The Road to Prevention:
Diagnosing early Cognitive Decline and Targeting Deficits with the Implementation of Cognitive Training

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I have nothing to disclose

Alzheimer's Association 2015 Statistics

- Estimated 5.3 million Americans of all ages have AD; includes 5.1 million age 65 years and older
- 200,000 under 65 have earlier onset AD
- 1 in 9 people age 65 and older have AD
- One-third of people age 85 and older have AD
- 81 percent who have AD are 75 years and up
- In 2010 there were an estimated 454,000 new cases by 2030 number projected to 615,000

Prevention is Something That We Can Do

A recent publication from AAN (2015)

1. Cerebrovascular disease: Variables of hypertension, diabetes, obesity, hyperlipidemia, metabolic syndrome, unhealthy diet, smoking and lack of physical acitivity are predictors for AD
2. Depression: Poor eating, lack of activity, poor sleep; death of spouse.
3. Traumatic Brain Injury: CTE, diffuse axonal injury, cellular changes, Tau
4. Cognitive Inactivity: Theory of cognitive reserve, high education, use of brain
5. Sleep Disorders: OSA, Insomnia, Poor sleep hygiene

Filley, 2015

This Affects All of Us

- 1 in 5 medicare dollars is spent on dementia
- Approximately two thirds of the caretakers ae women (34 percent age 65 and older)
- 85 percent of unpaid help for older adults in the U.S. is from family members
- 40 percent of the total number of years of AD is spent in the most severe stage; slow progression

2015 Alzheimer Association Report

The need for Early Diagnosis

- If you want to keep people in their homes then diagnosis needs to be early.
- That is not going to occur when the patient or spouse thinks the problem is present or when the children take a trip and notice a difference
- It is only to occur during a routine visit to the PCP.

The Problem is Time

- PCP's have no time for the simplest measure to administer especially if unfamiliar.
- Many new measures targeted to PCP are not being utilized. Doctors would rather refer out.
- We need to catch people earlier in their 50's and 60's not in their 70's and 80's
- Our outreach effort: Writing articles, seminars, local papers, visiting the PCP's

Adult Signs Suggesting Need for Neuropsychological Evaluation

- Memory problems: Daily tasks, appointments, cooking, routine activities, conversations, loss of items (keys, glasses, credit cards, check book)
- Getting lost and disoriented in familiar places
- Unable to make decisions, stuck and obsessed
- Emotional: Accusations, paranoid, moody
- Conversations not making sense
- Old personality emerges, deepened depression
- Actions occur without rhyme and reason

Memory Questions



1. Difficulty remembering things that someone recently told you?
2. Do you forget places where you have been?
3. Do you forget the things that you need to do?
4. Do you forget where you have placed something just that day before or even an hour ago?
5. Do you keep getting lost, even if it is the same route to the same place that you have been going to for years and years?



Memory Questions

6. Do you find yourself forgetting what you wanted to say?
7. Do you just think about things, becoming upset, unable to take action to change things?
8. Do you forget names of people you have known for years?
9. Is it hard to learn new things?
10. Do you make the same mistakes? Over and over?
11. Do you continually ask for directions to be repeated?



Purpose of Neuropsychological Evaluation

- Scientifically measures brain functioning
- Paper and pencil tests to address brain behavior functioning.
- Scientific method of predicting and assessing brain function that has stood the test of time
- Test patterns as opposed to standard scores may suggest neurological deficits confirmed by radiological assessment

Neurocognitive Assessment

- It is not uniform
- Some are using broad brush: tests of intelligence, attention, processing speed, memory, language
- Testing based upon decision tree for the types of dementia: AD, Lewy body, Cardiovascular, Frontal, Frontotemporal

The Problem of Testing: What test you use is what you find

- Findings depend upon the tests that you use
- MEAMS versus the RBANS
- If too simplistic memory will appear intact
- Testing in the morning may be very different from the later afternoon
- Different tests may yield different data that would be missed if reliant upon one measure.

Testing for Donna, age 74; BA: Global Systems Check vs. Specific Assessment

- **First Testing:**
- Used Intellectual Assessment: Impaired memory, average and above average scoring for language (reading recognition) and attention (task of coding, sequential and cognitive flexibility) average intelligence.
- **Second Testing:**
- RBANS, Doors and People, BVMT-R, Three Word Three Shape: More severe picture: confusion, word retrieval, delayed recall, verbal memory worse, not retaining information

Testing Needs to Match Diagnosis you are Ruling Out

- AD: Memory, Word Retrieval, Visuospatial
- Cardiovascular/Frontal Temporal: Memory and Executive Reasoning
- Frontal: Apraxia, Aphasia, Executive Deficits
- Lewy Body: Visual Perceptual, Executive, Psychosis
- Huntington's: Executive reasoning, psychosis, motoric
- MS: memory and attention, speeded processing motoric
- It is not uniform for every person

Neuropsychological Testing of the Brain:

- Frontal Processes: Word retrieval, planning, integration, ability to shift sets, perseveration, problem solving, concrete thinking versus abstract reasoning, deductive and inductive logical analysis, selective attention.
- Memory: Ability to learn new information; storage, retrieval and recognition (of learned information from distracter items). Verbal or Visual information: Stories, word lists or names/ Designs, Doors, Names and Faces. Short versus learning and long term delayed memory, working memory, memory confusion versus lack of recall, ability to cluster information for recall.

Neuropsychological Testing of the Brain

- Language: Comparing expressive and receptive, word retrieval application and subtleties of language concepts, pragmatic social language.
- Visual Perceptual: Discrimination, closure (close up design using component parts), visual spatial analysis, visual memory recognition of designs (re-shown amongst distracter items) figure ground (finding objects against busy background) form constancy (seeing objects as constant despite change in size or shading). Distortions in the copying of designs.

Neurocognitive Thinking Problems typically seen with Alzheimer's Dementia:

- Memory loss severe in the beginning stages
- Misplaced objects- cannot find anything or remember where it was
- No recall of conversations, new learning problem
- Memory of the past remains intact
- Visuospatial functioning immediately affected:
- Lost in familiar places, route finding
- Word retrieval

Neurocognitive Symptoms of Cardiovascular Dementia

- Memory confusion, poor efficiency, stepwise learning
- Executive reasoning: selective attention, integration
- Poor cognitive flexibility, black white thinking, rigid
- Getting stuck on one issue or thing, perseveration
- Difficulty with any step by step, sequential instruction
- Problems planning, organizing or making decisions
- Emotional reactivity, impulsive, judgmental, critical

Emotional Symptoms of Cardiovascular Dementia

- Social withdrawal, depression, social mistakes, wrong thing at the wrong time. Past behavior or extremes
- Inappropriate sexual behavior and comments.
- Problems communicating thoughts due to lost words
- Loss of inhibition, they feel it, they do it
- Loss of a sense of self, connection to the past, values, morals and beliefs
- Difficulty anticipating consequences of one's actions

Neurocognitive Symptoms and Primary Signs of Lewy Body Dementia:

- Executive Deficits: Problem solving, word retrieval, sequential learning, selective attention, distracted by novelty
- Visual spatial, visual perceptual, visual constructional
- Problems drawing and copying of designs
- Distorted perception, May affect balance and driving
- Thinking not logical, not processing things in reality
- Misinterpretation of conversation, confused with directions
- Mental illness or frank psychosis is immediately evident

Emotional Primary Signs of Lewy Body

- Suspicious, accusatory of others, paranoid
- Socially uncomfortable, dislike crowds
- Agitated, restless, unpredictable emotions, feelings do not fit the situation, easily upset
- Deep depression, fantasy, living in the movies, living inside themselves
- Empowered by God, visual hallucinations, Auditory hallucinations, conversations with God

Neurocognitive Signs of Frontal Lobe Dementia (Frontotemporal Dementias)

- Executive reasoning: Selective attention, perseveration, integration, poor sequential processing
- Apraxia, skilled movement
- Aphasia: Receptive versus expressive; incorrect comprehension or use of language
- Emotional, social, personal conduct, emotional blunting, loss of insight
- Symptoms appear in the 50's and result in poor financial judgment with significant consequences

Right Frontal Process: The Cornerstone of Self-Regulation:

- Guidance system for one's behavior
- Internal drive state or driven by the moment
- Social Emotional Intelligence: self-awareness, sense of self, nuances of social conduct, empathy
- When compromised:, Irritability and impulsiveness, difficulty understanding or predicting the impact of their behavior; hedonistic, lacking an internal drive state, driven by minor irrelevancies, inappropriate habits and routines.

Test Specifics: Frontal Processes and Language

- Rambling sentences- structure & grammar, omissions, substitutions
- Proverbs, interpreting them literally (glass houses)
- Integrating information in sentences or paragraphs
- Tangential output, rambling, non-completion of thoughts ,spontaneous changing of subject
- Pragmatic or social language: Nuances, subtleties, expression, what to say in a given social situation
- Speech comprised of articulation irregularities

Assessment for Specific Types of Dementia

- Cardiovascular: Memory (Retrieval, Recognition, Short term and delayed) and Executive Reasoning (planning, integration, selective attention, sequencing, word retrieval)
- Frontal: Executive Reasoning (planning, integration, selective attention, sequencing, abstract reasoning and problem solving, word retrieval, aphasias)

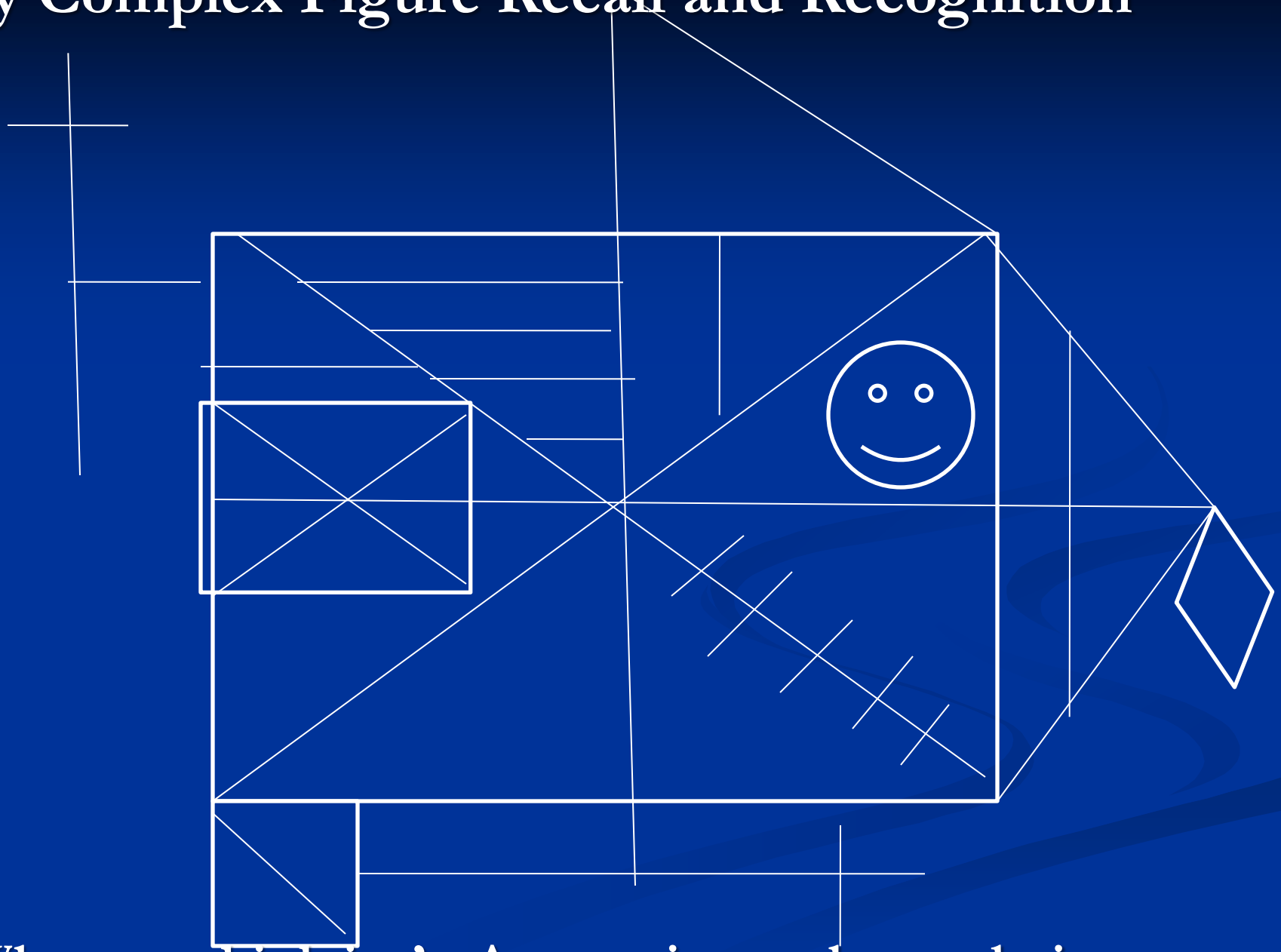
Assessment for Specific Types of Dementia

