Executive functions adhd

Notebook:	Mental Health Issues		
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Tags:	adhd, executive functioning stuff		

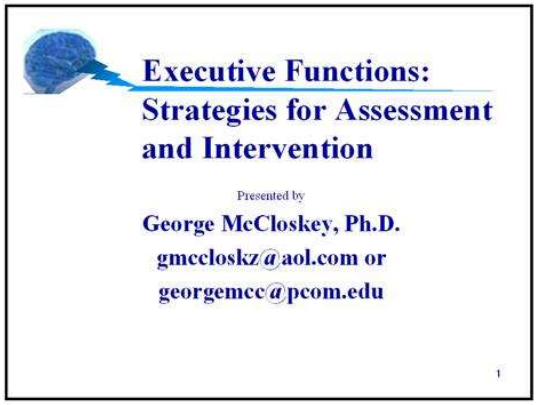
Executive functions adhd

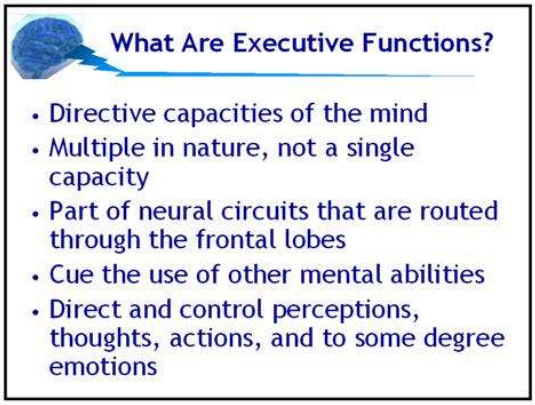
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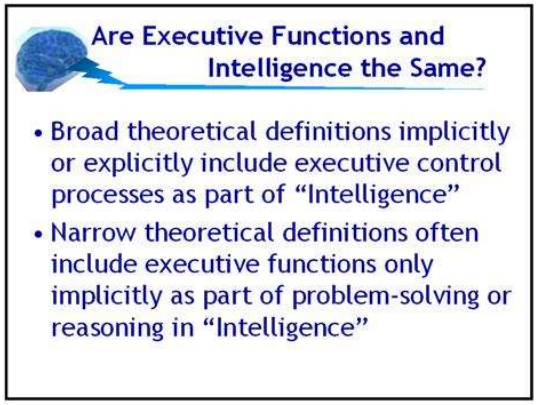


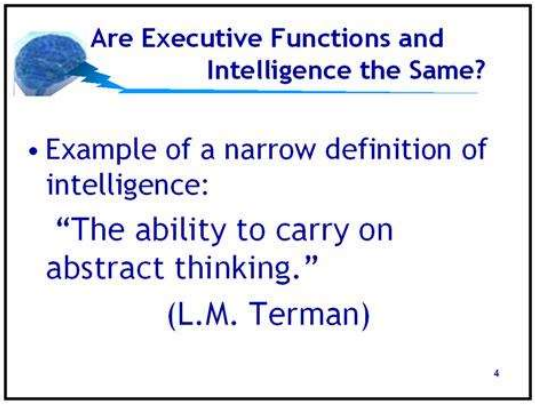
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Executive Functions:
Strategies for Assessment and Intervention
Presented by
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1


What Are Executive Functions?
• Directive capacities of the mind
• Multiple in nature, not a single capacity
• Part of neural circuits that are routed through the frontal lobes
• Cue the use of other mental abilities
• Direct and control perceptions, thoughts, actions, and to some degree emotions


Are Executive Functions and Intelligence the Same?
• Broad theoretical definitions implicitly or explicitly include executive control processes as part of "Intelligence"
• Narrow theoretical definitions often include executive functions only implicitly as part of problem-solving or reasoning in "Intelligence"


Are Executive Functions and Intelligence the Same?
• Example of a narrow definition of intelligence:
"The ability to carry on abstract thinking."
(L.M. Terman)
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Are Executive Functions and Intelligence the Same?

- Example of a broad definition of intelligence:

  Intelligence is the capacity to learn from experience, using metacognitive processes to enhance learning, and the ability to adapt to the surrounding environment, which may require different adaptations within different social and cultural contexts.

  (R. Sternberg, 2005)

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Executive Functions and Intelligence

- The concept of executive functions is not synonymous with the traditional concepts of intelligence or "IQ"
- Executive functions often are not directly assessed with standard intelligence tests

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Spearman on "g"

"As for the prevalent procedure of throwing a miscellaneous collection of tests indiscriminately into a single pool this-whether or not justifiable by the theory which gave birth to it-certainly cannot be justified simply by claiming that the results give a "general level," an "average," or even a "sample." No genuine averaging, or sampling, of anybody's abilities is made, can be made, or even has really been attempted. When Binet borrowed the idea of such promiscuous pooling, he carried it into execution with a brilliancy that perhaps no other living man could have matched. But on the theoretical side, he tried to get away too cheaply. And this is the main cause of all the present trouble." (1927)

Cited in A.R. Jensen. (1998). The g Factor, page 33.

Jensen on "g" and Intelligence

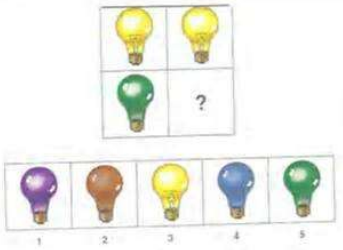
"My study of these two symposia and of many other equally serious attempts to define "intelligence" in purely verbal terms has convinced me that psychologists are incapable of reaching a consensus on its definition. It has proved to be a hopeless quest. Therefore, the term "intelligence" should be discarded altogether in scientific psychology, just as it discarded "animal magnetism" and as the science of chemistry discarded "phlogiston." "Intelligence" will continue, of course, in popular parlance and in literary usage, where it may serve a purpose only because it can mean anything the user intends, and where a precise and operational definition is not important.

Largely because of its popular and literary usage, the word "intelligence" has come to mean too many different things to many people (including psychologists). It has also become so fraught with value judgments, emotions, and prejudices as to render it useless in scientific discussion."

A.R. Jensen. (1998). The g Factor, p. 48.

Measuring reasoning ability

The yellow one goes with the yellow one. Which one down here goes with the green one?

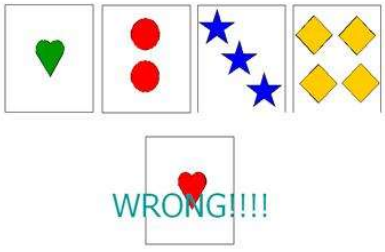


Measuring Executive Functions with a Reasoning Task

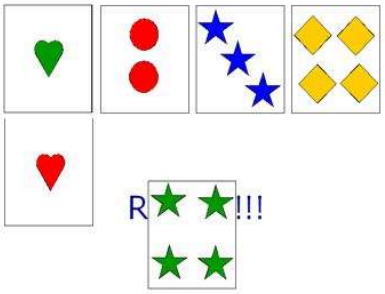
Directions for the Wisconsin Card Sorting Test (WCST):

I can't tell you much about how to do this task. Which of these do you think this one goes with? I'll tell you if your answer is right or wrong.

Measuring EF with a Reasoning Task



Measuring EF with a Reasoning Task



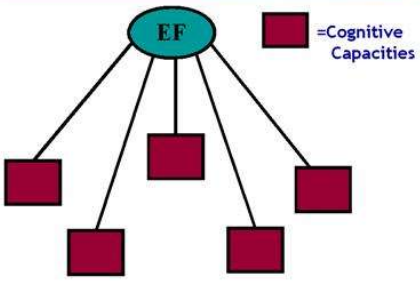
Executive Functions and School

- The more classroom instruction resembles tests of executive functions like the Wisconsin Card Sorting Test (figure out what we're learning, I'll tell you whether you are right or wrong), the more executive difficulties are going to impact classroom learning and performance.

Executive Functions Are Not a Unitary Trait

- Frequently referred to as "the CEO of the Brain" or the "Conductor of the Orchestra
- These metaphors
  - hint at the nature of EFs, but are far too general for effective understanding of the concept
  - create the impression of a central control center or a singular control capacity

EF as the Conductor of the Brain's Orchestra (i.e., EF as "g")



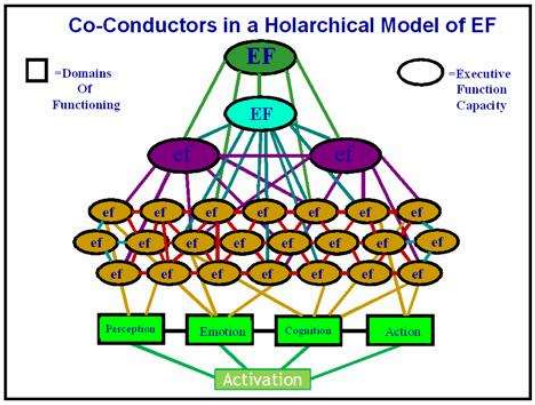
Executive Functions Are Not a Unitary Trait

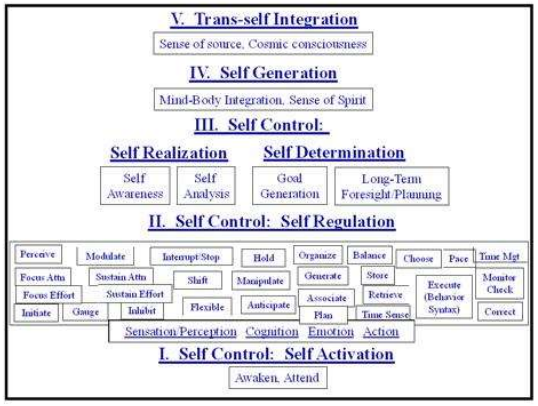
- The orchestra conductor analogy feeds into the "homunculus problem," a paradox of infinite regress, or just a complex metaphysical maze.
- For practical everyday problem-solving in a more concrete manner, it is better to use the concept of a system of interrelated "co-conductors" rather than posit a single conductor.

