Involves ability to organize oral and written expression, as well as to understand main points expressed in presentations or written material

- ◇ Keeping **track of homework**
- ◇ Poor organization of **newly learned material** can result in **difficulty retrieving** that material in free recall information, but better performance with recognition (multiple choice) formats
- ◇ Not always seen until fourth grade, but **common in cases of Executive Dysfunction**

Examples of Items from Teacher and Parent Questionnaires

- ◇ Does **not bring home homework** assignments sheets, materials, etc..
- ◇ Has **good ideas** but cannot get them on paper
- ◇ **Forgets to hand in homework**, even when completed
- ◇ Gets **caught up in details** and misses the big picture

Organization of Materials Scale

- ◇ Measures the **orderliness of work, play, and storage spaces**
- ◇ Assesses the manner in which children **order or organize their world and belongings**

Examples of Items from Teacher and Parent Questionnaires

- ◇ **Loses** lunch box, lunch money, permission slips, homework, etc...
- ◇ **Cannot find** clothes, glasses, shoes, toys, books, pencils, etc...
- ◇ Cannot find things in room or **school desk**
- ◇ Leaves a **trail of belongings** wherever he/she goes
- ◇ **Leaves messes** that others have to clean up

DISORDERS THAT IMPACT EF

Acquired brain injury (head trauma, stroke, oxygen deprivation, infection)

Autism Spectrum Disorders (There is no specific pattern of EF weakness, but children with Asperger's syndrome and nonverbal learning disabilities often demonstrate problems with self-regulation, self-directed thinking strategies, and flexibility)

Attention Deficit/Hyperactivity Disorder (EF deficits are CENTRAL in ADHD) Typical goal directed persistence is deficient in individuals with ADHD as well as weakness in self-regulation.

Sleep Disorders and Sleep Deprivation (The prefrontal cortex helps regulate sleep, arousal, and attention) Sleep deprived children have difficulty with complex tasks that require planning or goal directed persistence, particularly when the goals are abstract and rewards are delayed. Surveys indicate that **60% of children under 18 years complain of daytime sleepiness** and **15% report falling asleep in class.**

PROFILES OF EXECUTIVE DYSFUNCTION WITH SPECIFIC CONDITIONS

Attention Deficit Hyperactivity Disorder

- ◇ Longstanding history of attentional and behavioral control difficulties including overactivity, impulsivity, and problems sustaining attention in school
- ◇ Problems first noted in kindergarten, but more pronounced in second grade
- ◇ Difficulty with peer relationships

Attention Deficit Hyperactivity Disorder-Inattentive Type

- ◇ Often overlooked when there is not the accompanying activity level
- ◇ Difficulty sustaining attention
- ◇ Memory problems
- ◇ Comprehension problems
- ◇ Really overlooked in girls

Severe Executive Dysfunction

- ◇ Academic performance declines over time, starting in middle school, and worsening in high school
- ◇ Average to above average intellectual ability, but poor completion of assignments
- ◇ Loses or forgets homework
- ◇ Easily overwhelmed

Asperger's Syndrome

- ◇ History of behavioral and social problems
- ◇ Doesn't quite fit ADHD, but maybe OCD
- ◇ Doesn't respond to medication
- ◇ Difficulties appeared early
- ◇ Overly focused on certain subjects
- ◇ May be strong in reading and spelling

Typical Profile

- ◇ Elevated Behavioral Regulation and Metacognitive Scales
- ◇ Often Severe Executive Dysfunction
- ◇ Behaviors may actually be not OCD, but related to general difficulties with flexible problem-solving with peers and shifting behaviors or problem-solving behaviors

Central Auditory Processing Disorder

- ◇ Average to above average intellectual function
- ◇ Variety of complaints, but frequently reading comprehension, spelling, written language, problems following directions, work habits
- ◇ Not performing at expected levels

