

Neuropsychological assessment of older adults: what, when and why?

Benjamin Mast, Ph.D.
Associate Professor & Vice Chair,
Psychological & Brain Sciences
Associate Clinical Professor,
Family & Geriatric Medicine
University of Louisville

Mast, UofL Geriatric Symposium 2012

Overview

- What are we evaluating?
- When should people be referred?
- Why are people referred?

Mast, UofL Geriatric Symposium 2012

Case #1

- Clinical case description #1:
 - Bob is a 75-year old man who has difficulty with memory. He cannot remember:
 - where he placed his keys and wallet
 - to turn off the stove; to pay the bills
 - names of his neighbors
 - his children's names
 - his wife's name
 - He spends most of his day wandering around his home looking for his wife who died 7 years ago
 - When he ventures out of his home he gets lost and is unable to find his way home

Mast, UofL Geriatric Symposium 2012

Case #2

- Clinical case description #2:
 - Fred is a 75-year old man who complains of problems with his memory
 - He has difficulty recalling recent conversations, where he placed objects, but recognizes his neighbors and family members by name.
 - Fred is known to be on time for appointments, and can still help family members with directions to various locations around the city he lives in.
 - Fred continues to successfully manage his family's finances

Mast, UofL Geriatric Symposium 2012

Cognitive screening

- Determine who needs additional testing
- Brief, easy to administer
- Effective detection (minimize false positives, false negatives)

Mast, UofL Geriatric Symposium 2012

Screening tools

- MMSE
 - Useful for staging and tracking cognitive decline
- Clock drawing test
- Mini-Cog
- MoCA
- Symptoms of dementia screener (SDS)
- GPCOG

Mast, UofL Geriatric Symposium 2012

Clock drawing

- Quick, simple method for cognitive screening
- Draw the face of a clock, put in all the numbers, set the hands of the clock to 10 after 11.
- Many scoring systems exist
 - 4 point
 - Complete circle
 - All numbers included
 - Numbers correctly placed
 - Correct time
 - Less than 3 indicates failed screen

Mast, UoFL Geriatric Symposium 2012

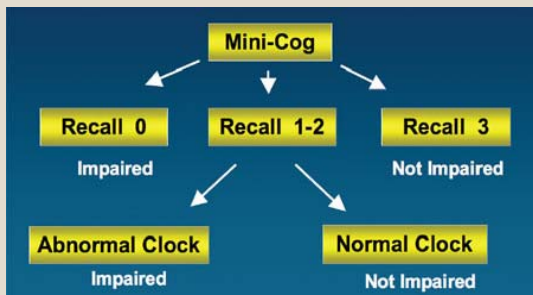
Mini-Cog

- Clock drawing + 3 word recall
- Repeat 3 words
- Draw clock
- Recall 3 words

- 5 points
 - 2 for clock drawing
 - 3 for recall

Borson et al, 2000
Mast, UoFL Geriatric Symposium 2012

Mini-Cog



Adapted from Borson S, et al. *Int J Geriatr Psychiatry*, 2000;15:1021-1027.
<http://www2f.biglobe.ne.jp/~bake/improvingad.htm>

Montreal Cognitive Assessment (MoCA)

- Newer screening measure
- Designed to be sensitive to mild cognitive impairment
- Greater emphasis on memory and executive functioning
- Score range 0-30
- <26 considered a failed screen

Mast, UofL Geriatric Symposium 2012

VISUOSPATIAL / EXECUTIVE

Copy cube

Draw CLOCK (Ten past eleven) (3 parts)

points

5 (End) A B 2
1 (Begin) D 4 3
C

[] [] [] [] [] []

Contour Numbers Hands /5

Mast, UofL Geriatric Symposium 2012

NAMING

[] [] []

/3

Mast, UofL Geriatric Symposium 2012

MEMORY		Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.					
		FACE	VELVET	CHURCH	DAISY	RED	No points
	1st trial						
	2nd trial						
ATTENTION		Read list of digits (1 digit/ sec.)					
		Subject has to repeat them in the forward order [] 2 1 8 5 4					___/2
		Subject has to repeat them in the backward order [] 7 4 2					
		Read list of letters. The subject must tap with his hand at each letter A. No points if 2-3 errors.					___/1
		[] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B					
		Serial 7 subtraction starting at 100 [] 93 [] 86 [] 79 [] 72 [] 65					___/3
		4 or 5 correct subtractions: 3 pts, 3 or 4 correct: 2 pts, 1 correct: 1 pt, 0 correct: 0 pt					