Executive Functions Are Not a Unitary Trait

Appropriate Metaphors for Executive Functions:

- A Team of Conductors and Co-Conductors of a Mental Ability Orchestra, or
- The Coaching Staff of a Mental Ability Football Team





Self Activation

- Initiation and "ramping up" of basic executive functions related to an awakened state of mind and to overcoming sleep inertia.

Self Regulation

- A set of control capacities that cue and direct functioning across the domains of sensation/perception, emotion, cognition, and action
- The current model posits 24 self-regulation executive functions

29 Self-Regulation EFs

• Perceive	• Flexible	•Balance
• Initiate	• Shift	•Store
• Inhibit	• Hold	•Retrieve
• Modulate/Adjust	• Manipulate	•Pace
• Gauge	• Organize	•Time Sense
• Focus Attn	• Anticipate	•Time Mgt
• Focus Effort	• Plan	•Execute
• Sustain Attn	• Generate	•Monitor
• Sustain Effort	• Associate	•Correct
• Stop/Interrupt	• Choose	

Self Realization

- Directs cognitive processes that engage in self-awareness, self-reflection and self-analysis.
- Cues cognitive processes to access accumulated information about self and apply it in specific situations to initiate, sustain, or alter behavior.

Self Determination

- Foresight/Long-Term Planning and Goal Generation
- Directs the use of cognitive processes to construct visions of the future and plans for action over longer periods of time. Directs reflection on the past for purposes of improving or altering behavior and thinking in the future.

Self Generation

- Directs the posing of speculative questions related to the meaning and purpose of life and/or the ultimate source(s) of reality and physical existence, mind-body relationships, spirit, and soul; contemplates existence beyond the physical plane.
- Directs the generation of a philosophy of life used to guide self-awareness, self-realization and the other levels of executive function processes; serves as a basis for an ultimate source of intentional behavior direction.

Trans-Self Integration

- Directs the engagement of mental processes that enable realization and experiencing of a trans-self state of ultimate or unity consciousness.
- In most spiritual traditions, this state is considered the highest achievement of human consciousness and therefore very different from the maladaptive states characteristic of clinical diagnoses of dissociative states.

Executive Function Variability

- Executive control is highly dissociable; it can vary greatly depending on the specific domain/subdomain of functioning that is being directed: sensation/perception, emotion, cognition, or action.
- Good executive control in one domain does not guarantee good executive control in the other domains; Poor control in one domain does not guarantee poor control in the other domains.

Arenas of Involvement

- Executive control also varies depending on the Arena of Involvement
- The Four Arenas of Involvement are:
  - Intrapersonal (Control in relation to the self)
  - Interpersonal (Control in relation to others)
  - Environment (Control in relation to the natural and man-made environment)
  - Symbol System (Control in relation to human made symbol and communication systems)

Executive Function Development

- Self-regulation executive functions are developing from the first years of life on throughout a person's entire lifetime.
- Large developmental shifts are noticeable, especially around adolescence.
- Because EFs are developmental in nature, natural maturational delays and lags are observed.

Executive Function Development

- Intraindividually, all EFs do not develop evenly. For any given individual, one EF can be more or less developed than any other EF at any given point in time.
- Interindividually, there is also great variation relative to chronological age. At the same age, different individuals will naturally vary considerably in their level of development of various EFs.

Executive Function Development and School

- Cultural change points (e.g., educational transitions to Preschool, Kindergarten, 1st grade, junior h.s., senior h.s., college, graduate school, and workplace entry) can serve to highlight EF developmental delays or significant deficiencies.

Executive Function Development and School

- Some EF-based clinical syndromes, such as ADHD, demonstrate clear patterns of delayed developmental progression. Barkley (1998) estimates developmental delays of about 30% associated with various EF processes such as Focus/Select, Sustain, Inhibit and Modulate.

Executive Functions and Clinical Diagnoses

- "Deficits in PFC [prefrontal cortex, aka frontal lobes] function are evident in every neuropsychiatric disorder (indeed, the term "psychiatric problem" seems synonymous with PFC dysfunction)."

Arnsten & Robbins 2002 in *Principles of Frontal Lobe Function*

Executive Functions and Clinical Diagnoses

- Most of the clinical conditions described in the DSM-IV reflect some form of Executive Dysfunction
- The DSM-IV can be thought of as "A User's Guide to All the Things That Can Go Wrong With the Frontal Lobes"

Executive Functions and Clinical Diagnoses

- A sampling of conditions involving EF deficits:
  - Autism Asperger's Syndrome
  - ADHD and ADD
  - Conduct Disorder
  - Oppositional Defiant Disorder
  - Depression and/or Anxiety
  - Obsessive-Compulsive Disorder
  - Fetal Alcohol Syndrome

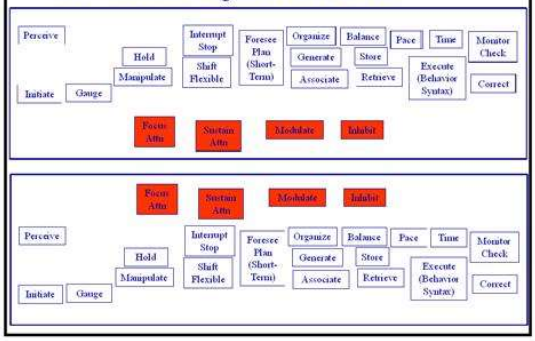
Executive Functions and ADHD

- EF and ADHD are not synonymous terms; rather ADHD is a condition involving EF deficits in:
  - Focus/Select, Sustain, Inhibit, Modulate
- Nearly all persons with ADHD also have additional self-regulation difficulties; the nature of these additional difficulties is what makes ADHD so variable from one person to the next and what causes confusion in diagnosis.

Executive Functions and ADHD

- Pharmacological treatment of ADHD usually only addresses the problems associated with the EFs specific to ADHD (Inhibit, Modulate, Focus/Select, Sustain)
- Most persons with ADHD will require additional interventions to assist with the additional self-regulation difficulties that persist even when medication is being used effectively to treat the primary ADHD problems.

Two Different Constellations of EF Difficulties for Two Individuals Diagnosed with ADHD



Executive Functions and School

- Although executive functions are used to guide cognitive processing involved in new learning, many new learning situations are structured in ways that reduce the need for strong executive direction.
- In contrast, demonstrating what has been learned usually requires significant involvement of executive control processes.

Executive Function Development

- The neural circuits for executive function activation are routed differently depending on whether the activation is based on an internally driven desire or command versus an external demand.

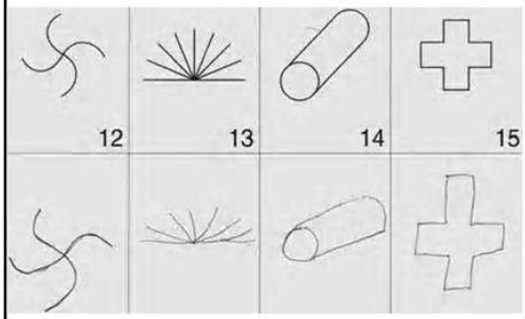
Executive Functions and School

- Because internally driven production is much easier to accomplish than externally demanded production for children with "producing difficulties" their lack of production on demand often stands in stark contrast to their seemingly effortless production "when the spirit moves them."

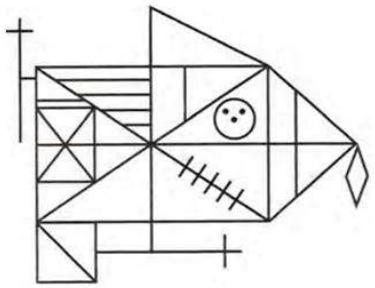
Executive Functions and School

- The on-demand deficiencies observed by others are often attributed to negative personal characteristics such as lack of responsibility, apathy, passive aggressive stance, or oppositional defiance.

- James Age 10, NEPSY Design Copying:



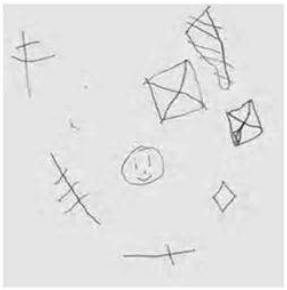
- Now draw this:



- James Age 10, Rey Complex Figure Copy:



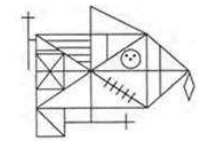
- James Age 10, Rey Complex Figure Recall after 3 minutes:



- James Age 10, Self-generated freehand drawing



- Production based on External Demand:

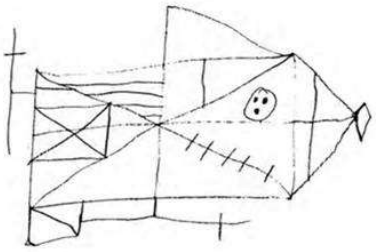




❖ Production based on Internal Command:



- James Age 10, Rey Complex Figure Copy Verbally Mediated by Psychologist:

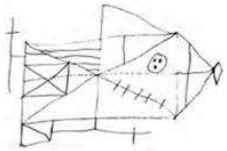


- James Age 10, Rey Complex Figure Copy:

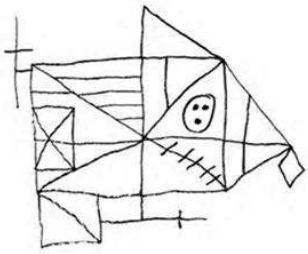
Self-initiated



Verbally Mediated



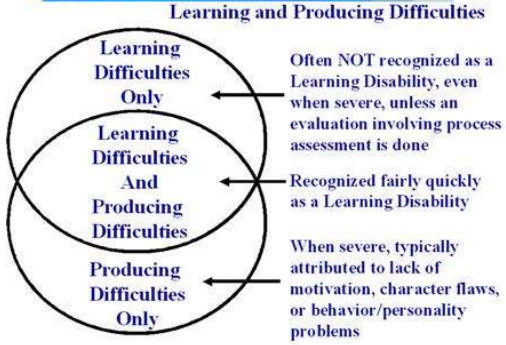
- James Age 14, Rey Complex Figure Copy: On-Demand Self-Initiated



Executive Functions and School

- As Martha Denckla has pointed out, Executive Function difficulties of a severe nature (especially in the Symbol System Arena) do not result in Learning Disabilities; they result in "Producing Disabilities."

