



Disclosure :

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Introduction:

- Cognitive rehabilitation presents a challenge for patients because their cognitive impairments hinder their ability to learn.
- Some variables need to be considered for cognitive rehabilitation to be successful:
 1. Treatment should be **client-centered**:
 1. learning style
 2. preferences
 3. support
 4. consideration of the environment

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2. Identify the desired outcome: Define Short Term Goals (STG) and Long Term Goals (LTG)
3. Practice should be targeted toward transfer and generalization
4. USE EVIDENCE TO SUPPORT OUR PRACTICE*
5. Evaluation of outcome

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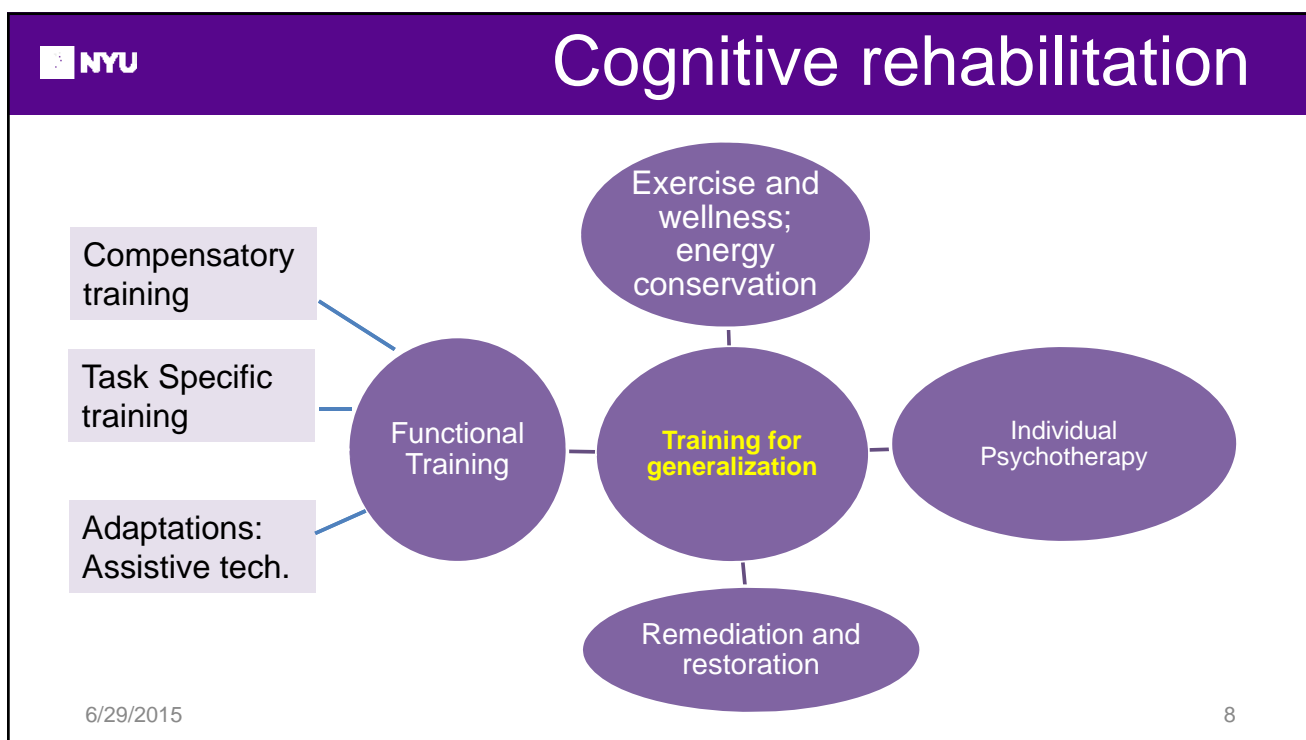
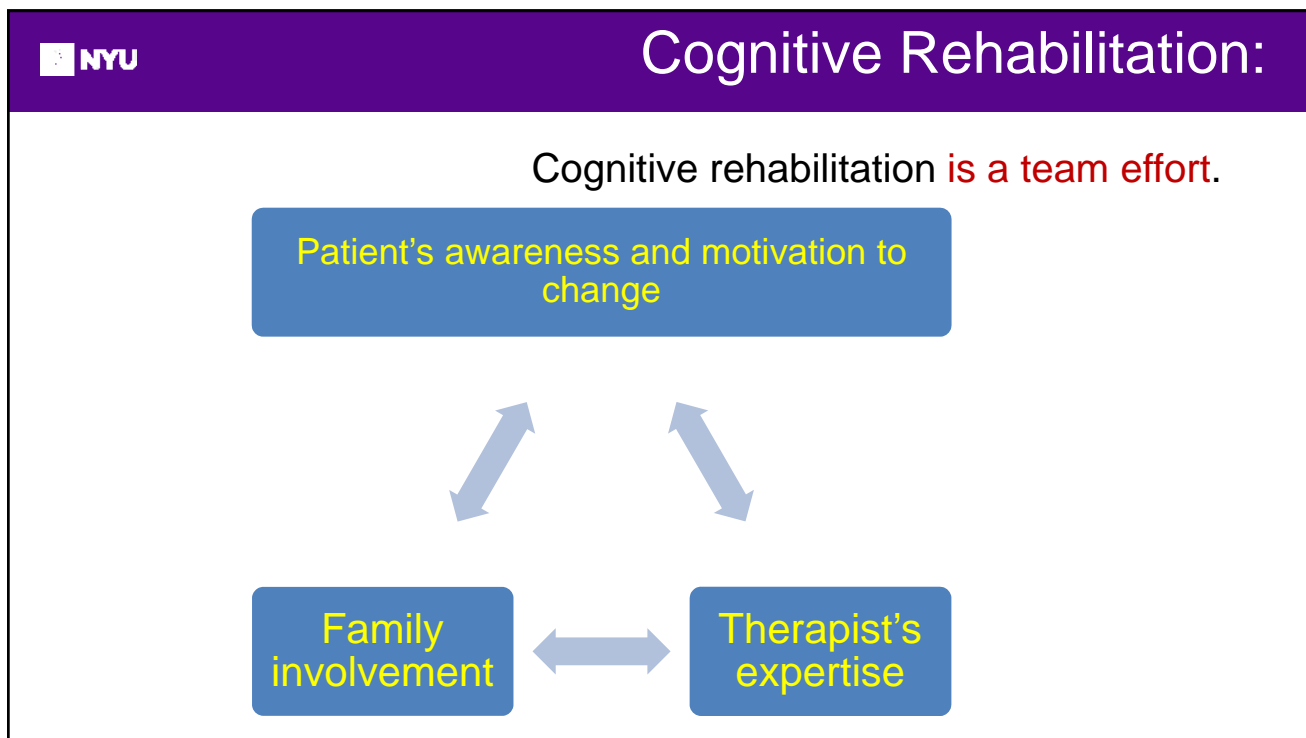
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OUTLINE

1. Define cognitive rehabilitation
 - Components of cognitive rehabilitation
2. The process of Rehabilitation
 - Assessment
 - Intervention – evidence based practice
3. Summary

What is cognitive rehabilitation?

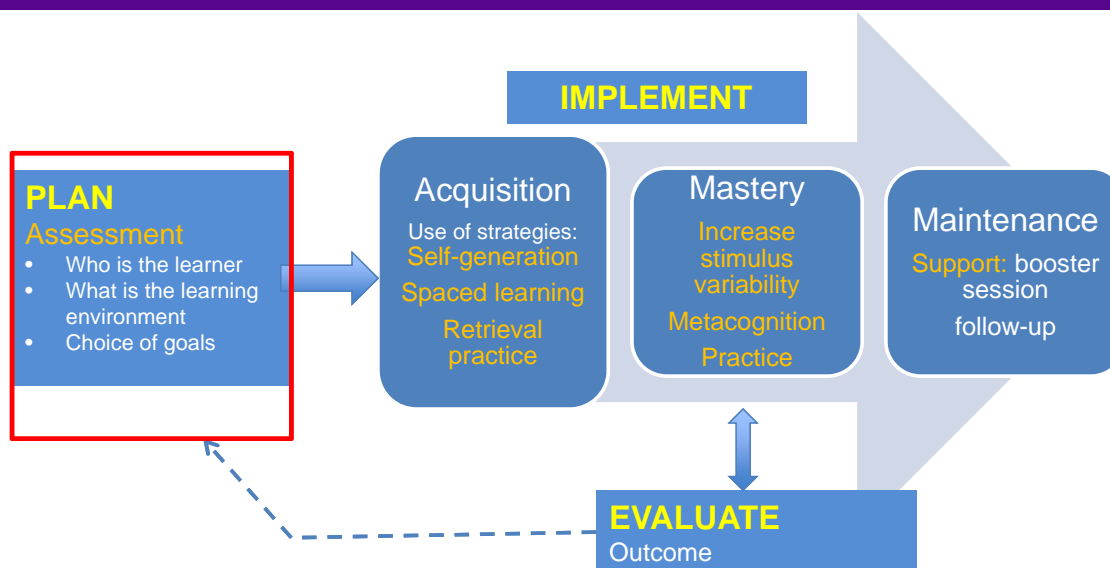
An intervention in which **patients and their families** work with health professionals to **restore** or **compensate** for cognitive deficits, improving the patients' **everyday functioning**.