Mast, UofL Geriatric Symposium 2012

LANGUAGE		Repeat : I only know that John is the one to help today. [] The cat always hid under the couch when dogs were in the room. []					___/2		
		Fluency / Name maximum number of words in one minute that begin with the letter F [] _____ (N ≥ 11 words)					___/1		
ABSTRACTION		Similarity between e.g. banana - orange = fruit [] train - bicycle [] watch - ruler					___/2		
DELAYED RECALL		Has to recall words WITH NO CUE	FACE	VELVET	CHURCH	DAISY	RED	Points for UNCLUED recall only	___/5
		Category cue	[]	[]	[]	[]	[]		
Optional		Multiple choice cue							
ORIENTATION		[] Date	[] Month	[] Year	[] Day	[] Place	[] City		___/6
		© Z.Nasreddine MD Version 7.1		www.mocatest.org		Normal: 23/30		TOTAL	___/30
		Administered by: _____						Add 1 point if ≤ 12 yrs old	

Mast, UofL Geriatric Symposium 2012

Informant report

- Sometimes the problems observed by those who know the patient well will not show up on standardized cognitive testing
- Brief questionnaires can enhance our ability to detect problems that occur in the person's everyday environment

Mast, UofL Geriatric Symposium 2012

Symptoms of Dementia Screener (SDS)

- Informant questionnaire
- 11 yes/no questions
- No special training needed to administer
- Does not require face-to-face administration (could be completed in waiting room, over phone, or by mail)

Mundt et al., 2000
Mast, UoFL Geriatric Symposium 2012

SDS items

- Does he (she) often repeat himself (herself) or ask the same question over and over?
- Is he (she) more forgetful, that is, have trouble with short-term memory?
- Does he (she) need reminders to do things like chores, shopping, or taking medicine
- Does he (she) forget appointments, family occasions, or holidays?
- Does he (she) seem sad, down in the dumps, or cry more often than in the past?
- Has he (she) started having trouble doing calculations, managing finances, or balancing the checkbook?

Mast, UoFL Geriatric Symposium 2012

SDS items

- Has he (she) lost interest in his (her) usual activities such as hobbies, reading, church, or other social activities?
- Has he (she) started needing help eating, dressing, bathing, or using the bathroom?
- Has he (she) become irritable, agitated, or suspicious or started seeing, hearing, or believing things that are not real?
- Are there concerns about his (her) driving, for example, getting lost or driving unsafely?
- Does he (she) have trouble finding the words he (she) wants to say, finishing his (her) sentences, or naming people or things?

Mast, UoFL Geriatric Symposium 2012

SDS interpretation

- Greater number of items endorsed indicates greater likelihood of dementia
- 5 or more symptoms
 - 90% sensitivity
 - 85% specificity

Mast, UofL Geriatric Symposium 2012

GPCOG

- Name and address (memory)
- Date (orientation)
- Clock drawing
- Informant interview (6 questions)
- <http://www.gpcog.com.au/>
- Online scoring

Mast, UofL Geriatric Symposium 2012

Cognitive screening

<ul style="list-style-type: none">• Bob• MMSE = 15• 3-item recall = 0• Not oriented to time, place• Clock drawing test 1/4	<ul style="list-style-type: none">• Fred• MMSE = 26• 3-item recall = 2• Oriented to place, but slightly off on time• Clock drawing test 3/4
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Mast, UofL Geriatric Symposium 2012

Questions

- Reactions/impressions of Bob & Fred?
- Who should be referred for neuropsychological assessment?
- What do you want to know?
- Why are you referring them?

Mast, UofL Geriatric Symposium 2012

What are we evaluating?

- Person
- Dementia syndromes
 - Alzheimer’s disease
 - Vascular dementia
- Mild cognitive impairment
- Cognitive changes – other factors
 - B12
 - Depression

Mast, UofL Geriatric Symposium 2012

Dementia syndrome (DSM)

- Memory impairment
- One or more of the following:
 - Aphasia (problems with communication)
 - Apraxia (problems with “overlearned” movements)
 - Agnosia (problems recognizing faces/objects)
 - Disturbance in executive functioning (planning, problem solving, anticipating outcomes)
- Represent a decline from prior levels of function
- Interfere with social/occupational functioning

Mast, UofL Geriatric Symposium 2012

Causes of dementia (types)

- There are many causes of dementia
- Most common causes:
 - Alzheimer's disease
 - Vascular disease
 - Dementia with Lewy bodies
 - Frontotemporal dementia
 - Alcohol related dementia

