ADHD Lectures Online

View 10 hours of parent presentations and 25+ hours of professional presentations on ADHD by Dr. Barkley at this website:

ADHDLectures.com

For CE Credits, the same presentations can be found at:
PsychContinuingEd.com

For written CE courses by Dr. Barkley, visit:
ContinuingEdCourses.com
Current Status of EF

• A term used extensively in education, psychology (especially neuropsychology), psychiatry, neuroscience, and other disciplines

• Typically regarded as “those cognitive abilities needed for goal-directed action”

• Considered to be an umbrella term (meta-construct) that comprises a set of interacting mental abilities

• Serves as the basis for self-regulation

• Argued as being humanity’s highest faculty

• Largely mediated by the brain’s prefrontal cortex
Serious Problems with the EF Construct

• Lacks any consensus definition
  – More than 20 definitions exist
  – Most emphasize self-regulation, goal directed behavior, and problem-solving

• Considered to be a meta-construct serving as an “umbrella” term for a set of more specific components
  – But up to 33 components have been attributed by experts to EF

• Assessment of EF always employs psychometric tests. But:
  – Many tests of EF started out as measuring other mental abilities
  – Many are unreliable and often poorly normed
  – All lack ecological validity (no relationship to ratings or observations)
  – Do not predict impairment in major life domains requiring EF

• Lacks a coherent theory and evolutionary basis
Building a Theory of EF: Linking Inhibition, Self-Control, and the Executive Functions
Building Blocks of A Theory

• Start with a theory of normal
• Self-awareness and inhibition are the initial EFs that create the foundation for self-regulation
• Inhibition comprises three related processes:
  1. Inhibiting the prepotent or dominant response (motor, verbal, cognitive, & emotion)
  2. Interrupting ongoing behavior
  3. Interference control: Protecting the EFs from distraction
What is Self-Regulation?

Self-regulation can be defined as:
1. Any action a person directs toward one’s self
2. So as to change their own subsequent behavior from what they otherwise would have done
3. In order to change the likelihood of a future consequence or event

An executive function can be defined as a major type of action-to-the-self (as in #1 above)

Note: you cannot direct an action at yourself without inhibiting your responses to the ongoing environment – they are mutually exclusive
What is EF?

There are 7 commonly recognized components of EF:
- Self-Awareness (meta-cognition)
- Inhibition
- Nonverbal working memory
- Verbal working memory
- Emotional self-regulation
- Motivational self-regulation
- Planning and problem-solving

• All can be redefined as actions-to-the-self
• Each likely develops by a behavior being turned on the self and then internalized (privatized, inhibited)
• They likely develop in a step-wise hierarchy - Each needs the earlier ones to function well
Developmental Progression of Actions-to-the-Self

The Self-Direction, Internalization (or Privatization), and Self-Regulation of Behavior

Overt-Public
- Behavior directed at others

Semi-Overt
- Behavior directed back to the self

Covert-Mental
- Private behavior or thinking

What are the 7 majors types of EF or action-to-the-self?
Self-Awareness (Self-Directed Attention)
Inhibition (Self-Restraint)
Emotion Regulation (Self-Directed Emotions)
Verbal Working Memory (Self-Speech)
Nonverbal Working Memory (Self-Directed Sensing)
Inhibition (Self-Restraint)
Self-Awareness (Self-Directed Attention)
Planning & Problem-Solving (Self-Directed Play)
Motivation Regulation (Self-Directed Motivation)

Sequential Development of the EFs

Age – Neurological Maturation
The EFs Create Four Developmental Transitions in What is Controlling Behavior

- External Mental (private or internal)
- Others Self
- Temporal now Anticipated future
- Immediate Delayed gratification
  (Decreased Temporal Discounting of Delayed Consequences)
Developmental Changes to Time Horizons

- Preschool Child: 6-24 Hrs.
- School-Age Child: 1-5 Days
- Teenager: 1-3 Weeks
- Young Adult: 8-12 Weeks
- Adults – 30 +: 8-12 Weeks

Future Event
Activation to Prepare Begins Only When Event Enters The Horizon
But Teens Are Here
You Are Here
Self-Regulatory Strength is a Limited Resource Pool

S-R Fuel Tank (Willpower)

Inhibition & Self-Restraint
Self-Management to Time (NV-WM)
Self-Organization & Problem-Solving (V-WM)
Emotional Self-Regulation
Self-Motivation

The pool increases in capacity with maturation.

Use of EF/SR reduces the pool temporarily.

