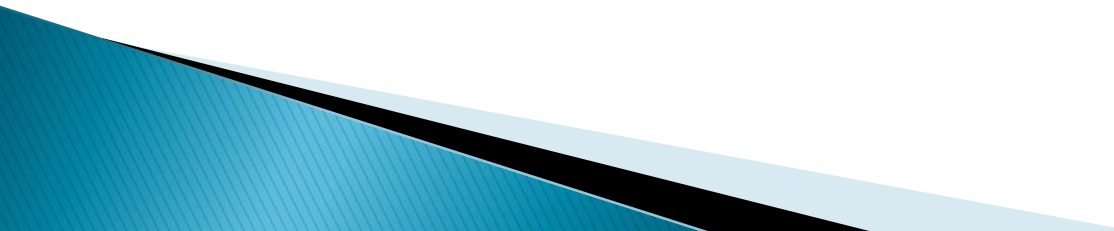


# Executive Function Skills Following a Brain Injury

Given by Carolyn Doty M.A., CCC/SLP  
Lisa Mammoser M.A., CCC/SLP  
Beaumont Health  
Brubaker Books

# Disclosures

- ▶ Financial- employed at Beaumont Health, Center for Adult Communication Disorders
  - ▶ Financial- authors for Brubaker Books, Inc.
  - ▶ Nonfinancial- no relevant nonfinancial relationship exists
- 

# Learning Objectives

- ✚ Identify components of executive functioning
- ✚ Understand how deficits in each component of executive functioning will affect a person following a brain injury
- ✚ Learn the benefits of individual and group treatment in improving executive functioning skills







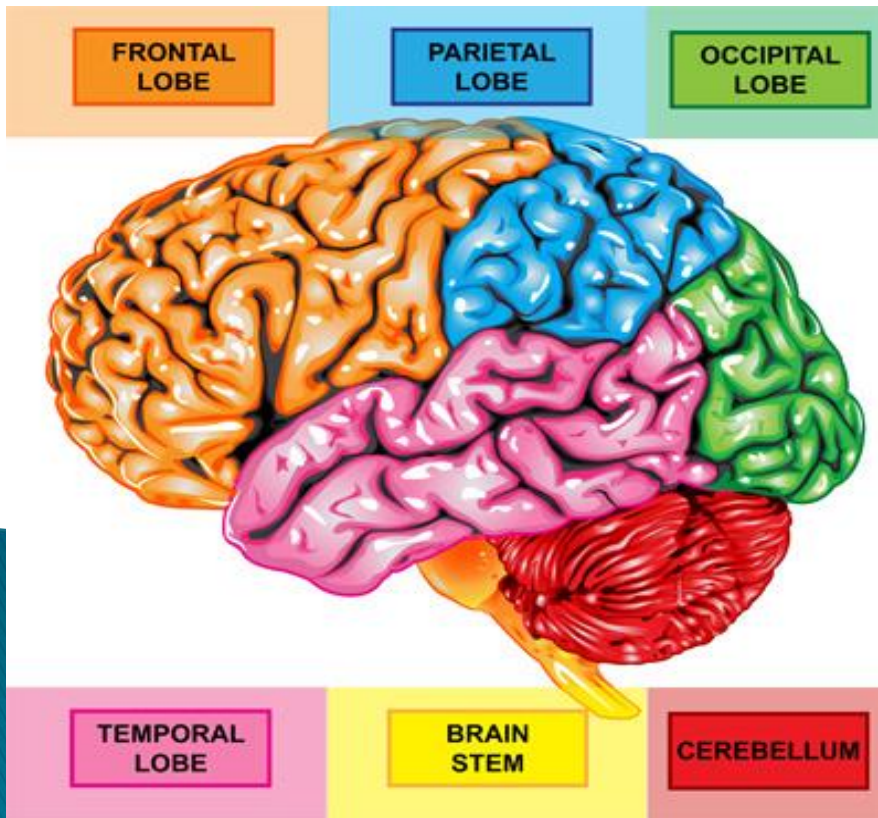
# Meet Doug Attorney at Law Stroke Survivor



Doug Fryer - After My Stroke 5-24-19 (4).mp4

# The Project Manager of Your Brain

The **frontal lobe** links and integrates all components of behavior at the highest level. Executive functions are the cognitive mechanisms essential for goal-directed behavior and for responding to new and novel situations. Cognitive functions and, in particular, executive function, are commonly affected after brain injury, leading to impairments in performance of daily activities, decrease in social participation and in quality of life. The frontal lobe is highly susceptible to injury.



## The functions of the frontal lobe include:

- Problem solving
- Decision making
- Reasoning
- Sequencing
- Analyzing
- Using logic
- Understanding cause and effect
- Understanding math concepts
- Speaking (expressive language)
- Motor planning
- ***Executive function***

# Executive Function Skills

- ▶ The frontal lobes can be damaged by any form of acquired brain injury, such as stroke, tumor, encephalitis and meningitis. They are particularly vulnerable to traumatic brain injury, due to their location at the front of the brain and their large size. Even a blow to the back of the head can cause frontal lobe injury because the brain is knocked back and forth in the skull and the frontal lobes bang against bony ridges above the eyes.
- ▶ It has been estimated that around 75% of people will have executive function difficulties after a stroke. (Chung CSY, Pollock A, Campbell T, Durward BR, Hagen S. (2013))
- ▶ Cognitive rehabilitation interventions for executive functions are based a combination of three principles: (1) Improving executive function components, (2) compensation of executive function impairment and/or (3) adaptive methods of increasing independence.
- ▶ Caregiver involvement in sessions is critical for carryover. Their involvement in the Caregiver Support Group is highly recommended.
- ▶ Assessment tools for evaluating executive function skills is limited therefore the best way to evaluate and treat is in every day/real world situations.



