

Complex Task Performance Assessment

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SCHOOL OF MEDICINE

Executive Function Definitions

- Executive function is the ability to integrate various component cognitive abilities to produce meaningful task performance.
- Executive dysfunction is the *relative inability* to:
 - Plan, organize, and initiate new solutions.
 - Identify and correct errors
 - Suppress habitual responses
 - Devise novel responses

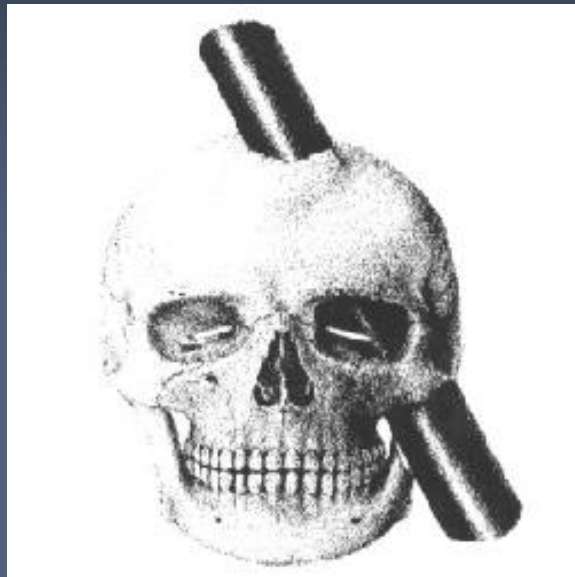
Distinction

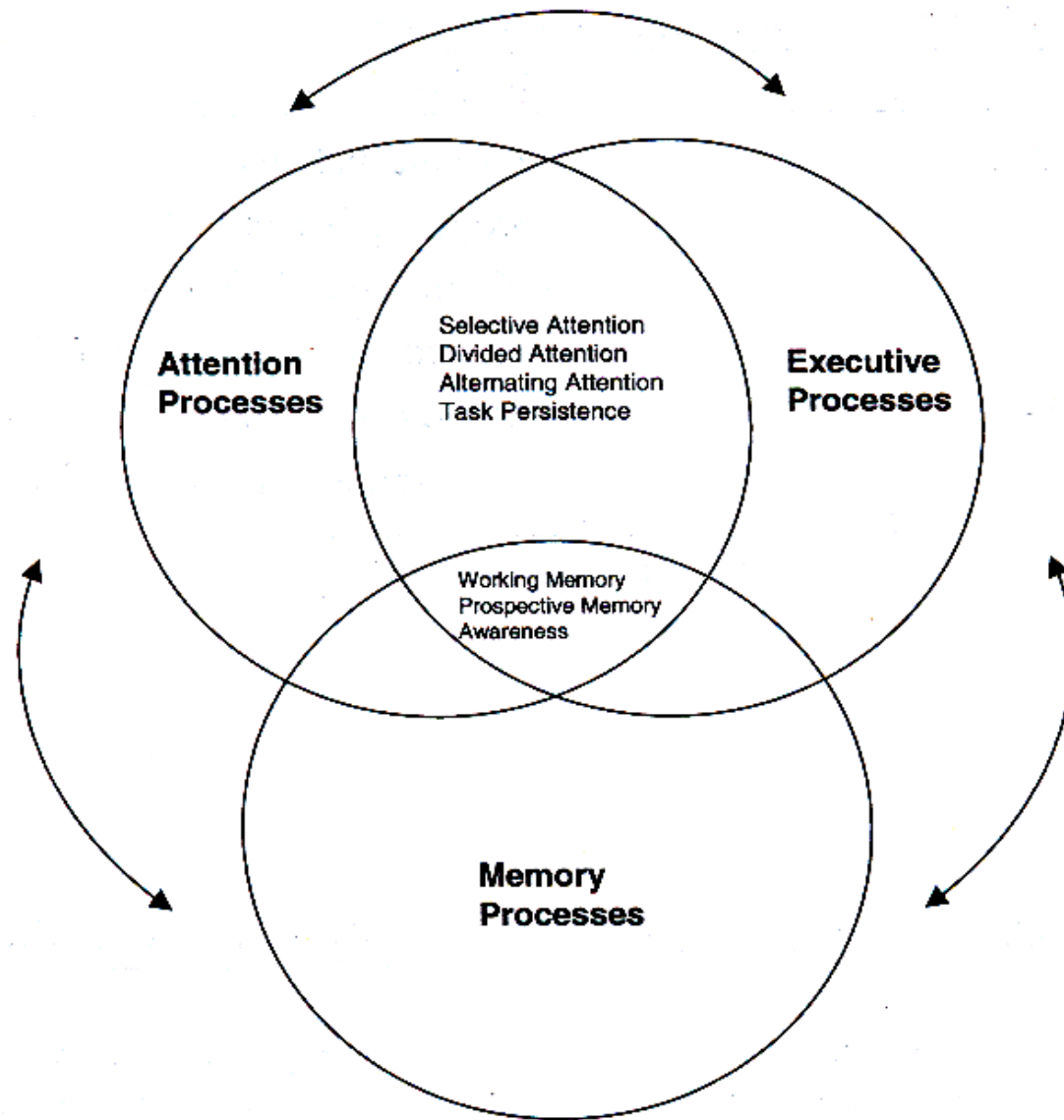
- Executive functions are distinguished from basic cognitive functions.
- Executive functions *cue* and *facilitate* the individual cognitive functions such as short-term memory, auditory processing, and visual representation.
- Executive functions are “higher order” abilities that *control* emotions and *coordinate* cognitive processes.