- Lewy Body: Visual perceptual (visual closure, figure ground, visual discrimination, visual sequential memory) and Executive Reasoning (planning, integration, selective attention, sequencing, abstract reasoning and problem solving, word retrieval, aphasias)
- Frontotemporal: Emotional Assessment (loss of sense of self) Memory (Retrieval, Recognition, Short term and delayed) and Executive Reasoning (planning, integration, selective attention, sequencing, word retrieval)

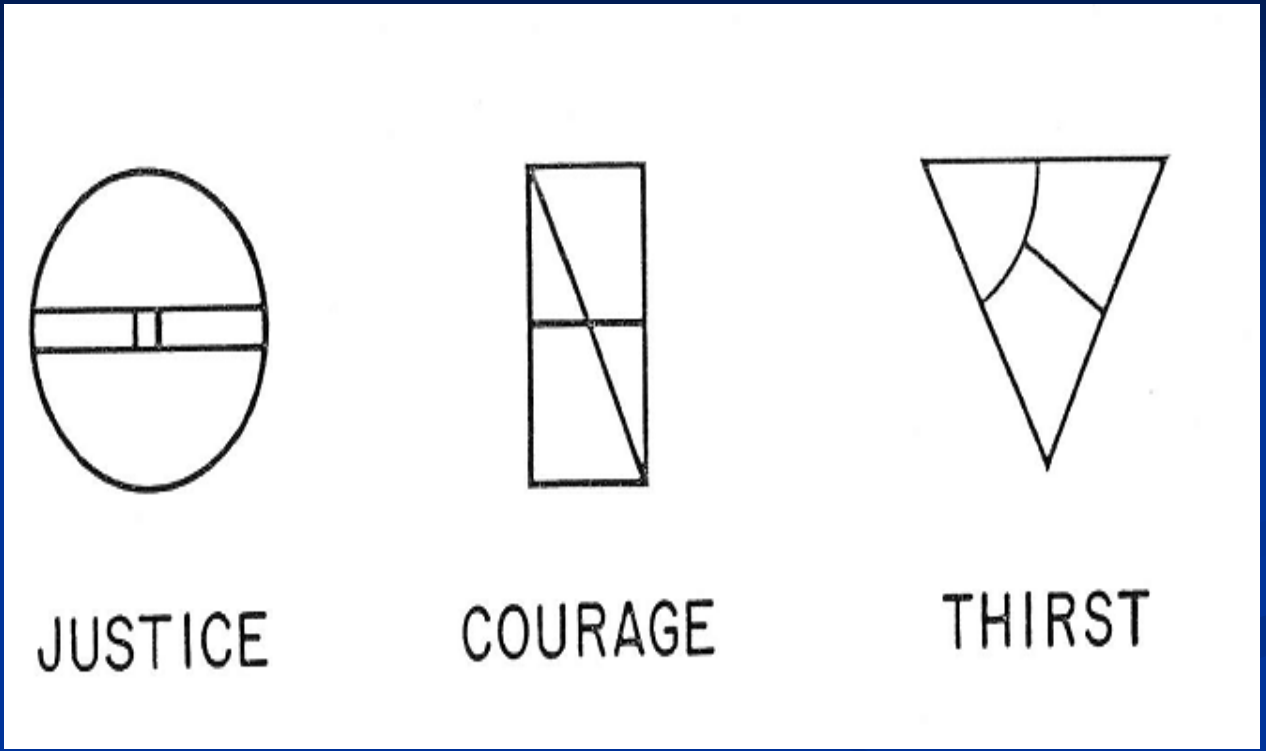
Examples of Memory Testing

- Verbal Retrieval: Learning tasks; word lists, stories, names of people
- Verbal Recognition: Names, names and faces
- Visual Retrieval: Learning tasks; visual designs
- Visual Recognition: Shapes, designs, pictures
- Short term memory, Working memory
- Sequential memory
- Delayed recall and recognition

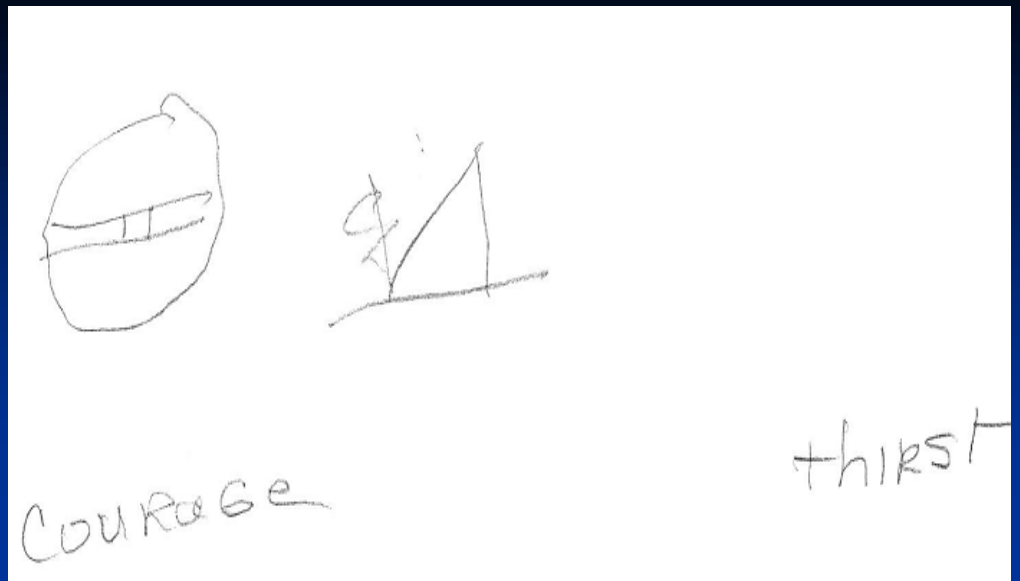
Rey Complex Figure Recall and Recognition



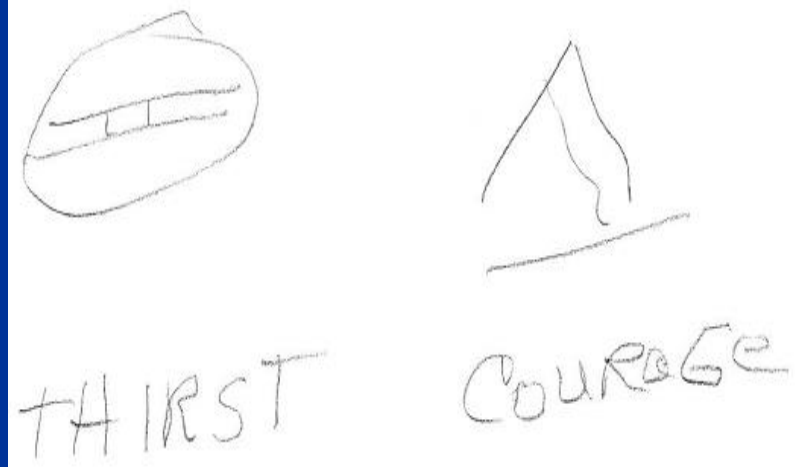
What you think isn't: A score is not the total picture