A General Model for Conceptualizing Learning and Producing Difficulties



Examples of EF Problems in Writing Skills

- Poor graphomotor control and lack of automaticity for handwriting
- Poor organization of written material
- Poor retrieval cueing or poor generate cueing for idea generation or idea fluency when writing
- Inability to use multiple self-regulation EFs at one time (e.g. hold, manipulate, retrieve with generate and execute)

Examples of EF Problems in Reading Skills

- Reading Decoding - poor use of one or more self-regulation EFs (e.g., lack of attention to specific letters in words; saying words that "look" like the word on the page)
- Rapid Automatic Naming - poor executive control of language fluency processes
- Reading Comprehension - poor direction of one or more self-regulation EFs (e.g., Focus, Sustain, Manipulate, Balance, etc.) when reading for meaning

Examples of EF Problems in Mathematics Skills

- Poor cueing of monitor and correct when doing calculation routines
- Poor cueing of hold, organize, manipulate and retrieve when setting up calculations or problems
- Poor cueing of organize, store, retrieve, execute when learning or applying rote knowledge (e.g. storing and retrieving multiplication tables)

Executive Functions and School

- Test taking can be exceptionally difficult for a student with executive function difficulties if the test format emphasizes executive function demands over content knowledge.

A dark color

B R _ W _

B R O W N

The Multidimensional Nature of Executive Functions

- Use of Executive Functions varies depending on:
  - the arena(s) of involvement in which the EF(s) are operating,
  - the domain(s) being directed by the EF(s)

The Multidimensional Nature of EF Assessment

- The Multidimensional Nature of the use of Executive Functions necessitates a Multidimensional approach to their assessment.
- Assessment of Executive Functions needs to address the use of Efs within all four domains of functioning and across all four arenas of involvement

EF Assessment Matrix

	Perception	Emotion	Cognition	Action
Self				
Others				
Environ-ment				
Symbol Systems				

EF Assessment Perspective x Method

Assessment Perspective	Assessment Method	
	Formal Methods – Using interviews, records reviews, and observation and interpretation methods that make use of standards established through normative comparisons	**Informal Methods** – Using interviews, records reviews, and observation and interpretation methods that do not make use of standards established through normative comparisons
Indirect Perspective – Collecting information in a manner that does not require direct contact with, or observation of, the client	Behavior Rating Scales Parent & Teacher Behavior Rating Scales Self-Report Rating Scales (e.g., BRIEF or MEFS Parent, Teacher and Self Rating forms)	Interviews of Parents, Teachers (e.g., use of the EFSO) Review of School Records Process-oriented Interpretation of Parent and Teacher Ratings and Self Reports
Direct Perspective – Collecting information through direct interactions with, or through direct observations of, the client	Individually-Administered Standardized Tests (e.g., D-KEFS, NEPSY-II, WCST, BADS, BADS-C)	Child Interview Systematic and Nonsystematic Behavioral Observations (e.g., use of the EFSO and EFCO) Process-oriented Interpretation of Standardized Test Performance and Classroom Work Samples

Assessment of Executive Functions

- Norm-referenced assessments of executive functions are currently available, including:
  - Individually-administered tests
  - Behavior rating scales

Assessment of Executive Functions

- The limitations of the current methods available need to be understood and taken into account when conducting an assessment.

The Multidimensional Nature of EF Assessment

- It is important to note that standardized, individually-administered measures of executive functions are limited to the Symbol System Arena.

EF Assessment Using Individually-administered tests

	Perception	Emotion	Cognition	Action
Self				
Others				
Environ-ment				
Symbol Systems	X		X	X

The Multidimensional Nature of EF Assessment

- The only EF behavior rating scale available, the Behavior Rating Inventory of Executive Functions (BRIEF) covers a broader range of Arenas and Domains, but items are highly nonspecific, combining many arenas and domains at once.

EF Assessment Using the BRIEF

	Perception	Emotion	Cognition	Action
Self		X	X	X
Others		X		X
Environ-ment				X
Symbol Systems			X	X

The Multidimensional Nature of EF Assessment

- The most effective approach to the assessment of executive functions involves:
- Conducting a thorough clinical interview(s)
- Using additional data collection methods to test hypotheses generated from the interview(s)

The Multidimensional Nature of EF Assessment

- Conducting a thorough clinical interview:
  - Identify arenas of involvement that are of concern, within the arenas of concern:
  - Identify domains of functioning that are of concern
  - Identify the specific executive function levels that are of concern
  - Identify the specific executive functions that are of concern within the level

The Multidimensional Nature of EF Assessment

- Use additional data collection methods to test hypotheses generated from the clinical interview:
  - Parent, Teacher, Self Report Inventories
  - Background information/Records review
  - Individually-administered standardized testing (for Symbol System arena concerns)

BRIEF Parent, Teacher, Self-Report Inventories

- Behavior Rating Inventory of Executive Functions (BRIEF)
  - Parent, Teacher and Self-Report Forms
  - Preschool, School-Age, Adult forms
  - Norm-referenced scores

Parent, Teacher, Self-Report Inventories

- The BRIEF assesses self-regulation EFs under the following 8 headings:
  - Inhibit, Shift, Emotional Control, Initiate, Working Memory, Plan/Organize, Org. of Materials, Monitor

Parent, Teacher, Self-Report Inventories

T-Scores and (Percentile Ranks)

Scales	Mother	Father	Math Teacher	Social Studies Teacher	Language Arts Teacher	Learning Support Teacher
Inhibit	49 (65)	47 (55)	53 (75)	49 (65)	**77 (96)**	**85 (98)**
Shift	38 (14)	42 (28)	53 (78)	45 (50)	**65 (92)**	**57 (85)**
Emotional Control	37 (8)	39 (17)	50 (65)	46 (50)	**54 (80)**	46 (50)
Initiate	56 (80)	53 (71)	**69 (95)**	**85(>99)**	**96(>99)**	**81(>99)**
Working Memory	**60 (84)**	**62 (88)**	**85(>99)**	**92(>99)**	**92(>99)**	**106(>99)**
Planning/ Organize	**62 (86)**	**60 (83)**	**73 (95)**	**80 (98)**	**80 (98)**	**92 (>99)**
Organize Materials	49 (52)	43 (33)	**57 (88)**	46 (60)	**69 (95)**	**111(>99)**
Monitor	46 (42)	40 (20)	**63 (90)**	66 (93)	**80 (98)**	**77 (97)**

Parent, Teacher, Self-Report Inventories

- The McCloskey Executive Function Scales are being developed to assess 29 self-regulation executive functions across the four domains of function within the four arenas of involvement.

EF Assessment Using the MEFS

	Perception	Emotion	Cognition	Action
Self	X	X	X	X
Others	X	X	X	X
Environ-ment	X	X	X	X
Symbol Systems	X	X	X	X

EF Assessment Using the MEFS-SRAV

Effectiveness Ratings
Rate the students use (or disuse) of the 23 Self-Regulation Executive Functions using the following criteria:

Internally Self-Regulated		Externally Guided			Externally Controlled	
Typically self-regulates this executive function.		Typically does not self-regulate this executive function but demonstrates the capacity to use this executive function when external guidance is provided.			Does not self-regulate; use of this executive function is minimal or non-existent even when external guidance is provided; External control is required as a substitute to maintain adequate functioning.	
7	6	5	4	3	2	1
Extremely effective; does not require any external guidance; highly independent with self-regulation.	Effective; usually does not require any external guidance; often independent with self-regulation; may occasionally require some external guidance.	Requires only minimal external guidance to maintain the effective use of this executive function.	Requires frequent external guidance to maintain the effective use of this executive function.	Requires very frequent external guidance to demonstrate the use of this executive function; use is not maintained even when guidance is provided.	External control can be used to effectively substitute for the absence of this executive function; the lack of this executive function is apparent when external control is not present.	External control is only marginally effective or not effective at all as a substitute for the absence of this executive function; a lack of this executive function is apparent even when external control is present.

EF Assessment Using the MEFS

MODULATE Cues the regulation of the amount and intensity of mental energy invested in perceiving, feeling, thinking, and acting.	Internally Regulated	Externally Guided	Externally Controlled	MODULATE	Self	Others	Environs	Academics
				Perceiving	3			
	7 6	5 4 (3) 2	1	Feeling	3	2-3	5	3
				Thinking	2	3	3	2
				Acting	6	2	5	2

Notes: very negative about self and others; has a hard time returning to a calm state once agitated; finds academic work extremely frustrating; cannot modulate attitude toward schoolwork.

