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DISCLOSURES

Dr. Benjamin is a partner in Brain Educators, LLC, and co-author of The Brain Card™, a pocket neuropsychiatry examination aid. The Brain Card™ includes tips on “bedside” assessment of executive function, which may overlap with some material in today’s lecture.

All patients seen in video examples consented to use of video in teaching

OUTLINE

- Executive Function Made Easy
- Acquired Frontal Syndromes
- Psychiatric Disorders with Dysexecutive Features
- “Bedside” Assessment of Executive Function
Some Measures of Success in Rehabilitation
- Independent living
- Treatment adherence
- Vocational stability
- Substance avoidance
- Interpersonal relationships

What area of cognitive function is most predictive of success in these areas?
FRONTAL/EXECUTIVE FUNCTION

What is Executive Function?
IF YOU READ THE PSYCHIATRY LITERATURE...
- Something to do with the Wisconsin Card Sort?
- Something to do with Working Memory?

Prefrontal (Executive) Functions Made Easy*
- The prefrontal cortex allows us to appropriately comport our behavior to the situation, and to apply what we have learned to novel situations. It allows us to break down ambiguous or overwhelming tasks into a sequence of accomplishable subroutines and keeps us motivated to act independently.

*According to Benjamin

- Appropriately comport behavior to situation
- Apply learning to novel situations
- Break down tasks into sequence of subroutines
- Motivation
- Independence
EXECUTIVE FUNCTION

DRIVE
SEQUENCING

ANTICIPATION  GOAL SELECTION  PLANNING  MONITORING

Attention  Visual-Spatial  Autonomic-Emotional  Sensory/Perception  Motor  Cognition

BEHAVIOR

The Frontal Lobes & Their White Matter Connections (the Largest Parts of our Brains) are Responsible for Executive Function

ACQUIRED FRONTAL BEHAVIORAL SYNDROMES

Traumatic  Congenital  Degenerative
DSM-IV-TR: Personality change due to General Medical Condition

- Persistent personality change
- Due to medical condition
- Not explained by another mental disorder
- Not just during delirium; not demented
- Impairs social, occupational or other functioning & causes distress
- Specify type: Labile, disinhibited, apathetic, aggressive, paranoid, other, combined

Frontal dysexecutive syndromes may be included in all 7 subtypes

THE GAGE ACCIDENT
Cavendish, VT 9/12/48

Gage: Harlow's Description

"He is furtive, inconstant, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires, at times pertinaciously obstinate yet capricious and vacillating, devising many plans of future operation which are no sooner arranged than they are abandoned in turn for others appearing more feasible. A child in his intellectual capacity and manifestations, he has the animal passions of a strong man. In this regard his mind was radically changed, so decidedly that his friends and acquaintances said he was "no longer Gage.""
Neocortical Representation of Limbic System

ORBITOFRONTAL SYNDROME
- Child-like euphoria ("monia")
- Facetious humor ("witzelsucht")
- Shallow, labile affect
- Social disinhibition
- Impaired judgment, tact, foresight
- Impulsive, distractible
- Difficulty maintaining set
**ORBITOFRONTAL SYNDROME**

- 38 yo MR woman referred for aggression & non-compliance (explosive outbursts for trivial reasons)
- Shallow, impulsive, un-empathic, child-like affect, but good vocabulary
- Frontal syndrome suspected
- 13 yr flu after 9/11

**TBI with OF Syndrome**

44 yo RH M MVA (motorcycle/no helmet) with SAH, contusions, R frontal fracture. Became angry, sarcastic, disinhibited, “can’t see the gray”

**DORSOLATERAL PREFRONTAL SYNDROME**

- Abolic, unmotivated
- Apathetic (occasional outbursts)
- Psychomotor slowing
- Concrete, stimulus bound
- Perseverative, poor problem solving, disorganized

Sensory Integration Assessment of Emotional Significance
CONGENITAL FRONTAL SYNDROME (G.K.)