Three Word Three Shape: Hospital Bedside Measure



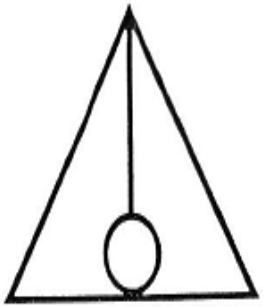
Pre-Treatment



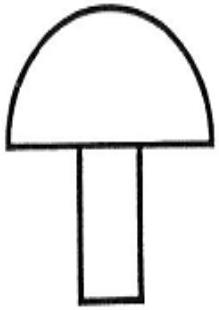
Incidental Memory

Following 1st Study Period

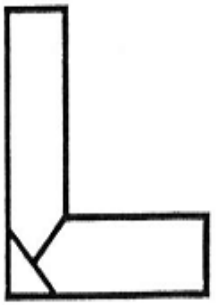
Louise



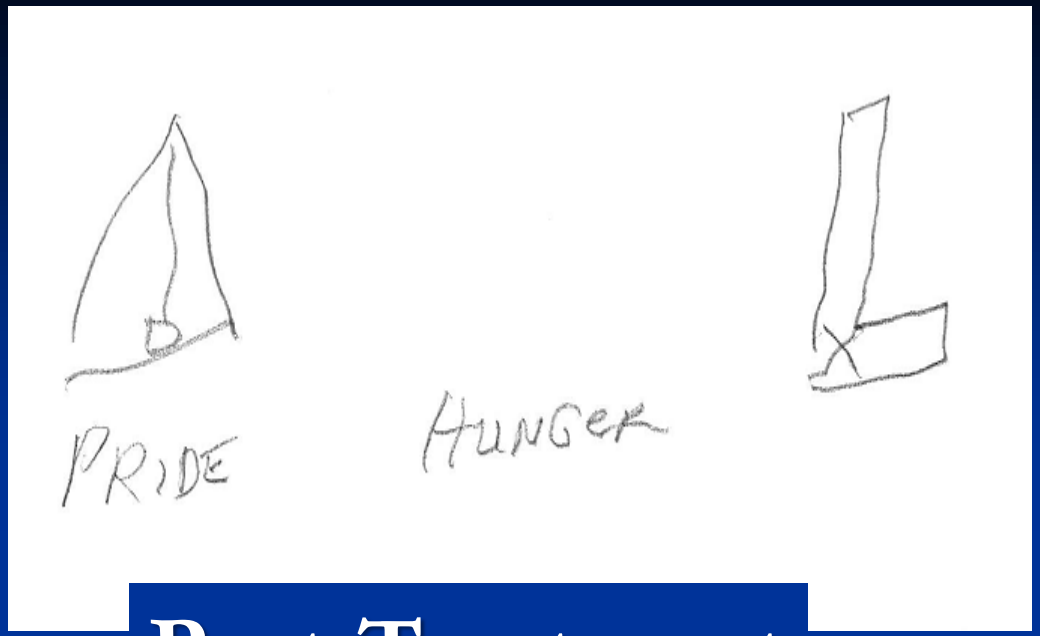
PRIDE



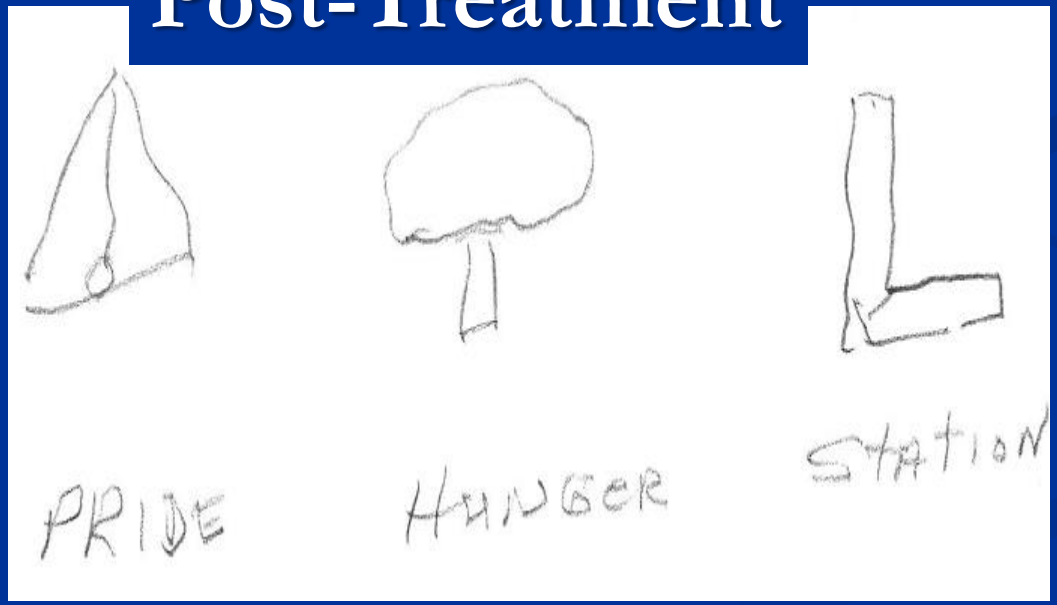
HUNGER



STATION



Post-Treatment



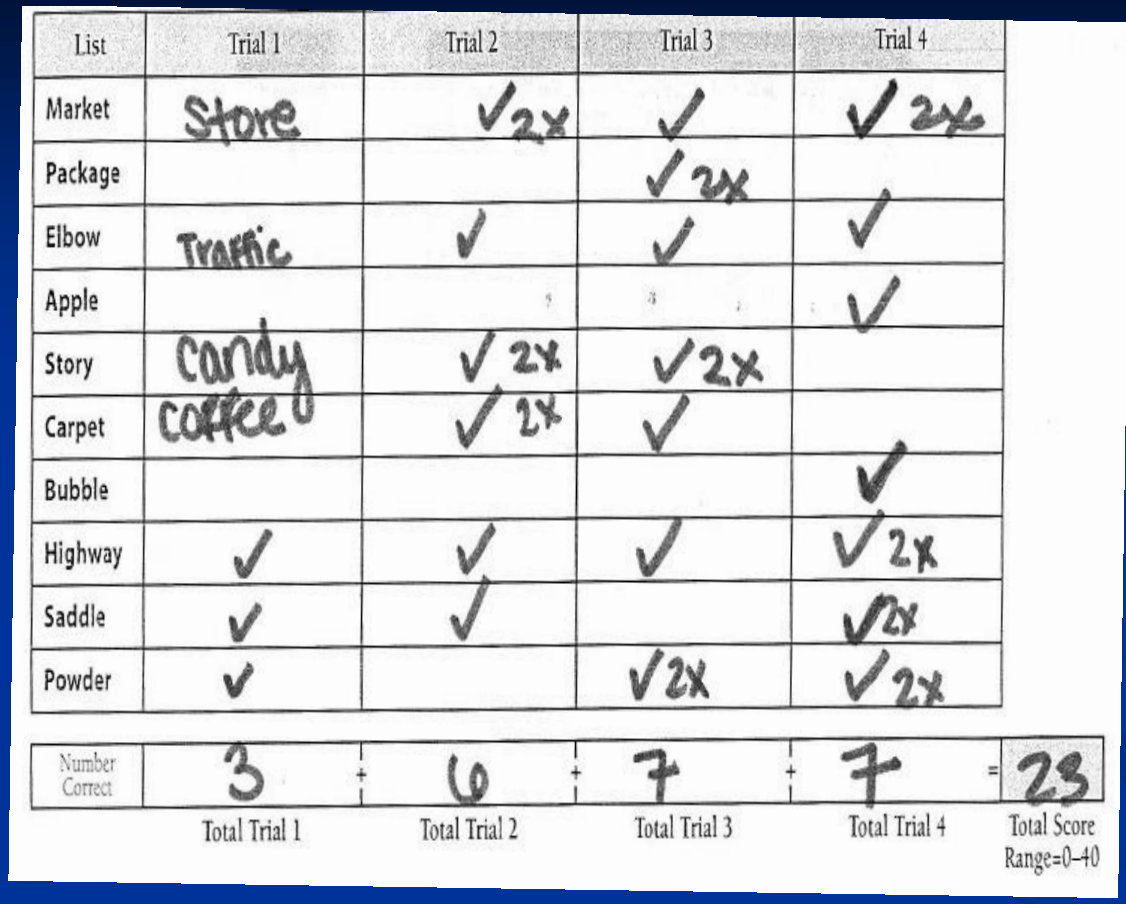
Incidental Memory

Following 1st Study Period

Louise

RBANS: Repeatable Assessment of Neuropsychological Status

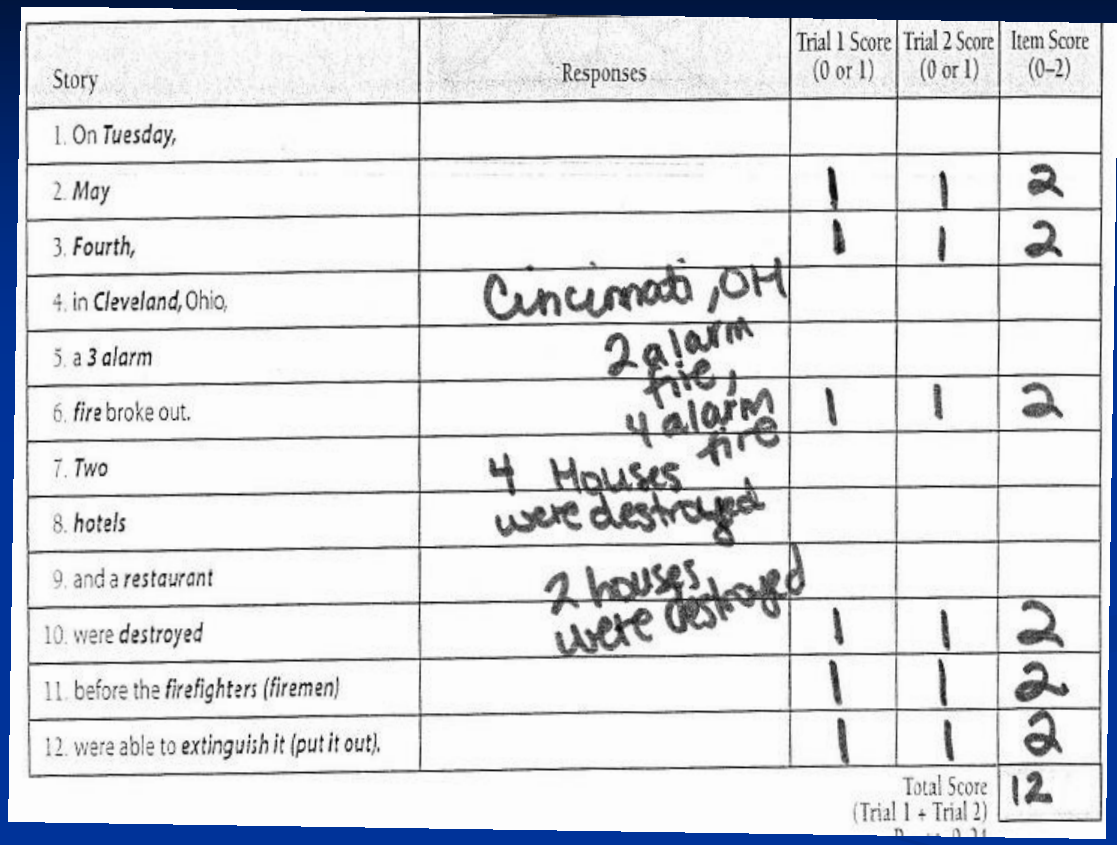
- Immediate Memory: List learning, short story
- Delayed Memory: List learning recall and recognition, short story, visual figure recall
- Visuospatial/Constructional: Copying visual figure, line judgment
- Language: Naming, word retrieval
- Attention: Short term recall number sequences, Coding
- Total Score



List	Trial 1	Trial 2	Trial 3	Trial 4
Market	Store	✓ 2x	✓	✓ 2x
Package			✓ 2x	
Elbow	Traffic	✓	✓	✓
Apple				✓
Story	Candy	✓ 2x	✓ 2x	
Carpet	Coffee	✓ 2x	✓	
Bubble				✓
Highway	✓	✓	✓	✓ 2x
Saddle	✓	✓		✓ 2x
Powder	✓		✓ 2x	✓ 2x

Number Correct	3	+ 6	+ 7	+ 7	= 23
	Total Trial 1	Total Trial 2	Total Trial 3	Total Trial 4	Total Score Range=0–40

