Peeling Back the Onion Layers

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OWL Stroke Webinar Series 2019

On WITH Life

Brain Injury Rehabilitation Specialists™

Objectives of this Webinar:

- Participants will be able to name 3 domains of cognitive functioning that may be negatively affected post left hemisphere CVA.
- Participants will be able to name 2 major factors that affect the likelihood of cognitive deficits post left hemisphere CVA.
- Participants will be able to discuss 2 types of assessment tools that are appropriate to use for cognitive assessment in individuals with aphasia.
- Participants will be able to name and discuss 2 intervention strategies that are appropriate to use for cognitive rehabilitation in individuals with aphasia.

Let's start with a real-life picture

Meet Dwight…

… no, not that Dwight

Let's start with a real-life picture

This Dwight!

Let's start with a real-life picture

- This Dwight
  - 55 years old, large ischemic stroke on 4/16/2018
  - Medical history: benign essential HTN; chronic GERD; DM w/ microalbuminuria; HLD; hypothyroidism; headache; acute kidney injury; acute metabolic encephalopathy; onychomycosis
  - Prior to stroke, had worked in IT for a major agricultural company

Let's start with a real-life picture

- Referred to OWL Outpatient Neurorehabilitation in January 2019
  - Did not start speech therapy services until February 2019 as he was receiving services at another clinic
  - OTR noted difficulties in object recognition, delayed memory, and attention during initial evaluation
  - PT noted 186% increase in TUG w/ dual task compared with TUG alone

Let's start with a real-life picture

- SP evaluation consisted of both language and cognitive-communication testing
  - Language testing indicated mild anomic aphasia
  - Cognitive-communication testing indicated moderate-to-severe impairments in short-term memory; visuo-spatial/constructional function; expressive language (under time pressure); and attention
  - PS subjective report: difficulty recalling information, significantly slowed processing, switching and dividing attention, even in tasks that did not have a significant language load

Mythbusting… or mere overgeneralization?

From the National Aphasia Association (FAQs):

Does Aphasia Affect a Person's Intelligence?

NO. A person with aphasia ***may have difficulty retrieving words and names, but the person's intelligence is basically intact***. Aphasia is not like Alzheimer's disease; for people with aphasia ***it is the ability to access ideas and thoughts through language – not the ideas and thoughts themselves- that is disrupted.***

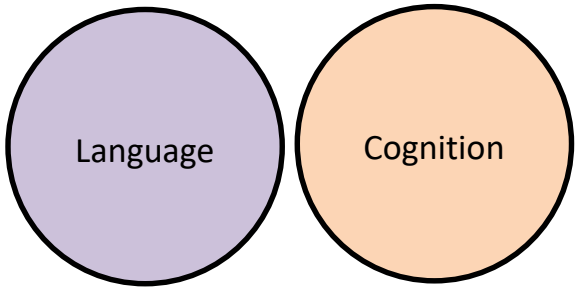
Mostly true… but…

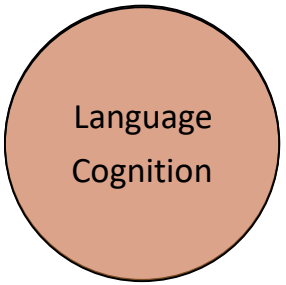
- Is a person's "intelligence" completely unaffected post left-hemisphere stroke?

- We need to start peeling back the onion layers!

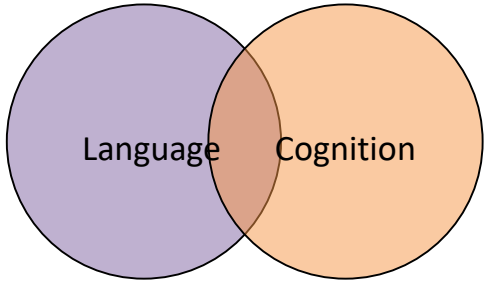
The age-old philosophical debate

What is the relationship between language and cognition????





