

Update on Evidence-based Approaches to Aphasia Management Across the Continuum of Care

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Linguistic Abilities in Aphasia

(Murray & Clark, 2015)

■ Phonology and Orthography

- ◆ ↓↓ speed and accuracy in producing and identifying speech sounds and letters
- ◆ Speed and accuracy in converting:
 - Letters → sounds
 - Sounds ← letters
- ◆ Problems may be product of:
 - Linguistic deficit
 - Sensory problems
 - Motor impairments

■ Lexical-Semantics

- ◆ ↓↓ speed and accuracy in producing and comprehending words/concepts

Linguistic Abilities in Aphasia

■ Morphology and Syntax

- ◆ Grammatical production and comprehension problems
 - ↓↓ speed, accuracy, and/or complexity

■ Pragmatics and Discourse

- ◆ Social language skills often an area of strength
 - Difficulties, however, are possible
- ◆ Discourse comprehension and production problems
 - ↓↓ informativeness, incomplete scripts, problems identifying gist, impaired idiom comprehension

The Need to Consider Cognitive Status in Aphasic Patients

- Neural multifunctionality (Cahana-Amitay & Albert, 2015)
 - ◆ Neural structures, neurotransmitters, and circuits often support both cognitive and linguistic functions (Alexander, 2006; Baldo et al., 2012; Kesner, 2009; Klingberg, 2010; Meyer et al., 2014)
 - ◆ Therefore, brain damage that disrupts language structures/circuits/neurochemistry likely to negatively affect some cognitive functions and vice versa
- Prevalence of cognitive deficits following is high in etiologies of aphasia

Extra-Linguistic Abilities in Aphasia

- Deficits possible in all attention functions (Murray, 2012; Pulsipher et al., 2013)
 - ◆ Linguistic and nonlinguistic attention tasks
 - ◆ Sustained attention (Barker-Collo et al., 2010; Gerritsen et al., 2003; Laures, 2005; Oron et al., 2015)
 - ◆ Attention Switching (Frankel et al., 2007; Murray, 2012)
 - ◆ Focused and divided attention (Hunting-Pompon et al., 2011; Kalbe et al., 2005; Murray, 2012; Villard & Kiran, 2015)
 - ◆ Right neglect (Barker Collo et al., 2010; Haselbach et al., 2014; Ihori et al., 2015; Wee & Hopman, 2008)

Memory Deficits in Aphasia

- Verbal and nonverbal STM (Baldo et al., 2012; Dignam et al., 2017; Laures-Gore et al., 2011; Martin et al., 2012; Potagas et al., 2011; Sideropoulos et al., 2015)
- Working memory (Christensen & Wright, 2010; DeDe et al. 2014; Ivanova & Hallowell, 2012, 2014; Mayer & Murray, 2012; Potogas et al., 2011; Seniow et al., 2009; Soares-Ishigaki et al., 2012; Sung et al., 2009)
- Encoding/learning (Valilla-Rohter & Kiran, 2013)
- Verbal and nonverbal declarative memory (Bartha & Benke, 2002; Beeson et al., 1993; Pulsipher et al., 2013; Vukovic et al., 2008; Yasuda et al., 2000)
- One of the most frequently reported cognitive changes following left stroke (Visser-Keizer et al., 2002)

EF Deficits in Aphasia

- **Deficits in several EFs** (Butts et al., 2015; Cocchini et al., 2010; Fucetola et al., 2009; Lesniak et al., 2008; Meteyard et al., 2015; Murray, 2014, 2017; Nicholas et al., 2011; Nys et al., 2007; Penn et al., 2010; Pulsipher et al., 2013; Salas et al., 2014; Vukovic, 2008; Yu et al., 2013; Zinn et al., 2007)
 - Impaired problem solving
 - Planning difficulties
 - Disinhibition
 - Problems detecting and following a rule
 - Lack of cognitive flexibility
 - Poor error awareness or detection

Cognitive Deficits Negatively Affect: Communication

- Each level of language processing (Giovannetti et al., 2008; Kong et al., 2014; Meyer et al., 2014; Murray, 2012; Sung et al., 2009)
- General language/communication skills (Coleman et al., 2011; Fridricksson et al., 2006; Ivanova et al., 2015; Murray, 2012, 2017; Nys et al., 2005)
- Ability to profit from treatment (Brownsett et al., 2014; Dignam et al., 2017; Edmonds et al., 2014; Murray et al., 2004; Purdy & Dietz, 2010; Lambon Ralph et al., 2010; Lesniak et al., 2008; Nicholas et al., 2011; Sandt-Koenderman et al., 2008; Seniow et al., 2009; Votruba et al., 2013; Wallace, 2010; Yeung & Law, 2010)
 - ◆ Difficulty acquiring new communication skills/strategies/device use
 - ◆ Limited generalization effects
 - ◆ Limited maintenance of treatment effects
 - ◆ ↓↓ compliance/motivation for treatment or compensatory strategy use