RBANS:
List Learning: Verbal Retrieval Task

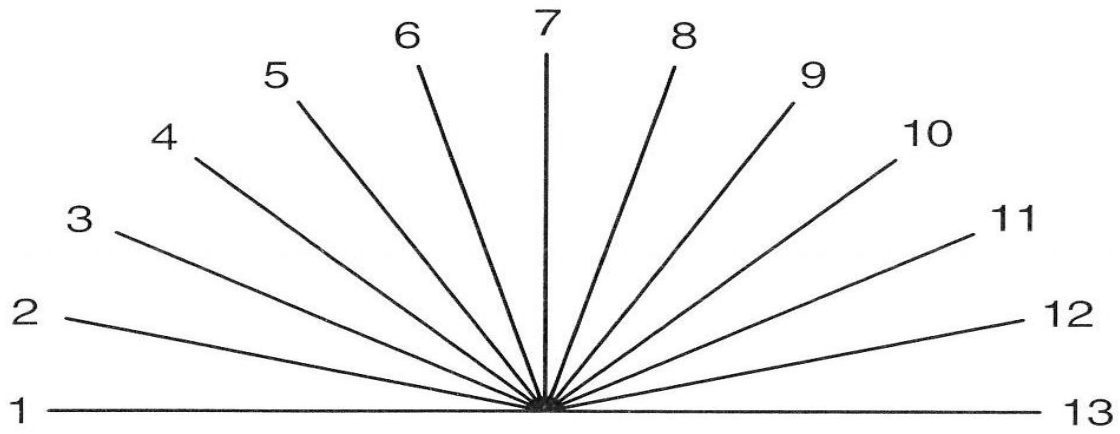


Story	Responses	Trial 1 Score (0 or 1)	Trial 2 Score (0 or 1)	Item Score (0–2)
1. On *Tuesday,*				
2. *May*		1	1	2
3. *Fourth,*		1	1	2
4. in *Cleveland,* Ohio,	Cincinnati, OH			
5. a *3 alarm*	2 alarm fire,			
6. *fire* broke out.	4 alarm fire	1	1	2
7. *Two*	4 Houses			
8. *hotels*	were destroyed			
9. and a *restaurant*	2 houses			
10. were *destroyed*	were destroyed	1	1	2
11. before the *firefighters (firemen)*		1	1	2
12. were able to *extinguish it (put it out).*		1	1	2
			Total Score (Trial 1 + Trial 2)	12

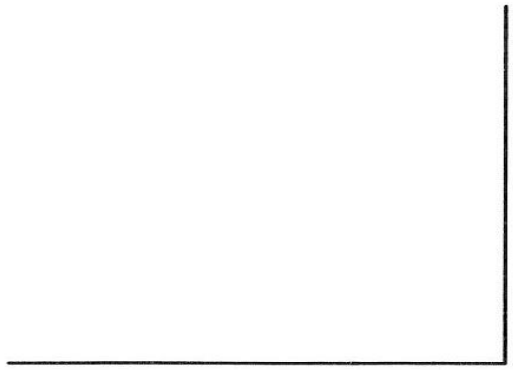
RBANS:
Story Memory: Verbal Retrieval Task

List Learning Tasks

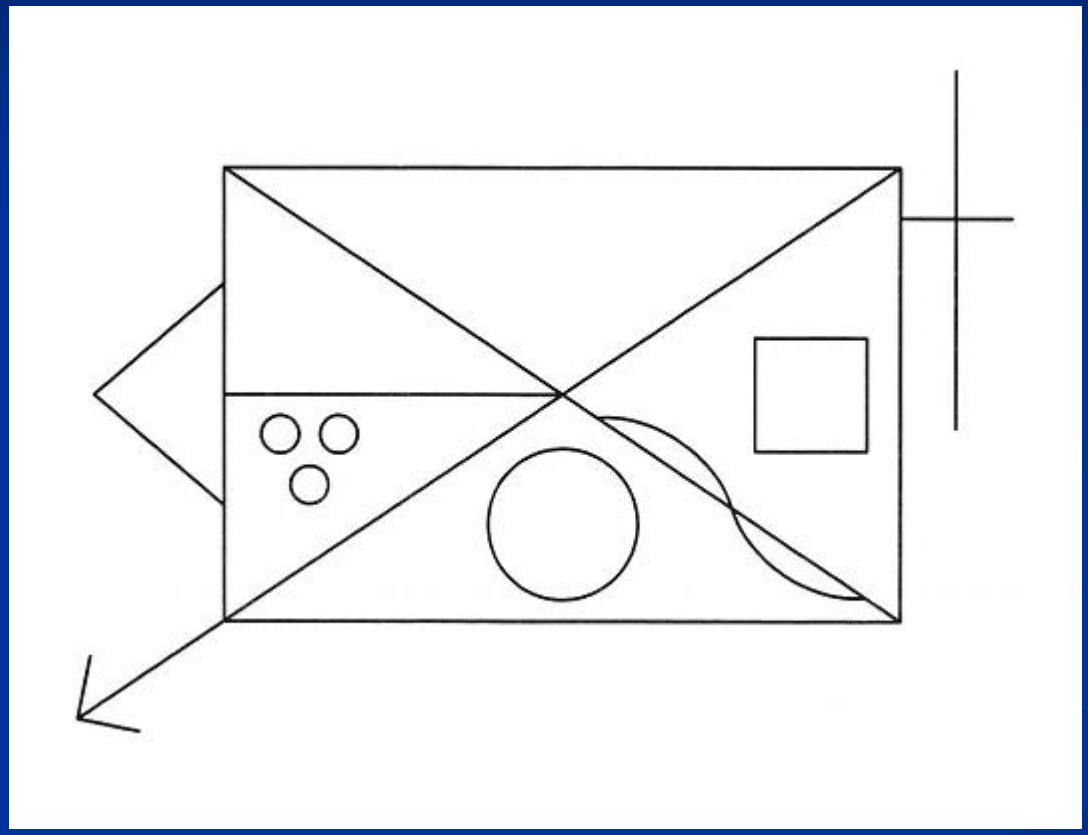
- Those with memory difficulties or dementia do not pick up the inherent categories in the lists of words.
- List are more difficult that do not use inherent categories.
- Are they learning from the list and benefiting from each learning trial



Line Judgment Task



RBANS: Repeatable Assessment of Neuropsychological Status



Visual Construction: Figure Copy and Recall

Review of the Research for Cognitive Rehabilitation/Training

- Current and early life engagement in cognitively stimulating activities was shown to independently slow late life decline. (Wilson, Boyle, Barnes, et al., 2013)
- Cognitive activity slowed the rate of decline years before death: Cognitive activity offers **protection against decline and may help preserve cognitive function despite the presence of pathology**

Review of the Research for Cognitive Rehabilitation/Training

- Consistent benefit of treatment of cognitive function over and above medication effects
- Specificity of the training appears to be a primary variable for improved functioning
- Effectiveness and durability of cognitive training intervention improves functioning even if limited in time and duration
- **Overall agreement that cognitive therapy (cognitive stimulation, cognitive training or rehabilitation) is an efficacious method to address dementia with or without medication**

Our Program

- Neuropsychological testing completed as a baseline and re-evaluation at distinct intervals throughout the cognitive training has resulted in significant improvement suggesting the benefit of this treatment. We have an ongoing study (51 subjects) since 2007, ages 51 to 90 years, high school to college, more often on medication (Donepezil and Memantine) which began following testing or had been instituted prior to the initial testing.

Cognitive Training

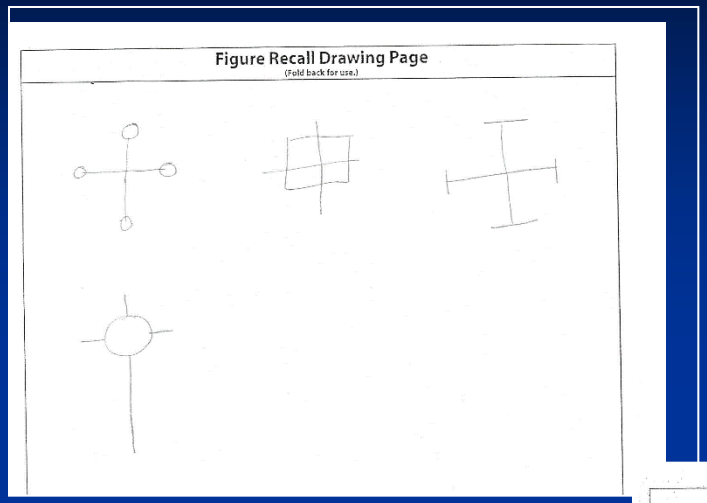
- Specific and individualized tasks based upon the test results
- Targeting visual perceptual, memory processes, executive reasoning, language
- Tasks of short term recall, recognition, verbal and visual, working memory, word retrieval
- Over 200 exercises
- Re-testing every three months to change program

Nancy, Age 64 years: DX: AD

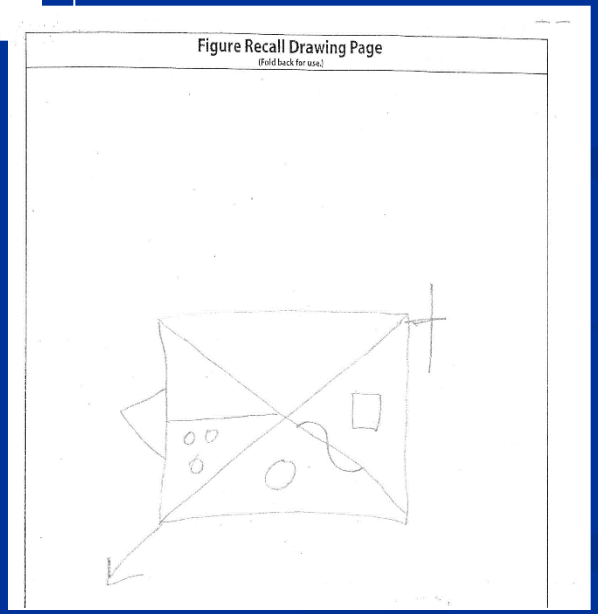
RBANS	8-2014	5-2015
Immediate Memory	94 (34th %tile)	109 (73rd %tile)
Visuospatial/Const	96 (39th %tile)	96 (39th %tile)
Language	85 (16th %tile)	64 (1st %tile)
Attention	94 (34th%tile)	85 (16th %tile)
Delayed Memory	89 (23rd%tile)	121 (92th tile)
Total Scale	87 (19th%tile)	92 (30th %tile)

- Nancy has continued to struggle with daily living skills despite making positive progress. Therapy goals are to increase activities decrease depression (watching old movies as primary activity) and increase physical hygiene. Some scores declined while others improved significantly suggesting possible further decline in areas not addressed in treatment.