Case Studies

Case Study with Psychological and Neuropsychological Evaluations

15 year old male

- ◇ Medical History
 - Suspected spinal meningitis at two weeks, but no diagnosis
 - Hospitalized at two years for RSV
 - Two bouts of chicken pox
 - Seizure at 4 years of age, diagnosed with partial complex seizure disorder, well controlled with medication
 - Abnormal EEG in bi-frontal region
 - Allergies and Asthma
 - Three sets of PE tubes
 - Takes **multiple medications** for diagnoses of ADHD, ODD, Depression, Adjustment Disorder.
 - Sleep an ongoing problem, he reported that he has trouble waking up in the morning

Educational History

- ◇ Has attended four schools
- ◇ No special services at public school
- ◇ Was placed in residential school last year for behavior problems and in 9th grade this year at public high school with no IEP
- ◇ School performance significantly improved in residential school
- ◇ Doesn't like school, but has friends there
- ◇ Poorest performance in math word problems and class behavior

Personality and Behavior

- ◇ Moody
- ◇ Stubborn
- ◇ "Thinks he's independent"
- ◇ Argumentative
- ◇ Very affectionate
- ◇ Impulsive
- ◇ Easily distracted
- ◇ Forgetful
- ◇ Disobedient
- ◇ Bothered by background sounds
- ◇ Easily upset by new situations
- ◇ Easily frustrated
- ◇ Disorganized
- ◇ Doesn't sleep well
- ◇ Seeks attention

- ◇ Lacks motivation
- ◇ Does not complete assignments
- ◇ Prefers to play with younger children
- ◇ Has difficulty following directions, Has inappropriate social behavior
- ◇ Lacks self confidence
- ◇ Has school anxiety
- ◇ Has generalized anxiety
- ◇ No particular present behavior problems and likes video games and basketball

Family History

- ◇ Parents divorced for 13 years
- ◇ Lives with mother and stepfather
- ◇ Has two half brothers (father's children) who have speech problems
- ◇ Mother completed associate's degree and had reading comprehension problems
- ◇ Father completed 11th grade and is terminally ill
- ◇ Extended Family History of speech/language problems, learning problems, mental retardation, mental disorders, and autism

Psych Eval in 2/08 as outpatient at hospital by psychologist

WISC-IV

- ◇ Average Verbal and Nonverbal skills
- ◇ Poor Working Memory
- ◇ Below Average Processing Speed

Psych Eval in 3/08 by school

WISC-Children III

- ◇ Average Verbal and Non-Verbal skills
- ◇ Average math and written language scores
- ◇ No mention of memory

Neuropsych Eval 8/08 in hospital

- ◇ **KBIT** administered with Average Verbal and Low Average Non-Verbal
- ◇ Other conclusions
 - All EF tests were average to borderline
 - Reasoning and Abstraction "normal"
 - "Borderline" performance on higher order reasoning and problem solving
 - 24 point difference in memory tasks, with better memory for verbal than non-verbal material
 - Word retrieval and receptive language normal
 - Evidence of reduced higher order executive functions in the form of borderline impaired higher order abstraction"
 - Consistent with "Non-dominant hemisphere frontal onset seizure disorder"
- ◇ Recommendation
 - Cognitive Rehabilitation focused on higher order reasoning and abstraction skills and functional memory skills
 - Ongoing psychiatric services

Achievement Test at Residential School

- ◇ Woodcock -Johnson III
 - Average to Low Average with lowest scores in Letter-Word Identification, Calculation, and Applied Problems

Results of the BRIEF completed by mother and child

PARENT SCALE	
Behavioral Regulation Skills	
Inhibit	X
Shift	X
Emotional Control	X
Metacognitive (Self-Directed) Skills	
Initiate	X
Working Memory	X
Plan/Organize	X
Organization of Materials	X
Monitor	X
Inconsistency Scale	Acceptable
Negativity Scale	Acceptable

SELF REPORT SCALES	
Behavioral Regulation	
Inhibit	X
Shift	X
Emotional Control	X
Monitor	X
Metacognitive (Self-Directed) Skills	
Working Memory	X
Plan/Organize	X
Organization of Materials	X
Task Completion	X
Subscales	
Behavioral Shift	X
Cognitive Shift	X
Inconsistency Scale	Acceptable
Negativity Scale	Acceptable