Acute/Subacute Care: Need for Formal Screening/Testing

- Edwards et al. (2006)
 - ◆ Stroke-related cognitive, perceptual, and linguistic deficits can go undetected without formal screening/testing!
- Formal screening necessary
 - ◆ Aphasia screening/bedside tests
 - Aphasia Screening Test - III (Whurr, 2011)
 - ◆ Short/bedside versions of aphasia batteries
 - e.g., WAB-R, BDAE-III, BAT Screening Test
 - ◆ Protocols in the empirical literature
 - e.g., Addenbrooke's Cognitive Examination-Revised: Language component (Gaber et al., 2011)
 - e.g., Aphasia Rapid Test (Azuar et al., 2013)
 - ◆ Psychometric qualities of many of these measures are suspect

Cognitive Screening Tools

- Do not use the *Mini-Mental State Examination* (MMSE) to screen for cognitive problems in individuals with aphasia (Golper et al., 1987; Osher et al., 2008)
 - ◆ Overestimates presence and severity of cognitive problems
- Some are specifically designed for aphasia and/or stroke
 - ◆ e.g., Cognitive Assessment scale for Stroke Patients (CASP; Barnay et al., 2014; Benaim et al., 2015)

Trends in Aphasia Test Batteries

- Bilingual Aphasia Test (Paradis, 2011; www.mcgill.ca/linguistics/research/bat/)
- Scales of Cognitive and Communicative Ability for Neurorehabilitation (SCCAN; Milman & Holland, 2012)
- Scenario Test (van der Meulen et al., 2010)

Trends in Tests of Specific Linguistic Functions: Examples

- Vocabulary Assessment Scales: Expressive and Receptive (Gerhardstein Nader, 2013)
- NAB Auditory Comprehension Test (Stern & White, 2010)
- CELF 5: Metalinguistics (Wiig & Secord, 2014)
- The Listening Comprehension Test - Adolescent (Bowers et al., 2009)
- Test of Written Language - 4 (Hammill & Larsen, 2009)

Tests of Specific Linguistic Functions

- Spoken and/or written discourse sampling (Bryant et al., 2016; Marini et al., 2007; Rousseaux et al., 2010; Murray & Clark, 2015)
 - ◆ Ideally sample a variety of genres and sample > 300 words
 - ◆ Assesses all language levels, considered an ICF activity/participation measure, and sensitive to sociocultural variation
- Commercially-available or research protocols for eliciting and/or analyzing spoken and/or written discourse samples:
 - ◆ e.g., *Supporting Partners of People with Aphasia in Relationships and Conversation* (Locke et al., 2008)
 - ◆ e.g., Kagan scales (Kagan et al., 2001; 2004)

Measures of Quality of Life and Related Constructs

- Aphasia Communication Outcome Measure (Hula et al., 2015)
- Assessment for Living with Aphasia (ALA; Aphasia Institute, 2010; Simmons-Mackie et al., 2014)
- Communication Disability Profile: Activities and Participation sections (CDP; Chue et al., 2010; Swinburn & Byng, 2006)
- Carer Communication Outcome After Stroke (Long et al., 2009)
- Informal communication participation measures

Cognitive Tests

- Use tests with relatively low language demands
 - ◆ Commercially-available options
 - e.g., Color Trails Test (D'Elia et al., 1996)
 - e.g., Comprehensive Test of Nonverbal Intelligence 2 (Hammill et al., 2009)
 - ◆ Options in the research literature
 - e.g., Picture span (DeDe et al., 2014)
 - e.g., Observational/Rating Scales
 - e.g., Evaluation of Everyday Memory (Tropp et al., 2015)
- A component of some aphasia batteries
 - e.g., SCCAN, Comprehensive Aphasia Test
- Documenting awareness issues
 - ◆ VATA-L: Visual-Analogue Test Assessing Anosognosia for Language Impairment (Cocchini et al., 2010)

Confounding Variables

- Inadequate norms for the elderly and ethnocultural minorities
 - ◆ Check research literature for extended norms (e.g., Lee et al., 2002)
 - ◆ Must acknowledge interaction between cultural background of client and structured testing environment (Agranovich et al., 2011; Bender et al., 2010)
 - ◆ EF tests particularly sensitive to healthy aging effects (Gavett et al., 2015)
- Few tests for assessing multilingual patients
- Psychometric concerns (Burgess et al., 2006; Mueller & Dollaghan, 2013; Pickens et al., 2010; Poulin et al., 2013)