RBANS: Delayed Figure Copy: Nancy



Pre-Treatment



Post-Treatment

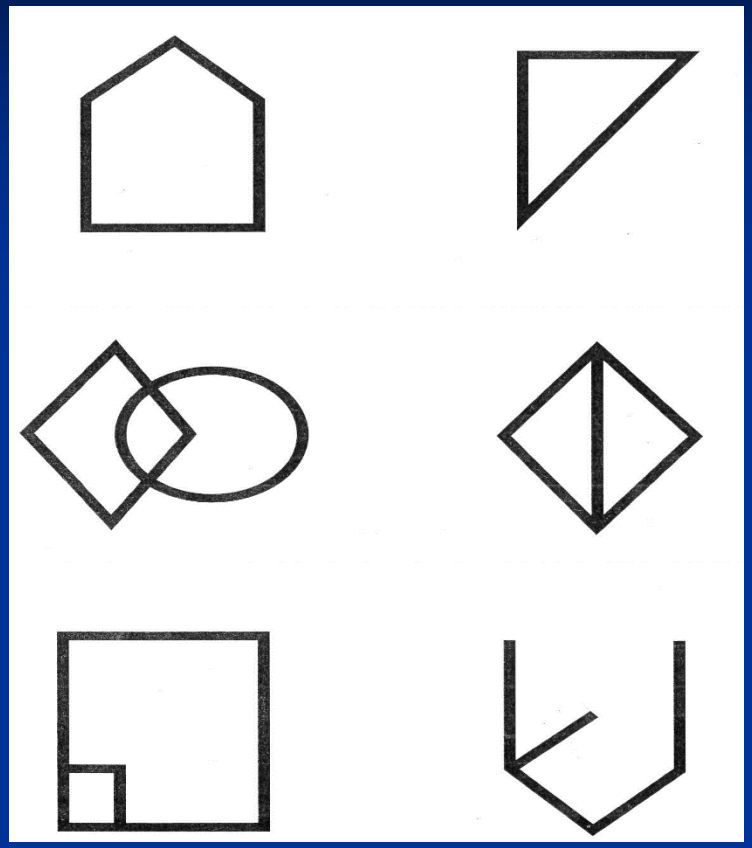
Nancy

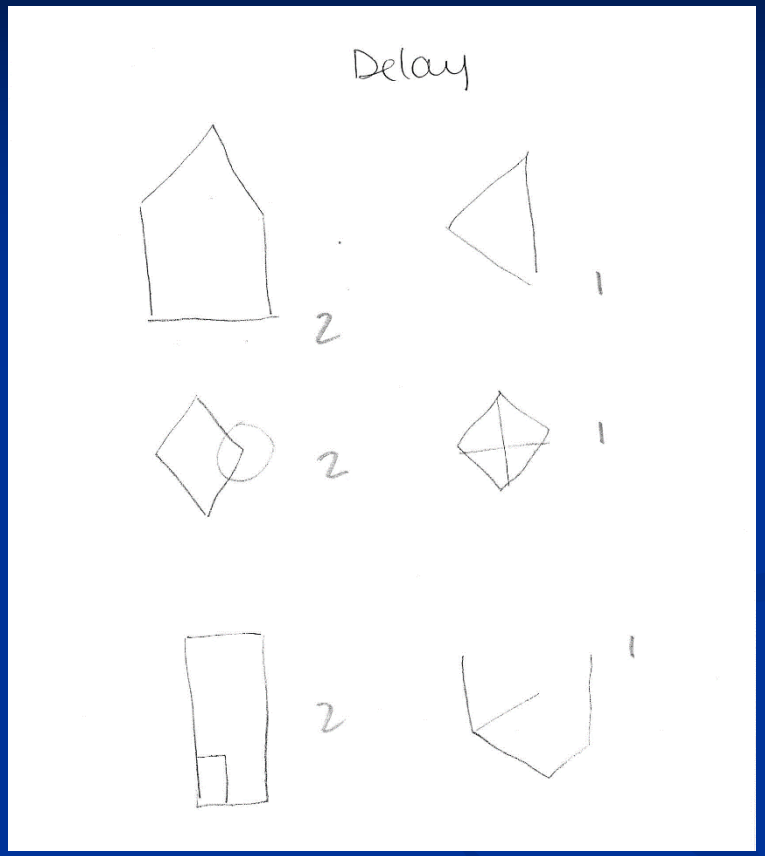
Brenda, Age 53 years: DX: AD

BVMT-R	2-2015	8-2015
Trial 1	41 (18th %tile)	31 (3rd %tile)
Trial 2	43 (24th %tile)	43 (24th %tile)
Trial 3	53 (62nd %tile)	42 (21st %tile)
Total Recall	44 (27th %tile)	37 (10th %tile)
Delayed Recall	50 (50th %tile)	60 (84th %tile)

- She remains in treatment. Quality of life is much improved; she retired due to the memory problems and she is spending time with her children and grandchildren. Self-esteem is significantly better and depression is significantly less.

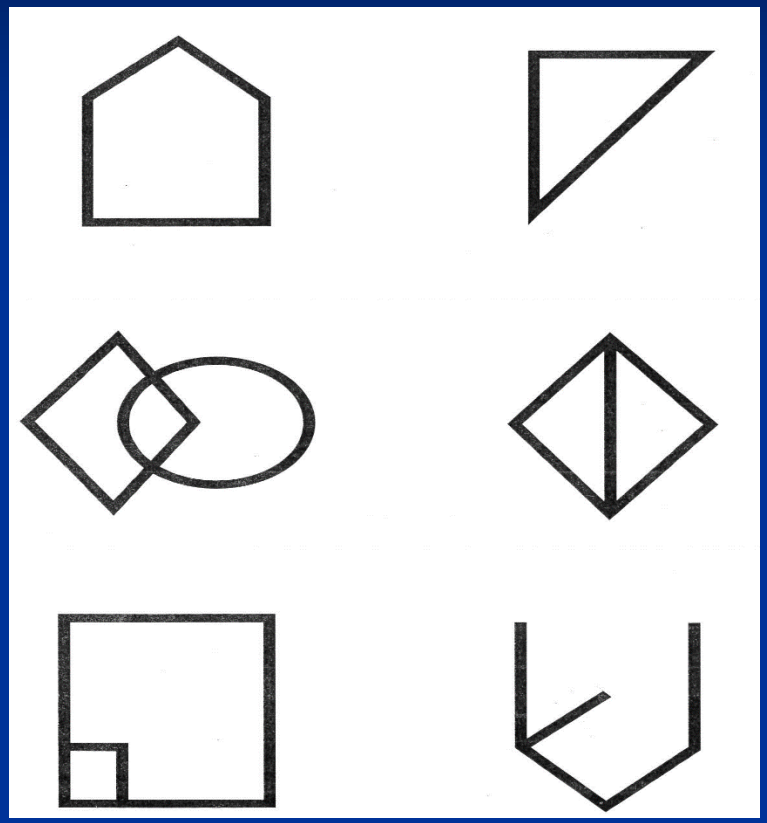
BVMT-R: Brenda 2-2015: Pre-Treatment

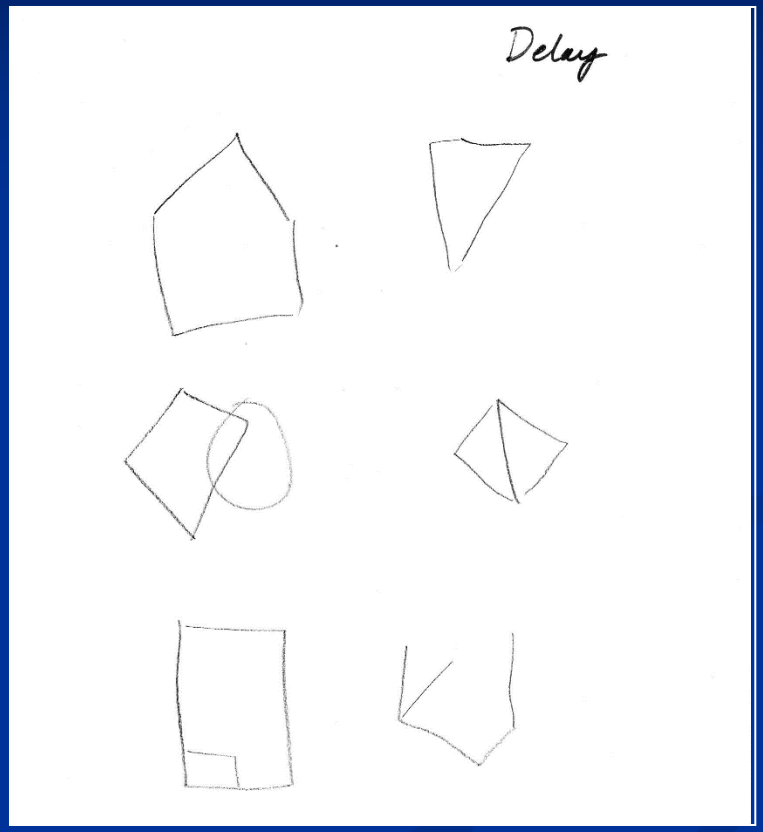




BVMT-R: Visual Retrieval Task

BVMT-R: Brenda 8-2015: Post-Treatment





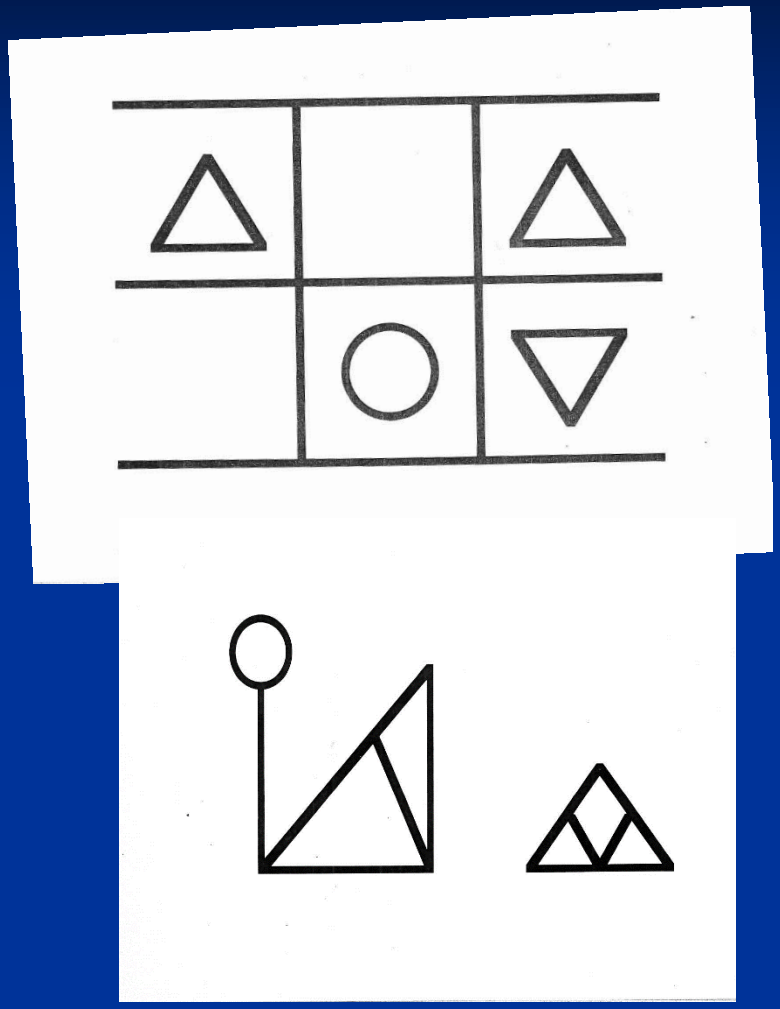
BVMT-R: Visual Retrieval Task

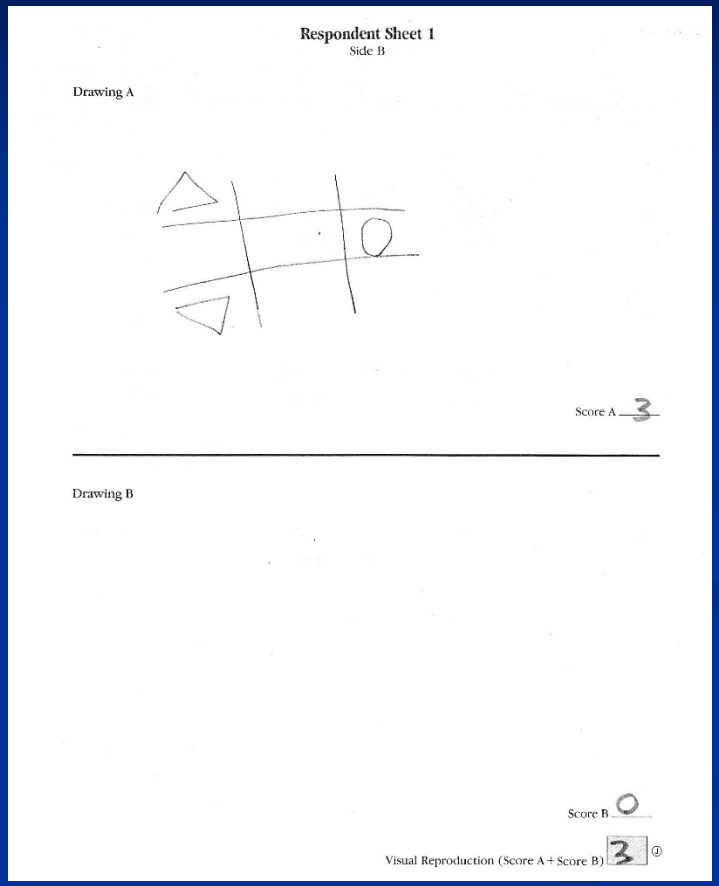
Brenda, Age 53 years: H.S.: Pre and Post Testing