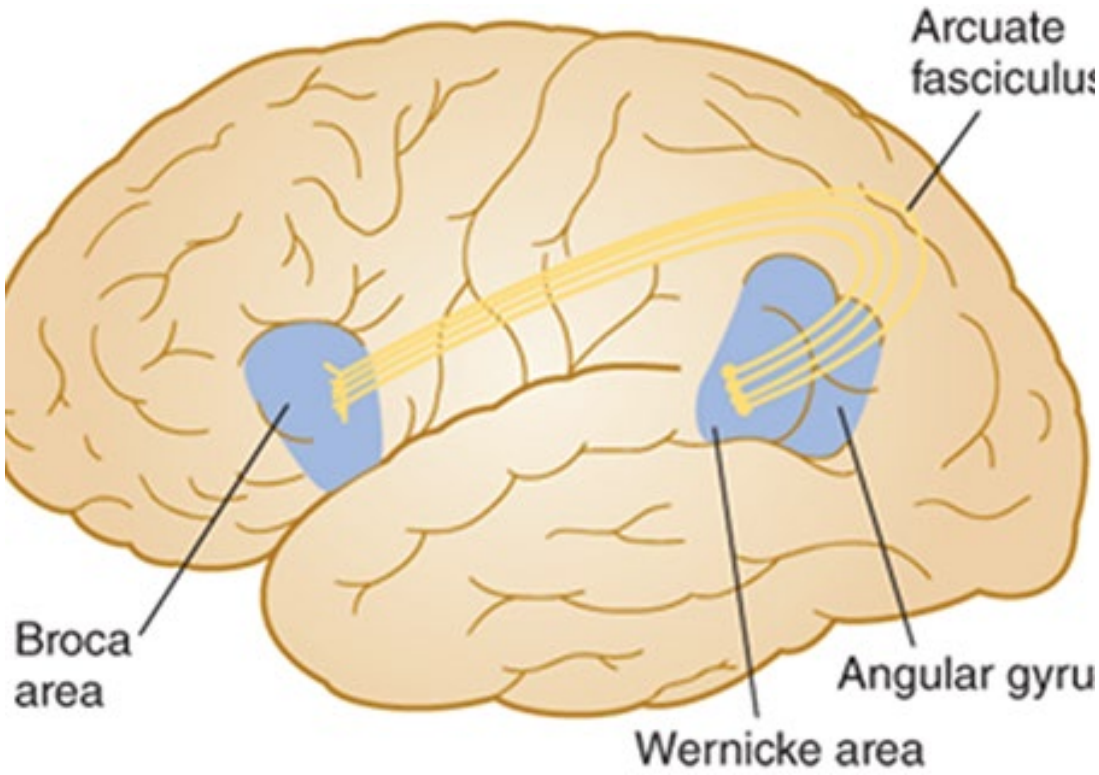
Are there changes in cognition that happen post-CVA that impede the recovery of language?



A review of neuroanatomy

- Critical language areas
  - Broca's area
  - Wernicke's area
  - Angular gyrus
  - Arcuate fasciculus

- 90-93% of individuals are left-hemisphere dominant for language



urce: Arash Salardini, José Biller: *The Hospital Neurology Book*
ww.neurology.mhmedical.com

A review of neuroanatomy

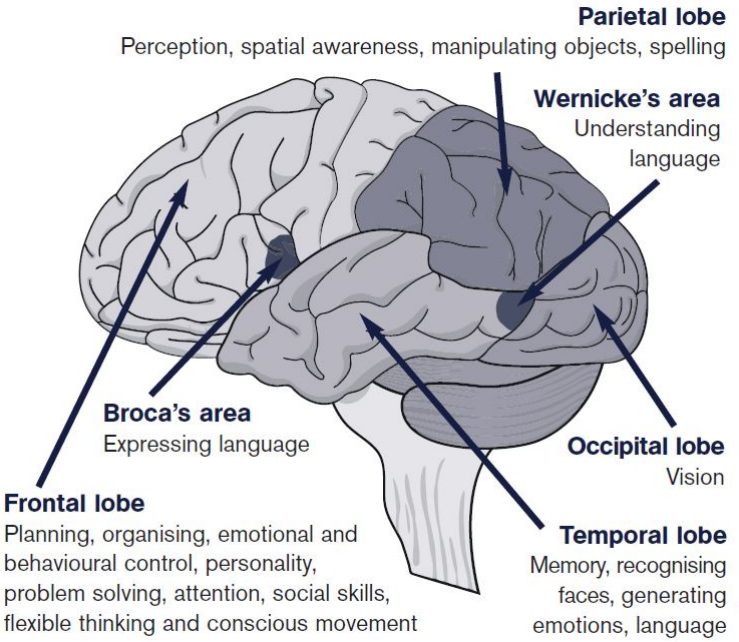
Highlighted cognitive functions:

Frontal lobe – problem solving; attention; social skills; flexible thinking

Temporal lobe – memory

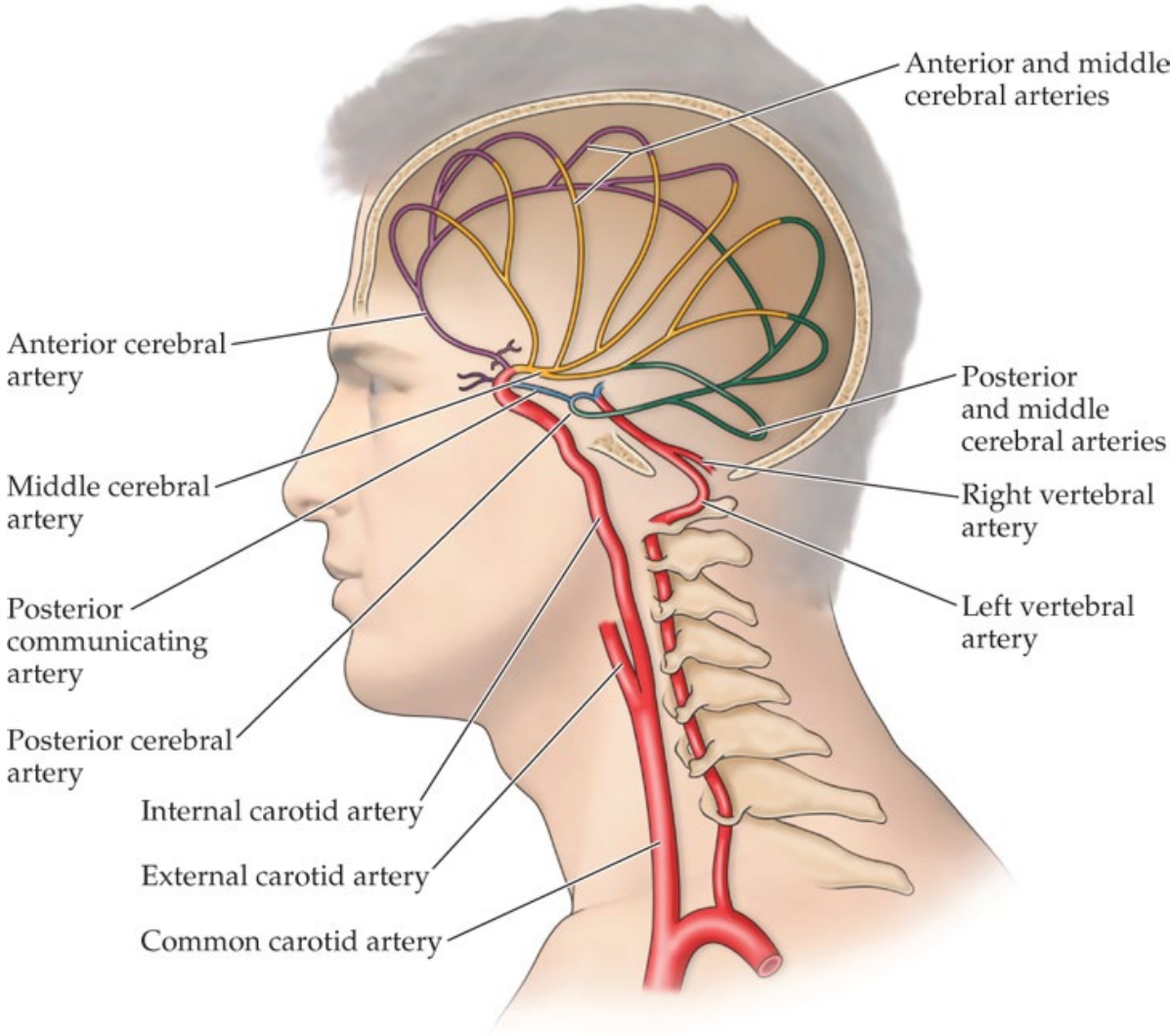
Occipital – vision

Parietal – perception, spelling, object manipulation



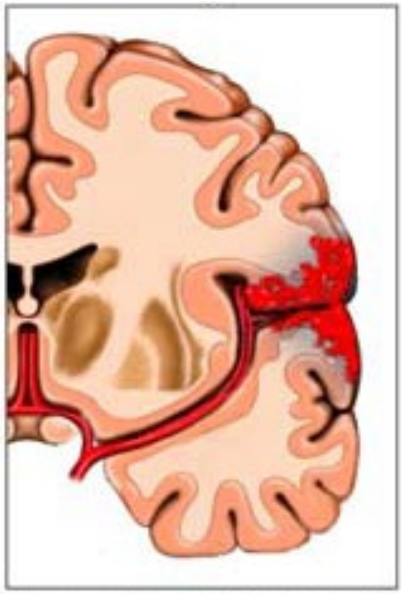
A Review of Neuroanatomy

- Vascular network
  - Carotid and vertebral arteries
  - Cerebral arteries
  - Communicating arteries

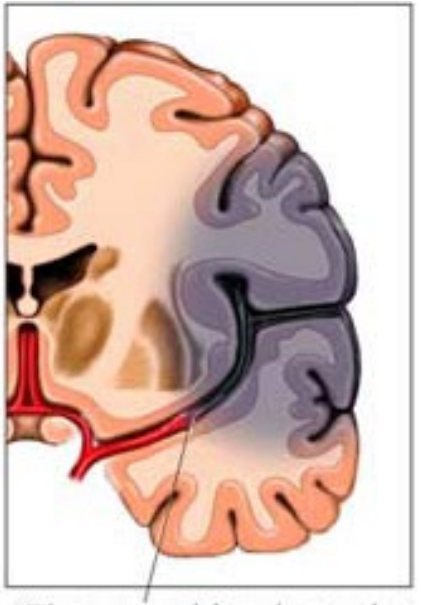


Cerebrovascular Accidents

- Types of stroke:
  - Hemorrhagic
    - Aneurysm
    - Arteriovenous malformation (AVM)
    - Uncontrolled hypertension
  - Ischemic (87% of CVAs)
    - Thrombosis
      - Atherosclerosis
    - Embolism
      - Atrial fibrillation



Hemorrhage/blood leaks into brain tissue



Clot stops blood supply to an area of the brain

Ischemic vs. hemorrhagic stroke

- Pre-inpatient rehab severity of functional impairment (FIM score):
  - Hemorrhagic > ischemic

- Post-inpatient rehab severity of functional impairment (FIM score):
  - Ischemic > hemorrhagic

- This trend also applies to cognitive impairment
  - Theory of rapid improvement – edema surrounding subcortical hemorrhage resolves more quickly than infarcts involving large amounts of cortex

As we're peeling the layers…

- What else is going on besides aphasia?