# Executive Function Skills

**Plan and Prioritize**

**Organization**

**Flexibility**

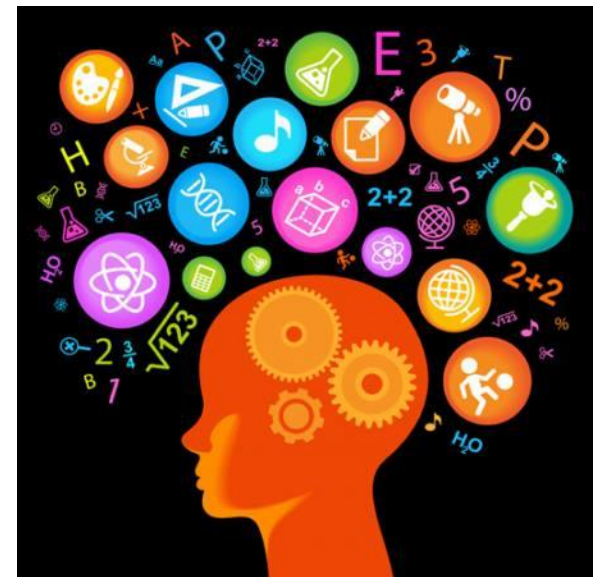
**Attention**

**Initiation**

**Working memory**

**Self-monitoring**

**Impulse Control**





# Plan and Prioritize

Definition: the ability to sequence steps to a task while considering time factors and rank of importance

Functional relevance:

- ▶ Difficulty setting a plan for the day so they may be late, show up on wrong days/times, difficulty completing job tasks, gets irrelevant tasks done before completing the most important tasks, overall nonproductive

Treatment, education and tools:

- ▶ Establish use of a planner which includes all tasks/activities to be completed according to a priority
- ▶ Set time frames for each tasks including prep time and drive time
- ▶ Breaking tasks into small manageable steps and writing out each step to the plan adding in estimated time to complete the step
- ▶ Using timers and alarms to adhere to time parameters
- ▶ Establish a home program to plan, prioritize and follow through with an expectation.

Date: \_\_\_\_\_

Things To Do:

Day: \_\_\_\_\_

6:00
7:00
8:00
9:00
10:00
11:00
12:00

●
●
●
●
●
●
●

**Phone Calls:**

1:00
2:00
3:00
4:00
5:00
6:00

Who:
Number:
Notes:
Who:
Number:
Notes:

Evening:
----------

<b>Notes:</b>
---------------

**Errands List and To Buy:**

--

Date: \_\_\_\_\_

Things To Do:

Day: \_\_\_\_\_

6:00
7:00
8:00
9:00
10:00
11:00
12:00

● Load of laundry
● Make cake
●
●
●
●
●

1:00
2:00
3:00
4:00
5:00
6:00

**Phone Calls:**

Evening:
----------

Who: Call Dr. Smith
Number:
Notes: ask about pain medication
Who:
Number:
Notes:

**Errands List and To Buy:**

Kroger- get calcepix, frosting eggs, b'day card.
---

<b>Notes:</b>
---------------


# Organization

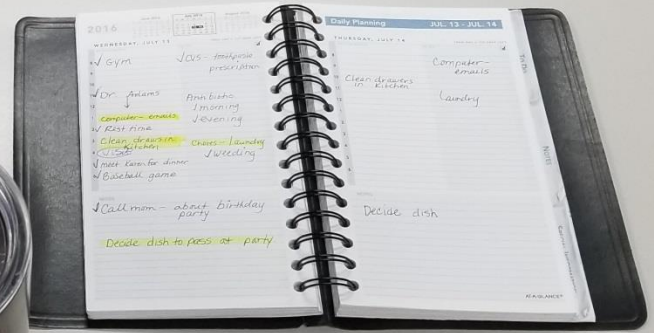
Definition: the ability to create order in your daily environment

Functional relevance:

- ▶ Belongings, paperwork, workspace, closets, drawers, etc disorganized and cluttered with difficulty bringing order to their environment, not efficient due to extra searching and back tracking throughout their day and/or task

Treatment, education and tools:

- ▶ Establish every thing has a place and everything in its place
  - ▶ Practice putting like things together
  - ▶ Take time in the session to organize papers, home program, purses, wallets, bags, checkbook, etc.
- 



# Flexibility

Definition: the ability to modify your thoughts or actions to respond to the current situation

Functional relevance:

- ▶ Lacking the ability to adjust if something isn't working, difficulty working as a team member, easily agitated when things are not going their way or as planned, rigid thinking with reduced ability to account for all aspects needed to make a plan or solve a problem, lack of creativity

Treatment, education and tools:

- ▶ Practice problem solving and reasoning coming up with alternative options
- ▶ Brain teasers
- ▶ Having a plan A and plan B
- ▶ Switch up where they should meet you for the session, switch up the session plan, etc.