MAS	2-2015	8-2015
Visual Reproduction	6 (Below Average)	11 (Average)
List Recall	7 (Below Average)	12 (High Average)
Verbal Span	7 (Below Average)	10 (Average)
Immed. Prose Recall	1 (Impaired)	6 (Below Average)
Delayed Prose Recall	3 (Well Below Average)	6 (Below Average)

Index Scores	2-2015	8-2015
Verbal Memory	66 (1st %tile)	95 (37th %tile)
Visual Memory	83 (13th %tile)	98 (45th %tile)
Global Memory Scale	71 (3rd %tile)	96 (40th %tile)

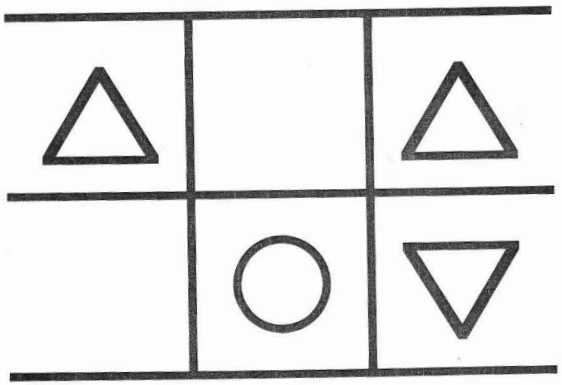
MAS: Visual Recall Task: Brenda 2-2015

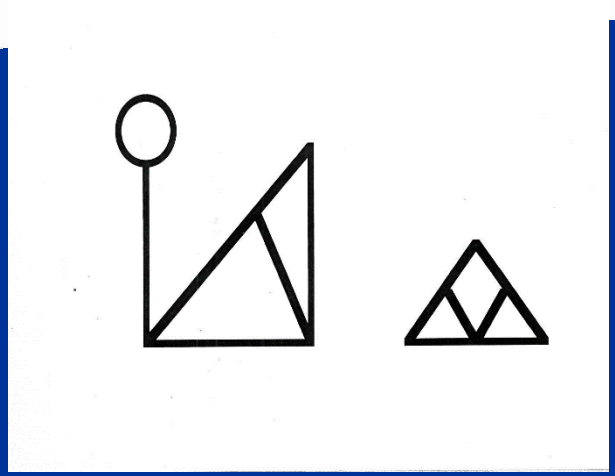


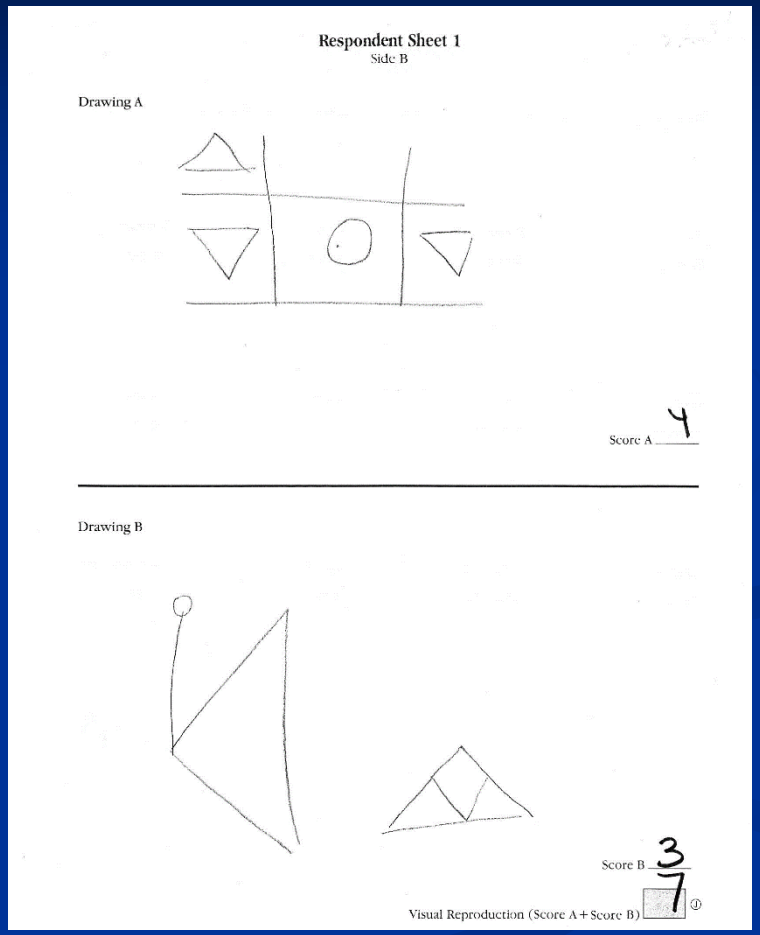


Visual Memory Pre-Treatment

MAS: Visual Recall Task: Brenda 8-2015







Visual Memory Post-Treatment

Brenda, Age 53 years: H.S.: Pre and Post Testing

WRAML-2	2-2015	8-2015
Visual Memory	77 (6th %tile)	100 (50th %tile)
Verbal Memory	76 (5th %tile)	100 (50th %tile)
Screening Memory	72 (3rd %tile)	100 (50th %tile)
Verbal Recognition	85 (16th %tile)	122 (93rd %tile)
Visual Recognition	100 (50th %tile)	90 (25th %tile)
General Recognition	90 (25th %tile)	107 (68th %tile)

Brenda: Pre and Post-Treatment

CVLT-II	2-2015	8-2015
Learning Trial 1-5	43	66
Interference List	-1.0	-0.5
Short Delay Free Recall	-1.0	+0.5
Short Delay Cued Recall	-1.5	+1.0
Long Delay Free Recall	-2.0	0
Long Delay Cued Recall	-1.5	+0.5

Verbal Learning Test

Syeed, Age 66 to 67 years: Diagnosed with Cardiovascular Dementia

MAS	8-2013	11-2013	12-2014
Verbal Memory	63 (1st%)	66 (1st%)	83 (13th%)

He went on medical leave for three months due to dementia and returned to work at the end of 2014. Testing was completed after he had returned from being overseas for three months contracting malaria. He was referred to a sleep neurologist and diagnosed with sleep apnea.

Sayeed, Age 66 to 67years: DX: Cardiovascular Dementia

BVMT-R	8-2013	11-2013	12-2014
Trial 1	25 ($1st^{\%}$)	49 ($46^{th\%}$)	33 ($4^{th\%}$)
Trial 2	↓20 ($1st^{\%}$)	37 ($10^{th\%}$)	37 ($10^{th\%}$)
Trial 3	↓20 ($1st^{\%}$)	41 ($18^{th\%}$)	47 ($38^{th\%}$)
Total Recall	↓20 ($1st^{\%}$)	41 ($18^{th\%}$)	44 ($27^{th\%}$)
Delayed Recall	↓20 ($1st^{\%}$)	27 ($1^{st\%}$)	54 ($66^{th\%}$)

Door/People	8-2013	11-2013	12-2014
Doors	↓4	4	5
Shapes	4	6	10
Visual Memory	3	4	7



