

## Disclosures

- ▶ Swathi Kiran
  - ▶ Co-founder of Constant Therapy (now- The Learning Corporation),
  - ▶ Consultant for The Learning Corporation
- ▶ Lisa Haynes
  - ▶ Full-time salaried employee of Lingraphica

## How Can Technology Enable Rehabilitation in Chronic Aphasia?

## Speaker Biographies

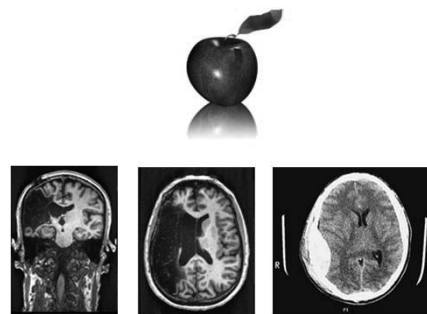
- ▶ Dr. Swathi Kiran is Professor in the Department of Speech and Hearing Sciences at Boston University. She examines language treatment for individuals with aphasia, bilingual aphasia and neuroimaging of brain plasticity. She has over 80 publications in high impact journals of cognitive neuroscience, neuroimaging, rehabilitation, speech language pathology and bilingualism.
- ▶ Lisa Haynes, MS-CCC-SLP is Manager of Clinical Affairs at Lingraphica, a healthcare technology company offering long-term solutions for individuals with speech-language and cognitive challenges through software and innovation. Lisa has extensive experience in AAC and working with individuals with aphasia. She graduated from Kansas State University with both her BS and MS degrees. During her career Lisa worked in a variety of settings, including hospitals, long-term care facilities, and as director of AAC services

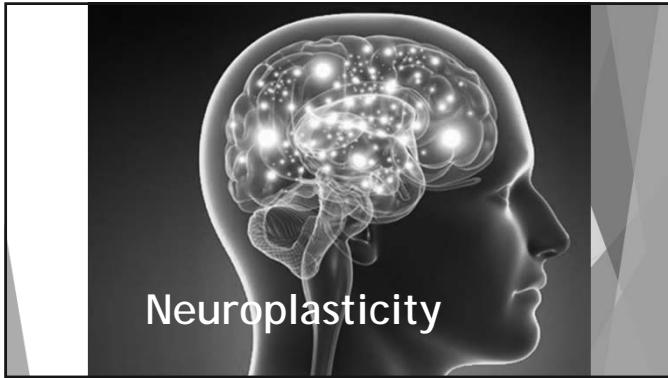
## Learner Outcomes

1. Participants will be able to describe 3 technologically advanced tools for treating people with chronic aphasia.
2. Participants will be able to identify key features and feedback systems offered through software to engage people with chronic aphasia.
3. Participants will be able to demonstrate application of technology for reducing impairment, compensating for impairment, and training purposes.


## What We'll Cover Today

- ▶ A systematic review of technological-based applications for aphasia
- ▶ The factors that are relevant to how technology can enable rehabilitation
- ▶ Treatment Intensity
- ▶ Taking ownership of one's care
- ▶ Personalizing Treatment
- ▶ Other Platforms for Reducing impairment
- ▶ Compensating for the impairment
- ▶ Patient-Client Usability
- ▶ Patient-Client Training/Caregiver Training
- ▶ Demonstration/Q&A



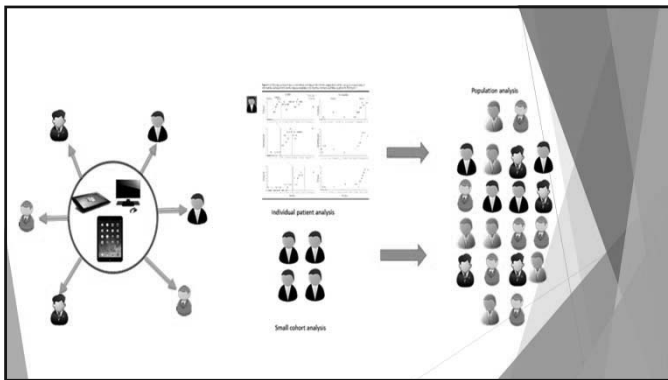


## Neuroplasticity



- The **adaptive capacity** of the Central Nervous System
- The mechanism by which the brain encodes experiences and learns **new behaviors**
- The mechanism by which the **damaged brain "relearns" lost behavior** in response to **rehabilitation**