Clinical Executive Function

- Essentially, higher-level cognitive processes refer to the “if” and “how” of performance
 - Higher-level cognitive processes refer to **if** a person will perform an action and **how** the person will perform that action
- EFs involve several parallel processes and interacting associations in various parts of the brain.
 - Optimally, these associations are collaborative.
- No longer “Frontal Lobe Syndrome”
 - Damage to the frontal lobes often creates executive dysfunction
 - Executive dysfunction also occurs when other parts of the brain are damaged or dysfunctional and the frontal lobes are intact, e.g. Parkinson’s Disease.

Phineas Gage





mTBI/mCVA Functional Consequences

- Routine behaviors/tasks are typically spared
 - “Overlearned activities”
 - Example-ADL; weapon assembly
- Capable of new cognitive learning
 - Basic attention and memory processes are typically spared
 - Behavioral learning strategies typically not necessary
 - Can learn new behaviors with practice
- Generalization and transfer is impacted
 - Problems with novel activities
 - Changing context
 - Changing task demands
 - Dynamic environments
 - Example: work, driving, financial management

mTBI/mCVA Functional Consequences

- Executive Functions
 - Self-monitor
 - Cognitive flexibility
 - Emotional control
 - Initiation
 - Plan/Organize/Sequence
 - Poor decision making
 - Task Monitoring
 - Initiation
 - Working Memory
- Common Manifestations
 - Impulsivity
 - Confabulation
 - Difficulty planning
 - Poor sequencing
 - Lack of insight
 - Apathy
 - Disinhibition
 - Aggression
 - Perservation
 - Poor decision making

Challenges for Assessment

- Traditional Cognitive Assessment
 - Short in duration
 - Clearly defined goals and outcomes
 - Well-structured
 - Designed to evaluate isolated cognitive components
 - Example: DKEFS Trailmaking
 - Effective in identifying specific cognitive deficits
 - Contradicts defined components of executive function
- Can have performance-based executive function deficits in absence of identified impairment on traditional cognitive assessments
 - Development of performance-based executive function assessments to supplement traditional assessment

Performance-Based Measures

- “Ecologically Valid”
 - Designed to simulate how a person would perform an activity in everyday life that requires executive functioning
- Multiple Errands Task
 - MET, MET-SV, MET-HV
 - Shopping task in a hospital district
 - List of tasks and rules provided without instructions on how to complete
 - Client determines when finished
 - Performance observed and scored
 - Task failures, task inefficiencies, rule breaks, interpretation failures
 - Has been showed to discriminate between those with and without executive dysfunction