EF	Sensation	Emotion	Cognition	Action
Modulate Intrapersonal	Has difficulty regulating the intensity of experiencing sensations produced by his/her own body.	Has difficulty regulating the intensity of experiencing or expressing own feelings about him/her self.	Has difficulty regulating the intensity of, or effort put into, own thoughts about him/her self.	Has difficulty regulating the intensity of, or effort put into performing self-initiated actions.
Modulate Interpersonal	Has difficulty regulating the intensity of experiencing what others are seeing, hearing, or experiencing.	Has difficulty regulating the intensity of experiencing or expressing feelings about others or what others are feeling.	Has difficulty regulating the intensity of, or effort put into, thinking about others or about what others are thinking.	Has difficulty regulating the intensity of, or effort put into doing things with others.
Modulate Environment	Has difficulty regulating the intensity of experiencing sensations from the surrounding environment.	Has difficulty regulating the intensity of experiencing or expressing feelings about objects and/or events occurring around him/her.	Has difficulty regulating the intensity of, or effort put into, thinking about objects and/or events occurring around him/her.	Has difficulty regulating the intensity of, or effort put into, performing actions and/or movements related to objects and/or events happening in the environment.
Modulate Symbol System	Has difficulty regulating the intensity of sensory experiences when reading, writing, calculating, or doing other "school work."	Has difficulty regulating the intensity of experiencing or expressing feelings about reading, writing, calculating, or other "school work."	Has difficulty regulating the intensity of effort put into thinking about reading, writing, calculating, or other "school work."	Has difficulty regulating the intensity of effort put into doing "school work" such as reading, writing, or calculating.

Self Regulation Capacity: Focusing and sustaining attention when working independently on tasks.

Duration	Frequency						
	1 Never 0% of the time	2 Occasionally Approximately 10% of the time	3 Sometimes Approximately 20%-40% of the time	4 Often Approximately 50%-70% of the time	5 Very Often Approximately 80% of the time	6 Almost Always Approximately 90% of the time	7 Always 100% of the time
1 Unable to focus and sustain attention for more than a few seconds when independently working on tasks.							
2 Able to focus and sustain attention for about 1 minute when working independently on tasks.							
3 Able to focus and sustain attention for about 2-3 minutes when working independently on tasks.							
4 Able to focus and sustain attention for about 5 minutes when working independently on tasks.							
5 Able to focus and sustain attention for about 10 minutes when working independently on tasks.							
6 Able to focus and sustain attention for about 15 minutes when working independently on tasks.							
7 Able to focus and sustain attention for 20 or more minutes when working independently on tasks.							

Parent, Teacher, Self-Report Inventories

- ADHD Rating Scales are measures of specific subsets of self-regulation executive functions, usually involving at least the following:
  - Inhibit
  - Stop/Interrupt
  - Focus/Select
  - Sustain

Parent, Teacher, Self-Report Inventories

- Commonly Used ADHD Rating Scales:
  - ADHD Rating Scale-IV
  - Brown ADD Scale
  - Conner's Rating Scales

Parent, Teacher, Self-Report Inventories

- General Behavior Rating Scales can also be analyzed for evidence of self-regulation executive Function; E.g., Specific Item Ratings on scales such as the BASC-II:
  - Has trouble concentrating
  - Forgets things
  - Changes moods quickly
  - Repeats one activity over and over
  - Is easily distracted
  - Never completes homework from start to finish

Parent, Teacher, Self-Report Inventories

- General Behavior Rating Scales can also be analyzed for evidence of self-regulation executive Function; E.g., Specific Item Ratings on scales such as the BASC-II:
  - Has a short attention span
  - Argues when denied his own way
  - Worries about things that cannot be changed
  - Is easily upset
  - Worries
  - Never completes work on time

Individually-administered Assessments of EF

- Although limited in scope, individually-administered assessment of executive functions can provide valuable information about the child's capacities to self-regulate perception, cognition and action within the Symbol System arena, especially in school.

Individually-administered Assessments of EF

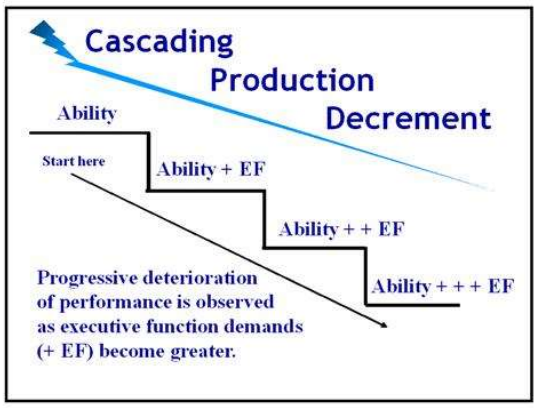
- Assessment of Executive Functions does not occur "in a vacuum." In order to evaluate how EFs cue and direct, they must have something (i.e., specific perceptions, emotions, thoughts, or actions) to cue and direct.

Individually-administered Assessments of EF

- Executive Functions must be assessed in tandem with processes, abilities and/or skills.
- Specific measures of Executive Functions always involve the assessment, to some degree, of an ability or skill other than executive function capacity.
- For the most accurate observation or measurement of EFs, the contributions of other abilities and skills need to be minimized, controlled for, or acknowledged in some way.

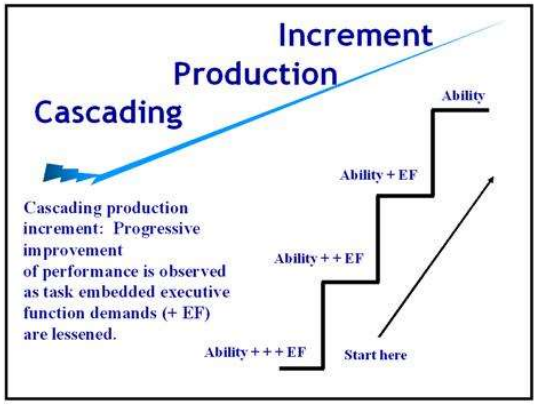
Individually-administered Assessments of EF

- EFs in the Symbol System arena are best assessed by using methods that can reveal Cascading Production Decrements or Cascading Production Increments

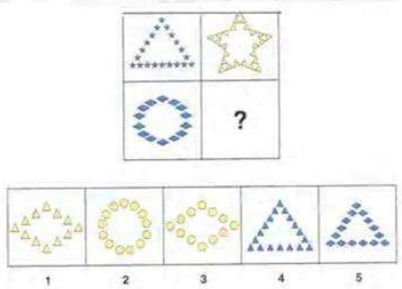


Individually-administered Assessments of EF

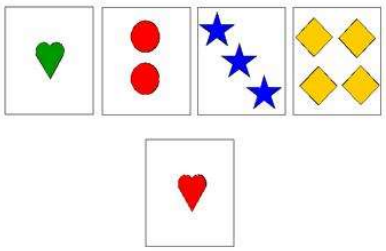
- Identify a specific cognitive ability domain baseline using a measure that minimizes EF involvement.
- Select and use a measure that adds executive function demands to the baseline ability and observe the results.
- Continue to add additional EF demands and observe results.



Measuring intelligence with a reasoning task



Measuring EF with a Reasoning Task



Cascading Production Decrement

Reasoning Ability: Matrix Reasoning

Start here

Reasoning Ability + + + EF: WCST

Progressive deterioration of performance is observed as executive function demands (+ EF) become greater.

Cascading Production Decrement

Visuo-motor Ability: Design Copying

Start here

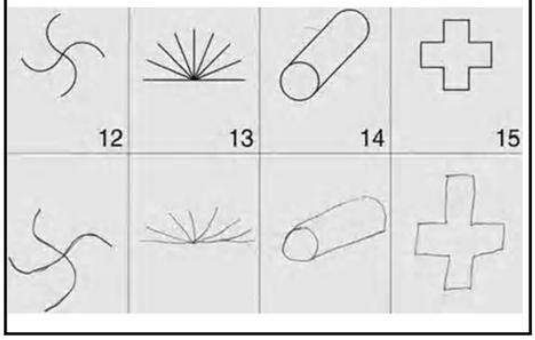
Ability + EF: BVMGT

Ability + + EF

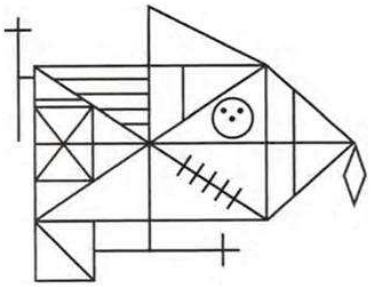
Ability + + + EF: RCFT

Progressive deterioration of performance is observed as executive function demands (+ EF) become greater.