(Klein & Jones, 2008)



**FOCUS REVIEW ARTICLE**

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## Technology-Based Rehabilitation to Improve Communication after Acquired Brain Injury

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Study	Participants		Control group	Treatment		Main results
	N, age, MPO <sup>a</sup>	Etiology and severity		Type	Duration and intensity	
Alfonso et al., 1997	N23, age 64.3, MPO 4.3 (all chronic)	Stroke <sup>b</sup> (mostly)	No	Linguaphica Instruction based items in the major linguistic categories that appear in a list of semantically related items; works on word retrieval on multiple levels	Mean duration 16.8 weeks (range); intensity mean 1.00 sessions per week in clinic; variable intensity (decided by patient for independent practice at home)	All standardized tests (MMSE, BBT, ECAT) showed gains for most patients
Fisk et al., 2002	N16, age 65.5, MPO 3.2 (all chronic)	Stroke	No; two read groups (all chronic guidance vs. partial guidance)	MetaTalk Words Card training	4 weeks or until criteria; 3 times per week; variable intensity (decided by patient for independent practice in partial guidance group)	Both groups showed gains on trained words (as measured by PNT); gains on PNT for one criterion-guided and on PNT for two partial-guided patients
Raymer et al., 2008	N16, age 70.8, MPO 3.2 (all chronic); 3 were chronic)	Stroke	No; two levels of intensity (trained design)	MetaTalk Multisensory matching exercises	Each training phase: 12 sessions, lower intensity; 1-2 times per week; higher intensity: 3-4 times per week	All patients improved on trained items; more in higher intensity phase; one patient showed gains on WMS-AC and ECAT
Ramberger and Maki, 2007	N4, age 87.5, MPO 3.3 (all chronic)	Stroke	No; two levels of intensity (trained design)	MetaTalk Words Self-paced naming with partial clinician guidance	15-20 sessions per week for lower intensity; 2 times per week higher intensity; 5 times per week	Three patients showed gains in naming; regardless of intensity
Chen et al., 2004	N18, age 82 (SD) 65 (SD); MPO 13 (SD) 15 (SD) (all chronic)	Stroke	Yes No treatment (N10) excluded	Multisensory Self-paced naming	2 months; 2-3 times per week	EG showed gains on BNT, but no between-group differences

Domain(s) treated	Study	Was the treatment tailored?	Home practice	Varied intensity	Within task engagement	Within task generalization	Multisensory	Engagement-based	Functional/quality of life improvement
Language, single domain, naming	Alfonso et al., 1997	X	X	X				X	
	Fisk et al., 2002	X	X	X	X	X	X	X	
	Raymer et al., 2008	X	X	X	X	X	X	X	X
	Ramberger and Maki, 2007	X	X	X	X	X	X	X	
	Chen et al., 2004								X
	Chen et al., 2007								X
Language, single domain, sentence processing and production	Maki and Venti, 1992	X			X	X		X	
	Maki and Venti, 1997	X			X	X		X	
	Chen et al., 2010	X	X	X	X	X		X	X
Language, single domain, reading	Martens et al., 2009	X	X	X	X	X	X	X	X
	Chen et al., 2014	X	X	X	X	X	X	X	X
	Mullaly-Fisher et al., 2013	X	X	X	X	X	X	X	X
	Thompson et al., 2012	X	X	X	X	X	X	X	X
Language, single domain, writing	Chen et al., 2007	X	X	X	X	X	X	X	X
	Chen et al., 2009	X	X	X	X	X	X	X	X

Domain(s) treated	Study	Was the treatment tailored?	Home practice	Varied intensity	Within task improvement	Within task generalization	Maintenance	Impairment-based improvement	Functional/quality of life improvement
Language, multiple domains	Choi et al., 2016	X	X	X			X	X	
	Stark and Warburton, 2016	X	X	X			X	X	
	Blake et al., 2014	X	X	X					X
	Conklin et al., 2014	X	X	X	X	X		X	
	Morley et al., 2004	X	X	X	X	X		X	
Language and cognitive	Palmer et al., 2012	X	X	X	X		X		
	Des Roches et al., 2015	X	X	X - compared EDs who receive more intensive than CG	X			X	
	Hosner and Corney, 2014	X	X					X	X
	Wallo et al., 2010	X						X	
	Wenke et al., 2014	X		X - compared EDs who also receive more intensive than CG				X	X