- Gilmore et al (2019): formal cognitive-linguistic test given to 67 persons with post-stroke aphasia, mean age 60.90 years, mean of 53.58 months post-onset
  - On scores of the visuospatial skills domain (non-linguistic), 37% scored below normal limits

- Chiou & Kennedy (2009): visual and auditory go/no-go tasks given to 14 persons with post-stroke mild to moderate aphasia, mean age 63 years, mean of 3.09 years post-onset
  - Persons with aphasia showed slower self-initiated control when switching from one rule to another compared to healthy control group

As we're peeling the layers…

- Purdy (2002): assessment requiring switching cognitive set tasks given to 15 persons with post-stroke aphasia, mean age of 61.9 years, mean of 39.7 months post-onset
  - Decreased performance on both tasks compared to healthy control group
  - Hypothesized that due to difficulty with switching attention and cognitive flexibility, persons with aphasia may have difficulty problem solving and executing alternative communication strategies in the moment of a communication breakdown
    - E.g., persisting attempts at verbal communication vs. gesturing or drawing

As we're peeling the layers…

- Baldo et al (2004) – assessment requiring switching cognitive set given to 41 persons with post-stroke aphasia, mean age 62.5 years, mean time post-onset of 51.0 months
  - Even though the assessment is considered to be a non-linguistic task, naming and comprehension deficits appeared to correlate with decreased performance on the test
  - All participants demonstrated understanding of the task, but showed difficulty switching to a new category – would perseverate despite negative feedback
  - Suggests that effective problem solving may be dependent on ability to utilize "inner talk"

Assessment implications

- Given that most cognitive assessments are verbal in nature, what can we consider in our assessment?
  - Visual memory
  - Non-verbal or low linguistic load attention shifting
  - Non-verbal or low linguistic load inhibition
  - Tests that allow for trials or pantomime so that patient can demonstrate comprehension of the task
  - Tests of non-verbal academic performance

Intervention implications

- Just like no 2 people have an identical aphasia profile after CVA, no 2 people have an identical cognitive profile
- By knowing more about *an individual's* underlying cognitive deficits, this sets a stronger foundation for more effective treatment planning
  - e.g., deciding if a communication book with pictures is appropriate if the patient has difficulty with visual recognition
- How do we target cognitive flexibility that is underlying significant language impairment?

Intervention options

- Language therapy has been shown to improve overall cognition (Marinelli et al, 2017)
- Visual memory tasks in addition to receptive/expressive language activities
  - 1-back and 2-back visual recall
- Non- or low-linguistic speed of processing tasks
  - Dynavision
  - Attention Process Training
  - Interference attention tasks (e.g., Stroop)
  - Working memory tasks using visual stimuli (e.g., BITS)

Intervention options

- Executive function tasks
  - Figure reconstruction and manipulation tasks
  - Temporal sequencing
  - Coding
- Visual recognition tasks
  - Learning and remembering visually associated pairs
  - Visual analogies
- Auditory recognition tasks
  - Sound matching
  - Learning and remembering auditorially associated pairs

Intervention options

- Whole-script training for persons with aphasia
  - Rather than working on expression at the individual word level, training entire conversations within a known context
  - Allows for training on questions and social comments

- Assessing and trialing variety of facilitative and alternative communication strategies
  - Writing and drawing
  - Yes/no questions
  - Choices
  - Pictures (photos vs. symbols vs. line drawings)
  - Gestures
  - Melodic intonation techniques
  - Visual-action therapy

Intervention options

- Dual-tasking (motor activity + cognitive/language activity)
  - shows improvements in the motor skill as well! (Park & Lee, 2019)

- Training of communication partners in supported conversation strategies
  - Utilize a variety of communication modalities
  - Encourage the use of alternative/augmentative communication strategies

Let's look at Dwight again

- Recently, training has been initiated on using dictation feature on his phone to create written messages to journal therapy activities, as well as to set reminders on his phone
- He was observed to complete successful return demonstration after teaching the technique, needing 2-3 trials of each strategy
- Continued to need verbal cueing when entering in information on therapy sessions to utilize dictation instead of attempting to type it, even though after each use, he stated, "Wow! This is awesome!"
- Needed maximal cueing to generate possible situations in which he would need to use reminders

Let's look at Dwight again

- SP interventions are focusing more on underlying attention and memory impairments
  - Attention process training
  - Spaced retrieval
  - Working memory with both linguistic material and low-linguistic material
  - Medication management
  - Reading/information processing language at the sentence level

Let's look at Dwight again

- OT continues to train reaction time with use of Dynavision; also notes that sometimes becomes disoriented during pathfinding tasks
- PT trains dual tasks, noting moderate slowing in gait speed when engaged in a cognitive-communication task, as well as increased loss of balance
- Forgets to complete HEP; is currently trialing email, Alexa, and phone reminders to help him complete exercises

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For nerds only (aka References)

Baldo, J.V., Dronkers, N.F., Wilkins, D., Ludy, C., Raskin, P., & Kim, J. (2005). Is problem solving dependent on language? *Brain and Language, 92*, 240-250.