OUTLINE

1. Define cognitive rehabilitation
 - Components of cognitive rehabilitation
2. The process of Rehabilitation

The process of rehabilitation:



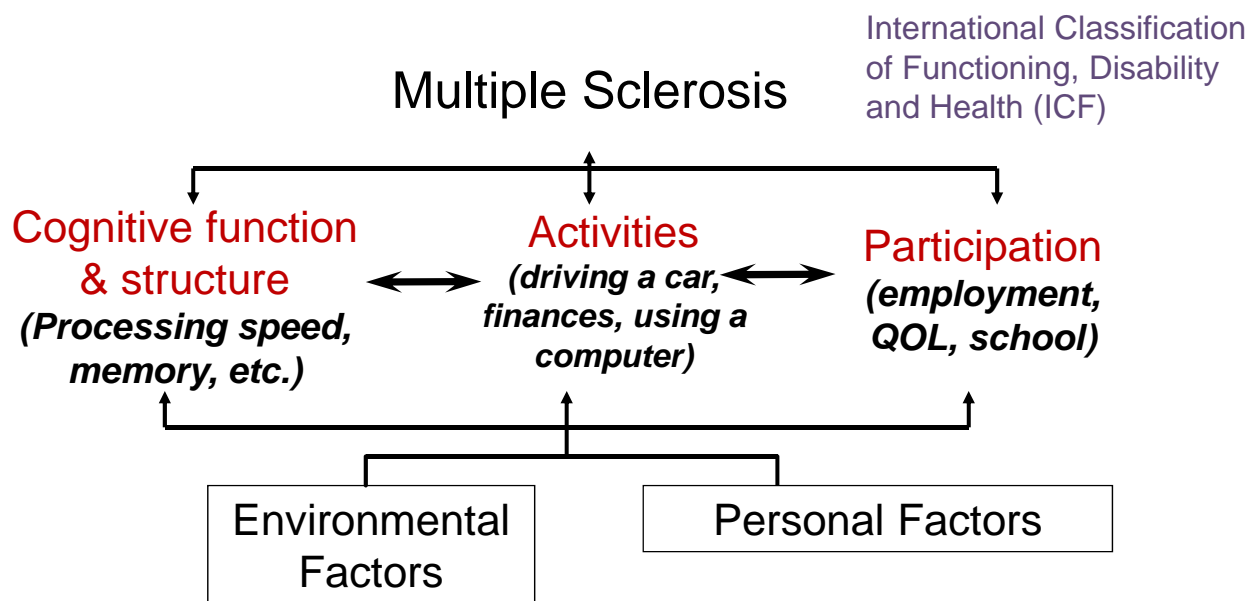
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*Modified from Sohlberg & Turkstra, 2011 10

OUTLINE

1. Define cognitive rehabilitation
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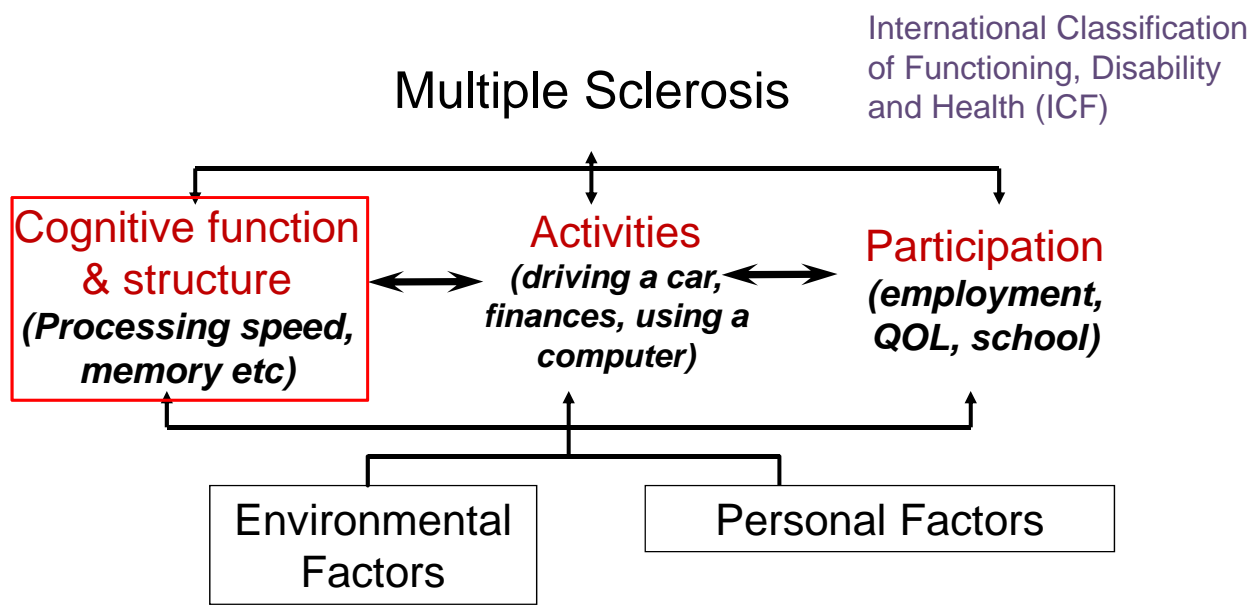
The Process of Rehabilitation: **Assessment**



How do we measure this?

What would be adequate outcomes when designing interventions for patients with MS with cognitive impairments?

The Process of Rehabilitation: **Assessment**





Examples of standardized measures:

Measures of Cognitive Function:

Minimal Assessment of Cognitive Function in MS (MACFIMS):

- processing speed/working memory
- new learning and recent memory
- spatial processing
- higher executive function

Brief International Cognitive Assessment for MS (BICAMS)

- Visual learning and memory
- Verbal learning and memory
- Processing speed

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Assessment

Standardized measures of cognitive impairments are important.

- BUT not sufficient as the primary indicator of successful intervention.

It is important to measure

- Activity of Daily Living
- Participation and QOL

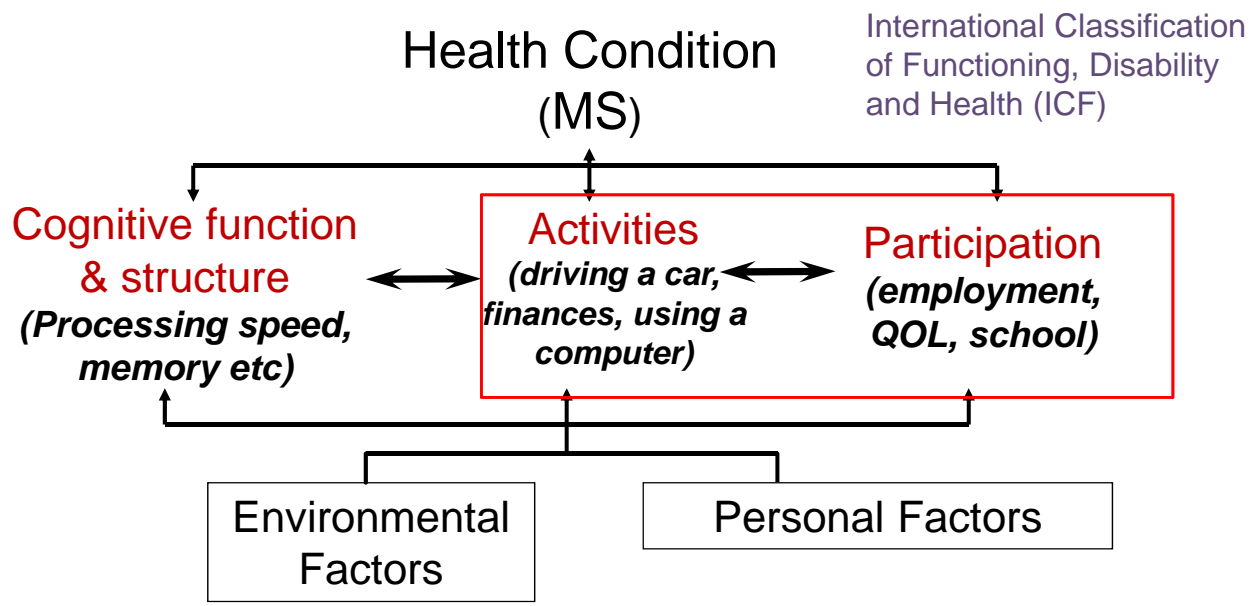
✓ For the patient, family members, and third party payers