Factors that are relevant-

- ▶ Treatment Intensity
- ▶ Personalizing Treatment
- ▶ Taking ownership of one's care


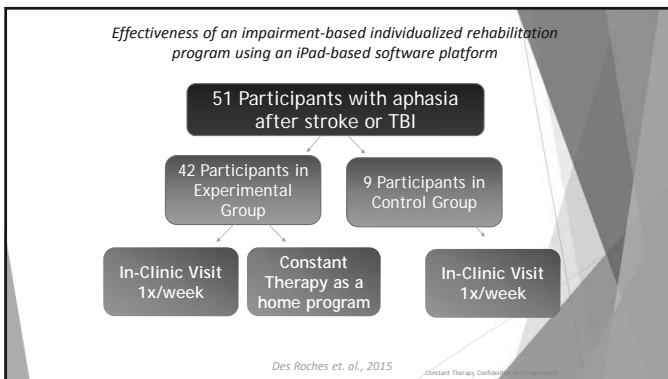
What Happens When you Combine Intensity and Technology?

**Constant Therapy**

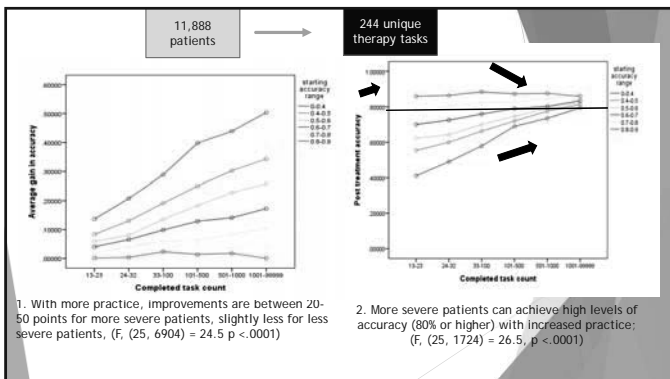
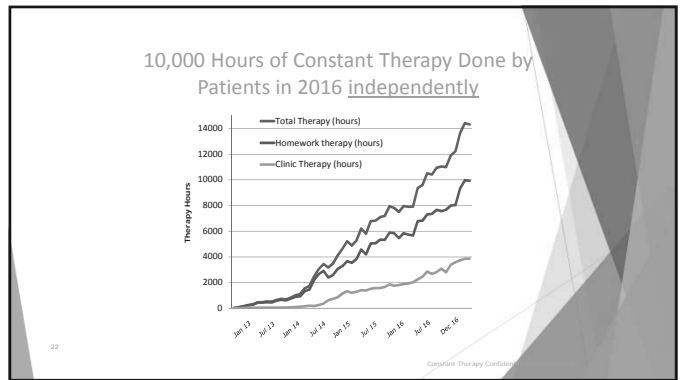
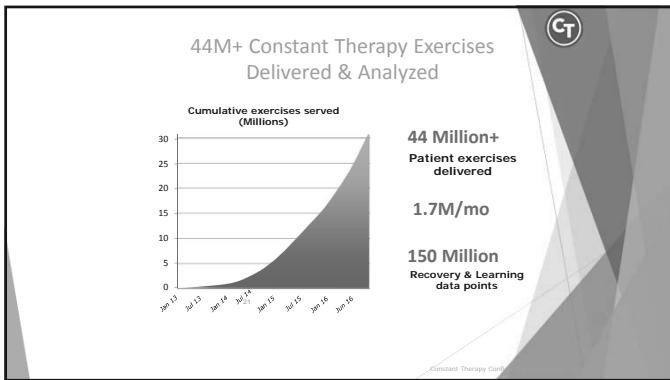
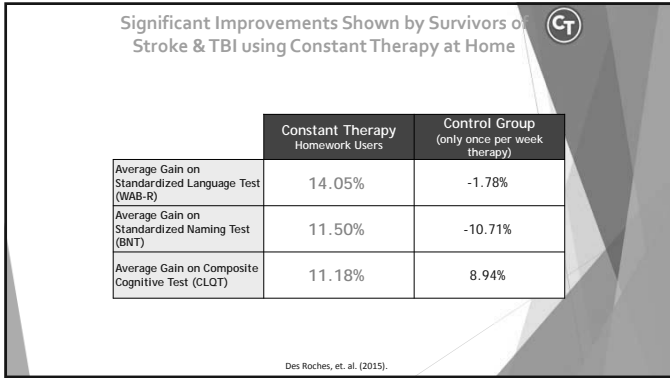
100,000 Science-Based Exercises