- James Age 10, NEPSY Design Copying:



- Now draw this:

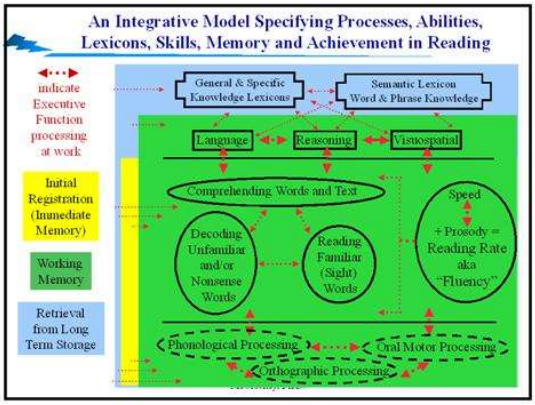


James Age 10, Rey Complex Figure Copy:

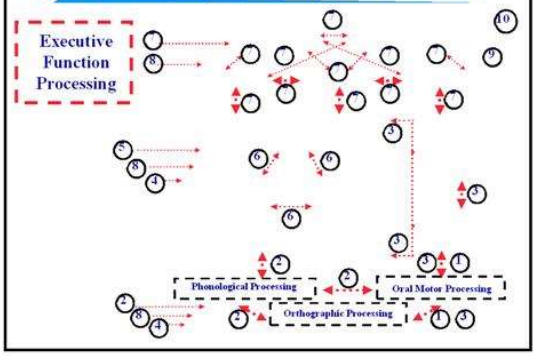


Examples of EF Problems in Reading Skills

- Reading Decoding - poor use of one or more self-regulation EFs (e.g., lack of attention to specific letters in words; saying words that "look" like the word on the page)
- Rapid Automatic Naming - poor executive control of language fluency processes
- Reading Comprehension - poor direction of one or more self-regulation EFs (e.g., Focus, Sustain, Manipulate, Balance, etc.) when reading for meaning



Executive Functions and Reading



Executive Functions and Reading

① Cueing immediate and sustained attention to orthography for accurate letter/word perception and discrimination

② Cueing and coordinating the use of phonological and orthographic processes for accurate word pronunciation

③ Directing efficient oral motor production, prosody, and rate for reading words and connected text

Executive Functions and Reading

④ Cueing and directing the use of attention and immediate memory resources for reading words and connected text

⑤ Cueing retrieval of information from various Lexicons to read words and connected text

⑥ Cueing and coordinating the use of word recognition, word decoding, and reading comprehension skills

Executive Functions and Reading

⑦ Cueing and coordinating the use of abilities and the retrieval of knowledge from Lexicons to create meaning for text comprehension

⑧ Cueing and sustaining the use of working memory resources while reading words and constructing meaning from text

⑨ Cueing and directing the oral expression of meaning derived from text comprehension

⑩ Cueing and directing the use of strategies for reading words and deriving meaning from text

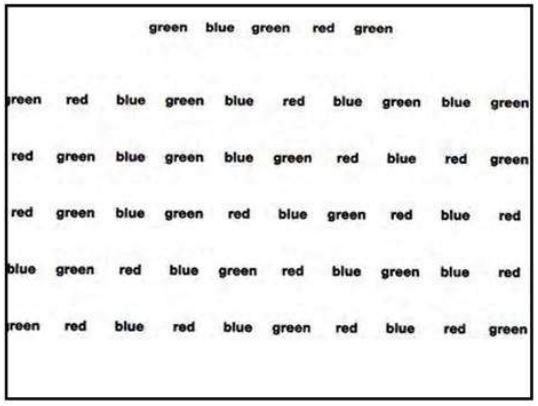
Executive Functions and Reading

Alana, an 11 year-old child displays adequate word reading skills when reading word lists and adequate RAN performance with letters and words. However, when asked to read a short two sentence text orally, she experiences extreme difficulties with applying both word reading and rapid naming skills; words are skipped, misread, and reread; highly familiar words are decoded instead of sight read, less familiar words are decoded at an extremely slow pace; word misreadings are left uncorrected despite the disconnect between the orally read word and the meaning of the text (e.g., reading "bornes" for "bones"). Despite superior ability to reason with verbal material, Amanda is unable to offer adequate responses to questions about what she just read, even after taking time to reread the sentences silently.

Assessing Executive Functions Related to Reading

- Example of D-KEFS Color-Word Interference Word Reading task:

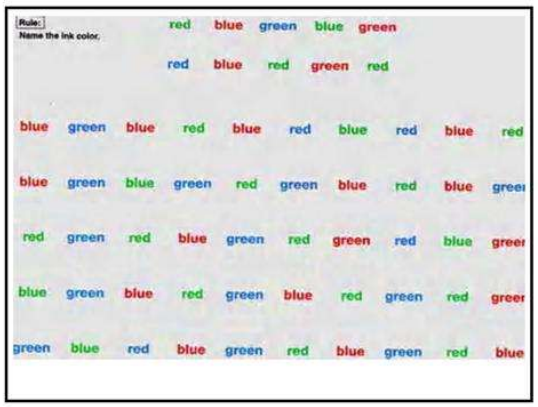
"Look at this page…read these words as quickly as you can without making any mistakes."



Assessing Executive Functions Related to Reading

- Example of D-KEFS Color-Word Interference Inhibition task:

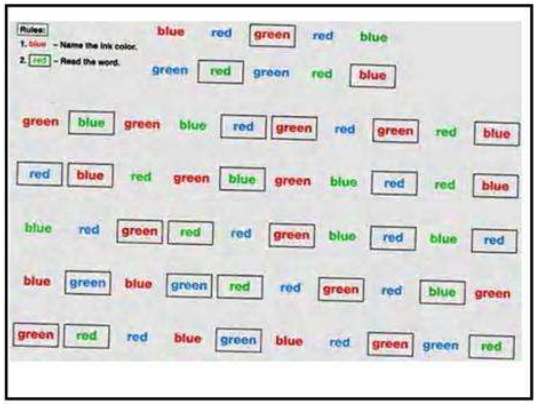
"Look at this page…the color names are printed in a different colored ink. You are to name the color of the ink that the letters are printed in not read the word."

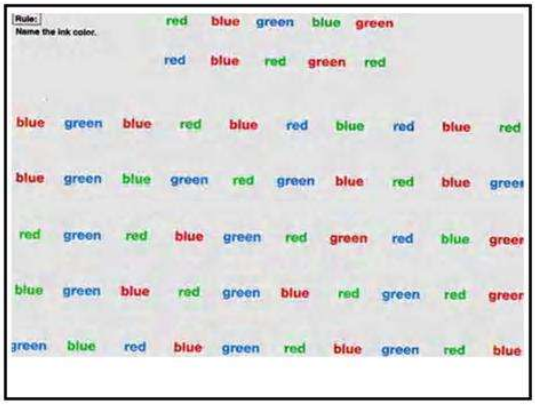


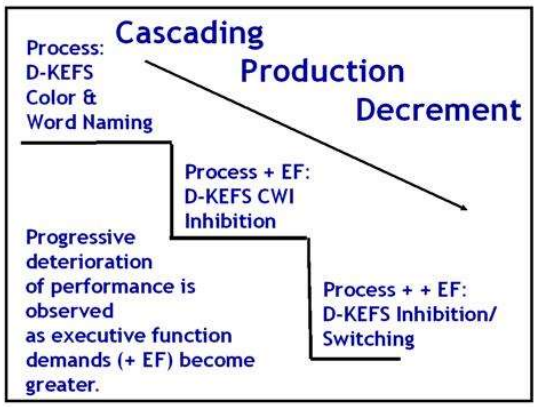
Assessing Executive Functions Related to Reading

- Example of D-KEFS Color-Word Interference Inhibition-Switching task:

"This time, for many of the words you are to name the color of the ink and not read the words. But if a word is inside a little box, you should read the word and not name the ink color."







Process Approach to Interpretation

The Process Approach requires a clear understanding of what a task measures so that performance can be effectively task analyzed to characterize a person's cognitive capacities as accurately as possible.

Process Approach to Assessing EFs

What Does WISC-IV Block Design Measure?

Consider the following quote from John Carroll (Human Cognitive Abilities, 1993, page 309):

Process Approach to Assessing EFs

What Does WISC-IV Block Design Measure?

"…difficulty in factorial classification arises from the fact that most spatial test tasks, even the "simplest," are actually quite complex, requiring apprehension and encoding of spatial forms, consideration and possibly mental manipulations of these forms, decisions about comparisons of other aspects of the stimuli, and making a response - often under the pressure of being required to respond quickly."

Process Approach to Assessing EFs

From Carroll's description, Block Design can be measuring at least 5 distinct cognitive processes:

- Visual perception and discrimination
- Reasoning with visual stimuli
- Visualization (optional)
- Motor dexterity
- Speed of motor response

Process Approach to Assessing EFs

From Carroll's description of Block Design, which of the 5 distinct cognitive processes do you think Subject 3 lacked?

- Visual perception and discrimination
- Reasoning with visual stimuli
- Visualization (optional)
- Motor dexterity
- Speed of motor response

Process Approach to Assessing EFs

Consider the following quote from Carroll (1993, p. 309):

...considerable confusion exists about the identification of factors in the domain of visual perception... Some sources of confusion are very real, and difficult to deal with. This is particularly true of confusion arising from **the fact that test takers apparently can arrive at answers and solutions – either correct or incorrect ones – by a variety of different strategies.** French (1965) demonstrated that different "cognitive styles" can cause wide variation in factor loadings; some of his most dramatic cases had to do with spatial tests, as where a sample of subjects who reported "systematizing" their approach to the Cubes test yielded a large decrease of the loading of this test on a Visualization factor (that is, decreased correlations of Cubes with other spatial tests), as compared to a sample where subjects did not report systematizing. It has been shown (Kyllonen, Lohman, & Woltz, 1984), that subjects can employ different strategies even for different items within the same test. Lohman et al. (1987) have discussed this problem of solution strategies, even rendering the judgment that factor-analytic methodology is hardly up to the task of dealing with it because a basic assumption of factor analysis is that factorial equations are consistent over subjects.

Process Approach to Assessing EFs

Carroll's description leaves out a critical 6th cognitive process, or group of processes, essential for effective performance of Block Design - the ability to initiate, focus, sustain, coordinate/balance, and monitor the use of the other cognitive processes - i.e., Executive Function processes.

What Does Block Design Measure?

An appropriate statement regarding the performance of the third subject would be:

"John's superior capacity for problem-solving with nonverbal visual material was applied inconsistently resulting in a Block Design Subtest Score in the average range."

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Functional Behavior Assessment

- Current best practices advocate the use of functional behavior assessment (FBA) techniques to identify and analyze behavior problems. FBAs:
  - identify setting events and antecedents that trigger problem behaviors,
  - describe the negative behavior to be changed,
  - specify positive replacement behaviors, and
  - specify consequences that exist for both positive and negative behaviors.