Other findings from CAP Eval

- ◊ Perceptual, memory, sequencing, phonological awareness, and language processing problems
- ◊ Mildly impaired in background noise
- ◊ 77 Standard Score (6th percentile) on Auditory Memory tasks of TAPS except Number Backwards (37th percentile)
- ◊ Mild auditory sequencing problems
- ◊ No errors on sustained auditory attention task on present level of medication

- ◊ Poor performance on **Phonemic Synthesis (12 with expected score of 23)**
- ◊ Average performance on PAT subtests
- ◊ Average sight words (52nd percentile) on TOWRE, but **poor (10th percentile) ability to decode unfamiliar words quickly**
- ◊ **Failed language screening** with score of 18 and expected of 23 (particular difficulty with repeating short sentences, expressive vocabulary, visually sequencing words into sentences, and comprehension)

Recommendations

- ◊ Sleep study
- ◊ Sound Field
- ◊ Language Processing Evaluation and therapy
- ◊ Reading Intervention, looks like dyslexia

INTERVENTION AND MANAGEMENT

Think about becoming "coaches" to help children be successful rather than thinking that they are just lazy. Big need for this in today's academic world with increasing demands. Could be selling point for your school.

Regarding behavior problems, remember that kids would rather be "bad" than "dumb." Takes the focus off their inability to do the work

Aspects of Intervention

- ◇ EF processes underlie most academic work from the 4th grade on
- ◇ Need to coordinate multiple subprocesses including planning time, organizing and prioritizing information, distinguishing main ideas, monitoring progress, and reflecting on work

Two Key Issues

- ◇ How should decisions be made as to whether progress is being made?
- ◇ How long should intervention efforts continue without modifications if no progress is being demonstrated?

General Guidelines

- ◇ Engage families and others who can model good behavior
- ◇ Assume that difficulties are unconscious behaviors
- ◇ Make child aware of capacities
- ◇ Develop external controls with the goal of eventually removing them
- ◇ Encourage hope, perseverance, and patience (may take a long time)
- ◇ Have reasonable expectations

Evidence based?

- ◇ Lack of evidenced based studies

GENERAL PRINCIPLES (McCloskey)

- ◊ Executive Function difficulties are associated with suboptimal brain function
- ◊ Brain function can be altered through intervention
- ◊ Intervention can activate the use of intact brain function
- ◊ Balance Internal vs. External Controls

Important!!!

- ◊ Children do not consciously choose to have problems
- ◊ Be careful with reward/punishment system
- ◊ Don't blame the child
- ◊ Help child to internalize executive control
- ◊ Maturation helps!!

Develop Internal and External Control

McCloskey et. Al.

Internal control

- ◊ **Goal**-Develop external control
- ◊ Cognitive Behavior Therapy
- ◊ Increase awareness
- ◊ Teach specific EFs as skills routines
- ◊ Model behavior
- ◊ Behavior Therapy
- ◊ Increase well-being
 - Yoga, Tai Chi, physical activity
- ◊ Social-Problem Solving Therapy
- ◊ Self-talk (Metacognitive)
- ◊ Videotape

External Control

- ◇ Pharmacological treatment
- ◇ Structure environment
- ◇ Structure time
- ◇ Provide feedback
- ◇ Provide rewards

Pharmacological

- ◇ Doesn't directly work on frontal lobes
- ◇ Research shows that meds primarily work on other parts of the cerebral cortex and/or subcortical regions
- ◇ Can improve use of self-regulation capacities of focus/select, sustain, and monitor cues

Environmental

- ◇ May be most important area of intervention
- ◇ Can be most dangerous for child who doesn't manage this well
- ◇ Critical for child, family, community
- ◇ Increase self-awareness
- ◇ Use timers
- ◇ To do Lists
- ◇ Infrared Sound Field Amplification

Young children

- ◇ Focus should be on organizing and structuring the **environment** and organizing and providing **cueing** for behavioral strategies and routines
- ◇ Often need **direct rewards** and positive incentives
- ◇ Can be quite stressful at first and then **fade cueing**

Accommodations vs. Modifications (Ozonoff and Schetter in Meltzer 2007)

- ◇ **Accommodation**: Change in course, standard, or test (prep, location, timing, scheduling, expectations, responses) that allow participation **without** lowering standards
- ◇ **Modification**: A change that **does** lower standard or expectation