So Does: Stress, Alcohol, Drug Use, & Illness
Understanding the S-R Resource Pool

- Acts of S-R require effort; this diminishes the pool
- Every type of EF activity depletes the pool temporarily
- This adversely affects all subsequent use of EF
- Sustained use of the EF/SR pool so depletes it that any subsequent attempts at EF/SR are at greater risk of failure
- This includes EF/SR used in work, social conduct, moral behavior and other situations where EF/SR would be necessary

3 Important Processes in the Development of EF

• The **Self-Direction** of Actions
  – Behavior toward the world and others gets redirected to the self, occurring in the absence of external events and others that initially would prompt such behavior.
  – The stimulus for such behavior is initially a mental visual image but later can be self-speech

• The **Privatization** of Those Actions
  – With development, self-directed actions become less visible
  – This is likely the result of the inhibition of the brain-related activity associated with these actions from entering the spinal cord (switch is the basal ganglia and right frontal lobe?)

• The **Regulation** of the Self by These Actions
  – The self directed actions come to govern the self and ongoing behavior, resting control of behavior from the environment
Building a Hierarchy of Executive Functioning: Extending the Phenotype into Daily Life
Anterior-posterior (rostral-caudal) hierarchy of cognitive control of behavior

Reliance on Cultural Methods and Products

Social Complexity: Interactions & Networks

Increasingly Abstract, Longer-Term Goals

Increased Valuing of Delayed Outcomes

Extended Time Horizon

Extended Space Horizon

Increased Behavioral Complexity/Hierarchies

Neurological Maturation

Barkley’s Model of EF

**Level I: Instrumental – Self-Directed Abilities**
i.e., self-awareness, executive inhibition and interference control, nonverbal and verbal working memory, planning, problem-solving, self-motivation, emotion regulation

**Level II: Methodical – Self-Reliant Abilities**
Essential for daily adaptive functioning, self-care, and social self-defense
i.e., Self-Organization and Problem-Solving, Self-Management to Time, Self-Restraint, Self-Motivation, Self-Regulation of Emotions

**Level III: Tactical – Reciprocal Abilities**
i.e., Underlies human social exchange, turn taking, reciprocity, promise keeping. Basis of economic behavior (trading); Underlies ethics, social skills and etiquette; Basis for education. Required for legal contracts.

**Level IV: Strategic – Cooperative Abilities**
i.e., Underlies human coordinated group activities in which goals can be attained that are not possible for any individual. Underlies cooperative ventures, division of labor, formation of communities and governments
Executive Functioning - Defined

*EF is the use of self-directed actions (self-regulation) to choose goals, and to select, enact, and sustain actions across time toward those goals, usually in the context of others and often relying on social and cultural means. This is done for the maximization of one’s longer-term welfare as the person defines that to be.*

(Barkley, 2012)
Implications for Child Development

- It takes 30 years for the EF brain to mature
- Thus children do not have most of their adult EF capacity
- While teens have more capacity for self-awareness and inhibition, they have only about 60% of the other components
- Children and teens have a far more limited time horizon and capacity for time management, less delayed gratification, more limited emotional and motivational self-regulation, and more limited planning/problem-solving
- Therefore kids and teens will not make the same choices that adults will make about the now vs. the future given the same context and information
- This means that dealing with children or teens as adults will fail and only serve to generate conflict – take a child or teen’s view of life!
The Bell Curve of EF

Number

Competence

Average Performers (68%)

Poor Performers (16%)

High Performers (16%)

0.1% 2% 95% 130 145

68%

34% 34%

14% 14%
Understanding EF in Children

- Kids and teens are still struggling with the emergence and development of the 7 EF components – they are not adults!
- Compared to adults, they have a form of “Time Blindness” or a “Temporal Neglect Syndrome” (Myopia to the Future)
- They have a more restricted EF hierarchy the extent of which is based on their age and any co-existing EF disorders, such as ADHD
- They have less of the 8 developmental capacities (time, space, motivation, behavioral, abstract, social, cultural, etc.)
- Therefore, they cannot hierarchically organize as complex or as long-chained sets of goal directed behavior across time as can adults
- That is why you don’t ask children to plan weddings !!!!
- ADHD reduces EF abilities by 30%+
Anterior-posterior (rostral-caudal) hierarchy of cognitive control of behavior


Increased Valuing of Delayed Outcomes
Extended Space Horizon
Increased Behavioral Complexity and Hierarchies
Reliance on Cultural Methods and Products
Neurological Maturation
The Brain as a Knowledge vs. Performance Device

Childhood & Adolescence

Performance: Doing what you know

Knowledge: Knowing what to do
Children and the Resource Pool

• The extra effort SR requires in a child or teen may deplete this pool far more rapidly than in adults.
• And/or the pool may be smaller in children and teens making it more likely to be depleted by efforts at SR.
• Requiring children or teens to simply try harder may deplete this pool so much that it leaves them at greater risk for failure in immediately subsequent situations that may require further SR.
• There may be implications here for adverse after-effects from excessive taxing of or even training of SR/EF such that following the task or training period the child or teen is at greater risk for poor self-regulation in subsequent social or academic situations.
What Can Improve EF Difficulties?