# Attention

Definition: the ability to focus on a given task while handling or inhibiting distractions in the environment

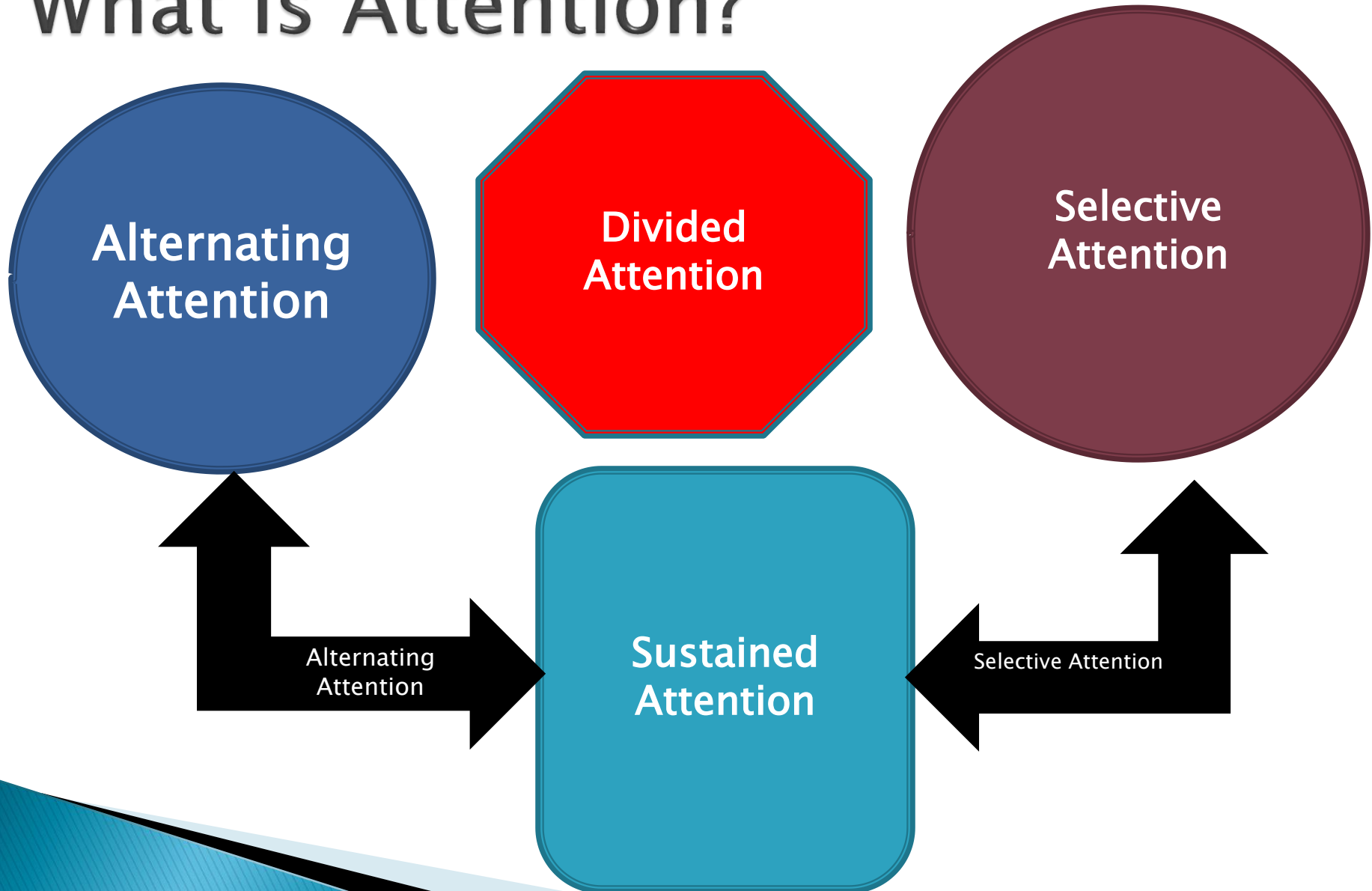
Functional relevance:

- ▶ Difficulty finishing a task in a timely manner, gets distracted easily, challenged with filtering out distractions, struggles with shifting from one task to another and to process two or more different demands with timely shifting of attention

Treatment, education and tools:

- ▶ Be able to work on a task in a quiet environment through completion
- ▶ Gradually impose auditory and visual background distractions such as music, people talking, etc
- ▶ Introduce distractions which require immediate attention taking them away from the primary task to a secondary task and then return back to the primary task
- ▶ Practice switching attention back and forth between tasks that require different cognitive and communicative demands

# What is Attention?



# Initiation

Definition: the ability to begin your plan to complete a task

Functional relevance:

- ▶ Often appears lazy or unmotivated, says what they want to do but has difficulty getting up and going, procrastinates

Treatment, education and tools:

- ▶ Make a plan and stick to it checking off what was completed
- ▶ Timers and alarms to alert to start times
- ▶ Set time or conditional parameters for tasks that they have to monitor





# Action Plan

## Example of an Action Plan

**Goal:** Arrive to doctor's appointment on time.

- Anxiety
- Depression
- Fatigue
- Pain
- Stress
- Illness
- Auditory distractions
- Visual distractions
- Unfamiliar people
- Unfamiliar place
- Time pressure
- Prolonged time duration
- Limited break time
- Lighting problems
- Complex task
- Ongoing socialization

**Rate yourself before and after the plan is implemented.**

1 = not present 2 = mild 3 = moderate 4 = severe 5 = very severe

<b>Anxiety</b>					
1	2	3	4	5	
		3			
<b>Depression</b>					
1	2	3	4	5	
			4		
<b>Fatigue</b>					
1	2	3	4	5	
		3			
<b>Pain</b>					
1	2	3	4	5	
	2				
<b>Stress</b>					
1	2	3	4	5	
				5	
<b>Illness</b>					
1	2	3	4	5	
1					

**List some of your problems preventing success:** (Lack of commitment, lack of a plan, interfering factors, etc.)

I'm always late  
I'm in a hurry  
I forget things I need for the appointment and the day

**Step-by-step action plan:** (Divide task into small manageable steps, define how long each step should take, and when step is to be completed.) Post this plan in clear sight. Check off each step as it is completed.