(Price et al. 1990)

Frontotemporal Dementia

42 yo M w/ OCD, withdrawal, & peculiar behavior since mom died 6 months earlier

1992 1994

TBI Frontal Dysexecutive Syndrome: 20 Year Follow-up

- 41 yo RH M 20 yrs a/p MVA with R frontal fracture and ICH (2 wk PFA), spastic quadriplegia, dysarthria
- Unable to understand why wife recently left him, unable to adjust to new job responsibilities
- Poor concentration, very distractible, can't analyze errors, unaware of deficits, occasionally suspicious
Psychiatric Disorders with Dysexecutive Features
- Schizophrenia
- ADHD
- OCD
- Major Depression
- Mania
- Tourette Syndrome
- Substance Dependence

BEDSIDE ASSESSMENT OF EXECUTIVE FUNCTION

Is There an Executive Function Test in the Basic Mental Status Exam?
- The entire patient interaction
- Aspects of the history
- Behavioral observations
- Much of the MSE & cognitive assessment
Evidence of Executive Function is Ubiquitous
- Planning/anticipation/foresight
- Self error monitoring
- Social awareness
- Ability to follow sequential commands

ASSESSMENT OF FRONTAL FUNCTION
Neurological Examination
- Forced grasping
- Grope
- Gegenhalten
- Motor inappropriateness
- Gait
- Waxy flexibility

ASSESSMENT OF FRONTAL FUNCTION
Observations
- Perseveration (establish, change, maintain set)
- Free will
- Imitation behavior
- Deviation behavior
- Full vs absent
- Alien hand
- Complexity of thought (vs simplicity)
- Apathy
- Impulsivity
- Forethought/planning
- Empathy
- Expressive emotional prosody
- Verbal fluency
- Comprehension
- Apparent, affect, humor
**ASSESSMENT OF FRONTAL FUNCTION**

**STANDARD MSE**
- WORLD or months backward
- Serial 7’s
- Similarities
- Proverbs: Familiar & unfamiliar
- Insight: Did patient request treatment?
- Judgment: What are your plans?

**ASSESSMENT OF FRONTAL FUNCTION**
**ADDITIONAL BEDSIDE TESTS**
- Complex problem solving
- Verbal sequencing task
- Alternating sequences/multiple loops
- Non-verbal sequencing task
- Draw-a-clock
- Word list generation
- Cognitive estimation
- 2:1 Alternating motor task
- Conceptual series completion
- Go/no-go task
- Motor sequencing task (Luria 3 step)
- Rhythmic tapping

**Complex Problem Solving**
**AN EXCELLENT FRONTAL SCREEN TASK**

If I were to give you $5 and ask you to buy 4 packs of nuts at 89¢/pack, how much change would you receive?
$5 - (4 \times 0.89) =

Requires
- Working memory
- Arithmetic
- Cognitive estimation
- Error checking
- Sequencing
Alternating Sequences

- Perseveration/Poor Error Checking
- Stimulus Bound
- Pull to Stimulus

Alternating Sequences

- Normal
- Recurrent Perseveration

Multiple Loops

- Continuous Perseveration
- Pull to Stimulus
“I just asked you to stop doing that...”

Draw-A-Clock Task (11:10)

Stimulus bound: pulled to the 10

“When others on the unit are yelling she always begins to yell, too.”
Cognitive Estimation

- How many people would you guess can fit on a crowded city bus?
- How many miles across is our state?
- How many feet long is this room?
- How many feet high is the ceiling?
- How long is the average person’s spine?

“How much money do you think you would need each month to pay your living expenses?”

Conceptual Series Completion

Fill in the blank:

AZ BY CX D_
Verbal Sequencing Task

Arrange the words to form a sentence:
RIGHT HAND CHANGE THE HIM
HAND HIM THE RIGHT CHANGE
“You know what we discussed. Before you can be discharged you have to…”

Word List Generation
- Broad Category: List all the words you can think of that begin with the letter “b” (but not capital “B”). You have 1 minute. \( NL=12/min \)
- Narrow Category: List all the animal names you can think of—they can be farm animals; jungle animals; animals of the land, sea, or air; pet animals; wild animals; & they can start with any letter. You have 1 minute. \( NL=18/min \)

2/1 Alternating Task; Go/No-go
- “When I hold up 1 finger, you hold up 2. When I hold up 2, you hold up 1”
- “When I hold up 1 you still hold up 2, but when I hold up 2, keep your hand down & don’t do anything”
Selected Neuropsychological Tasks
- Wisconsin Card Sorting Task
- Stroop Color Interference Test
- Iowa Gambling task
- Trails B

Wisconsin Card Sort

Stroop Test

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