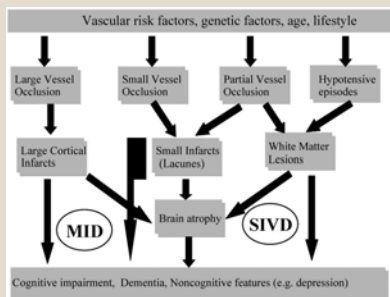
Mast, UofL Geriatric Symposium 2012

Differential diagnosis

- Early AD – gradual onset, memory deficit, naming, semantic fluency, executive functioning
- Vascular dementia – abrupt onset, fluctuating course, focal neurological involvement,
- Lewy body dementia – visual hallucinations, Parkinsonian symptoms, noticeable fluctuation in cognition
- Frontotemporal dementia – personality change prior to memory problems; language disturbance

Mast, UofL Geriatric Symposium 2012

Pathways to vascular cognitive impairment



O'Brien (2006). Vascular cognitive impairment. Am J Ger Psych, 14, 724-733.

Key criteria – daily functioning

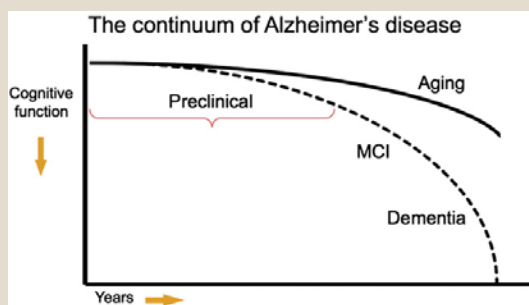
- What if the person is impaired on testing, but remains relatively independent in daily functioning?
- Dementia vs. MCI (or CIND)
- Types of MCI
 - Amnestic type
 - Multiple cognitive domain type

Mast, UoFL Geriatric Symposium 2012

Mild cognitive impairment (MCI)

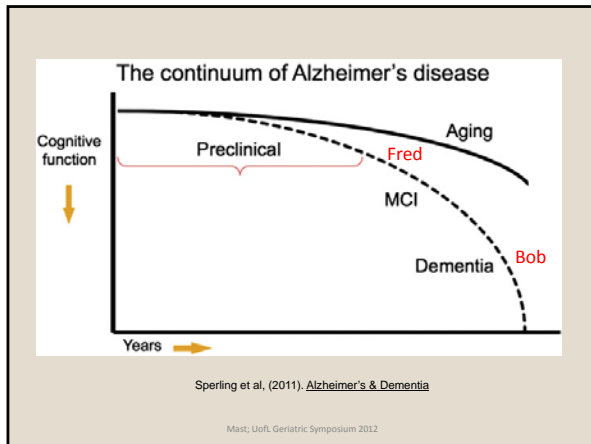
- Subjective memory complaint
- Normal general cognitive functioning
- Normal functioning in activities of daily living
- Absence of dementia
- Isolated impairment (>1.5 SD below mean) in memory or other cognitive functioning
(Petersen, 2001)

Mast, UoFL Geriatric Symposium 2012



Sperling et al. (2011). *Alzheimer's & Dementia*

Mast, UoFL Geriatric Symposium 2012



- ### Assessment functions and questions
- **Detection:** Does impairment exist?
 - **Staging:** How severe is the impairment?
 - **Differential diagnosis:** What might be causing the impairment?
 - **Functional implications:** What are the real life consequences of this impairment?
 - **Care planning:** How can this person compensate and live optimally with these changes?
- Mast, UofL Geriatric Symposium 2012

- ### Reasons to refer for NP testing
- Failed cognitive screen
 - Passed cognitive screen, family or pt still concerned
 - Dementia diagnosis established, but functional capabilities are not
 - Comorbid depression
- Mast, UofL Geriatric Symposium 2012

What is clinical neuropsychology?

- A specialty within clinical psychology that focuses on “brain-behavior” relationships
- Focuses on the extent to which brain diseases/injuries are affecting behavior
 - Cognitive functioning/thinking skills
- Used with a variety of conditions:
 - Traumatic brain injury, Alzheimer’s disease, seizure disorders, stroke

Mast, UofL Geriatric Symposium 2012

Neuropsychological assessment

- Neuropsychological assessment: standardized testing designed to evaluate cognitive functioning
- What does neuropsychological assessment involve with older patients?