70 Therapy Tasks

10 Levels of Difficulty

The experimental group showed greater improvement in accuracy and latency on Constant Therapy tasks



### Constant Therapy Delivering Intensity through Technology

- Can be used independently or with a clinician
- Personalized therapy plan
- Therapy Anywhere
- Access with desired frequency and time

Constant Therapy Corp.

### Constant Therapy Delivering Intensity through Technology

- Program advances with client progress
- Easy access to objective data and reports
- Clinician and client can connect remotely



### Personalizing Treatment

#### COGNITIVE TASKS

ATTENTION	RELATIONAL PROCESSING	ANALYTICAL REASONING	MEMORY	SPATIAL REASONING	ARITHMETIC
Symbol Matching	Clock Math	Word Ordering	Visual	Word Problems	Addition
Slapback	Clock Reading	Picture Ordering	Map Matching	Conway Math	Subtraction
Flanker	Symbol Matching	Subtraction Sequencing	Word Matching	Clock Math	Multiplication
Picture Back Memory	Map Matching	Map Reading	Picture Matching	Number Patterns	Division
Calendar	Memory Recall	Picture Recognition	Picture Back Memory	Functional Math	
Memory Recall	Picture Recognition	Slapback	Picture Recognition		
Picture Recognition					

#### LANGUAGE TASKS

AUDITORY COMP	WORD RETRIEVAL	WRITING	READING	SPEAKING
Auditory Command	Syllable ID	Picture Spelling	Old One Out	Word Recognition
Noisemask	Sound ID	Word Spelling Completion	Category Matching	Word Initiation
	Phrasing	Word Copy Completion	Picture Matching	Read Word About
Word ID	Category Matching	Picture Spelling	Written Word Copy	Picture Planning
PHONOLOGICAL PROCESSING	Letter Matching	Word Scrambling	Word ID	SENTENCE PLANNING
Minimal Pair Matching	Picture Naming	Word Copy	Category ID	Instruction Sequencing
Letter to Sound Matching	Letter to Sound Copy	Long Reading Copy	Short Reading Copy	Picture Selection Completion
Spoken Count	Letter to Sound Matching	Written Lexical Decision	Word Length Decision	Visual Sentence Completion
Spoken Rhyming	Spoken Count	Spoken Rhyming	Visual Sentence Completion	Functional Reading
Minimal Pair Matching	Minimal Pair Matching	Minimal Pair Matching	Minimal Pair Matching	Inference Reading
				Instruction Sequencing

**Everyday Skills Category**

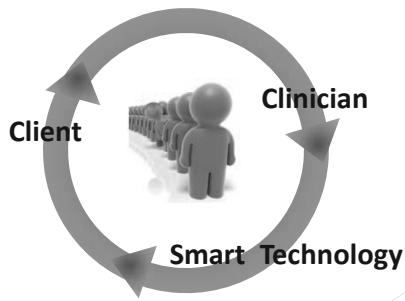
Functional Reading: What does the Pork Rilette come with? (Options: Tomato Jam, Tarragon Pickle Relish, Both of the above)

Clock Reading: What is the time shown on this clock? (Options: 8:17, 3:08, 3:55)

Voice Mail: Who is the recipient of this voicemail? (Options: Mr. Green, Mr. and Mrs. Carter, Mr. and Mrs. Barton)

Functional Math: How much should Susan get back in change? (Calculator interface)

### Personalization in 3 Steps



### Customized exercise programs



## Taking ownership of one's care

## Taking ownership of one's care

- Available on Apple and Android phones/tablets
- Access customized homework by **pressing 1 button!**
- Engage with desired frequency
- Use with clinician or independently
- Review results
- Share progress
- Transition through the continuum of care
- Customer service and support

## Client Homepage



## Other Platforms for Reducing Impairment



## Telepractice

"The application of telecommunications technology to the delivery of speech language pathology and audiology professional services at a distance by linking clinician to client or clinician to clinician for assessment, intervention, and/or consultation."