Doors: Visual Recognition

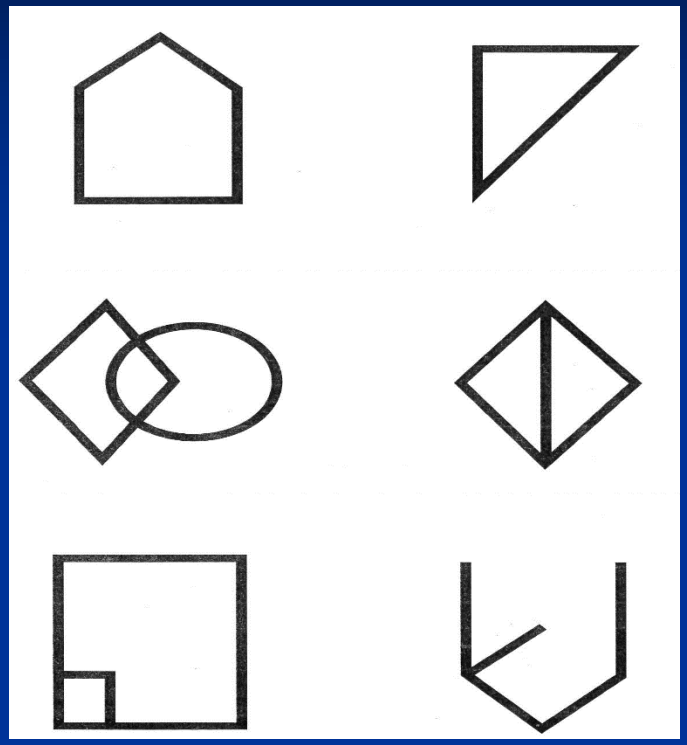


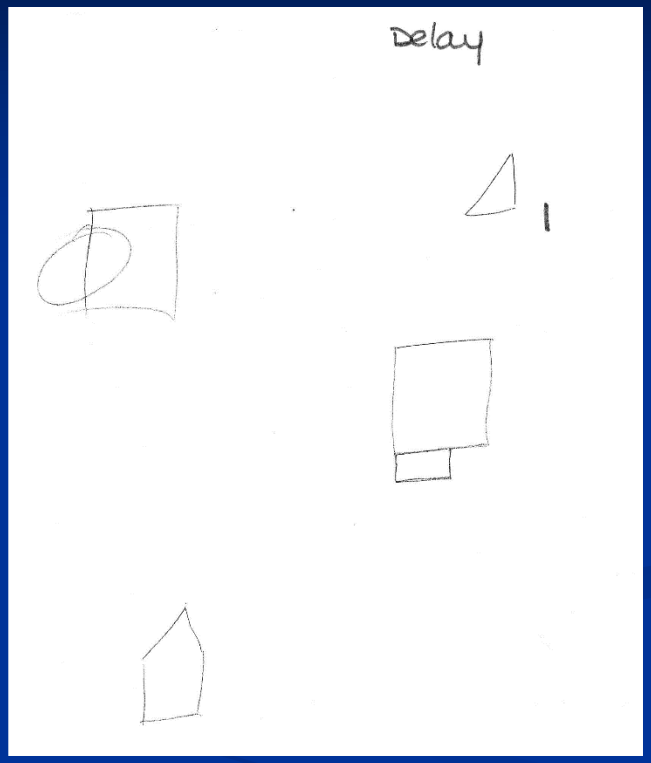






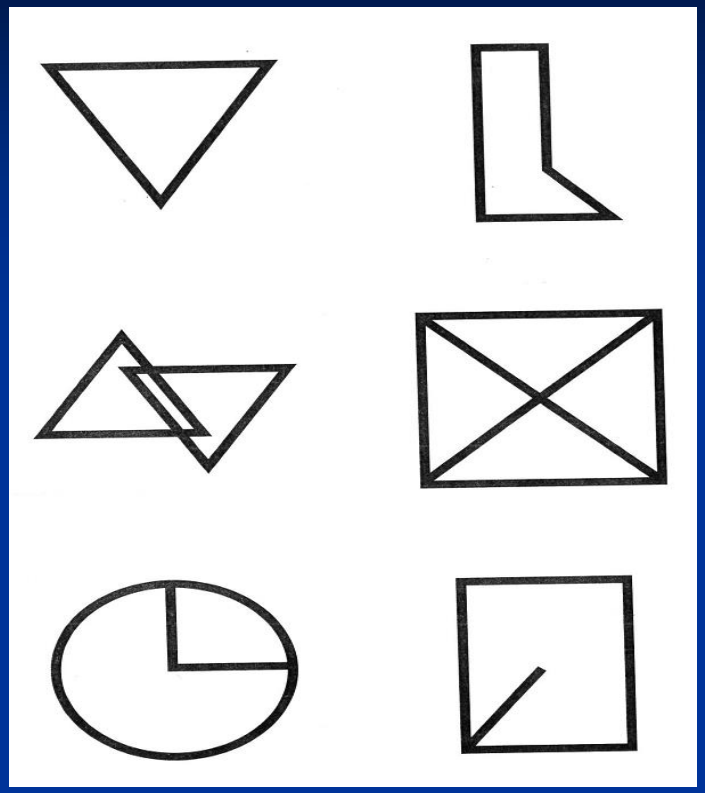
BVMT-R: Sayeed 8-2013: Pre-Treatment

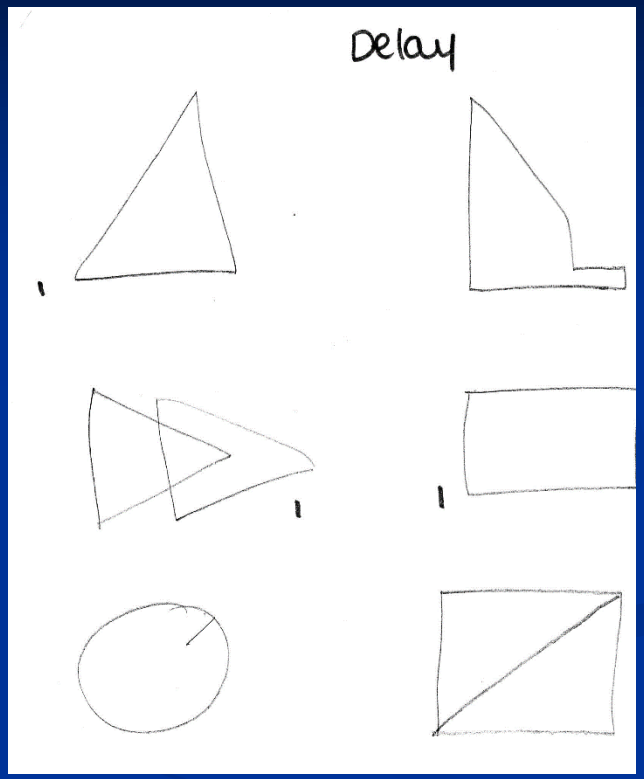




BVMT-R: Visual Retrieval Task

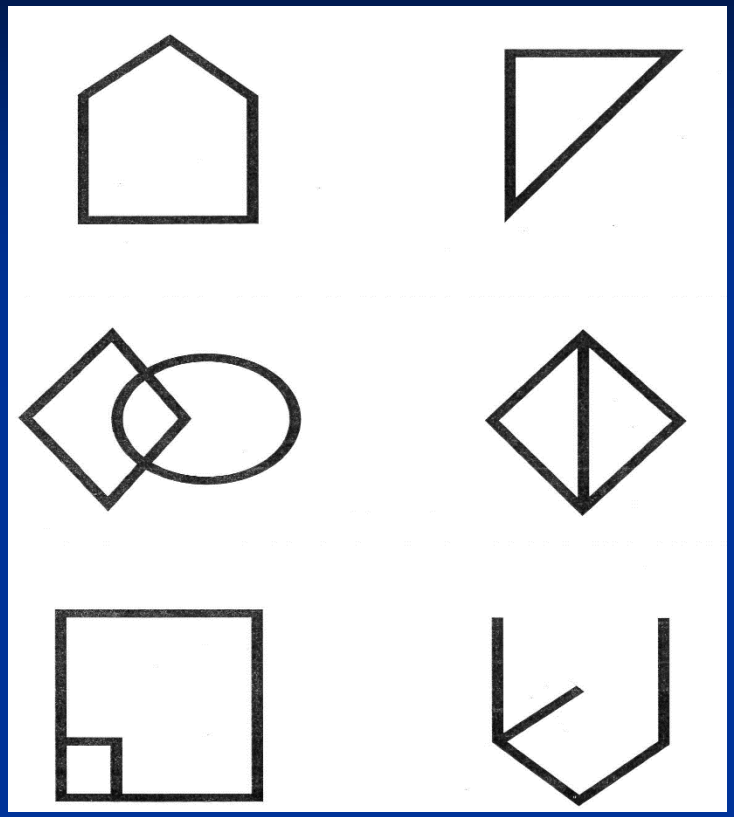
BVMT-R: Sayeed 11-2013: Post-Treatment

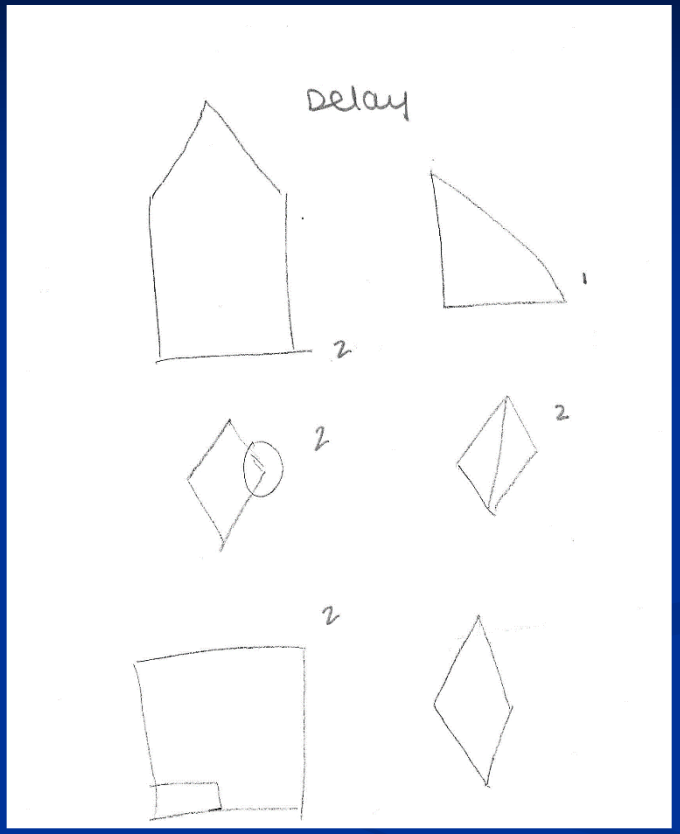




BVMT-R: Visual Retrieval Task

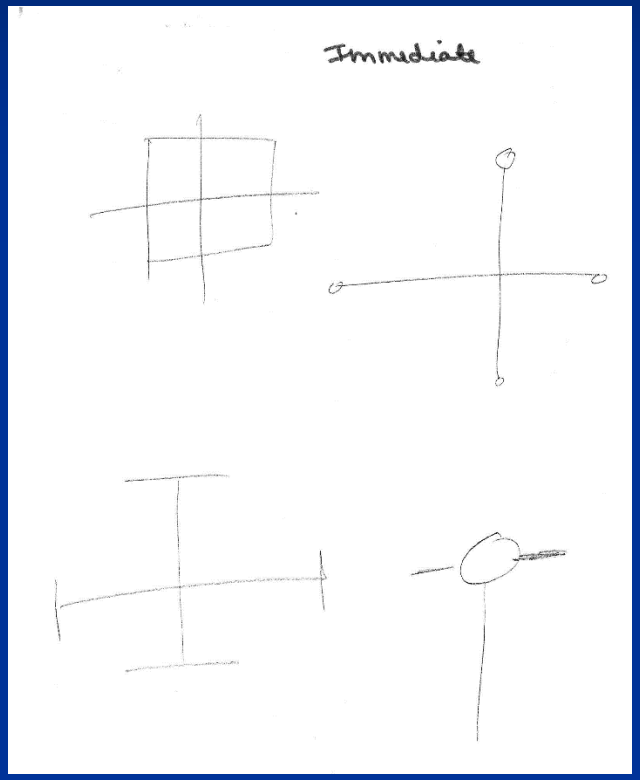
BVMT-R: Sayeed 12-2014: Post-Treatment





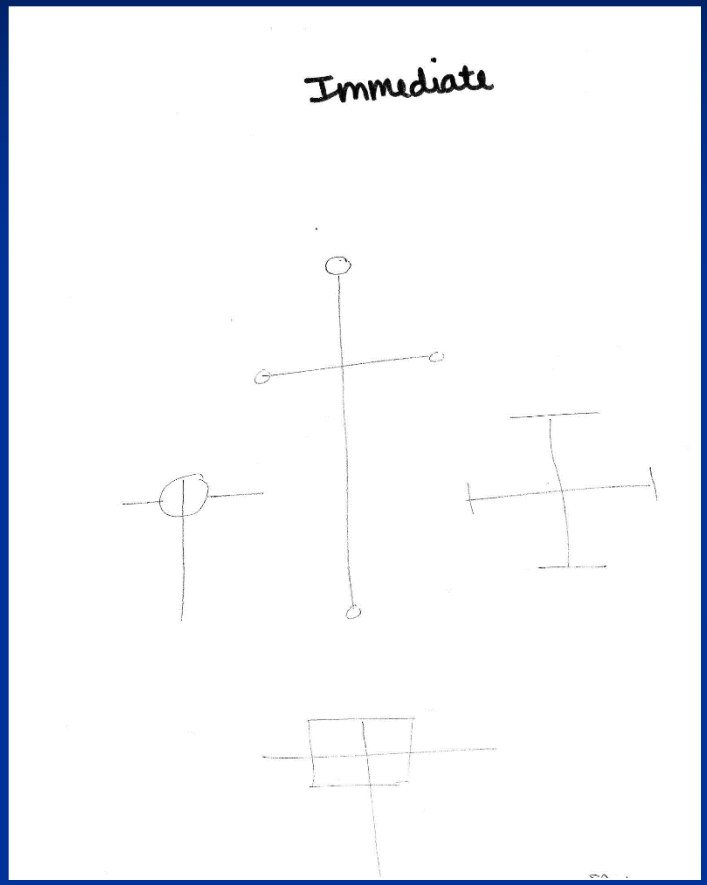
BVMT-R: Visual Retrieval Task

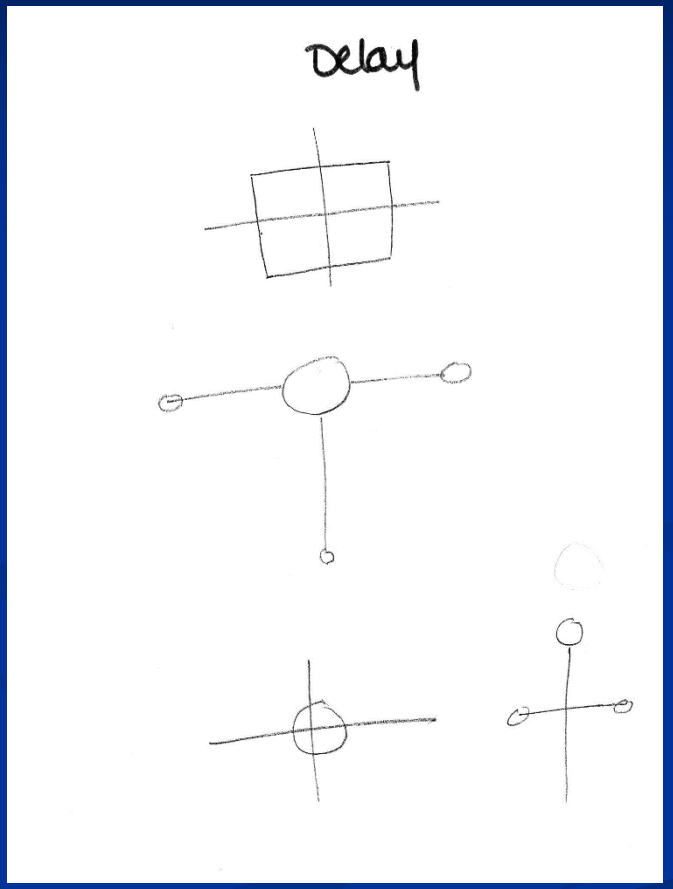
Doors and People Test: Visual Recall Task: Sayeed: 8-2013: Pre-Treatment



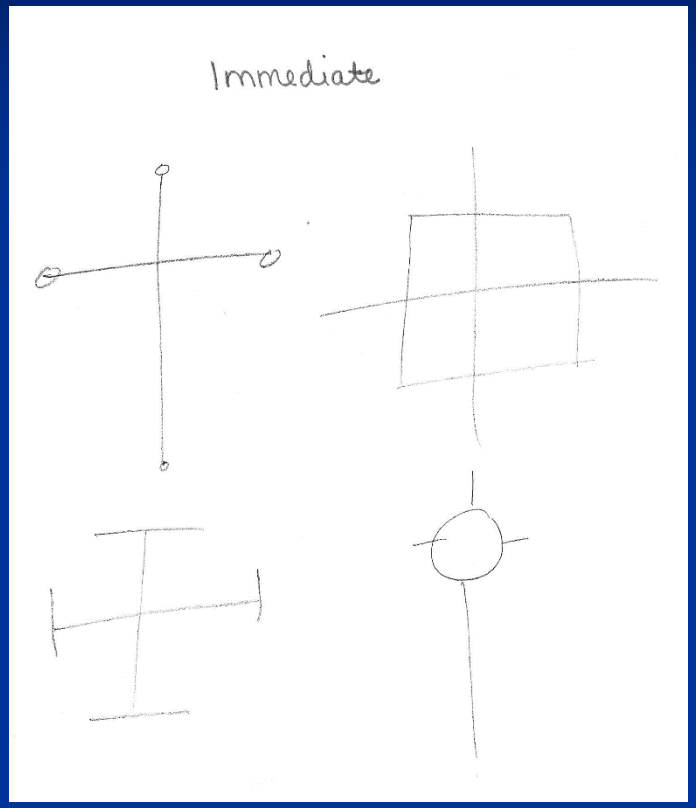
He did not recall anything after a delay of time

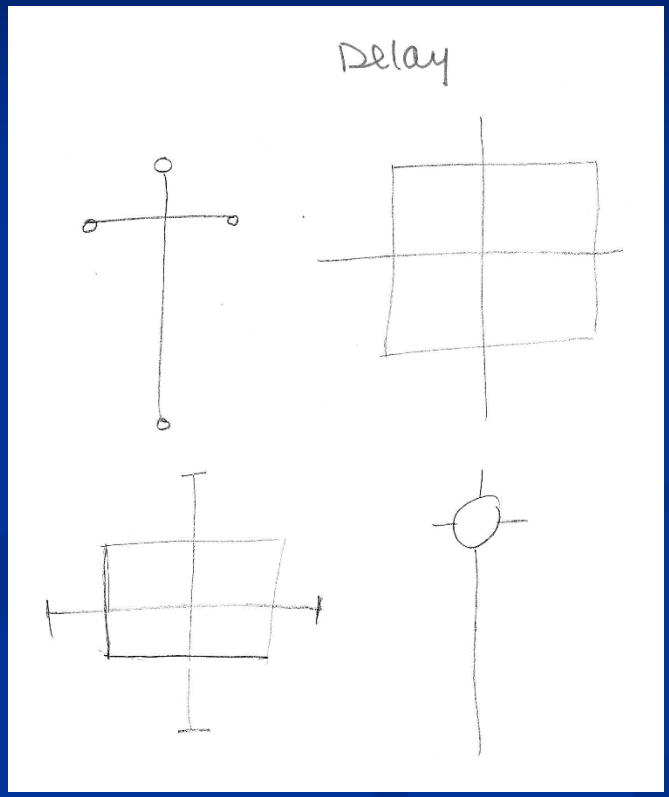
Doors and People Test: Visual Recall Task: Sayeed: 11-2013: Post-Treatment





Doors and People Test: Visual Recall Task: Sayeed: 12-2014: Post-Treatment





Constance, 71 to 72 years: DX: HD

DKEFS	1-2014	6-2014	2-2015
Trail Making	3	5	
Tower Test	6	6	7

Composite scores

Connie loves coming in for therapy describes it as the highlight of her week. She began to drive again after being in therapy for six months. She is pleased with her progress.

Catching Dementia Early

MAKES EVERYONE HAPPY

Grandma and Grandpa continue hosting the holidays in their home. The family system remains integrated.



Grandchildren sleep over at their grandparents. Parents are provided with help.



Grandchildren learn wisdom from their grandparents and receive the total unconditional love which forms a platform for self-esteem and self-worth



Grandparents are afforded the ability to remain revered and honored. They are allowed to age gracefully and to die with their boots on.