Functional Behavior Assessment

- The focus of a traditional FBA:
  "Behavior support plans are designed to alter patterns of problem behavior. The process by which this is done, however, involves change in the behavior of family, teachers, staff, or managers in various settings. Plans of behavior support define what *we* will do differently. It is the change in our behavior that will result in improved behavior of the focus person." (O'Neill, Horner, Albin, Sprague, Storey, & Newon, 1997, p. 65).

Functional Behavior Assessment

A → B → C

In traditional functional behavior assessments antecedents are said to TRIGGER the behavior that results in the consequences, but the reasons WHY the antecedents trigger the behavior is not really addressed.

FBA: Is A-B-C Enough?

- Since the antecedent does not trigger the same undesirable behaviors in ALL students in the same situation, there must be something about the students that differs in an important way.
- Functional behavior assessment ignores internal considerations (i.e., perceptions, emotions, thought) and focuses on applying external control to effect change in behavior.

FBA: Is A-B-C Enough?

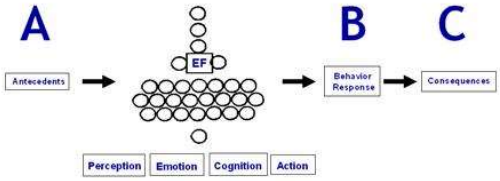
- Because of their strong emphasis on observable behaviors, functional assessments typically do not provide a conceptual basis for understanding the root causes of why setting events and antecedent conditions result in problem behaviors even when the negative consequences associated with the problem behaviors are completely undesirable from the student's perspective as well as everyone else's.

FBA: Is A-B-C Enough?

- While some strict behaviorists might argue that it is unnecessary to speculate on such causal issues, parents, teachers, and students themselves find such explanations to be central to their attempts to make sense of things.

The EF Driven FBA

Informed by knowledge of executive functions, the functional behavior assessment model can be revised as follows:



EF-Driven FBA

- While it might appear that the child is consciously choosing how to perceive, feel, think and act when a lack of production is observed, proper conceptualization of executive function difficulties requires an acknowledgement that the source of the executive function problem is most likely a result of less than optimal nonconscious brain function rather than a conscious choice to act in a contrary manner.
- Most importantly, clinicians must help parents and teachers, as well as themselves, realize that the executive difficulties that are so exasperating to them are just as exasperating to the child, with the only difference being in the nature of the reactions that are expressed.

EF-Driven FBA

- With a good understanding of executive functions, problems can be clearly stated in terms of perceptions, emotions, thoughts or actions that can be changed through intervention. The goal here is twofold: 1) to help the child, the parents, and professionals to understand the nature of the deficit and 2) through proper intervention, to assist the child or adolescent in changing the behavior from a negative to positive.

EF-Driven FBA

- An Executive Function-driven FBA can identify the executive function difficulties that are the source of the behavior problems.
- Subsequently, part of the intervention plan would be to help parents and teachers understand the nature of these executive function difficulties, their impact on the student's behavior, and the reasons why external control strategies are required.
- Additionally, understanding the executive function difficulties producing the problem behaviors will help those charged with delivering the intervention adopt an appropriate perspective during implementation.



Executive Function Difficulties

Are they the result of:

- Disuse through Conscious Choice
- Innate Deficiency
- Maturational Delay
- Disuse through Nonconscious Choice

Executive Function Difficulties: Why?

- Adopting an effective approach to case conceptualization involves three critical key elements that hinge on supplying the clinician with the answers to questions about the nature of executive function difficulties.

Executive Function Difficulties: Why?

- Question: Are the observed behaviors associated with executive function difficulties a matter of conscious choice or a matter of nonconscious brain dysfunction due to the executive function difficulties?
- Answer: Executive function difficulties are associated with sub-optimal brain function that is not likely to be the result of conscious choice.

Executive Function Difficulties: Why?

- Question: Is the less than optimal brain functioning associated with the observed executive difficulties an unalterable condition resulting from permanently damaged neural networks or is it an alterable condition caused by the underutilization or underdevelopment of neural networks?

Executive Function Difficulties: Why?

- Answer: While it is certainly true that in cases of more severe brain damage, neural networks have been altered to the point where little change in the current level of executive function capacity is likely, these cases are much more the exception than the rule. In the absence of clear evidence that the child was born with severe brain damage or has suffered a severe traumatic brain injury since birth, it is best for professionals working with children with executive function difficulties to assume that these children possess the neural capacity to alter their current state of brain function.

Executive Function Difficulties: Why?

- The important assumption here is that internal change that would enable the child to demonstrate the desired self-regulation capacities is possible. Working from the initial assumption that change is possible is the second essential key element to proper conceptualization of the problem.
- This optimistic stance enables the clinician to develop an intervention plan with the goal of positive change rather than the goal of simply managing a sub-optimal state of functioning. A lack of progress over time toward positive goals, however, may necessitate the inclusion of behavior management strategies to deal with a child's current lack of executive control.

Executive Function Difficulties: Why?

- Question: Are the observed executive function difficulties the result of disuse of already developed neural capacities or the result of a delay in the natural progression of neural network development?

Executive Function Difficulties: Why?

- Answer: If the difficulties are the result of disuse of existing neural capacities, then an intervention plan focused on positive behavior change goals will be based on teaching the child how to activate these neural networks, either consciously or nonconsciously, to achieve the positive goals. In this situation, the amount and rate of progress toward positive goals will be constrained only by other contextual factors such as the level of functioning of other cognitive capacities (e.g., the child's capacity to benefit from language-based learning).

Executive Function Difficulties: Why?

- Parents, teachers and others involved with a child with executive function difficulties must be careful not to attribute the particular production deficits they observe to character flaws or consciously chosen states of mind, such as laziness, lack of motivation, apathy, irresponsibility, or stubbornness. Rather, it must be understood that the behaviors that they are observing emanate from difficulties that are rooted in brain function.

Executive Function Difficulties: Why?

- If the difficulties are more related to delays in the natural progression of development of neural networks that enable increased executive control, then progress toward positive goals is likely to be slower and less consistent than might be expected even when other contextual factors are not creating any conditions that might constrain progress.

Executive Function Difficulties: Why?

- As time progresses, an apparent lack of progress might suggest to some that the child is not capable of developing the self-regulation capacities. In the absence of clear physical evidence of severe neural dysfunction however, the best course of action is to maintain a positive outlook and continue to encourage and assist the child in working toward positive change goals.



Development of Interventions for EF Difficulties

- Requires keeping in mind:
  - If a behavior/reward plan is used, it needs to be done with considerable understanding of whether the behavior plan is rewarding behaviors that are in the child's repertoire. Also, recognition that the plan is likely to be only a form of external control, not an instructional device, is important.
  - The developmental nature of executive function capacities; time in itself is likely to improve functioning. Important to model attitude of hope, perseverance, and patience.

EF-Driven FBA

- A functional assessment infused with knowledge of executive functions makes it clear that the origin of the problem behaviors lies in brain functions over which the student does not have conscious control.
- Understanding this fact helps parents, teachers, and students realize that the behaviors being exhibited typically are not conscious, premeditated acts defiantly carried out in the presence of a clear awareness of the consequences they will produce.
- Rather, these behaviors are the result of inadequate activation of executive function capacities that are necessary for regulating perceptions, feelings, thoughts and actions.

EF-Driven FBA

- In other words, the problem behaviors are not simply a matter of personal choice or the means to achieve desired consequences.
- Acknowledgement of the neuropsychological origins of problem behaviors provides parents, teachers, and school staff with a conceptual framework that engenders understanding and compassion rather than negatively biased attributions regarding the student's character and moral fiber.

Behavior Problems and Curricular Mismatch

- All too often when a traditional behavior support plan is required, the implicit message communicated to parents and the student is: "Since Billy has chosen not to take control of his own behavior, we will now take control for him to ensure that no problems occur in the classroom."

Behavior Problems and Curricular Mismatch

- When using an executive function-oriented behavior support plan, a very different, explicit message is delivered to all involved in the process, including the parents and student:
- "Billy is experiencing executive function difficulties, that is, he having trouble ____ (state the specific executive function difficulties). These difficulties most likely are being caused by a lack of maturation of some parts of Billy's brain. These difficulties are making it hard for Billy to control behavior. We are going to provide Billy with a program that will help him control his behavior while he is here in school."

Behavior Problems and Curricular Mismatch

- In cases where the executive function difficulties are less severe and the student is older (late elementary through high school age), the outcomes of the executive function-oriented functional assessment can serve a greater number of roles in planning and implementing intervention efforts.

Behavior Problems and Curricular Mismatch

- These roles can include identifying the executive function difficulties producing the problem behaviors and subsequently explaining to parents, teachers, school staff, and the student:
  - 1) the nature and role of the executive function difficulties and their role in producing the problem,
  - 2) why external control strategies might be needed at the outset of the intervention,
  - 3) that the ultimate goal of the intervention plan is to help the student internalize control and engage in self regulation,
  - 4) that the intervention plan will include a transition stage during which the student will be taught ways to improve self regulation,
  - 5) that the student will be guided through a process of moving from external control of behavior to internal control of perceptions, feelings, thoughts and actions.

Behavior Problems and Curricular Mismatch

- It can be seen that the expanded A-EF/PETA-B-C executive-driven model for interventions focuses not just on behaviors, but on the perceptions, feelings, thoughts and actions that lead to the behaviors and the executive control capacities that cue and direct all of these. The executive-driven model also has the ultimate goal of self regulation rather than maintenance of external control.

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Behavior Problems and Curricular Mismatch

- Interventions based on the executive-driven model do not say that problem behavior is a mater of choice and the solution is for the student to make better choices - or else. Ultimately, the goal of an executive-driven intervention is to get to the point where, in fact, the student actually *is* making good choices, not just about behavior, but also about perceptions, feelings, and thoughts associated with behaviors.