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The process of Rehabilitation: **Assessment**



Measurement of Instrumental ADL

- There are few assessment tools that systematically assess basic and instrumental activities of daily living (ADLs)



Performance based assessments of ADL

- Measures problem solving
- Measures speed
- Both do not measure level of function



Performance based assessments of ADL

- Often tasks are not conducted in the natural environment
- Many are kitchen-based
 - Not relevant to all persons
- Some measure only one aspect of performance such as executive functions





Self-report Measures of Activity and participation

Self-reports provide information related to ADL and QOL

- Example: Functional Assessment of MS (FAMS), Functional Behavioral profile (FBP)
- Biased by affect symptomatology or cognitive impairments.

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Innovative assessment: Activity limitations

GOAL: Examine **actual performance** of everyday activity: everyday technology

Everyday technology is sensitive to the specific needs of persons with disabilities:

- Increase independence and control over the environment for people with cognitive or physical disabilities.

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Development of the Actual Reality (AR) Task

Actual Reality (AR) is an innovative, performance-based assessment approach that involves utilization of the Internet to perform actual, everyday life activities



The three internet tasks from actual websites:

- Book and purchase an airline ticket to go to Orlando FL



- Choose and order cookies as a birthday present for a 13 years old boy



- Order a pizza delivery for an evening party





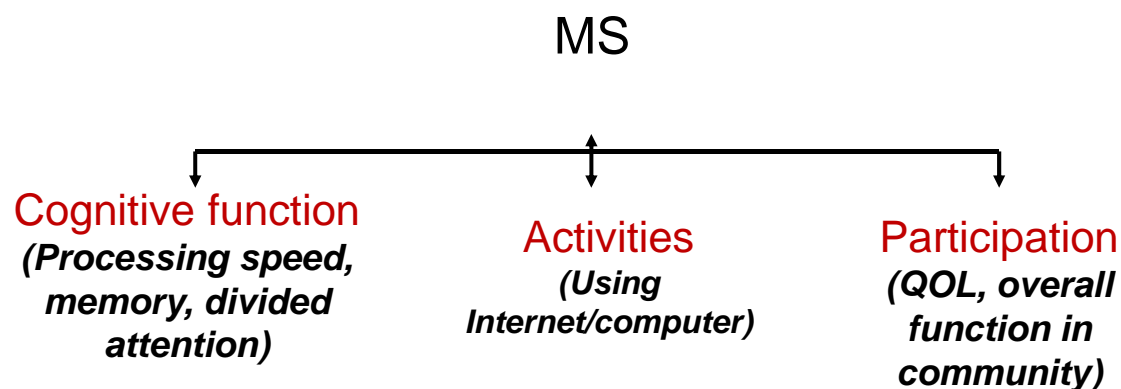
Actual Reality Scoring

4 dependent measures were recorded:

- Cognitive skills
- Performance of AR steps
- Total errors committed
- Time to complete task



Interaction between cognitive functions, activity and participation





Summary of regression analyses to predict AR scores

DV \ IV	•Actual Reality: Cognitive Scale	•Actual Reality: Step Errors	•Actual Reality: Total Number of Errors	•Time for Completion
•Anxiety	.17	.005	.05	-.02
•Depression	-.05	.002	.005	-.10
•QOL (FAMS)	-.19	-.17	-.17	-.004
•Cognitive Composite Score	-.76**	-.76**	-.75**	-.51
•R ² (F)	3.9*	4.1*	3.8*	1.4



“Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS) and performance of the Actual Reality” (Submitted)

To examine whether the BICAMS (SDMT, CVLT, BVMT-R) is associated with performance of activities of daily living in MS (n = 41).

	Actual Reality: Cognitive Scale	Actual Reality: Step Errors	Actual Reality: Total Number of Errors	AR: time in minutes	BICAMS t-score	FAMS (QOL)
Age	.23	.21	.24	.27	.05	.09
Education	-.27	-.36*	-.37*	-.24	.54**	.15
Months since diagnosis	.17	.20	.17	.08	-.25	.03
Depression	-.21	-.12	-.13	-.21	.05	-.53**
FAMS	.13-	.06	.04	.07	.08	
BICAMS t-score	-.53**	-.55**	-.58**	-.50**		

Case example:

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A case study

- Linda, 39 YO, single mother of a 5-year-old girl.
- Diagnosed with RR MS @ 30
- Symptoms prior to the diagnosis.
- Until 1 year ago, Linda was independent in activities of daily living:
 - taking care of herself
 - her daughter
 - their financial matters
 - prepare meals
- She worked from home as a graphic designer.

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Case study-continued...

- 1 year ago, Linda started to have memory impairments.
 - This prevented her from continuing to work.
- Her mother moved in to help with her daughter, household organization, and financial matters.
- Recently, Linda expressed feelings of low self-esteem and helplessness saying that she feels frustrated because she cannot do things by herself.

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Case study-continued...

- Linda said that she would like to start working again, be more involved in raising her daughter and helping with managing finances.
- Before starting an intervention, Linda was assessed using three type of assessments:
 - Standardized measures of memory (Cognitive functions)
 - IADL (e.g. household activities) (Activity Limitation)
 - QOL (Participation Restriction)

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NYU Case Study: Possible Outcome for Linda based on the ICF

Following cognitive rehabilitation Linda shows:

Outcome 1: improvement on the standardized memory tests, however, her scores on the IADL and QOL stayed the same.

Outcome 2: no changes on memory standardized measures, however, improvement on measures of IADL and QOL

Outcome 3: improvement on memory standardized measures, as well as on measures of IADL and QOL.

Which outcome is most successful?

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NYU

1. Define cognitive rehabilitation

- Components of cognitive rehabilitation

2. The process of Rehabilitation

- Assessment

- **Intervention**

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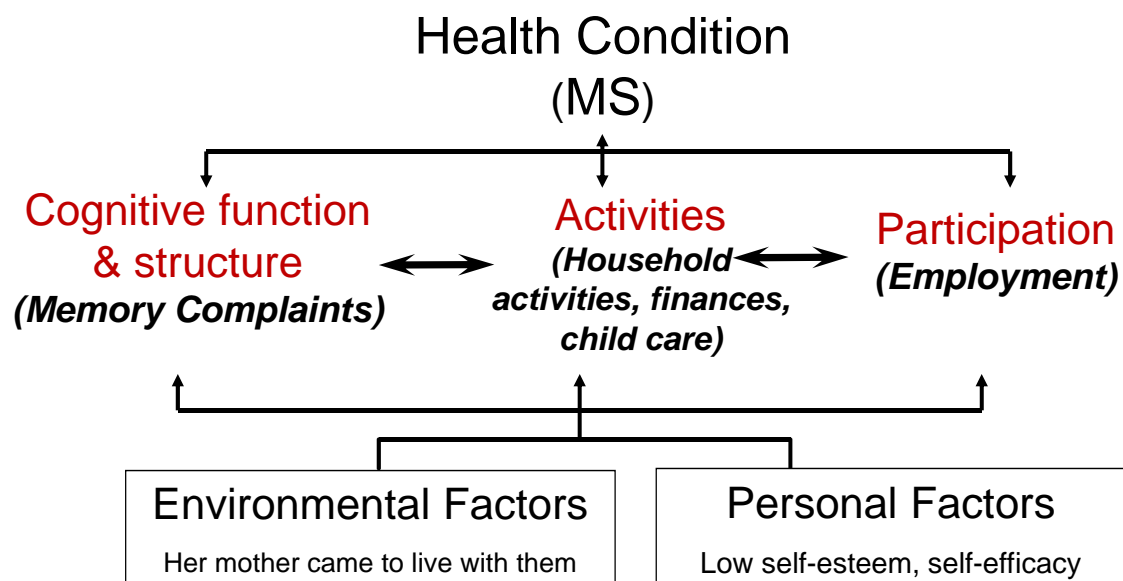
Some of Linda's reported symptoms:

- "I can't remember where I put things. I often misplace my phone or my keys."
- "I have trouble finishing a task because I get distracted."
- "I have difficulty learning new things, or remembering new information."
- "I have difficulty remembering important dates that I should know like my daughter's parent-teacher conference."
- "I forget what I've read 20 minutes after putting my book down."
- "I can't remember if I've paid my bills every month."