- Lay out clothes the night before (15 min)
- Put items that I need to take with me by the back door (20 min)
  - Medication List
  - List of questions for the doctor
  - Directions to the office
  - Phone
  - Purse
  - Planner
  - Keys

- Set alarm clock for 7:00 am (giving yourself hour and a half to get ready) (5 min)
- Get up when you hear your alarm (5 min)
- Take shower and get dressed – 45 minutes
- Eat breakfast – 20 minutes
- Brush teeth – 5 minutes
- Gather assembled items that I need to take with me – 10 minutes
- Leave the house - 5 minutes
- Drive time – 20 minutes
- Arrive 10 minutes early for your appointment for quiet time and review of daily planner

**Success of Step-by-step plan:** (What went well and what did not go according to the plan. What did you not consider?)

Plan went well, but needed more time to get dressed. I didn't think about leaving extra time to let the dog out before I left.

**Self-Evaluation:** (How did you feel about the outcome? Would you change your plan? How would you change your plan?)

I felt more in control of my day using this plan. I was very confident entering the doctor's appointment because I gave myself the time to relax before my appointment. Next time, add more buffer time for things like caring for the dog.


# Working memory

Definition: temporarily mentally holding or manipulating information for use in the near future

Functional relevance:

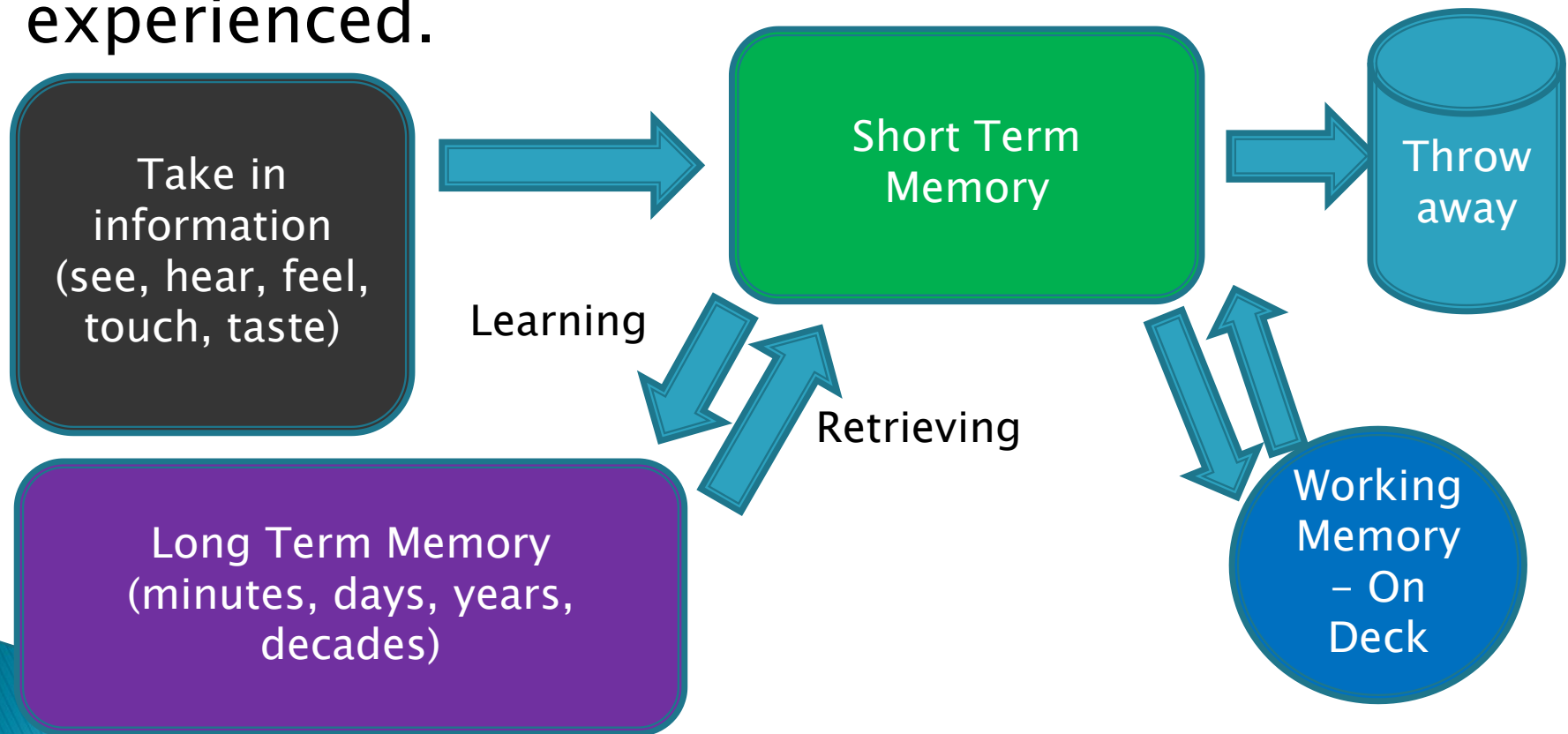
- ▶ Difficulty remembering what they were told, loses track of what they were intending to do or say, appears nonproductive in getting favors or requests completed