Mast, UofL Geriatric Symposium 2012

Assessment Procedures

1. Chart review
2. Comprehensive interview
3. Neuropsychological Testing (1-5 hours)
4. Scoring and comparison to norms
5. Review other diagnostic information
6. Written report
7. Feedback
8. Care planning (follow-up)

Mast, UofL Geriatric Symposium 2012

Neuropsychological testing

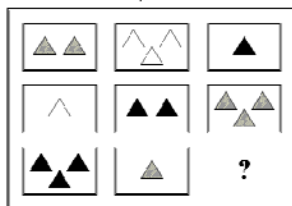
- Performance based tests in multiple domains of cognitive functioning
 - Memory
 - Attention
 - Language/communication
 - Executive functioning
 - Visual-spatial functioning
 - Processing speed

Mast, UofL Geriatric Symposium 2012

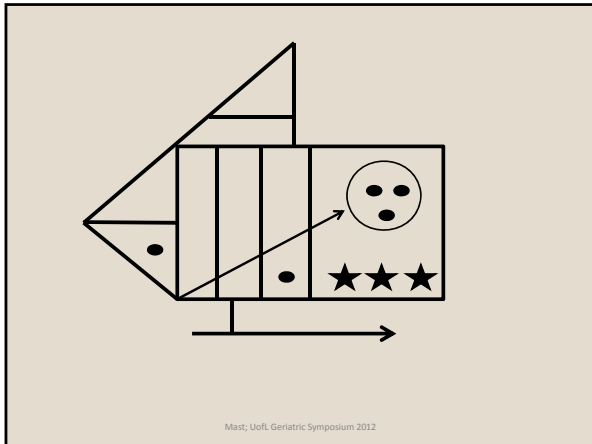
Listen to the following story. When I am through reading it, write down as many of the details as you can remember. Do not take notes during the reading of the story.

Mast, UofL Geriatric Symposium 2012

Which answer fits in the missing space to complete the pattern?



Mast, UofL Geriatric Symposium 2012



Write all the words you can think of that begin with the letter M. No proper names. You have 1 minute.

Mast, UofL Geriatric Symposium 2012

Scoring

- Depending on the type of test, score might reflect
 - # correct (e.g., words recalled)
 - Time to completion
 - Correct demonstration of actions
- Raw scores are converted to standard scores and compared to normative data

Mast, UofL Geriatric Symposium 2012

Why do we standardize?

- To make scores for one individual meaningful in terms of a whole group of people.
- To make scores of one person comparable to those of another
- To make scores of one person comparable to one's own score if re-tested
- Importance of standard administration and scoring:
Animal naming

Mast, UofL Geriatric Symposium 2012

Norming

- Determine the *mean* score of a large group of individuals
- Determine the *variability* of the scores around that mean (standard deviation).

Mast, UofL Geriatric Symposium 2012

To Develop *Standard Scores (z-scores)*:

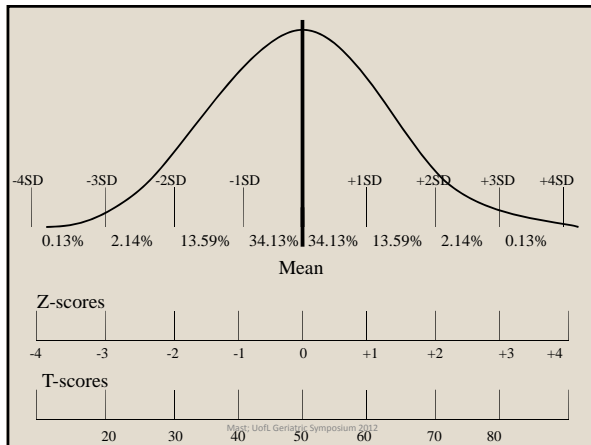
- Give the test to a large group of (relevant) individuals, and compute raw scores for each person.
- Convert all the scores to standardized scores by a *linear transformation*:
 - Subtract score from the mean and dividing by the standard deviation.
 - Z-scores have a distribution with a mean of 0 and standard deviation of 1.

Mast, UofL Geriatric Symposium 2012

Other transformations

- Because z-scores have a negative number for all scores below the mean, additional linear transformations are frequently used.
- IQ scores have a mean of 100 and a SD of 15.
- T-scores have a mean of 50 and SD of 10.

Mast, UofL Geriatric Symposium 2012



Percentiles and classification

- Person scored better than X% of individuals her age
- 75th percentile and above – High average
- 26-74th percentile – Average
- 11-25th percentile – Low average
- 6-10th percentile – Borderline to mildly impaired
- 3-5th percentile – Moderately impaired
- 2nd percentile or lower – Significant impairment

Mast, UofL Geriatric Symposium 2012

Norms in CN

- Inappropriate norms are a serious issue
- Risk misclassification
- Which variables explain differences in performance in the “normal” brain?