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Case Study: Linda continued...





Case study-continue

- Linda said that she would like to start working again, be more involved with raising her daughter and helping with financial management.
- Linda and her therapist chose 4 main, short-term goals.

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Treatment goals were:

1. Linda will demonstrate the ability to locate and find items in her house
2. Linda will improve her use of technology/adaptive equipment to manage her finances for increased independence in household activities
3. Linda will be able to remember appointments and other daily tasks
4. Linda will be able to sustain attention for more than 30 minutes in order to complete a task

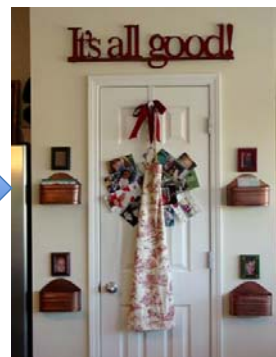
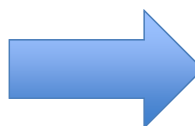
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STG 1. Linda will demonstrate the ability to locate and find items in her house

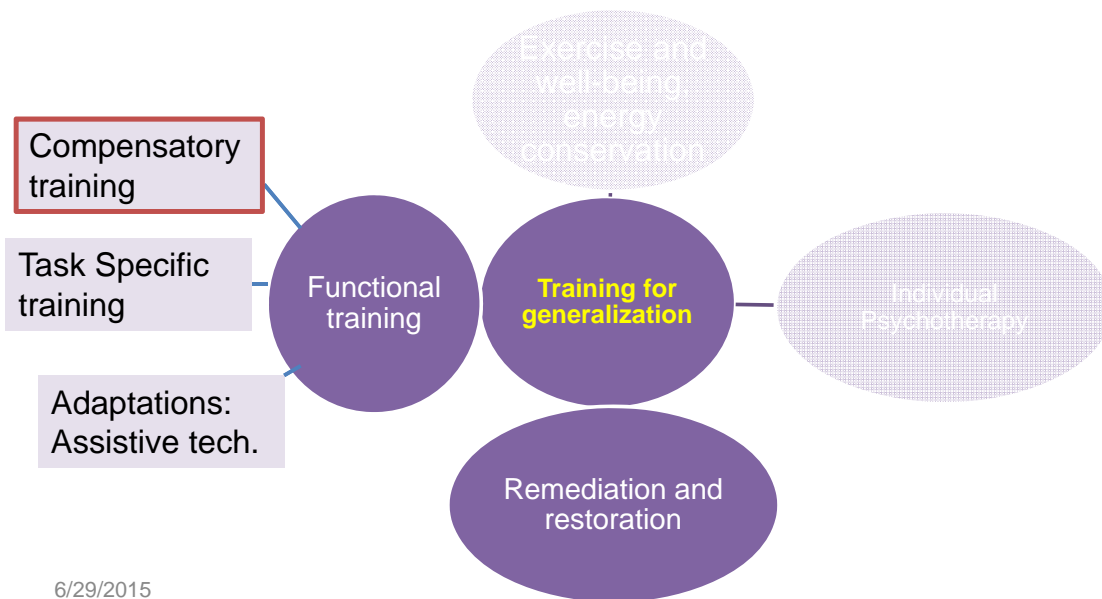


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Cognitive rehabilitation



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Self-Generation

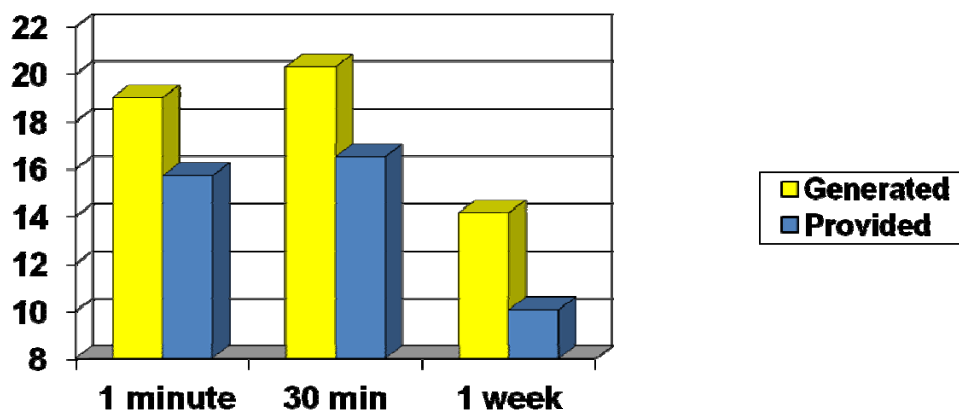
Generation Effect: Items self-generated by individuals are better remembered than items simply read or heard

- Generation: Category: *Corn - W_____*
- Or
- Provided: Category: *Lake- River*
- Research has demonstrated that *Self-Generation* maximizes new learning in individuals with MS



Food Preparation Results –MS

(Goverover et al., 2008)



Self-generation treatment:

The treatment has two components:

1. Introduction of self-generation strategy through training
2. Use of metacognitive cues (knowledge about one's performance).
 - The learner observes increased memory abilities through self-generation in comparison to provided information and should learn to apply the strategy to his/her daily life.