Application of EF Interventions to the IEP/504 Process from BRIEF

- ◇ Rather than specific academic curriculum "content," these **goals** focus on the development of a learning and/or **problem solving "process"** designed to **enhance** the efficient learning and memory of academic information
- ◇ **Emphasis of support** is on teaching, modeling, and cueing an approach to self-management through active planning, organization, and monitoring of work

Long Term Goal

- ◇ "The student will independently employ a systematic learning/problem solving method (Goal-Plan-Do-Review system) for tasks that involve multiple steps and/or require long-term planning."
- ◇ Domain specific goals and objectives then articulated
- ◇ Younger children, preface with "With directed assistance,.....will....."

Examples of IEP/504 Goals generated from BRIEF software

◇ Goal Setting

- ...will **participate** with teachers in setting instructional goals ("I want to be able to read this book")
- ...will accurately **predict** how effectively she will accomplish this a task. (Complete it, predict her grade, amount of time taken)

◇ Planning

- Given a routine (e.g., complete a sheet of math problems, clean room),...will **indicate what steps or items** are needed and the order in which events will proceed
- Given a selection of three actions necessary for an instructional session,.....will **indicate their order, create a plan on paper, and follow the plan**
- Having failed to achieve a predicted grade on a test, ...will **create a plan for improving performance for the next test**

◇ Monitoring

- Given a routine, ...will indicate **what steps or items** are needed and the order in which events will proceed
- Given a selection of three actions necessary for an instructional session, ...will **indicate their order, create a plan on paper, and follow the plan**
- Given a task that she correctly identifies as difficult for her,...will **create a plan for accomplishing that task**
- Having failed to achieve a predicted grade on a test,...will create a plan for **improving performance** for the next test

◇ Organizing

- ... will follow/create a system for organizing personal items in her **locker**
- ... will select and use a system to **organize her assignments** and other school work
- Given a complex task, ...will **organize the task on paper**, including the materials needed, the steps to accomplish the task, and a time frame for completion
- ...will prepare an **organized outline** before proceeding with writing projects

◇ Self-Monitoring, Self-Evaluating

- ...will keep a **journal** in which she records her plans and predictions for success and also records her actual level of performance and its relation to her predictions
- ...will **identify errors** in her work without teacher assistance
- ...'s **rating of her performance** on a 10-point scale will be within one point of the teacher's rating

◇ Self-Awareness

- ...will accurately **identify tasks** that are easy/difficult for her
- ...will accurately identify her **strengths and weaknesses**
- ...will **explain why** some tasks are easy/difficult for her

◇ Self Initiating

- When...does not know what to do, she **will ask** the teacher
- With **regular/minimal prompting** from the teacher, assistant, or parent, ...**will begin** her assigned tasks, initiate work on her plan, and so forth

Executive Function difficulties related to Academic Subjects

McCloskey et.al.

EF Difficulties Related to Reading

- ◇ Example: child reading words slowly may have difficulty with **Pace**
- ◇ Example: child seems to have abilities but cannot apply EFs of **Inhibit, Perceive, and/or Focus cues** to process orthography of the words on the page
- ◇ Can learn to adjust with guided repeated oral reading, paired reading, and speeded word reading

EF Difficulties Related to Writing

- ◇ Lacks EF control of attention and effort, motor memory, and motor production
- ◇ Need **guided practice**
- ◇ **Handwriting** strengthens the capacity for depth of processing of language when writing
- ◇ **Scaffolding** approach with well-documented efficacy studies
- ◇ **Self-Regulated Strategy Development Model (SRSD)** by Graham and Harris

EF Difficulties Related to Math

- ◇ **Graphomotor production** of numbers and mathematics symbols is critical to developing computation skills
- ◇ Computation errors usually result from deficient perceiving, inhibiting, and/or focus/select **cues**
- ◇ Use cognitive strategy instruction (Jitendra & Hoff (1996) to develop cues