- Information to caregivers (allows reframing)
- Maturation (accounts for 50-75% of annual gains)
- Accommodation
  - Re-arranging the cultural or educational scaffolding to reduce the impairments from EF difficulties
- Modification of EF-related behavior
  - Training in self-regulation strategies
  - Implementing behavior (contingency) management
    - Age, setting, and person specific
    - Cognitive rehabilitation training – doesn’t generalize
- ADHD Medications
Implications for Managing EF Problems

• Teaching skills is not enough!
• The key is to supplement training with prosthetic environments around the individual to compensate for their EF difficulties (scaffolding)
• Effective treatments are always those at the “point-of-performance”
• The EF deficits are usually developmental (neuro-genetic) and not social or cultural in origin
• Therefore, if severe enough to be a disorder, medications may be essential – ADHD meds are neuro-genetic therapies
• While adolescence creates a diminished EF capacity compared to adults: Does this excuse accountability?  
  – (No! The problem is with time and timing, not with consequences)
More Management Implications

• Behavioral treatments are helpful for restructuring natural settings to assist the EFs
  – They provide cues to assist working memory (signs, lists, cards, charts, posters)
  – They can use external timing devices to assist with time management
  – They provide artificial consequences in the large time gaps between consequences (accountability) (i.e., tokens, points, etc.)
  – They provide greater structure and accountability and so can address motivational deficits related to time delays
When faced with a situation in which the person has had trouble with EF/SR before:

- **Stop** the action (inhibit)
- **Scan** the situation and task (spatial sweep - like radar)
  - Readjust the lense of awareness – zoom out to place the context in a larger frame (begin with the end in mind); then zoom back in
- **See** the future (visualize the goal and success)
- **Say** the future (describe the goal and success)
- **Feel** the future (how will you feel if you succeed?)
- **Play** with the future and the steps to get to it (options)
- **Go** for your goal (initiate the plan)
How can we assist the developing EF system? By reverse engineering

- Externalize important information at key points of performance (use external working memory)
- Externalize time and time periods related to tasks and important deadlines
- Break up lengthy tasks or ones spanning long periods of time into many small steps
- Externalize sources of motivation
- Externalize mental problem-solving (make it manual)
- Replenish the SR Resource Pool
Externalizing Working Memory

- Use externally (outside the individual) represented forms of information to remind the individual what is to be done at the point of performance.
- This can be done by using sticky notes, cues, cards, lists, posters, signs, and other prompts of critical reminders at the point of performance.
- For older kids and adults, also use personal journals, digital recording devices, Watch-Minder watches, WristLists, day planners, personal organizers, computer organizers.
Wristlists
wristlists.com

CHOOSE THE TEXT FOR YOUR LASER ENGRAVED PLATES
Externalizing Time and the Future

Make time physical, external, and obvious

- timers, clocks, counters, and anything else that can signal time’s passing

Break down future projects and goals into small pieces and do a piece a day (or more frequently).

Bring the Es, Rs, & Os of life close together.
Make Motivation External

- Identify tasks and settings in which consequences are too delayed or nonexistent
- Put artificial consequences into these large gaps in time
  - Tokens, points, prizes, praise, privileges
- Increase accountability to others – more frequent check-ins with others to see that work is being done, goals are being met
Make Problem-Solving Manual

• When tasks normally require mental problem-solving (manipulating mental information, generating multiple ideas, etc.) make the mental information external, physical, or manual
  – For math, use marbles, number lines, an abacm, etc. and calculators
  – For words, use cards, paper, computer word processing programs
Replenishing the EF/SR Resource Pool

S-R Fuel Tank (Willpower)

- Greater Rewards and Positive Emotions
- Statements of Self-Efficacy and Encouragement
- 10 minute breaks between EF/SR tasks
- 3+ minutes of relaxation or meditation
- Visualizing and talking about future rewards before and during SR demanding tasks
- Routine physical exercise; Also Glucose ingestion

Regular limited practice using EF/SR and the Willpower Pool can increase later pool capacity. However, the capacity may eventually diminish once practice is terminated.

Gross’ Process Model of Emotion

Self-Regulation Strategies to Modify the Emotional Response

Situation Selection → Situation Modification → Attention Deployment → Cognitive Change → Response Modification

Selection → Situation → Attention → Appraisal → Response

Feedback Loop

Sequence of an Emotional Response

All strategies are not equally effective in controlling emotion

- Strategies may activate some common brain regions yet each strategy also activates different brain regions.
- Because of the neuro-anatomy of ADHD, some strategies may be more effective than others (e.g., setting selection or distraction may work better than re-appraisal and emotional suppression).
- In general, the earlier in the sequence the intervention occurs, the greater the control exerted over the subsequent emotion.
Conclusions

• Executive functioning is self-regulation
• People use at least 7 types of self-directed actions for self-regulation – these are EFs
• People vary in each of their EF abilities
• These variations are largely genetic but are to some extent malleable
• The EF system takes 30 years to mature
• Children and teens have far less EF than adults
• But EF at any age can be boosted with accommodations, external scaffolding or structure and practice