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Plan of treatments

Same for treatment
and control groups

Session 1: words in sentences

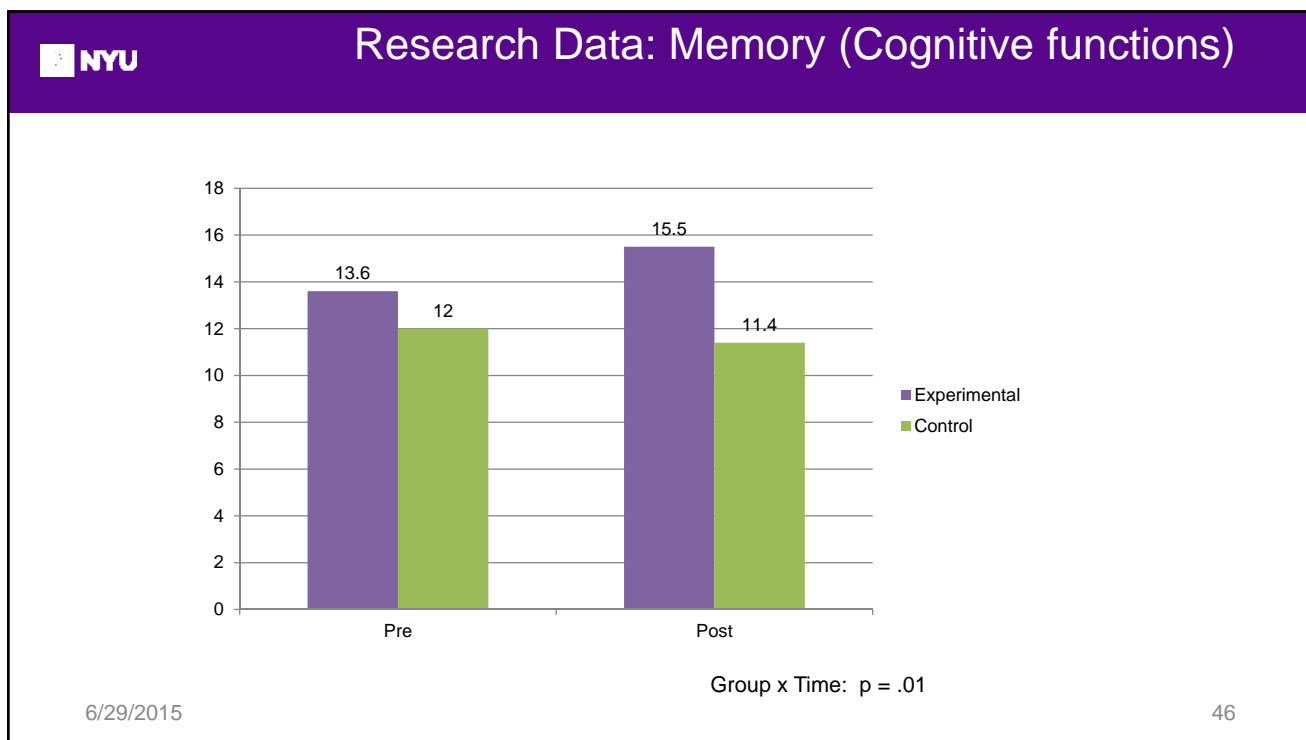
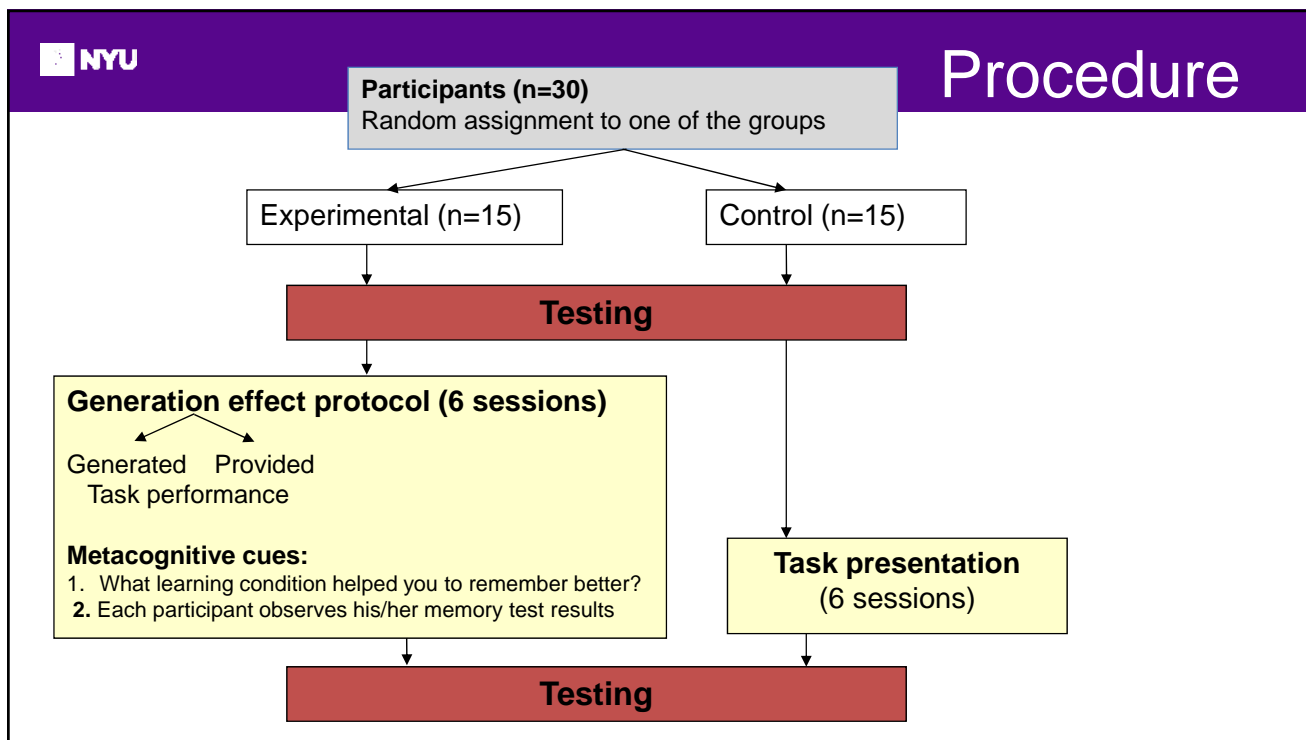
Session 2: pair-associated words

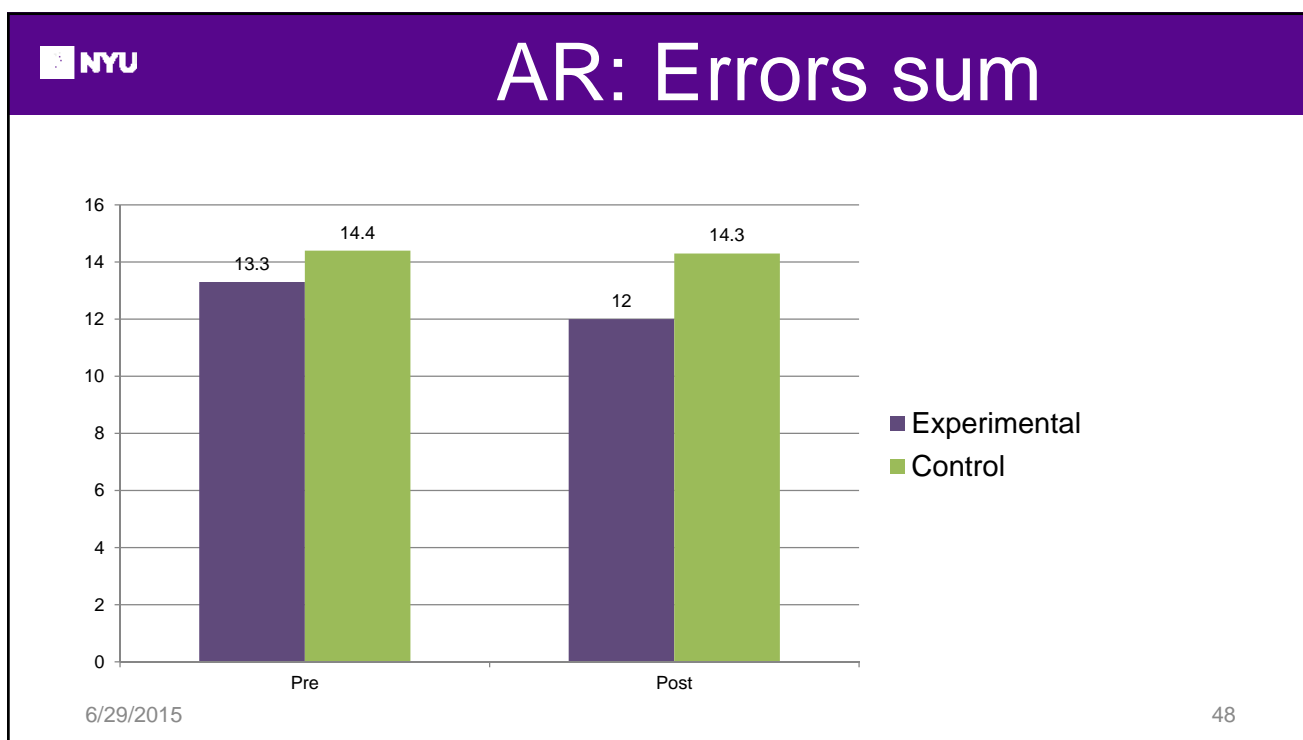
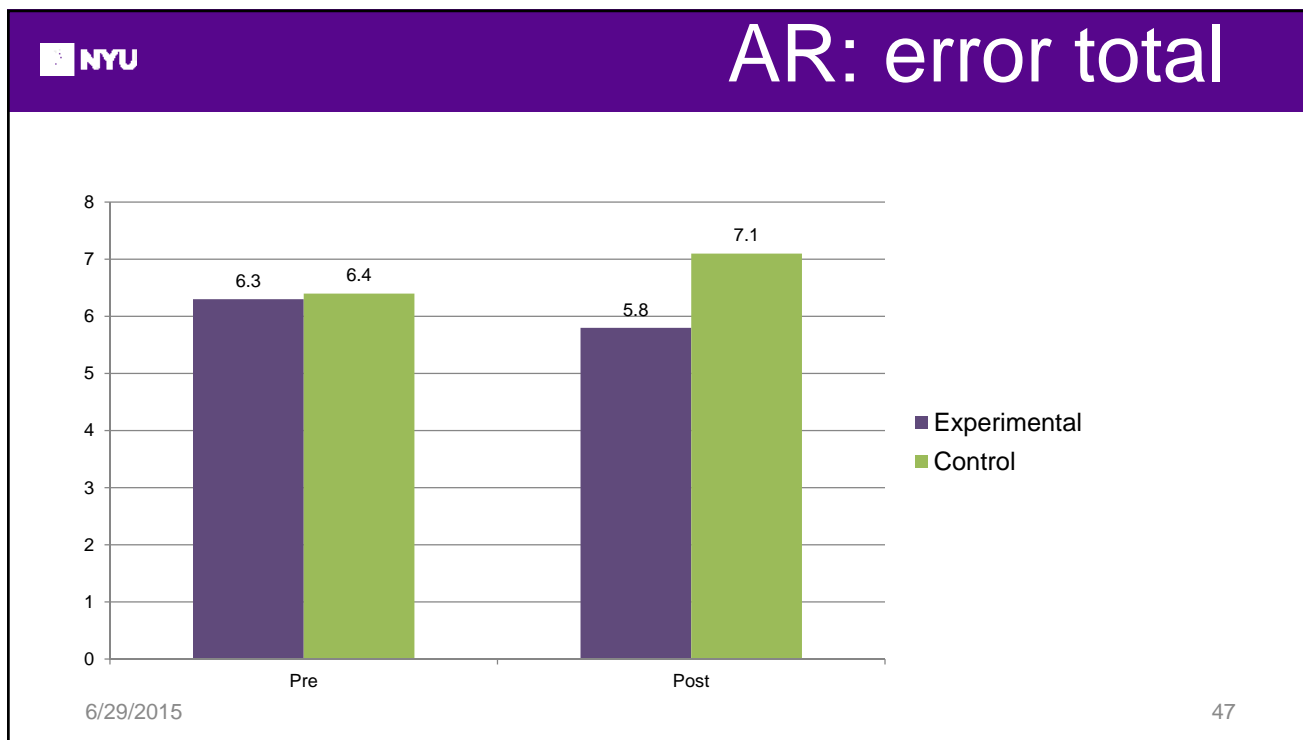
Session 3: learning names and object locations