<http://www.asha.org/Practice-Portal/Professional-Issues/Telepractice/>

## Telepractice

- ▶ Synchronous
- ▶ Asynchronous
- ▶ Hybrid

<http://www.asha.org/Practice-Portal/Professional-Issues/Telepractice/>

## Telepractice

- ▶ TalkPath Live
  - ▶ Requires HIPAA compliant platform
  - ▶ State Licenses
  - ▶ E-Helper
  - ▶ Client Coordinator
  - ▶ Digital Tools

## Telepractice: HIPAA Compliance

- ▶ Refer to your state laws
- ▶ Protect Data Privacy
  - ▶ Encrypted Data (PHI)
  - ▶ Waiting Room
- ▶ Business Associate Agreement

<https://vsee.com/hipaa/>

## Telepractice: State Licenses

- ▶ State Licenses  
<http://www.asha.org/advocacy/state/>
- ▶ ASHA State Team Liaison  
<http://www.asha.org/uploadedFiles/Direct-State-Liaison-Model-Map.pdf>
- ▶ Interstate Compact  
<http://www.asha.org/Advocacy/state/Audiology-and-Speech-Language-Pathology-Interstate-Compact/>

## Telepractice: E-Helper

- ▶ The client's assistant or helper
- ▶ Solves technology issues
  - ▶ Setting up/Logging In
  - ▶ Adjusting camera/microphone/speakers
  - ▶ Troubleshoots internet issues
- ▶ Creates a conducive environment for therapy
  - ▶ Eliminates distracting noise
  - ▶ Adjusts lighting
- ▶ Provides cues, tokens, object-stimulus

## Telepractice: Client Coordinator

- ▶ Connects client to SLP
  - ▶ Get online and enter session
- ▶ Supports Client
  - ▶ Provides home program support
  - ▶ Gives appointment reminders
- ▶ Supports E-helper
  - ▶ Gives technical support/software support
- ▶ Supports SLP
  - ▶ Ensures a successful session
  - ▶ Reports any issues with home program

## Telepractice: Digital Tools

- ▶ Therapy tools
  - ▶ Web-based or App
  - ▶ TalkPath Therapy, Constant Therapy, Bunglow,
- ▶ Common Tools
  - ▶ Web-based or App
  - ▶ Word doc, Power Point, Google, Google Maps, Facebook, News Sites

## Compensating for Impairment

- ▶ No-tech
  - ▶ Uses one's own body
  - ▶ Gestures, sign-language, counting on fingers
- ▶ Low-tech
  - ▶ Usually does not require electricity or batteries
  - ▶ Communication Board, Pen/Paper, White Board
- ▶ High-tech
  - ▶ Uses hardware and software
  - ▶ iPad, tablet, laptop, dedicated SGDs

## POLL

1. Take out your phone.
2. Create a text message to recipient 22333.
3. Text the key to recipient 22333. The key is AUDICATHCART769.
4. Answer the question by texting A, B, or C.

## Compensating for Impairment (SGD/App)

- ▶ Prosthetic Benefits
- ▶ Orthotic Benefits
- ▶ Functional Communication
- ▶ Additional benefits of SGD use
  - ▶ Rehabilitative
  - ▶ Habilitative
  - ▶ Stimulation

## Compensating for Impairment: Prosthetic Benefits

- ▶ Prosthesis
  - ▶ "An artificial device to replace or augment a missing impaired part of the body" - Merriam-Webster
- ▶ Prosthetic devices for speech
  - ▶ Electrolarynx
  - ▶ Speech-Generating Devices
- ▶ Functional Benefit
  - ▶ Replaces speech

## Compensating for Impairment: Orthotic Benefits

- ▶ Orthotic
  - ▶ "A device (such as a brace or splint) for supporting, immobilizing, or treating muscles, joints, or skeletal parts which are weak, ineffective, deformed, or injured"
- ▶ Orthotics for speech
  - ▶ SGDs
  - ▶ Apps
- ▶ Functional Benefit
  - ▶ Supports speech production and language expression