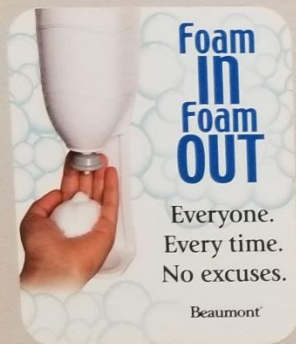
Treatment, education and tools:

- ▶ Give information in the form of directions, lists, messages etc. then add a delay or distraction having them recall the information later
  - ▶ Instruct in the use of association, visualization and verbalization strategies to help in storing information
  - ▶ Practice giving information that requires mental manipulation
- 

# What is Memory?

It is the mental activity of recalling information that you have learned or experienced.





At 10:30

- 1) Take out meat from freezer
- 2) Let dog out
- 3) put cake in oven

Before you leave:  
Bring in dog  
Take cake out of oven

# Functional Treatment



Our House



# Our City



# Self-monitoring

Definition: the ability to evaluate your behavior and performance against expectations and make adjustments as needed

Functional relevance:

- ▶ Reduced awareness of their performance on work or home projects, mistakes are not corrected, haphazard in their approach to tasks with lack of attention to details

Treatment, education and tools:

- ▶ While completing a task, set a timer for self assessment
- ▶ Teach them how to anticipate a situation and develop a plan for managing it
- ▶ Teach them to self assess their performance
- ▶ Write down your thoughts while completing a task or while others are talking to control interrupting
- ▶ Practice STOP AND THINK as a routine in managing tasks

**STOP AND THINK**





# Impulse Control

Definition: the ability to recognize and inhibit emotions, reactions and behaviors to fit to the current situation

Functional relevance:

- ▶ Interrupts with irrelevant comments, easy to anger, impulsive with actions and words without first thinking through the consequences or impact on others

Treatment, education and tools:

- ▶ Verbalize what they are going to do before they do it
- ▶ Have them talk about the “why”
- ▶ STOP and THINK
- ▶ Video tape to help them assess their behavior
- ▶ Problem solve other options

# BRAIN CHALKBOARD

## BRAIN CHALKBOARD



Write down your thoughts when others are talking for future reference.

# Factors that Affect Executive Functioning Skills

- **Not paying attention**
- **Distractions/Interference**
- **Stress**
- **Depression**
- **Inactivity**
- **Lack of organization**
- **Vision and hearing problems**
- **Fatigue**
- **Drugs and alcohol**
- **Some physical illnesses or medications**



# Principles of Neuroplasticity

- ▶ Use it or lose it
- ▶ Use it and improve it
- ▶ Specificity
- ▶ Repetition matters
- ▶ Intensity matters
- ▶ Time matters
- ▶ Salience matters
- ▶ Age matters
- ▶ Transference
- ▶ Interference

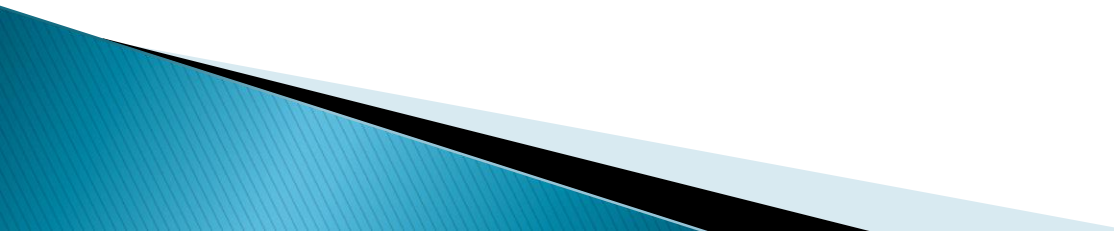


# Formalized Testing

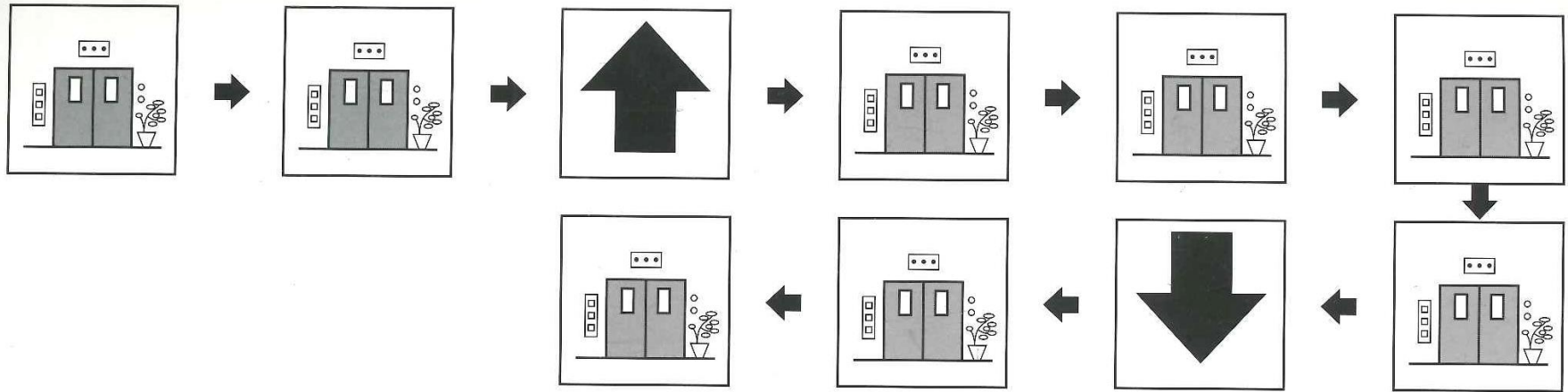
These are a few of the tests we use to assess skills related to EFS.