Session 4: learning dates and appointments

Session 5: learning IADL: cooking and finances

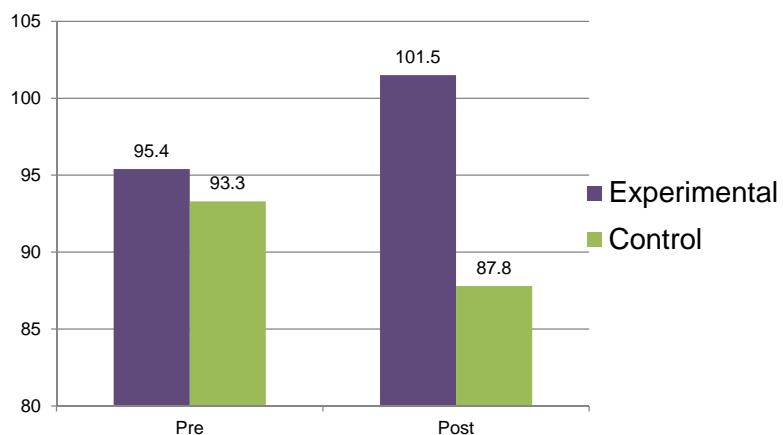
Session 6: learning task of personal choice







Research Data: Participation: FBP- self-report



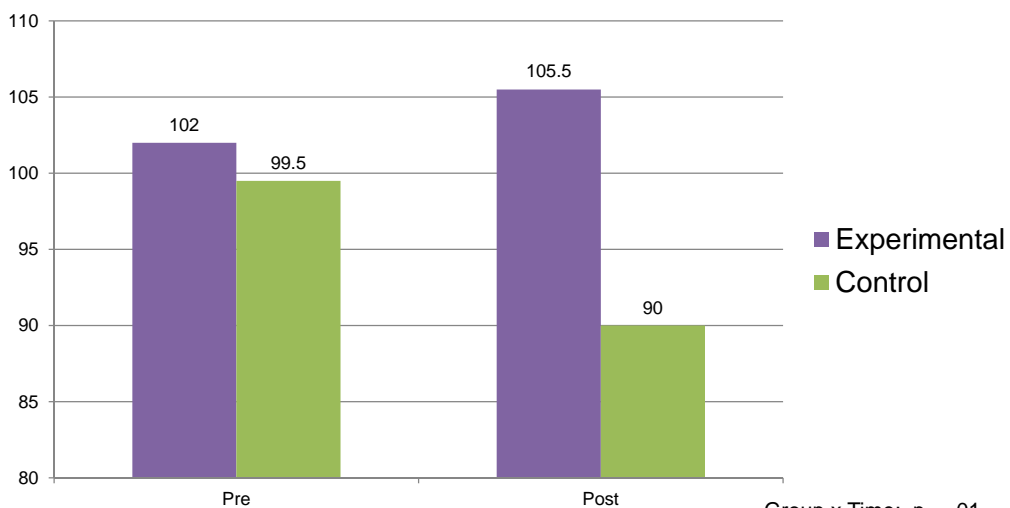
Group x Time: $p = .008$

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Research Data: QOL-FAMS



Group x Time: $p = .01$

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Bench to bedside

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Application to the clinic:

Linda was asked to learn the location of objects in a setting. Half of the objects were presented in the generated condition and half in the provided condition.

She was asked a metacognitive question:

“What learning condition helped you to remember the task better?”

She also viewed her memory-recall test results.

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Kitchen: Object Location



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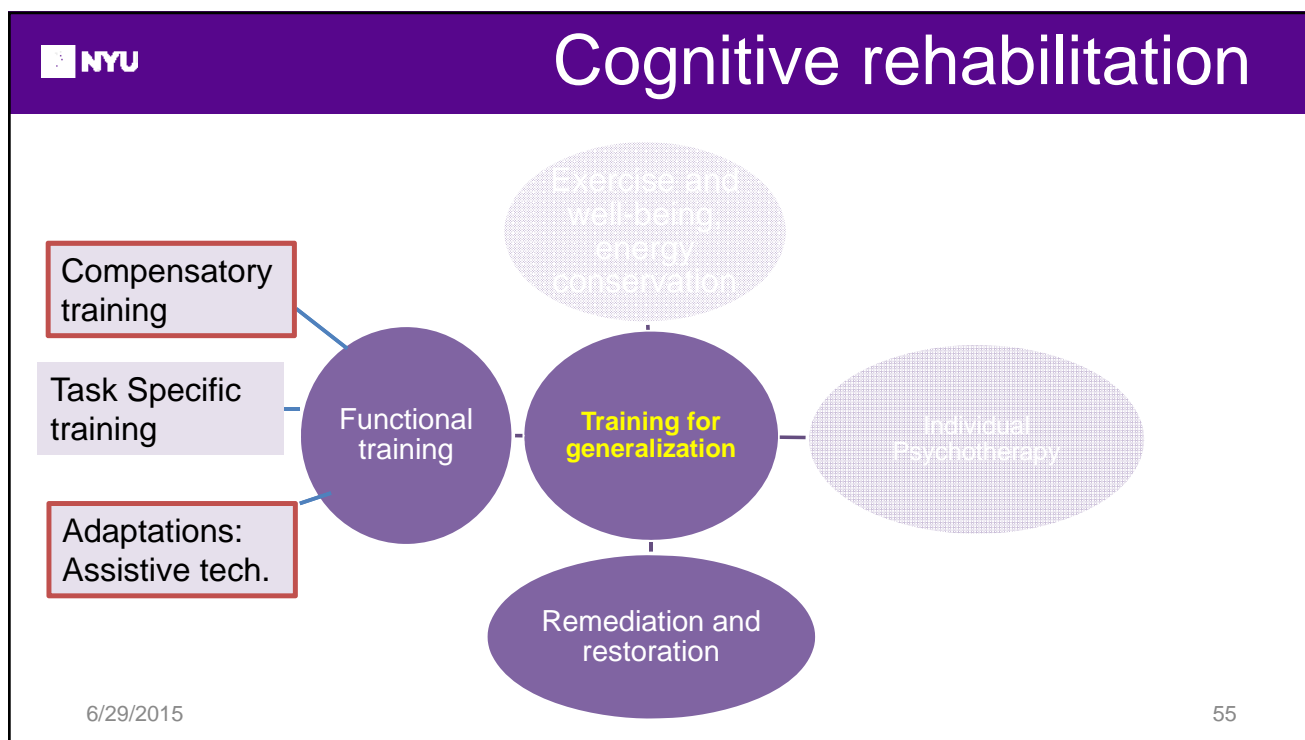
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STG 2: Linda will improve her use of technology/adaptive equipment to manage her finances for increased independence in household activities



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NYU **Assistive Technology**

- The recent growth in the use of smart phones should be a strong consideration for treatment.
- These systems have strong rehabilitative potential, are affordable, socially acceptable and can support the completion of ADLs in the actual environment (Sohlberg & Turkstra, 2011).
- Therefore, it would be beneficial to use a novel treatment approach using **assistive technology for cognition (ATC)**

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Matching the person to the most optimal assistive technology

- Matching the person to the most optimal assistive technology is central to successful cognitive rehabilitation.
- There are some websites such as (<http://www.coglink.com/techmatch>) that match the best technology for the consumer



Technology specific to financial management

- A number of online websites or APPS have been developed.
- These apps are specific to budget and managing finances
- **BUT**---How do we teach the client to use the app?