## Compensating for impairment: Functional Communication

- ▶ Take out your smart phones!
  - ▶ Text messages
  - ▶ Facebook
- ▶ What is functional communication?
  - ▶ Needs, wants, social, emotional, health
  - ▶ Engagement!
- ▶ How does high-tech AAC (SGDs/Apps) support functional communication?
  - ▶ Highly flexible
  - ▶ Accommodates customized vocabulary



## Compensating for Impairment: Additional Benefits

- ▶ Rehabilitation
  - ▶ Feedback systems
  - ▶ Mirror Neuron Stimulation
- ▶ Habilitation
  - ▶ Maintain skills
- ▶ Engagement
  - ▶ Connects user to communication partner
  - ▶ Relevant topics

## Compensating for Impairment: SGD Screening

- ▶ Quick Assess App
  - ▶ Screen multiple clients
  - ▶ Screen motor skills
  - ▶ Screen vision
  - ▶ Phrase completion
  - ▶ Categorization
  - ▶ Repetition
  - ▶ Naming
  - ▶ Conversational Speech

## Patient Usability

- ▶ What does this mean?
- ▶ Hardware
- ▶ Software
- ▶ Tech Support

## Patient Usability: Hardware

- ▶ Desktop, laptop, tablet, phone
- ▶ Dimensions - size and weight
- ▶ Screen - size, touch sensitivity, and contrast
- ▶ Buttons - power and volume up/down
- ▶ Case - carrying/stand
- ▶ Alternative Accessibility - adaptive keyboard/mouse/joystick

Goal: The client can safely and effectively transport and operate the device.

## Patient Usability: Software

- ▶ Screen layout
  - ▶ Screen design
  - ▶ Icon size & number of icons per screen
  - ▶ Move icons
- ▶ Feedback systems
  - ▶ Auditory feedback
  - ▶ Visual feedback
  - ▶ Projection
- ▶ Ability to customize
- ▶ Relevant content
- ▶ User Interface

## Patient Usability-Tech Support

- ▶ Tools
  - ▶ Remote
- ▶ Channels
  - ▶ Website
  - ▶ E-mail
  - ▶ Remote
  - ▶ Live chat
  - ▶ Call
  - ▶ SGD Instant message
- ▶ Staff
  - ▶ Extended hours
  - ▶ All staff SCA trained
  - ▶ Patience

## Patient Usability - Chart Comparison

	Wheelchair	SGD
Assessment-Set-up	PT/OT measures client, completes seating assessment, and determines manual or electric wheelchair.	SLP conducts lang AAC eval to determine appropriate device size and most effective language software. SLP may refer to PT/OT for mobility, ergonomics, and/or access with the device. SLP, Caregiver, and/or PWA (sometimes) customizes the device. Depends on PWA's skills ( I, A, or D).
Basic Operations	Locking the brakes (I, A, or D) Driving-self-propel, joystick (I, A, or D) Transfers (I, A, or D)	Turn on/off (I, A, or D) Volume up/down (I, A, or D) Charging (I, A, or D)
Navigation	Where am I going and how do I get there? (I, A, or D)	Where's my icon and how do I formulate a message? (I, A, or D)

## Patient Usability - Training

- ▶ Training for the SLP
  - ▶ Training features
  - ▶ Training clinical application
- ▶ Training for the SLP training the patient
  - ▶ Functional Use
- ▶ Training for the SLP training the caregiver
  - ▶ Basic operations
  - ▶ Functional use
  - ▶ Training features
- ▶ Training the caregiver
  - ▶ Achieve Communication Excellence

## Final Thoughts

- ▶ A systematic review of technological-based applications for aphasia
- ▶ The factors that are relevant to how technology can enable rehabilitation
- ▶ Treatment Intensity
- ▶ Taking ownership of one's care
- ▶ Personalizing Treatment
- ▶ Other Platforms for Reducing impairment
- ▶ Compensating for the impairment
- ▶ Patient-Client Usability
- ▶ Patient-Client Training/Caregiver Training
- ▶ Demonstration/Q&A

## Demonstration

## Questions & Answers