Older Students

- ◇ Help students be aware of their difficulties
- ◇ Study skills courses
- ◇ Demonstrate organizing and planning steps
- ◇ Direct instruction in test taking skills
- ◇ Instruct in note taking skills
- ◇ Employ peer tutoring for homework and long term projects
- ◇ Improve home/school communication
- ◇ Employ good test construction by teachers
- ◇ Rewards/punishment incentives

Reference for Intervention

- ◇ Executive Function in Education from Theory to Practice edited by Lynn Meltzer, Ph.D. (2007) from The Guilford Press

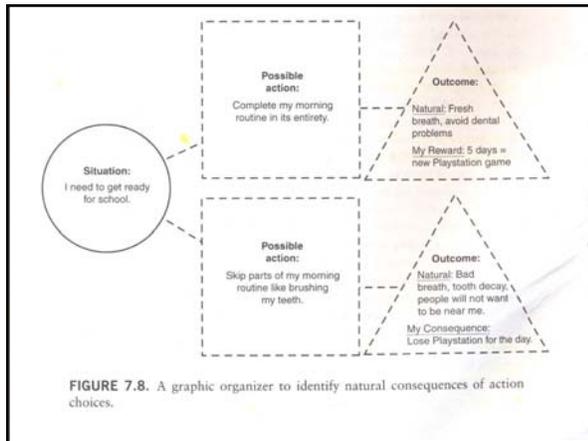


FIGURE 7.8. A graphic organizer to identify natural consequences of action choices.

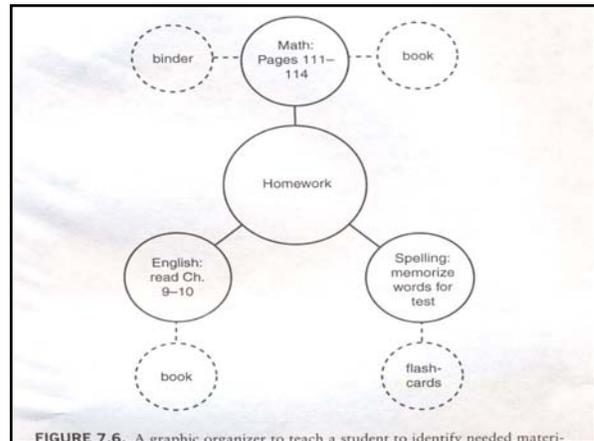


FIGURE 7.6. A graphic organizer to teach a student to identify needed materials.

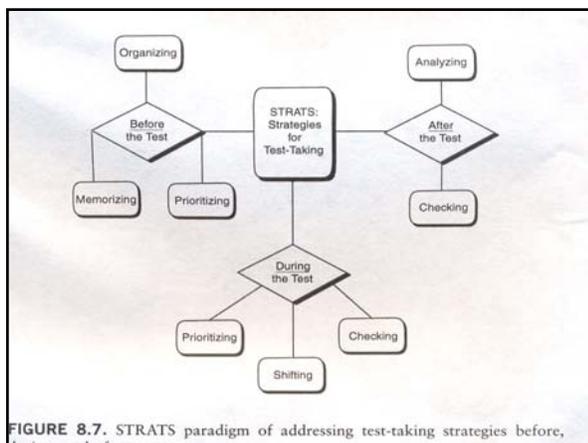


FIGURE 8.7. STRATS paradigm of addressing test-taking strategies before, during, and after the test.

Math Notes

Topic: Adding and Subtracting Fractions

Chapter 1 Lesson 14.4 Page # 241-243 Date 11/10/06

Term	Definition	Example
Least common denominator (LCD)	The least common multiple of the denominators of 2 or more fractions.	$\frac{1}{8}$ and $\frac{3}{4}$, LCD = 8

Key information

If the denominators are the same, add or subtract the numerators.
If the denominators are different, find the LCD, change numerators.
Add or subtract the numerators.
Reduce if possible or change to a mixed number.

