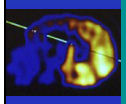

The Frontal Lobes: A Users Guide & WHY THEY MATTER IN REHAB

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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?

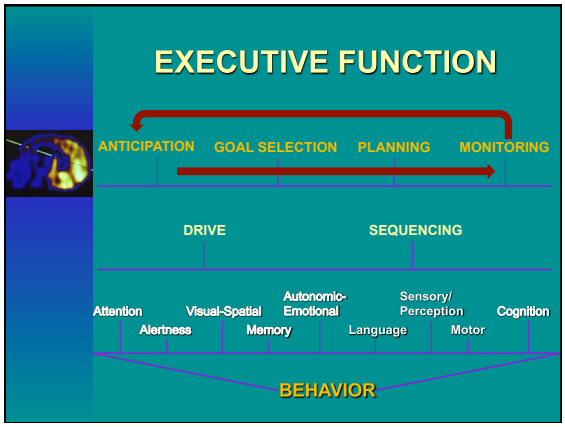
Prefrontal (Executive) Functions Made Easy*

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.

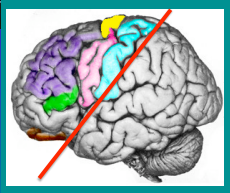
- Appropriately comport behavior to situation
- Apply learning to novel situations
- Break down tasks into sequence of subroutines
- Motivation
- Independence

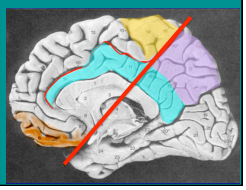
**According to Benjamin*

EXECUTIVE FUNCTION



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

Traumatic Frontal Executive Dysfunction

Gage: Harlow's Description

"He is fitful, irreverent, 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.' "

Traumatic Frontal Executive Dysfunction

Sunday
September 13, 1998

Rutland / Southern Vermont

Page 3

The Sunday Rutland Herald

Skull Session

Rollicking Festival Remembers Bizarre Brain Injury

By MELISSA MACKENZIE
Correspondent

CAVENDISH - While an assortment of international neurologists at Okemo Mountain Resort discussed Phineas P. Gage's amazing skull, approximately 1,000 people, most of whom had not heard of Gage until a few months ago, lined up in front of his birthplace having old-fashioned fun.

In 1848, a 3.5-foot iron rod pierced Gage's skull in two places. The railroad worker lived for another 13 years, his faculties intact except for a drastic personality change.

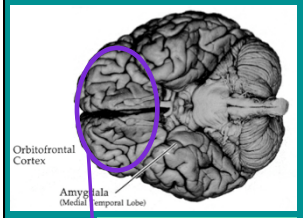
The 150th anniversary commemoration of the unusual accident began with a parade Saturday, followed by a parade headed by the Rev. Edward H. Wadsworth, a direct descendant of the Cavendish doctor

Phineas Gage's famous skull, an early bit of evidence suggesting that different lobes manage the brain's functions, was on exhibit inside the town hall, instead of at Harvard Medical

Photo by Brad

Bryanna Cobb, 4, and Sharon Cobb, 7, examine Phineas Gage's skull in a display case in Cavendish. A festival Saturday commemorated

ORBITOFRONTAL SYNDROME



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

Traumatic Frontal Executive Dysfunction

Neocortical Representation of Limbic System

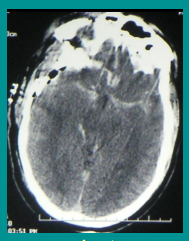
ORBITOFRONTAL SYNDROME

- 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 f/u after 9/11

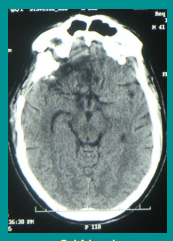
Traumatic Frontal Executive Dysfunction

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"



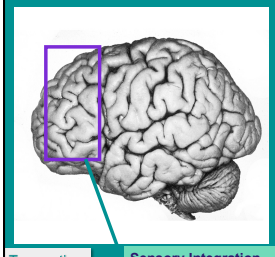
Acute



6 Weeks

Traumatic Frontal Executive Dysfunction

DORSOLATERAL PREFRONTAL SYNDROME

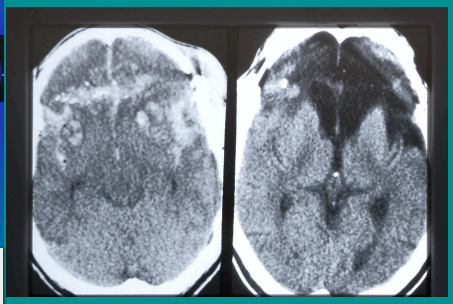


- Abulic, unmotivated
- Apathetic (occasional outbursts)
- Psychomotor slowing
- Concrete, stimulus bound
- Perseverative, poor problem solving, disorganized