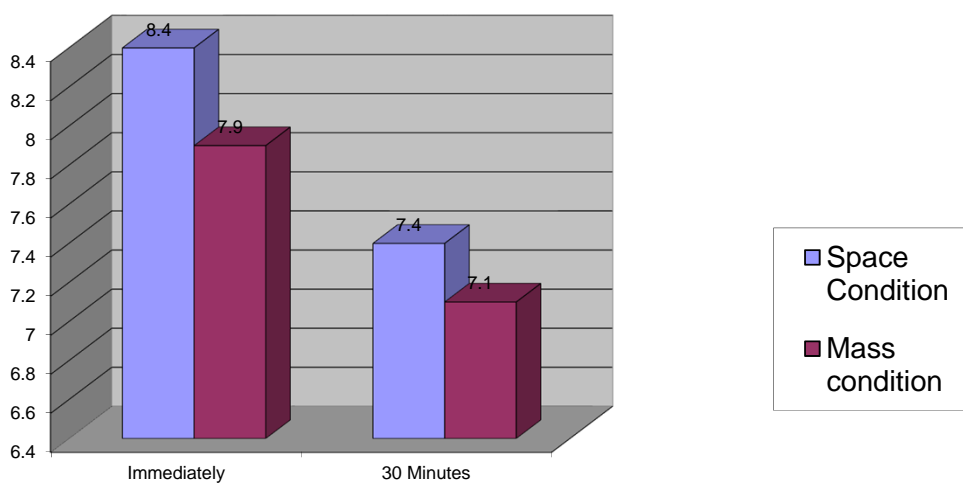
Spaced learning

The spacing effect - New learning is significantly improved when repeated trials are distributed over time (spaced repetitions) compared to consecutive learning trials (massed repetitions)

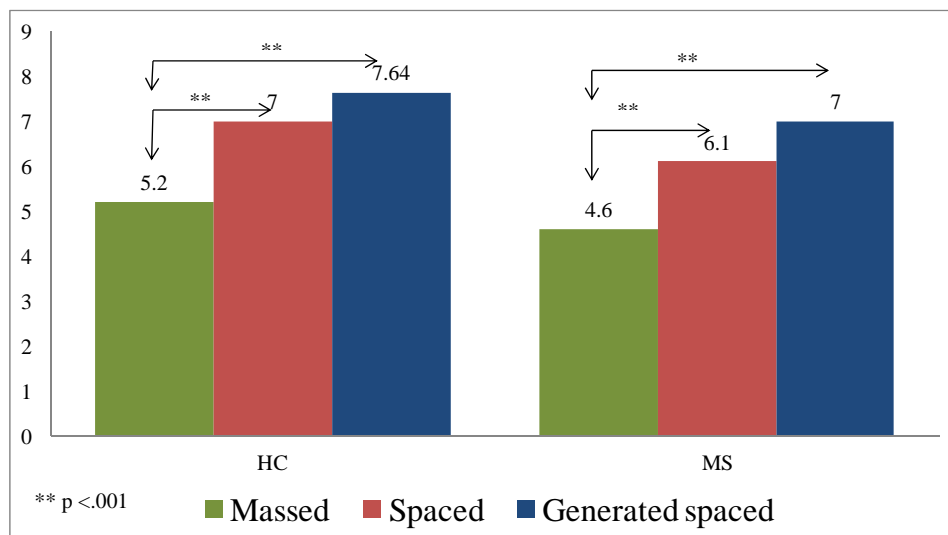
Space: X____X____X
 Massed condition X/X/X



Reading a paragraph (MS) (Goverover et al., 2009)



Evidence: Memory for Names and Faces



From Bench to Bedside

Combination of strategies:

Linda learned the steps of how to operate a managing finance app

GENERATED CONDITION:

- Each time when you shop, open the (the name of the app)
- Setup your budget by (category)
- Set a limit for (expenses)
- To enter your receipts (amount paid)

THURSDAY, APRIL 11		
<input type="checkbox"/>	13 ATM Office	\$ 2,300.00
	Savings	Biweekly
	Wages / Salary : Net Pay	
SATURDAY, APRIL 13		
<input checked="" type="checkbox"/>	11 Mr. Landlord	(\$ 1,500.00)
	Savings	Monthly
	Mortgage / Rent	
FRIDAY, MAY 3		
<input checked="" type="checkbox"/>	City Gas & Electric	~ (\$ 60.00)
	Savings	Monthly
	Utilities	
<input type="checkbox"/>	Costco	(\$ 30.00)
	Checking	Monthly
WEDNESDAY, MAY 8		
<input checked="" type="checkbox"/>	Toyota	(\$ 600.00)
	Savings	Monthly
	Automobile	
<input type="checkbox"/>	Costco	(\$ 350.00)
	Mastercard	Every 3 weeks
	To Savings Euro	
Selected total:		(\$ 2,160.00)

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Combination of spaced and self-generated conditions

Spaced, 5 minutes apart

- Each time when you shop, open the (name of the app)
- Setup your budget by (category)
- Set a limit for (expenses)
- To enter your receipts (amount paid)
- Each time when you shop, open the (name of the app)
- Setup your budget by (category)
- Set a limit for (expenses)
- To enter your receipts (amount paid)

Massed

Each time when you shop, open the (the name of the app)

Each time when you shop, open the (name of the app)

And so on

STG 3: Linda will be able to remember appointments and other daily tasks



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Retrieval Practice

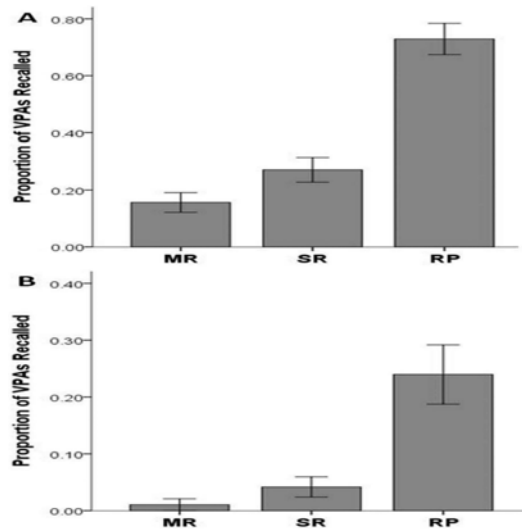
- Retrieving the target information one or more times prior to testing.
- The idea is not to **repeat** the correct information, but to try and **retrieve** it.
- Feedback as to the correct answer may or may not follow.