Mast, UoFL Geriatric Symposium 2012

Marcopulos et al, 1997

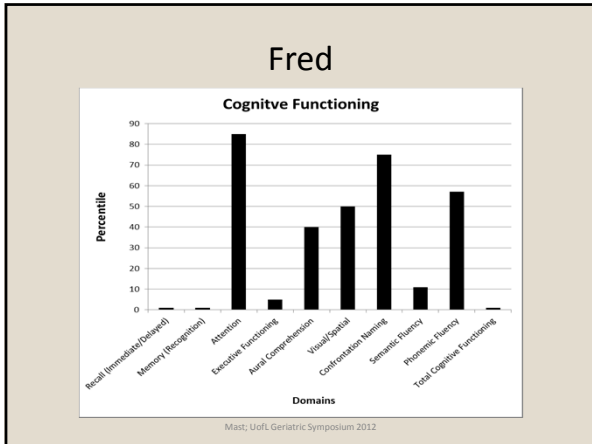
- 133 non-demented, healthy elders from rural Virginia (all had <10 years of education)
- Half scored below published cut-off scores on neuropsychological measures
- Many would have been classified as mildly to moderately impaired on most tests when using the standard, published norms

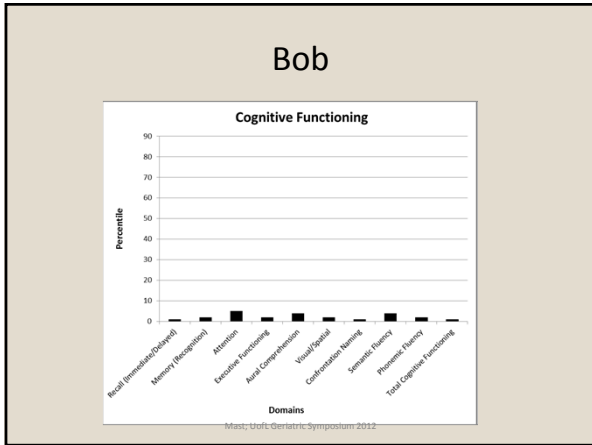
Mast, UoFL Geriatric Symposium 2012

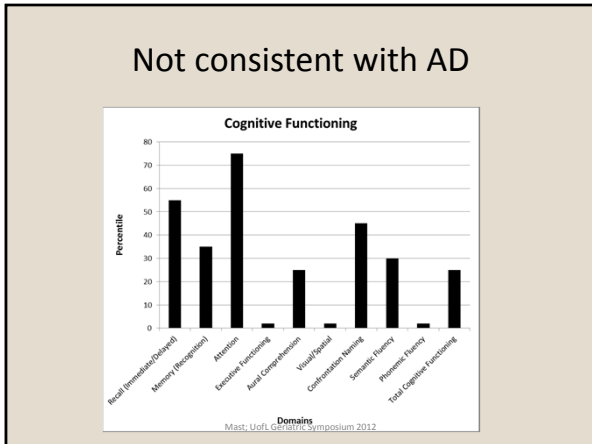
Interpretation

- Do the scores suggest cognitive impairment?
- Does the pattern of impairment support differential diagnosis?
- Interpretation should consider data from other sources: medical record, neuroimaging, reported history and progression

Mast, UoFL Geriatric Symposium 2012







Appreciation of premorbid functioning

- How does the interpretation change in light of information concerning how well the person was functioning prior to injury or disease?
 - Premorbid intellectual functioning
 - Educational and occupational attainment
- Considering premorbid functioning allows for determination of whether current functioning is actually a decline from prior levels.

Mast, UofL Geriatric Symposium 2012

How can we estimate premorbid functioning?

- Life history measures
 - Educational and occupational history
 - Other medical history
- Tests of reading, vocabulary
- Best performance approach
- Equations

Mast, UofL Geriatric Symposium 2012

Functional implications

- Medication management
- Financial management
- Safety in the home (e.g., cooking; judgment)
- Driving
- Need for additional supervision
- Depression/other treatment
- Medication review
- Caregiver burden and assistance

Mast, UofL Geriatric Symposium 2012

Living with cognitive impairment

- Additional measures
 - Quality of Life in Alzheimer’s Disease (QoL-AD)
 - Values and Preferences Scale
 - Pleasant Events Schedule
 - Stigma Impact Scale

Mast (2011). Whole Person Dementia Assessment. Health Professions Press, Baltimore, MD.

Mast, UofL Geriatric Symposium 2012

- Tell me everything you can remember about the story I read to you.
- Draw as much of the figure as you can remember.

Mast, UofL Geriatric Symposium 2012