Sensory Integration
Assessment of Emotional Significance

Traumatic Frontal Executive Dysfunction

Self-Inflicted GSW



Traumatic Frontal Executive Dysfunction

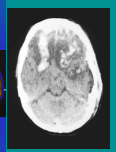
PREFRONTAL SYNDROMES

DORSOLATERAL
- Abulic, unmotivated
- Apathetic
- Psychomotor slowing
- Poor problem solving
- Occasional outbursts
- "Pseudodepressed"

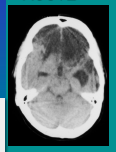
ORBITOFRONTAL
- Impulsive, disinhibited
- Inappropriate jocularity
- May be hyperactive
- Emotional lability
- Frequent outbursts
- "Pseudopsychopathic"

Traumatic Frontal Executive Dysfunction

MIXED FRONTAL SYNDROME



ACUTE

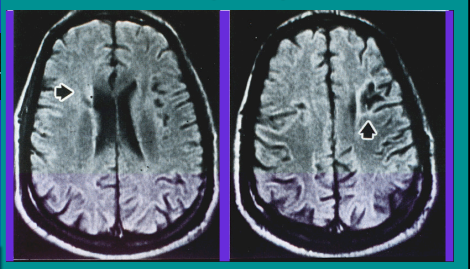


CHRONIC

- 34 year old single RH computer technician fell while intoxicated
- s/p L f-p fracture, SDH, bifrontal ICH, VP shunt
- Mild spastic R HP, incontinence, perseveration, decreased verbal fluency, stimulus-bound behavior, marked executive dysfunction
- Impulsive, irritable, concrete, denied deficits, apathetic, explosive, sensitive to environmental cues

Traumatic Frontal Executive Dysfunction

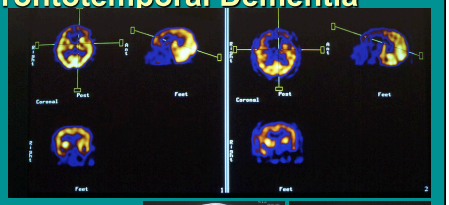
CONGENITAL FRONTAL SYNDROME (G.K.)



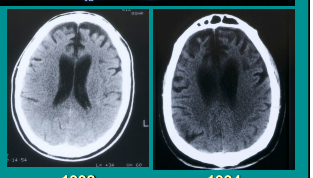
(Price et al, 1990)

Congenital Frontal Executive Dysfunction

Frontotemporal Dementia



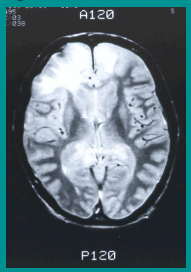
42 yo M w/ OCD, withdrawal, & peculiar behavior since mom died 6 months earlier



1992 1994

Degenerative Frontal Executive Dysfunction

TBI Frontal Dysexecutive Syndrome: 20 Year Follow-up



- 41 yo RH M 20 yrs s/p MVA with R Frontal fracture and ICH (2 wk PTA), spastic quadraparesis, 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

Traumatic Frontal Executive Dysfunction

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

Assessment of Executive Function

Evidence of Executive Function is Ubiquitous

- Planning/anticipation/foresight
- Self error monitoring
- Social awareness
- Ability to follow sequential commands

Assessment of Executive Function

ASSESSMENT OF FRONTAL FUNCTION

Neurological Examination

- Forced grasping
- Grope
- Gegenhalten
- Motor impersistence
- Gait
- Waxy flexibility

Assessment of Frontal Function

ASSESSMENT OF FRONTAL FUNCTION

OBSERVATIONS

- Perseveration (establish, change, maintain set)
- Free will
  - Imitation behavior
  - Utilization behavior
  - Pull to stimulus
  - Alien hand
- Complexity of thought (vs simplicity)
- Apathy
- Impulsivity
- Foresight/planning
- Empathy
- Expressive emotional prosody
- Verbal fluency
- Confabulation
- Appetite, sexuality, humor