- ❑ TEA test
- ❑ Decision Speed from Woodcock Johnson
- ❑ Working Memory from Woodcock Johnson
- ❑ Word Fluency (FAS) from NCCEA

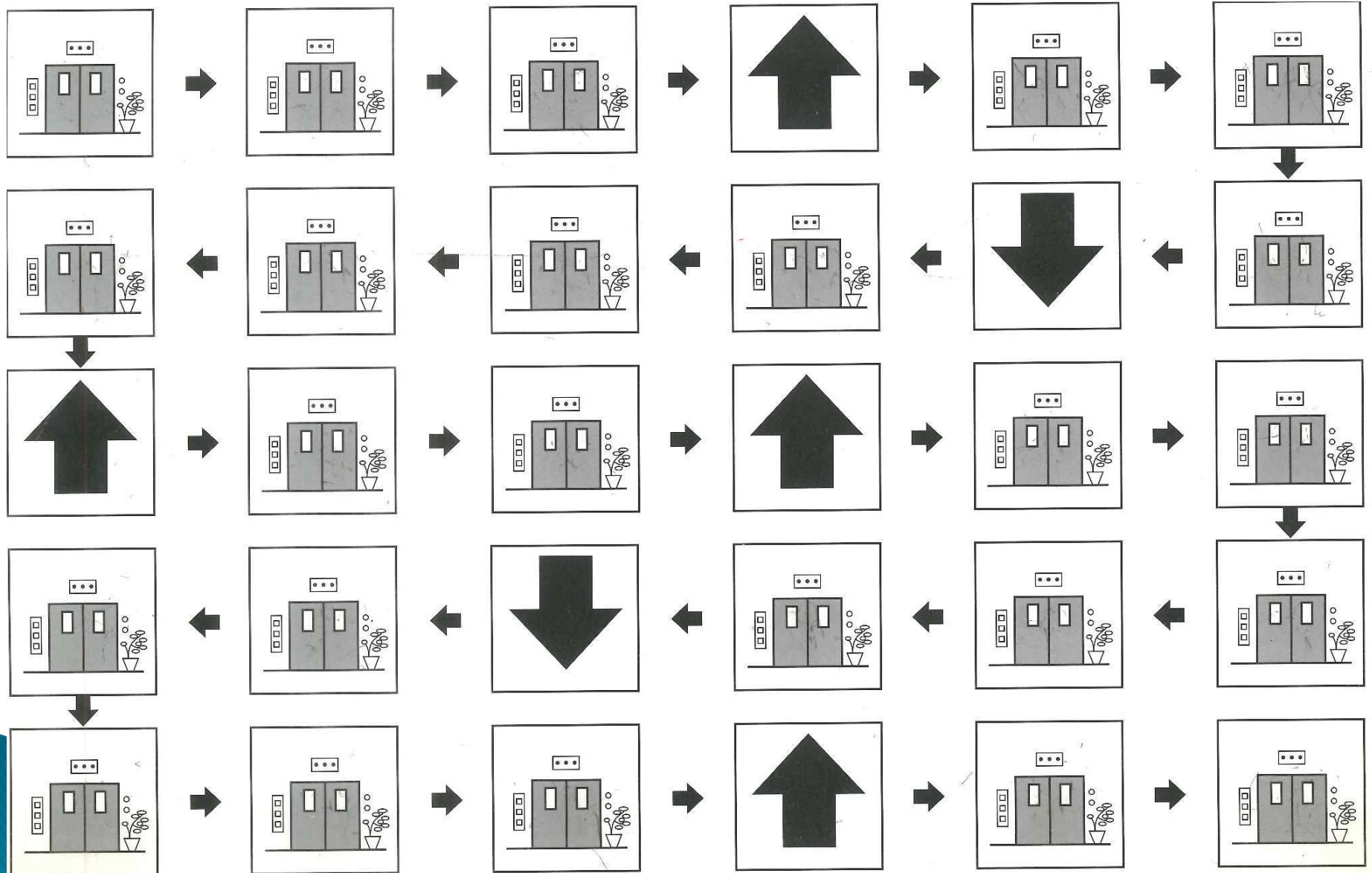
Formalized testing is not always indicative of everyday functioning.