Behavior Problems and Curricular Mismatch

- Something, however, needs to happen on the way from not making any choices to making good choices. That something will be an intervention program that will be suited to the particular executive function capacities, or lack of executive function capacities, of the student. For some students, intervention will be a more straightforward matter of educating them in the effective use of executive function capacities they already possess.

Behavior Problems and Curricular Mismatch

- In other situations, intervention will be a matter of trying to help the student develop greater executive function capacities, possibly needing to start with external control strategies and gradually working toward internal control.

Behavior Problems and Curricular Mismatch

- Whatever path intervention efforts take, and whatever the outcome, adopting an executive-driven model will ensure sensible and humane treatment of the child along the way.

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Executive Function Intervention

Intervention efforts will vary along a continuum from imposing external control to encouraging internal self control

EF Intervention Continuum

External Guidance and/or Control

Internal Guidance and Control

Development of Interventions for EF Difficulties

- Requires keeping in mind:
  - The need for a balance between teaching internal self-regulation strategies with providing external controls for support and management so that teaching can take place.
  - The environment in which intervention is happening: Requires those close to child to have reasonable EF capacities and be able to model those capacities.

Development of Interventions for EF Difficulties

- EF Self-regulation skills eventually need to be just that—Self-regulated.
- During classroom instruction, it is necessary to find the balance between providing enough EF SR cueing to help students function, but not too much to prevent EF skill-development.
- It is easy to underestimate the multiplicity of Efs required and focus only on those related to attention and organization.

Executive Function Intervention

For intervention purposes, it is best to assume that EF deficiencies are the result of disuse through nonconscious choice. The general intervention goal then becomes education to make the child conscious of the EFs needed and how to engage them.

Intervention Strategies for Providing External Guidance

- Helping children improve self-regulation through direct assistance from others:
  - Executive function literature: Dawson and Guare (*Smart but Scattered)*, Posner and Rothbart (*Educating the Human Brain)*, Levine, research of Watson and Westby, Singer and Bashir.
  - ADHD literature provides best evidenced-based literature on interventions.
    - Well documented efficacy of psychostimulant medications.
    - Effectiveness of behavior management plans
    - Works of Russell Barkley, Clare Jones, Phyllis Teeter

Strategies for Providing External Guidance

- Provide predictable, consistent structure to classroom environments and routines:
  - Post and discuss class rules and schedules
  - Review and rehearse routines
  - Maintain basic room arrangement

Strategies for Providing External Guidance

1) Provide external prompts and cues as a substitute for self-regulation.

Strategies for Providing External Guidance

- In preschool, kindergarten and early elementary years, in many ways, teachers ARE their student's frontal lobes.
- Providing executive prompts and cues are important to assure that children are engaged appropriately in the instructional process.
- Modeling good executive functions helps children see how they can self-regulate their own perceptions, emotions, thoughts and actions.

Strategies for Providing External Guidance

- In late elementary, junior-senior high school, college, and even graduate school and work places, effective teachers/supervisors provide executive function prompts and model good executive function use.

Assessing the Use of EF Prompts in the Classroom

An Observation Form (McCloskey, Perkins & VanDivner) has been developed for use to help structure observations and assist in providing effective feedback to teachers.

Executive Function Classroom Observation Form (EFCO)

- The form has two components
  - A definition and sample sheet to help you focus on the types of prompts that you are observing.
  - The observation form, that lists all 29 areas, has a space for taking notes and keeping track prompts that are observed.

Example Prompts

- The definitions & sample prompts are used to prepare for the observation
- For each self-regulation EF, examples of positive and specific prompts and negative, vague and/or poorly timed prompts are provided.

EFCO Example Prompts

- Each self-regulation EF has sample prompts for each of the four domains of function:
- P =Perceiving;
- F = Feeling;
- T = Thinking
- A = Acting

Strategies for Becoming Familiar with EF SRs and Prompts

- To effectively use the observation form, you will have to build familiarity with each of the 29 self-regulation areas.
- At first, this can seem overwhelming, but if you use your own EF's effectively, it can be accomplished!
- Break them down into chunks, perhaps study one a day. In less than a month, you will have them mastered.

Perceive

- The Perceive function cues the use of sensory and perception processes to take information in from the external environment or "inner awareness" to tune into perceptions, emotions, thoughts, or actions as they are occurring.
- Prompt examples: "Listen to this." "Look up at the board."
  "How are you feeling right now?"

Initiate

- The Initiate function cues the initial engagement of perceiving, feeling, thinking, or acting .
- Prompt example: "Start walking now." "Begin work on the count of five."

Inhibit

- The Inhibit function cues resistance to, or suppression of, urges to perceive, feel, think, or act on first impulse.
- Prompts direct capacities to an alternate source rather than drawing attention to the perception, emotion, thought, or action that should be inhibited.
- Prompt example: "Don't start until I tell you to go."

Modulate/Adjust

- The Modulate function cues the regulation of the amount and intensity of mental energy invested in perceiving, feeling, thinking, and acting.
- Prompt example: "Let's all use our indoor voices now."
  "Please tone it down a bit."

Stop/Interrupt

- The Stop/Interrupt function cues the sudden, immediate discontinuation of perceiving, feeling, thinking, or acting.
- The Stop/Interrupt cue always precedes the Shift/Flexible cue when altering problem-solving based on changing conditions, and switching or alternating attention.
- Prompt example: "Stop writing now."

Gauge

- The Gauge function cues one to identify the demands (perceptual, emotional, mental, physical) of a task or situation and cues the activation of the resources needed to effectively engage the task or situation.
- Prompt example: "Consider what it's going to take to get this job done right."

Focus Attention

- The Focus Attention function cues the direction of attention to the most relevant specifics (perceptions, emotions, thoughts, and/or actions) of a given environment, situation, or content while downgrading or ignoring the less relevant elements.
- Prompt example: "Pay attention to what happens to the baking soda after the vinegar is added."

Sustain Attention

- The Sustain Attention function cues sustained attention to the most relevant specifics (perceptions, emotions, thoughts, and/or actions) of a given environment, situation, or content.
- Prompt example: "You will need to watch the computer screen carefully for the entire 10 minutes."

Focus Effort

- The Focus Effort function cues the concentrated engagement of energies for perceiving, feeling, thinking, and/or acting.
- Prompt example: "Just focus your effort right now on completing Question 4."

Sustain Effort

- The Sustain Effort function cues the sustained engagement of energies for perceiving, feeling, thinking, and/or acting.
- Prompt example: "You will need to maintain that kind of effort for the entire 10 minutes in order to complete the assignment."

Shift

- The Shift function cues a relatively quick change in the direction and engagement of perceptions, emotions, thoughts or actions in reaction to what is occurring in the internal or external environments.
- Prompt example: "The museum is closed for emergency repairs, so we won't be able to go on the field trip."

Flexible

- The Flexible function cues a willingness to alter the frame of reference for the direction and engagement of perceptions, emotions, thoughts or actions in reaction to what is occurring in the internal or external environments.
- Prompt example: "It doesn't need to be done exactly the same way each time."

Execute/Sequence

- The Execute function cues the orchestrating of the proper syntax of a series of perceptions, feelings, thoughts, and/or actions, especially in cases where automated routines are being accessed or are initially being developed.
- Prompt example: "Use the routine you learned to do these."

Monitor

- The Monitor function cues the activation of appropriate routines for checking the accuracy of perceptions, emotions, thoughts or actions.
- Prompt example: "Periodically check the task directions to see if you are following all of them."

Correct

- The Correct function cues the use of appropriate routines for correcting errors of perception, emotion, thought, or action based on feedback from internal or external sources.
- Prompt example: "Correct any errors you find."

Hold

- The Hold function cues activation of the necessary cognitive processes required to maintain information in working memory and continues cueing these processes until the information is manipulated, stored, or acted on as desired.
- Prompt example: "Hold that thought while we hear a reaction from the other group."

Manipulate

- The Manipulate function cues the use of working memory and other cognitive processes for the manipulation of perceptions, feelings, thoughts or actions as they are being held in mind or being accessed in the environment.
- Prompt example: "Visualize what it would look like if you turned it upside down."

Store

- The Store function cues the movement of information about perceptions, feelings, thoughts and actions from the mental processing environment of the present moment into "storage" for possible retrieval at a later time.
- Prompt example: "This is important; it will be on Friday's quiz."

Retrieve

- The Retrieve function cues the activation of cognitive processes responsible for finding and retrieving previously stored information about perceptions, feelings, thoughts and actions.
- The more specific the demands or constraints placed on the retrieval task, the greater the requirements for precision of retrieval cues.
- Prompt example: "To answer the question correctly, you will probably need to recall all that we learned about photosynthesis."

Sense Time

- The Time function cues the monitoring of the passage of time (e.g., cueing the engagement of the mental functions that enable a person to have an internal sense of how long they have been perceiving, feeling, thinking or acting).
- Prompt example: "How long have you been working on that?"

Manage Time

- The Time function cues the use of time estimation routines (e.g., cueing the engagement of mental functions that enable a person to have an internal sense of how long something will take to complete, or how much time is still left in a specific period of time).
- Prompt example: "Tell me how long you think this will take you to do."

Pace

- The Pace function cues the awareness of, and the regulation of, the rate at which perceptions, emotions, cognitions, and actions are experienced or performed.
- Prompt example: "You will need to work quickly as there is not much time left."

Generate

- The Generate function cues the realization that novel, fluid problem-solving efforts are required and cues the activation of the resources needed to carry out problem-solving routines.
- Prompt example: "We haven't tried to solve a problem like this one before."
  "This problem will require some novel thinking if you are going to find a solution."