Performance-Based Measures

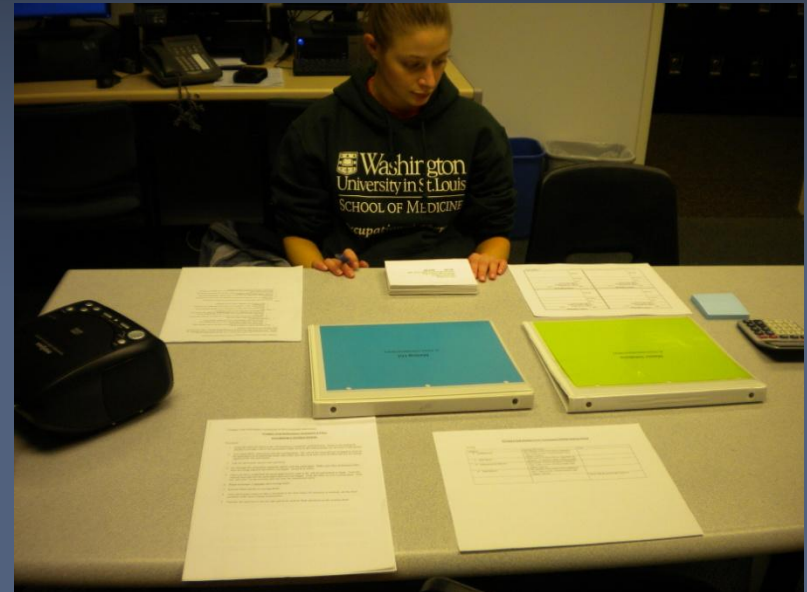
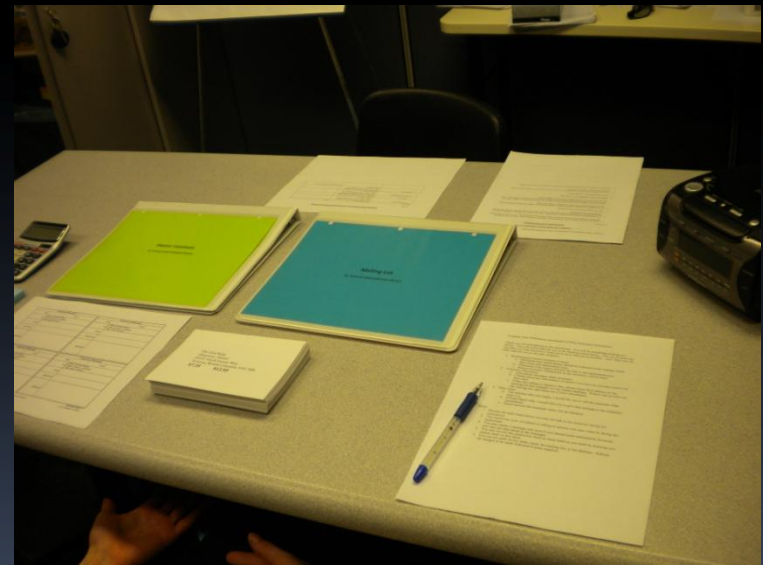
- Limitations
 - Only provide insight into that activity
 - Activities have to be novel but not new
 - Important to client
 - Can't retest without alternate forms
 - Community based measures have to be redeveloped at each site

Performance-Based Measures

- Framework for development
 - Paul Burgess
 - Multitasking Criteria
 - Many tasks
 - Interleaving required
 - One task at a time
 - Interruptions and unexpected outcomes
 - Delayed intentions
 - Differing tasks characteristics
 - Self-determined targets
 - No immediate feedback
- Complex Task Performance Assessment (CTPA)—work-focused

CTPA

- Work-simulation-Library
 - Primary task
 - Inventory Control
 - Secondary task
 - Phone messages
 - Delayed intentions 
 - Tell time
 - Give examiner message
 - Rules



Multitasking Construct	Operational Definition	CTPA Component
Many Tasks	A number of discrete and different tasks have to be completed.	Inventory control sheet, answer all phone messages, respond to appropriate phone messages, time and event prospective memory tasks
Interleaving required	Performance on these tasks needs to be dovetailed in order to be time-effective.	Phone messages are dovetailed with inventory control activity
One task at a time	Due to either cognitive or physical constraints, only one task can be performed at any one time	Can not physically write the phone message while recording on inventory control.
Interruptions and unexpected outcomes	Unforeseen interruptions, sometimes of high priority will occasionally occur, and things will not always go as planned.	Phone messages are intermittingly spaced throughout the CD
Delayed intentions	The time for a return to a task that is already running is not signaled directly by the situation	Time and event prospective memory tasks, i.e. tell examiner when 10 minutes has past.
Differing task characteristics	Tasks usually differ in terms of priority, difficulty and the length of time they will occupy.	All tasks require a different amount of time. The inventory control is the main focus of the activity.
Self-determined targets	People decide for themselves what constitutes adequate performance.	Participant informs examiner when they are finished.
No immediate feedback	There is no minute-by-minute performance feedback of the sort that participants in many laboratory experiments will receive. Typically, failures are not signaled at the time they occur	No feedback from examiner on correct or incorrect performance during the assessment. Participant makes their own determination.

Example: “Joe”

- Joe is a 46 year executive for a telecommunications company who had a mild stroke
- Scored WNL on all neuropsychological measures of EF
 - Scaled by age
 - Joe had graduate level education
 - Strong tie to intelligence
- CTPA
 - Did not complete before time limit was reached
 - Task failures: phone messages, inventory control, time-based prospective memory task
 - Asked several questions which is against the rules
 - Did not have a strategy to complete the tasks (difficulty planning/poor decision making)
 - Perseverate on a phone message and have to start over on inventory control (perseveration/poor sequencing)
 - Stated that he thought he did “okay” but did not see the connection to his job because he did not work at a library (insight)

Revisions and further work

- Two revisions
 - First-focused on decreasing the time demand
 - Limited number of titles
 - Limited number of messages
 - Second-focused on clarifying the instructions and decreased time demand for validation
 - Focus ultimately on clinical utility
 - Needed to be administered in a feasible time frame
 - Shorten number of messages
 - Rewrote the instructions to be more clear
 - Revisions based on numerous administrations by five administrators
- Currently
 - Testing individuals with mild stroke and community controls
 - Reliability and validity