Bhalla, A., Wang, Y., Rudd, A., & Wolfe, C.D.A. (2013). Differences in outcome and predictors between ischemic and intracerebral hemorrhage: the South London stroke register. *Stroke, 44*, 2174-2181.

Cherney, L.R., & Halper, A.S. (2008). Novel technology for treating individuals with aphasia and concomitant cognitive deficits. *Topics in Stroke Rehabilitation, 15*, 542-554.

Chiou, H.S., & Kennedy, M.R.T. (2009). Switching in adults with aphasia. *Aphasiology, 23*, 1065-1075.

Chiou, H.S. & Yu, V.Y. (2018). Measuring life participation, communicative confidence, language, and cognition in people with aphasia. *Perspectives of the ASHA Special Interest Groups.* SIG 2, Vol. 3(Part 1), 4-12.

Frankel, T., Penn, C., & Ormond-Brown, D. (2007). Executive dysfunction as an explanatory basis for conversation symptoms of aphasia: A pilot study. *Aphasiology, 21*, 814-828.

Gilmore N, Meier EL, Johnson JP, Kiran S, Non-linguistic cognitive factors predict treatment-induced recovery in chronic post-stroke aphasia, *Archives of Physical Medicine and Rehabilitation* (2019), doi: https://doi.org/10.1016/j.apmr.2018.12.024

For nerds only (aka References)

Kelly, P.J., Furie, K.L., Shafqat, S., Rallis, N., Chang, Y., & Stein, J. (2003). Functional recovery following rehabilitation after hemorrhagic and ischemic stroke. *Archives of Physical Medicine and Rehabilitation, 84*, 968-972.

Marinelli, C.V., Spaccavento, S., Craca, A., Marangolo, P. & Angelelli, P. Different cognitive profiles of patients with severe aphasia. *Behavioural Neurology* (2017), doi: https://doi.org/10.1155/2017/3875954.

Marshall, J. (2009). Framing ideas in aphasia: The need for thinking therapy. *International Journal of Language & Communication Disorders*, 44, 1-14.

McNeil, M.R., Doyle, P.J., Hula, W.D., Rubinsky, H.J., Fossett, T.R.D., & Matthews, C.T. (2004). Using resource allocation theory and dual-task methods to increase the sensitivity of assessment in aphasia. *Aphasiology, 18*, 521-542.

Murray, L.L. (2012). Attention and other cognitive deficits in aphasia: Presence and relation to language and communication measures. *American Journal of Speech-Language Pathology, 21*, S51-S64.

Nagata, K., Yanoki, K., Kabe, S., Suzuki, A., & Araki, G. (1986). Regional cerebral blood flow correlates of aphasia outcome in cerebral hemorrhage and cerebral infarction. *Stroke, 17*, 417-423.

For nerds only (aka References)

Nicholas, M., Hunsaker, E., & Guarino, A.J. (2015). The relation between language, non-verbal cognition and quality of life in people with aphasia. *Aphasiology, 31*, 688-702.

Park, M., & Lee, S. (2019). Effect of a dual-task program with different cognitive tasks applied to stroke patients: a pilot randomized control trial. *NeuroRehablitation, 44*, 239-249.

Purdy, M. (2002). Executive function ability in persons with aphasia. *Aphasiology, 16*, 549-557.

Vallila-Rohter, S. & Kiran, S. (2015). An examination of strategy implementation during abstract nonlinguistic category learning in aphasia. *Journal of Speech, Language and Hearing Research, 58*, 1195-1209.

Thank you!

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