Assessment of Executive Function

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 Executive Function

ASSESSMENT OF FRONTAL FUNCTION
ADDITIONAL BEDSIDE TESTS

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

Assessment of Executive Function

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 x 0.89) =

Requires

- Working memory
- Arithmetic
- Cognitive estimation
- Error checking
- Sequencing

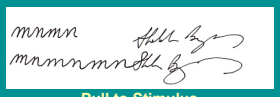
Assessment of Executive Function

Alternating Sequences

Normal

Perseveration/Poor Error Checking

Stimulus Bound



Pull to Stimulus

Assessment of Executive Function

Alternating Sequences

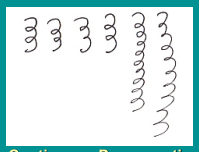
Normal

Recurrent Perseveration

Assessment of Executive Function

Multiple Loops

Pull to Stimulus

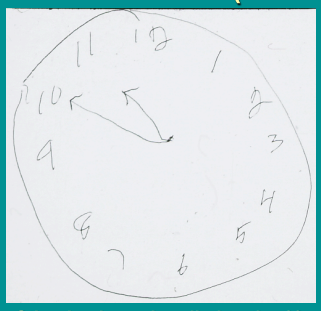


Continuous Perseveration

Assessment of Executive Function

"I just asked you to stop doing that…"

Draw-A-Clock Task (11:10)



Stimulus bound: pulled to the 10

Assessment of Executive Function

"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?

Assessment of Executive Function

"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_

Assessment of Executive Function

Verbal Sequencing Task

Arrange the words to form a sentence:

RIGHT HAND CHANGE THE HIM

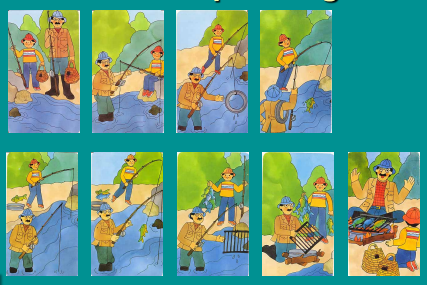
HAND HIM THE RIGHT CHANGE

Assessment of Executive Function

Nonverbal Sequencing

Assessment of Executive Function

Nonverbal Sequencing



Assessment of Executive Function

"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. ***NI=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. ***NI=18/min***

Assessment of Executive Function

2/1 Alternating Task; Go/No-go

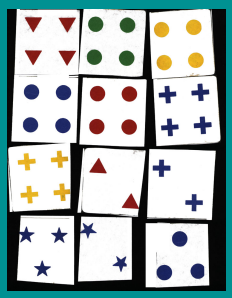
- "When I hold up 1 finger, you hold up 2. When I hold up 2, you hold up 1"
- "When I hold up 1 you still hold up 2, but when I hold up 2, keep your hand down & don't do anything"

Selected Neuropsychological Tasks

- Wisconsin Card Sorting Task
- Stroop Color Interference Test
- Iowa Gambling task
- Trails B

Assessment of Executive Function

Wisconsin Card Sort



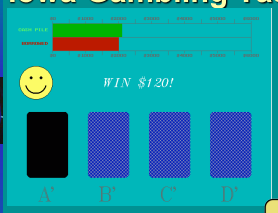
Assessment of Executive Function

Stroop Test

RED	XXXXX	GREEN
GREEN	XXXXX	BLUE
RED	XXXXX	RED
BLUE	XXXXX	BLUE
BLUE	XXXXX	GREEN
GREEN	XXXXX	RED
BLUE	XXXXX	GREEN
RED	XXXXX	BLUE

Assessment of Executive Function

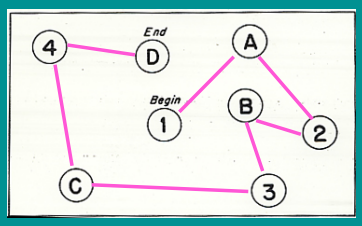
Iowa Gambling Task



	Bad Decks		Good Decks	
	A	B	C	D
Gain/Deck:	$100	$100	$50	$50
Loss/10 cards:	$1250	$1250	$250	$250
Net/10 cards:	-$250	-$250	$250	$250
Rewards/10 cards:	5	1	5	1

Assessment of Executive Function

Trails B (sample)



Assessment of Executive Function

EXECUTIVE FUNCTION IS A MAJOR CONTRIBUTOR TO SUCCESS IN REHABILITATION

IT'S TIME FOR PSYCHIATRY TO UNDERSTAND IT!