Associate

- The Associate function cues the realization that associations need to be made, and cues the activation of the resources needed to attempt to make the necessary associations.
- Prompt examples: "Have you heard anything like that before?"
  "This problem is very similar to one you worked on last week."

Organize

- The Organize function cues the use of routines for sorting, sequencing, or otherwise arranging perceptions, feelings, thoughts, and/or actions, to enhance or improve the efficiency of experience, learning, or performance.
- Prompt example: "Let's establish the order in which you need to do things to get this task done."

Anticipate

- The Foresee/Plan function cues the anticipation of conditions or events in the very near future, such as the consequences of one's own perceptions, feelings, thoughts and/or actions.
- Prompt example: "If you keep erasing in that same spot, what do you think will happen to the paper?"

Plan (Short-term)

- The Plan function cues the engagement of the capacities required to identify a series of perception, feelings, thoughts, and/or actions that, if carried out, would be most likely to produce a desired outcome in the very near future (within minutes to within several hours).
- Prompt example: "Write down what you will do over the weekend and when you will do it so that you will be ready for the test on Monday."

Choose/Decide

- The Choose function cues the need to achieve closure, i.e., to make a choice among alternatives now.
- Prompt example: "Make a choice now." "Pick one now." "Choose now."
- The Choose cue often must be preceded by the Stop/Interrupt cue.
- Prompt example: "You need to stop thinking about it and make a choice now."

Balance

- The Balance function cues the regulation of the trade-off between opposing processes or states (e.g., pattern vs detail; speed vs accuracy; humor vs seriousness) to enhance or improve experiencing, learning, or performing.
- Prompt example: "Work as quickly as you can, but be careful not to make any mistakes."

Strategies for Providing External Guidance

2) Provide time management aids, such as calendars, clocks, timers, schedules, peer leaders and coaches, work teams, etc.

Strategies for Providing External Guidance

3) Align external demands with internal desires to maximize motivation.

- ❖Allow self-selection or choice of assignments whenever possible
- ❖Use high interest material to illustrate application of new knowledge and skills

Strategies for Providing External Guidance

4) Provide immediate and frequent feedback about the effectiveness of attempts to engage self-regulation executive functions. Providing students with feedback about their performance enables them to engage executive capacities more effectively to learn from their mistakes and improve future performance.

Strategies for Providing External Guidance

- When providing feedback, be sure to emphasize the importance of effort; make sure the child realizes that self-regulation is not simply something you have or don't have – it can be increased by applying techniques and strategies; the more effort placed into applying the techniques, the more likely the improvements.

Strategies for Providing External Guidance

5) Rewards can be a tremendous benefit to a child who has difficulty aligning internal desires with external demands. Use rewards, but heed the following cautions:



Using Rewards to Increase Production

- Rewards do not teach the child how to reflect on and alter perceptions, emotions, thoughts or actions, they simply reward the presence of desired behaviors.
- Reward programs imply that a child can do it if he/she wants to or is motivated enough. This often leads away from the realization that many children who are motivated and do want to change their behavior don't know what to do to change it.

Strategies for Helping Students Develop Internal Control

6) Increase student awareness of:

- ❖self-regulation expectations and goals for development
- ❖personal self-regulation strengths and weaknesses



EF Implications for Classroom Instruction

- STATING GOALS
  - To assure that executive function capacities are used to their fullest potential, it is important to state goals for both achievement and self-regulation. Stating goals enables executive function capacities, either consciously or nonconsciously, to engage the perceptions, emotions, thoughts, and actions, needed to achieve the goals.

Strategies for Helping Students Develop Internal Control

1) Model appropriate use of self-regulation executive function capacities

Strategies for Helping Students Develop Internal Control

2) Teach self-regulation capacities as specific skill routines, such as

- ❖The CC3 method for improving spelling self-study
- ❖Stop, Think, Good Choice, Bad Choice?
- ❖CBT homework assignments

Strategies for Helping Students Develop Internal Control

CC3 Method:

- Carefully CONSIDER and COPY the word.
- COVER and COMPOSE the word.
- COMPARE your spelling with the word and CORRECT any errors you see.

Strategies for Helping Students Develop Internal Control

3) Develop a common vocabulary and set of nonverbal symbols for describing or signifying self-regulation capacities and signaling their use (e.g., cueing flexibility with "The Coconut Story")

Strategies for Helping Students Develop Internal Control

- Based on assessment of EF difficulties, school psychologist and 9 year-old student established cue vocabulary that staff and parents used:
  - "Read the room"—to increase perceive capacity
  - "Start"—to increase initiation
  - "Stop"—to increase inhibition
  - "Check"—to monitor work or behavior
  - "Correct"—to edit/fix errors

Strategies for Helping Students Develop Internal Control

4) Model and encourage the use of internalized "self-talk" as a means of increasing awareness of executive functions and when and how to use them (e.g., modified Berninger mantra for writing: "What I can think I can say. What I can say I can write. What I can write I can revise.")

Strategies for Helping Students Develop Internal Control

5) Model and teach the use of self-administered reward routines to increase the use of self-regulation executive functions (e.g., teach the child how to "bargain with yourself" to get homework accomplished).

Strategies for Improving Assessment Methods

1) Offer bonus points for handing in homework and assignments on time instead of taking points away

2) Point out minor errors and offer students a chance to correct them before assigning a grade

Strategies for Improving Assessment Methods

3) Offer feedback and opportunities to revise writing assignments before grading them

4) Offer students choices for ways to demonstrate content knowledge

Strategies for Improving Assessment Methods

5) Offer credit for all efforts to correct work; offer opportunities to retake failed tests

6) Deduct no more than 5-10% of total points for minor detail errors

Strategies for Improving Assessment Methods

7) Offer multiple ways to participate in classroom activities, not just oral expression

8) Use pop quizzes only as a diagnostic tool rather than a graded performance measure

Strategies for Improving Assessment Methods

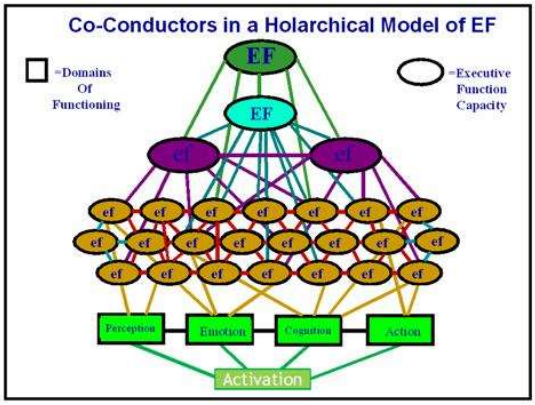
9) Offer response choices (word banks) for open-ended question formats

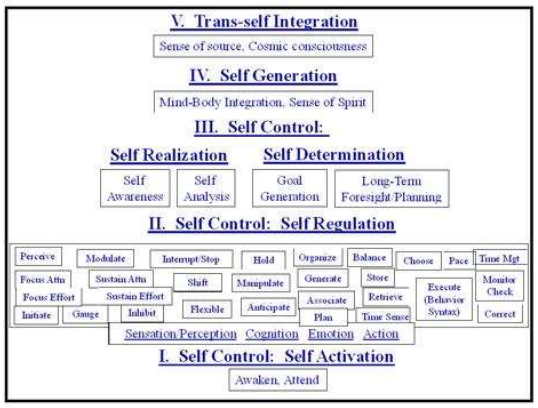
10) Provide guidelines and progress checks for long-term projects

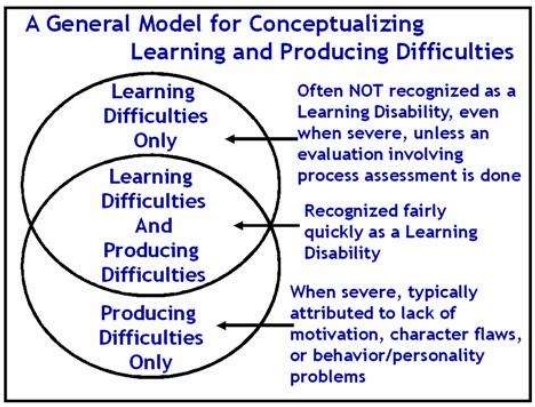
Strategies for Improving Assessment Methods

11) Avoid placing constraints on response modes as much as possible

12) Teach note-taking, memory strategies, and study skills when necessary

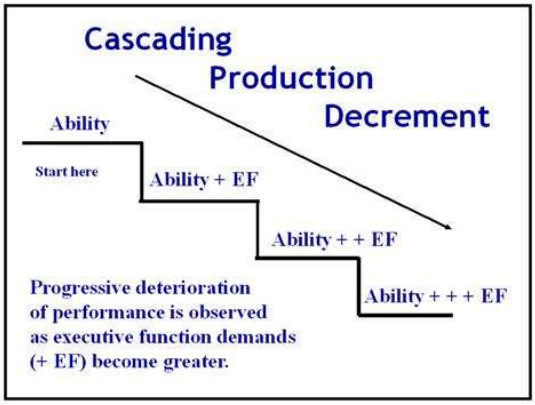






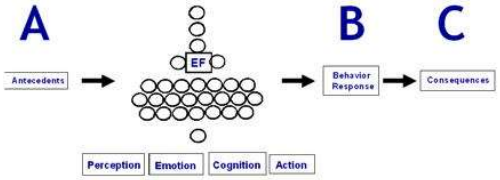
EF Assessment Matrix

	Perception	Emotion	Cognition	Action
Self				
Others				
Environ-ment				
Symbol Systems				



The EF Driven FBA

Informed by knowledge of executive functions, the functional behavior assessment model can be revised as follows:



EF Intervention Continuum

External Control

Internal Control

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