# Test of Everyday Attention by the Thames Valley Test Company



# Test of Everyday Attention by the Thames Valley Test Company



# Group Treatment

- ▶ Executive Functioning Strategies Discussion Group
- ▶ Attention Group
- ▶ Strategies: Use It or Lose It
- ▶ Return to Work (Life) Support Group
- ▶ Caregiver Support Group





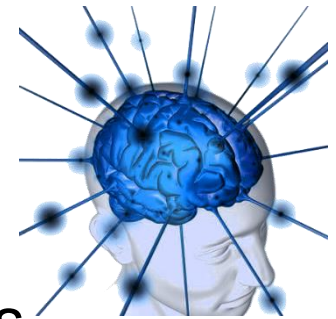
# Executive Functioning Strategies Discussion Group

- ▶ 6-week module group, meets weekly for 1 hour each session with 5-10 participants
- ▶ Educates the participants on memory and executive functioning strategies
- ▶ Strategies: 3 internal strategies of association, visualization, and verbalization and 3 external strategies of time management, organization, and planning
- ▶ It may be the 1<sup>st</sup> time a person is meeting someone else who also has a brain injury so it creates a place of support and camaraderie
- ▶ Group members learn and practice with each other going through the same difficulties as they are



Executive Function Strategies Group Full 6-24-19 (4).mp4

# Attention Group



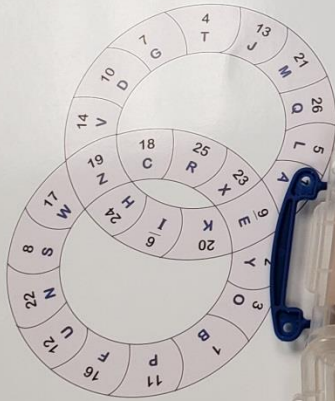
- ▶ Meets weekly for 1 hour with 5-10 participants
- ▶ Works on selective, alternating and divided attention given various tasks across the modalities of reading, auditory, verbal, graphic and/or higher level language
- ▶ Each person learns how to manage distractions, shift their attention between various tasks, and develop a plan so they can sequence through the tasks, given various parameters, in a productive and efficient manner
- ▶ The group members practice using strategies learned in their individual and/or group treatment sessions as well as learn from others as they are given challenging tasks to manage
- ▶ Group members decide how much they can handle and may opt out of certain parts of the tasks practicing self monitoring



# Complex Challenges for Cognition

A Collection of Visual Tasks  
Targeting Attention & Memory

## Circular Search



Complex Challenges for Cognition © 2017 Brubaker Books. All rights reserved.

Top 5 Sandwiches

- 1.
- 2.
- 3.
- 4.
- 5.

Top 5 Fruit Sales

- 1.
- 2.
- 3.
- 4.
- 5.

Top 5 Mini-Candy Bars

- 1.
- 2.
- 3.
- 4.
- 5.

Top 5 Dog Breeds in U.S.

- 1.
- 2.
- 3.
- 4.
- 5.

Top 5 Most Common Food Allergies

- 1.
- 2.
- 3.
- 4.
- 5.

Top 5 Worst Years for Tornadoes

- 1.
- 2.
- 3.
- 4.
- 5.

Top 5 Apple-Growing States

- 1.
- 2.
- 3.
- 4.
- 5.

# WORKBOOK FOR REASONING SKILLS

Prepared by Lisa Mammoser  
Reasoning Skills pg. 213-218  
Auditory task

Auditory Sequencing Task  
Page 225-230 in Workbook for Reasoning Skills. Read each paragraph to the patient and have them sequence the sentences to show what happened 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>. Have them paraphrase the paragraph as well.

1.  He put on a pinstriped shirt.  
 He put on a maroon tie.  
 He put on a blue shirt.
2.  They made shortcake.  
 They hulled the berries.  
 They cut up the berries.
3.  The dog eats.  
 The dog drinks water.  
 The dog chases squirrels.
4.  I had apple juice.  
 I had toast.  
 I had cereal.
5.  They went to Cincinnati.  
 They went to Chicago.  
 They went to Cleveland.
6.  He blew his nose.  
 He got on the bus.  
 He got a paper.
7.  They ate hamburgers.  
 They ate potato chips.  
 They ate pizza.
8.  Harry sat down.  
 George sat down.  
 Bill sat down.
9.  Preheat the oven.  
 Mix the eggs, butter, and sugar.  
 Melt the sugar and butter.

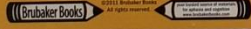
Name colors with 3, 4, 5, and 6 letters in them.

Say male names that begin with the first letter in each day of the week.

## Flex Your Brain Cards

Cards to stimulate cognitive flexibility, working memory, and attention for adolescents and adults  
Level 2

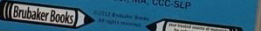
Susan Howell Brubaker, MS, CCC-SLP  
Carolyn Doty, MA, CCC-SLP  
Lisa Mammoser, MA, CCC-SLP



## Flex Your Language Cards

Cards to stimulate word retrieval, word fluency and sentence formulation for adults and adolescents

Susan Howell Brubaker, MS, CCC-SLP  
Carolyn Doty, MA, CCC-SLP  
Lisa Mammoser, MA, CCC-SLP



# Strategies: Use It or Lose It

- ▶ Meets twice a month for an hour each time
- ▶ Focus is to provide education and support in the use of functional strategies as the patient works the strategies into their daily lives ongoing
- ▶ Topics such as time management, organization, planning, etc. are discussed each time as well as any issue a group member wants to discuss
- ▶ The group members gain support from others going through what they are going through and learn how others are coping with daily challenges



Use It or Lose It Strategies Group Full 6-24-19 (2).mp4

# Return to Work (Life) Group

- ▶ Meets once a month for 1 ½ hours in the evening
- ▶ The group is primarily run by the group members with some facilitation by SLPs
- ▶ Topics are initiated by group members with some being related to stroke and brain injury rehabilitation while other topics may be more social
- ▶ Group support is significant
- ▶ Group members comment “It’s my one place I don’t have to try so hard. I don’t have to hide my deficits”.