1 of every 5 dollars spent by Medicare is for Dementia patients.

Over 5 million people are living with Alzheimer's

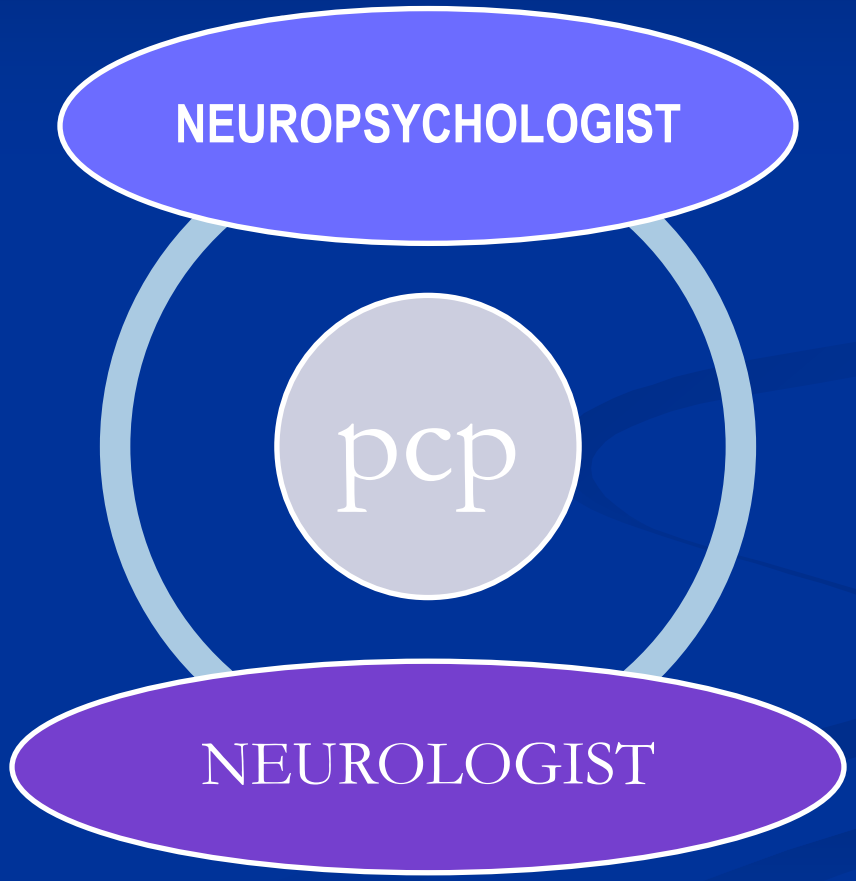
16 million is estimated by 2050

It is the country's most expensive condition

Projected as 214 billion for 2014 and 1.2 trillion by 2050

(Alzheimer's Association Disease Facts and Figures Report, 2014, 2015)

The referral system that provides relief. The PCP remains the hub but does not have to hold up the system



While dementia may not be curable:
It can be contained.
The Alzheimer's Accountability Act introduced in Congress authorizes NIH
to submit a budget to Congress justifying funding for critical AZ research.

Take Home Message

- There is something that can be done to provide treatment for dementia: The diagnosis of dementia does not mean that the disease course is fixed and untreatable
- Perhaps if this concept was propagated as opposed to the latter, more people would be willing to undergo early evaluation
- Early evaluation = Increased prognosis for change

Take Home Message

- Concept of focused treatment providing individualized activities based upon brain behavior relationships addressing specific aspects of memory, executive reasoning, language and visual perceptual functioning.
- Cognitive or brain enhancing activities address memory (short and long term, retrieval and recognition, visual and verbal) executive reasoning processes (selective attention, integration, perseveration, sequential analysis, cognitive flexibility) language (word retrieval) and visual perceptual.
- **Cognitive training and medication are becoming the gold standard.**

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