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Recall after a short delay of 30 minutes (A), and a long delay of one week (B)



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James F Sumowski et al. *Mult Scler* 2013;19:1943-1946



Bench to Bedside



Learning appointments and schedule

Neurologist

Friday, June 12 @ 9

End of the year
performance

Saturday, June 27 @ 6

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Learning appointments and schedule

Neurologist

End of the year
performance

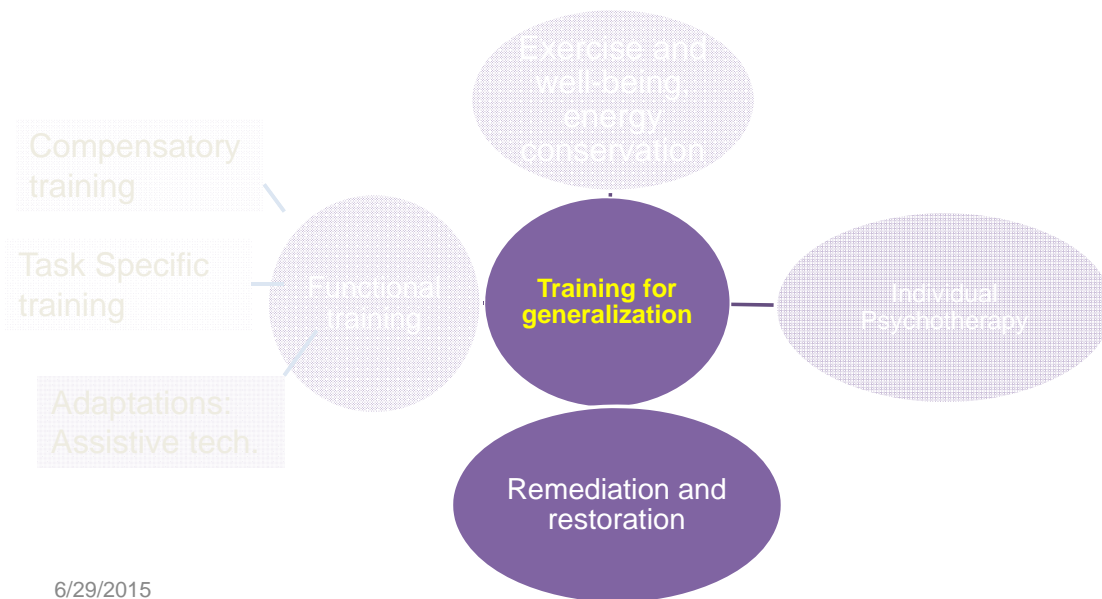
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STG 4. Linda will be able to sustain attention for more than 30 minutes and keep track of a task



Cognitive rehabilitation



Speed of processing training

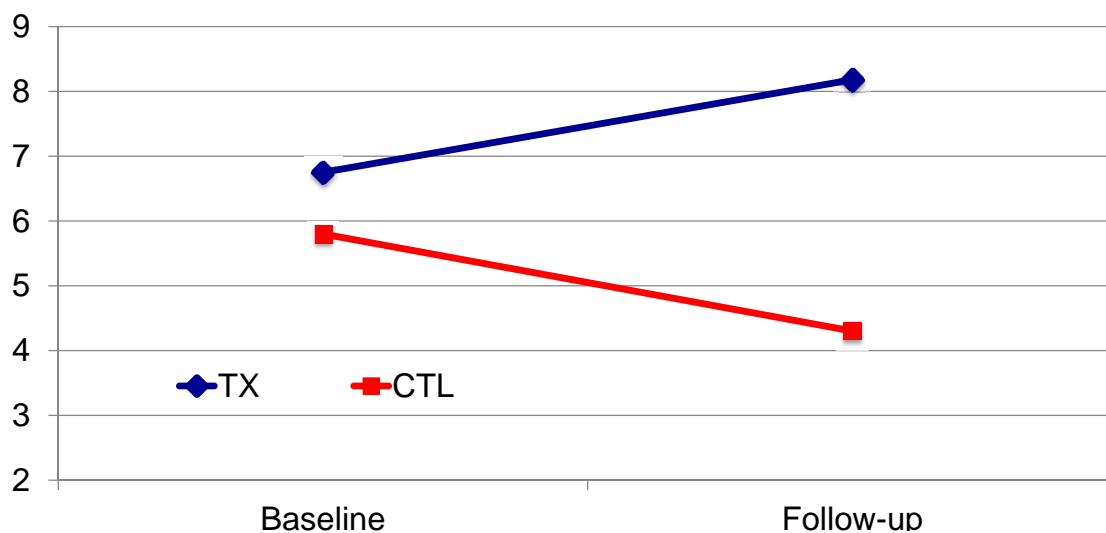
- Speed of processing training is **ability specific**, with the primary aim of improving mental processing speed.
- The goal of the program: More complex information can be processed within briefer periods of time.

Will be discussed in details in the last session by Nancy Moore

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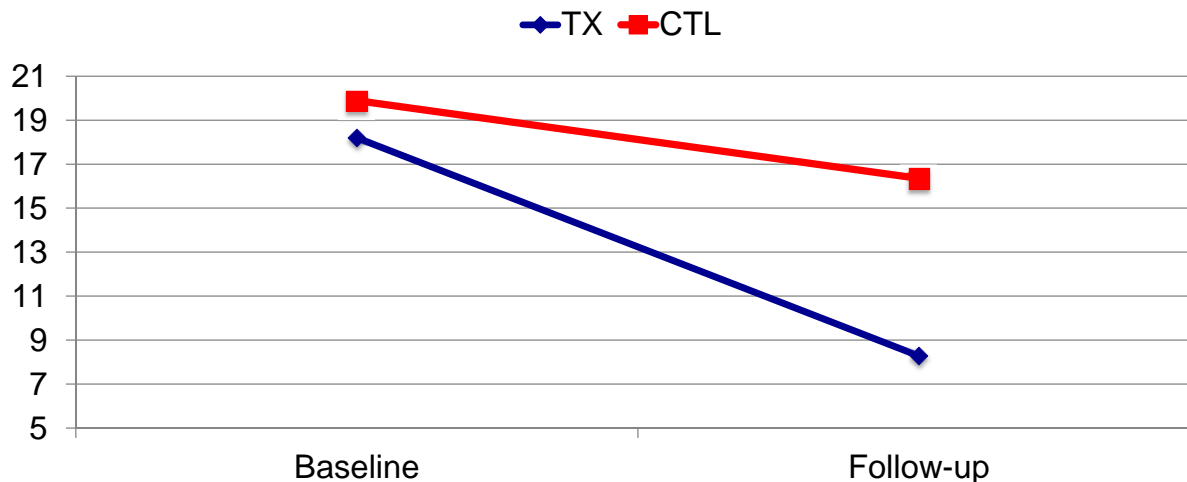
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SPT in MS: Pilot Data



Letter Comparison Test, $p < 0.05$

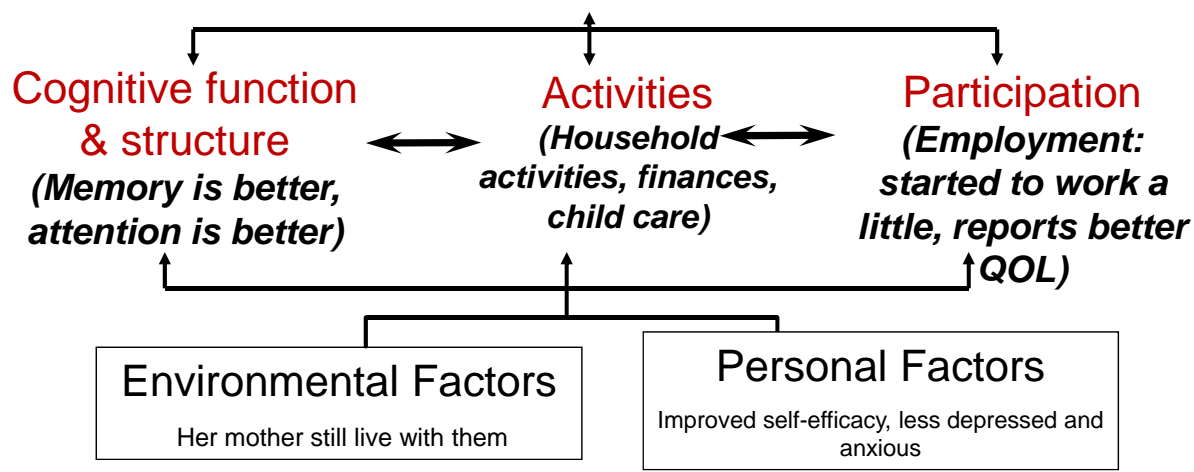
SPT in MS: Pilot Data



TIADL (everyday life), $p < 0.05$

Linda Post Treatment:

Linda (MS)





Summary:

PLAN:

Client-centered:

We assessed Linda's abilities, interview her and her family about her/their goals, resources and explored her learning style.

Set Goals: Identify her desired outcome: Define STG and LTG

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IMPLEMENTATION:

Practice should be targeted toward transfer and generalization

USE EVIDENCE TO SUPPORT YOUR PRACTICE

EVALUATE

Evaluation of outcome

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Given the relatively young age of MS diagnosis, use of cognitive rehabilitation that can improve cognition and functional performance is crucial.

Implementing various approaches for cognitive rehabilitation to improve real life information can be done.

It requires careful planning, **IMPLEMENTATION AND EVALUATION.**

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