# Caregiver Support and Education

Caring for a person with executive deficits can be a full-time job and living with personality and behavior changes in a relative or friend can be very distressing.

Problems that caregivers may experience include:

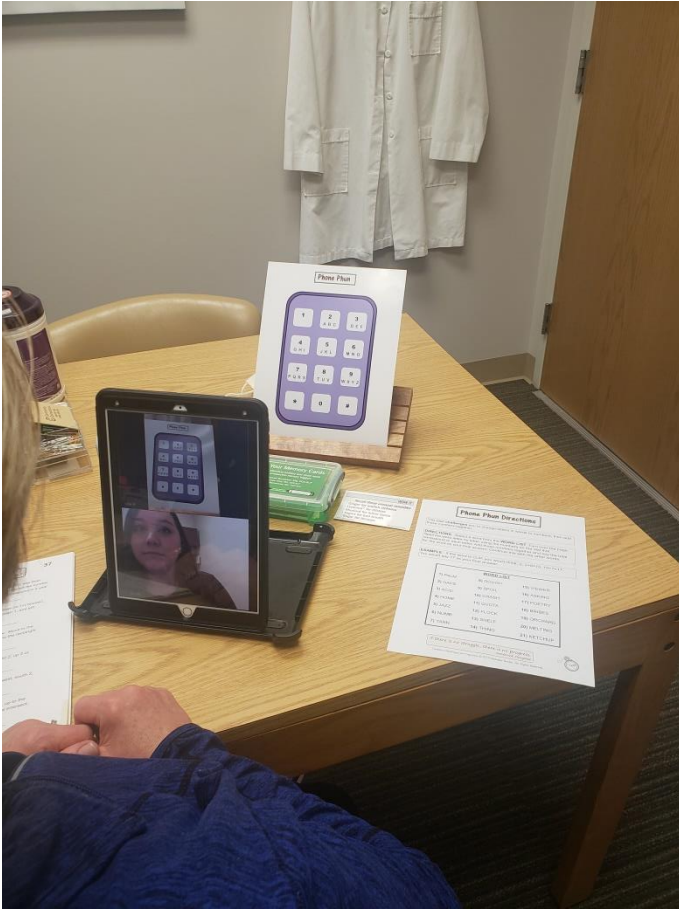
- Stress, anxiety or depression
- Increased responsibility
- Strained relationships
- Reduced communication with partner
- Restricted leisure/social life
- Reduced sexual and emotional intimacy with a partner
- Feeling tired and frustrated

It is important for family members, children, and possibly friends to access education and support for their practical and emotional needs. Visiting treatment sessions, being the clinician for a day, and attending a support group can all be ways to provide education and support to caregivers.

# Telemedicine

Benefits are...

- Treat a patient despite a pandemic, inclement weather, transportation issues or illness.
- The patient is in their own environment with their environment's distractions.
- The clinician can evaluate strategy implementation within the patient's home.
- Telemedicine is used for individual and group sessions.



20210223\_164911.mp4



20210223\_165537.mp4

- 45-year old male with Thalamic Stroke
- Hospitalized 7 days, Subacute Rehab 31 days
- Initial Outpatient Treatment Session 48 days post onset – *Severe expressive and receptive aphasia, Severe Executive Function deficits*
- Following three months of **individual treatment** three times weekly treatment plan added the **Executive Function Strategies Group** for six weeks
- Addition of **Reading Group** for seven months
- Following 18 months of Individual and Reading Group **Attention Group** was added
- **Discharged** from individual treatment following **24 months of outpatient individual and group treatment**
- Currently involved in the **Beaumont Health Volunteer Program – Greeter and Patient Escort**
- Continues to attend **Attention Group 1-2 times weekly**



- 
- Patient had **five different insurance coverages**
  - **Applied for prior authorization 12 times + family initiated an appeal and received an additional 15 visits**
  - **Plus private pay**
  - Wife was involved in the **Caregiver Support Group.**

# Dameon

## Case Study



TEST	May-17	Feb-18	Aug-18	Apr-19	Mar-20
Rapid Picture Naming (WJ-III)	profound	borderline	borderline/ low average	borderline	low average
Retrieval Fluency (WJ-III)	profound	borderline	borderline/ low average	borderline	borderline
Word Fluency (FAS)		moderate	average	low average/ average	average
Token Test (NCCEA)	mod/severe	mild			
Oral Directions (DTLA)			borderline/ low avg	borderline	low avg/ borderline
Logical Memory I (WMS-III)			average	high average	superior
Logical Memory 2 (WMS-III)			average	average/high average	high average
Auditory Working Memory (WJ-III)				average	average
Decision Speed (WJ-III)	profound	severe	borderline	severe	borderline
Visual Elevator (TEA) – accuracy/time			discontinued	low average/ profound	average/ profound
Information and Orientation (WMS-III)	profound				low average

*Thank you for your  
sustained, selective, and  
alternating attention.*

**Questions?**



# References

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