Examples

$$\begin{array}{r} \frac{1}{5} + \frac{2}{3} = \frac{12}{15} + \frac{10}{15} = \frac{22}{15} \\ \frac{1}{5} + \frac{2}{3} = \frac{7}{15} \end{array}$$

$$\begin{array}{r} \frac{7}{8} - \frac{1}{4} = \frac{14}{16} - \frac{4}{16} = \frac{10}{16} \\ \frac{10}{16} = \frac{5}{8} \end{array}$$

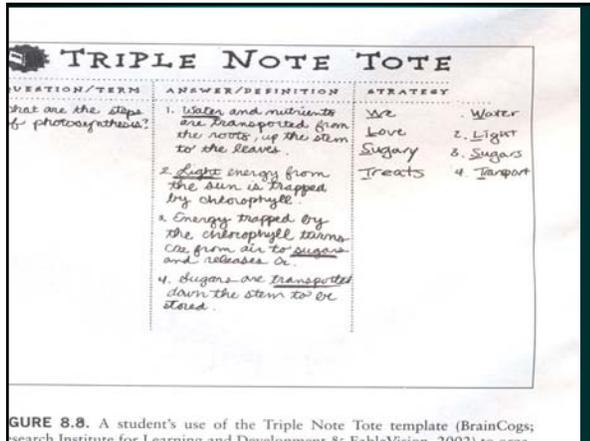


FIGURE 8.8. A student's use of the Triple Note Tote template (BrainCogs; Search Institute for Learning and Development, 8, E-11-15, 2003).

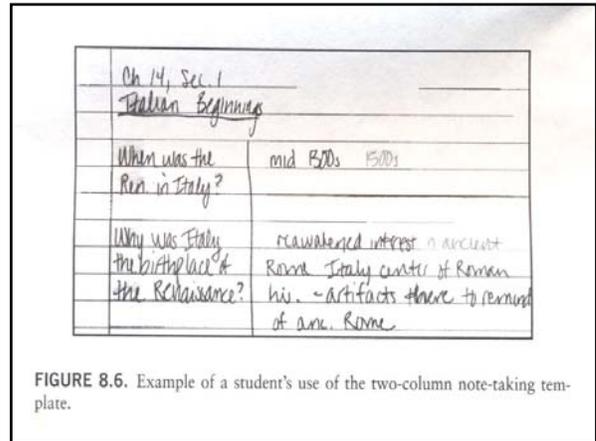


FIGURE 8.6. Example of a student's use of the two-column note-taking template.

Objectives	Below Average	Needs Improvement	Proficient	Exemplary Performance	Earned Points
Planning	1 point Little or no evidence of planning.	2 points A planning sheet is included but it is incomplete.	3 points Student includes an outline or graphic organizer that is partially filled out. Planner is somewhat related to final essay.	4 points Student includes completely filled out outline or graphic organizer and final essay reflects its use.	
Organizing	1 point Student does not include a rough draft.	2 points Student includes a partially completed rough draft that does not follow an organizational plan.	3 points Student includes a rough draft that roughly follows his or her outline or graphic organizer.	4 points Student includes a rough draft that is well organized and follows the planning tool.	
Shifting	1 point Student shows no changes from the rough draft to the final draft.	2 points Only slight evidence of improvements is seen between the rough and final drafts.	3 points Student makes at least two changes beyond spelling and punctuation in the final draft.	4 points The student takes a different point of view in the final draft or makes at least three major improvements between the rough draft and the final draft.	
Prioritizing	1 point Essay includes no transition words to show sequence, contrast, or relative importance of ideas.	2 points Essay includes only transition words such as "and," "also," and "but."	3 points Essay includes two more sophisticated transition words that indicate sequence, importance, or contrast, such as "however," "on the other hand," "another example," etc.	4 points Essay includes more than two transition words to connect ideas or paragraphs.	
Checking	1 point Student does not submit a checklist with the writing project.	2 points Student checks for a few mistakes but not for others.	3 points Student checks off the checklist to indicate that he or she checked most of the items on the list.	4 points Student submits checklist indicating that he or she has checked for each item on the list. Student's writing reflects no errors that are listed on the checklist.	
	0 points	0 points	0 points	0 points	Score

Conclusions

- ♦ You can help identify **why** children are having difficulty particularly when "scores" are average
- ♦ You can **quantify** certain behaviors
- ♦ You can **judge** how well teachers and parents agree on how the child is viewed and how the child seems him/herself
- ♦ You can make **concrete suggestions** for management
- ♦ You can make a difference in a child's life!