Important Aphasia Treatment Resources

- www.u.arizona.edu/~pelagie/ancds/index.html
 - ◆ Aphasia treatment tables
- www.ancds.org
 - ◆ Links to systematic, evidence-based reviews of treatments for a variety of neurogenic communication disorders
- www.speechbite.com
 - ◆ speechBite - evidence-based practice resource for communication and/or swallowing disorders treatments
- www.aphasiapathway.com.au
 - ◆ Australian Aphasia Rehabilitation Pathway – best practice statements for all phases of aphasia management
- Shrubsole et al. (2017)
 - ◆ Recommendations for post-stroke aphasia rehabilitation: An updated systematic review and evaluation of clinical practice guidelines

When to Treat?

- Research indicates that patients in the acute through chronic aphasia recovery phases benefit from aphasia treatment (Breitenstein et al., 2017; Conklyn et al., 2012; Hoeg Dembrower et al., 2017; Laganaro et al., 2003; Moss & Nicholas, 2006; Robey, 1998)
- ◆ No relationship between response to aphasia treatment and time post-onset for patients > 1 year post-onset (Moss & Nicholas, 2006)
 - i.e., no time limit on treatment-related recovery
 - Prognostic decisions based on time post-onset alone are unwarranted

Behavioral Aphasia Treatment Approaches

(Murray & Clark, 2015)

◆ Stimulation

- Identify potent stimulus factors
- Expose to stimulus and task hierarchies to “stimulate” compromised linguistic function or language modality

◆ Cognitive neuropsychological (CN)

- Use normal or disordered language models to delineate problematic specific linguistic process(es)
- ↑↑ problematic process(es) and/or capitalize on more intact process(es)

◆ Cognitive

- Directly or indirectly address compromised non-linguistic cognitive abilities to ↑↑ language skills or response to language treatment

◆ Compensatory

- Focus on strategies and environmental modifications to compensate for impairments

◆ Neurophysiological

- Foster cognitive-linguistic abilities via modulation of neural activity/well-being

Stimulation Approaches: Example

- **Constraint-induced/intensive aphasia therapy** (Cherney et al., 2008; Faroqi-Shah & Virion, 2009; Kavian et al., 2014; Kurland et al., 2012; Meinzer et al., 2007, 2012; Sickert et al., 2014; Szaflarski et al., 2008; Rose, 2013)
 - ◆ **Procedures**
 - Only allow spoken language
 - Typically provided in group setting
 - Short-term, highly intensive (e.g., ≥ 3 hr/day for 5-10 days)
 - ◆ **Outcomes:**
 - ↑ spoken output
 - Intensity may be more important than constraint aspect
 - Can be administered by trained “layperson”
 - Maintenance of effects and ideal candidates not yet well established (Faroqi-Shah & Virion, 2009)

Stimulation Approaches: Discourse-Level Tx Example

- Computer-based script training (Bilda, 2011; Cherney et al., 2008, 2014; Goldberg et al., 2012; Lee et al., 2009; Manheim et al., 2009)
 - ◆ *AphasiaScripts*
 - Computerized version of conversational coaching
 - ◆ Typical treatment steps
 - Develop scripts with clinician
 - At-home practice of at least 30 min/day for 9 wks
 - ◆ Outcomes for range of aphasia types and severities
 - ↑↑ script-related words/min (variety of parts of speech)
 - ↓↓ aphasia severity (WAB) in some participants
 - ↑↑ self-ratings of communication, confidence
 - All participants liked the computer program
 - Some generalization to untrained contexts but need more research on generalization and maintenance

Stimulation Approaches: Computer Tx

■ Considerations

- ◆ Positives (Latimer et al., 2013)
- ◆ Negatives (e.g., Leung et al., 2014; Ponsford et al., 2014; Velikonja et al., 2014)

■ Examples

- Bungalow software, Constant Therapy, BangaSpeak (Messamer et al., 2016), bespoke programs (e.g., Radman et al., 2016)

■ Systematic review of computer-delivered aphasia tx (Zheng et al., 2016)

- Moderately severe, nonfluent aphasia and < 65 yrs over-representation
- Outcomes:
 - Effective vs. no tx
 - Possibly as effective as clinician-delivered tx

CN Approaches:

Example of Semantic-Based Treatments

- Strengthen semantic activation to ↑ speed and accuracy of word retrieval (Boyle, 2017; de Jong-Hagelstein et al., 2011; Kiran & Bassetto, 2008)
- Tx protocols:
 - ◆ Semantic Feature Analysis (SFA; Boyle, 2010, 2017; Falconer & Antonucci, 2012; Maddy et al., 2014; Wambaugh et al., 2014)
 - ◆ Verb Network Strengthening Treatment (VNeST; Edmonds, 2016; Edmonds et al., 2009, 2014; Edmonds & Babb, 2011; Kwag et al., 2014)
- Outcomes
 - ◆ ↑ naming of trained items regardless of nature of anomia
 - ◆ Variable ↑ to untrained items within trained categories or discourse

Cognitive Tx Approaches

- **Attention Process Training** (Sohlberg et al., 2001, 2011):
 - ◆ Coelho (2005) & Sinotte & Coelho (2007)
 - ◆ Amaddii et al. (2007)
 - ◆ Lee & Sohlberg (2013)
- **STM protocols**
 - ◆ **No delay repetition protocols** (Berthier et al., 2014; Francis et al., 2003; Harris et al., 2014)
 - Primarily task specific gains
 - ◆ **Delayed repetition protocols** (Kalinyak-Fliszar et al., 2011; Koenig-Bruhin & Studer-Eichenberger, 2007)
 - Primarily task specific gains

Cognitive Tx Approaches

■ Working Memory protocols

- ◆ Letter n-back tx protocol (Zakarias et al., 2017)
 - N-back task to target WM and interference control
 - Outcomes among 3 participants
- ◆ Multiple WM component tx (Paek & Murray, 2015; Vallat et al., 2005)
 - Variety of tasks to target executive and buffer components of WM
 - > outcomes for Vallat et al.'s participant

Language Treatments That Consider Cognitive Limitations

- Implicit memory/learning approaches
 - ◆ ↓↓ effort and awareness demands during learning process
 - ◆ Spaced retrieval (Benigas, 2015; Bourgeois et al., 2016)
 - Recall information over progressively longer intervals
 - in concert with anomia treatment (Fridriksson et al., 2005; Morrow & Fridriksson, 2006)

Language Treatments That Consider Cognitive Limitations

- **Errorless learning** (EL; Ehlhardt et al., 2008; Fillingham et al., 2006; Lloyd et al., 2009; Middleton & Schwartz, 2012; Middleton et al., 2016; Page et al., 2006)
 - Cue so patient never makes a recall error
 - Requires intensive treatment
 - ◆ Anomia tx +/- EL (Jokel & Anderson, 2014; Middleton et al., 2016)
 - ◆ Mapping tx +/- EL (Wierenga et al., 2006)
 - ◆ Multimodality comm. tx with EL (Wallace et al., 2014)
 - ◆ AAC tx with EL (Wallace & Hux, 2014)
- **Switch Back Through Translation** (Ansaldi et al., 2009)
 - ◆ Target involuntary language switching via:
 - Train to translate word in non-target language into target language following occurrence of involuntary switching

Compensatory Approaches: Example of Multi-Modality Treatments

- Train gesture, writing, drawing, low and/or high tech devices to augment or replace spoken output or facilitate comprehension (Hux et al., 2010; Nicholas et al., 2011; Marshall et al., 2013; Rose et al., 2013)
 - ◆ Suitable for:
 - breadth of aphasia profiles
 - acute and chronic recovery phases
 - ◆ e.g., Multimodal Communication Training (Purdy & van Dyke, 2011; Wallace et al., 2014)

Compensatory Approaches

- **Conversation therapy** (Beckley et al., 2013, 2016; Beeke et al., 2015; Hickin et al., 2015; Savage et al., 2014; Sirman et al., 2017; Wilkinson & Wielart, 2012)
 - ◆ Train facilitative strategies to person with aphasia alone or in concert with a daily communication partner
 - ◆ Target discourse/conversation skills
 - ◆ Common tx activities
 - Initial conversation analysis, education about “conversation,” self-reflection of videotaped samples, practice of strategies
 - ◆ Consistent +ive outcomes, but:
 - Diverse outcome measures and few aphasic participants
 - SLPs report low use and confidence in (Rose et al., 2014)

Compensatory Approaches: Unpaid & Paid Caregiver Training

(Best et al., 2016; Cameron et al., 2015; 2017; Horton et al., 2015; Kim et al., 2017; Simmons-Mackie et al., 2010; Wilkinson & Wielaert, 2012)

- ◆ e.g., Supported Conversation for Adults with Aphasia (www.aphasia.ca); Connect-Communication Disability Network program; Better Conversations with Aphasia (<https://extend.ucl.ac.uk/>)
- ◆ Variety of training formats
- ◆ ↑↑ use of facilitative, repair, and AAC strategies and ↓↓ nonfacilitative ones
- ◆ ↑↑ communication skill and confidence of caregiver and aphasic adult

Neurophysiological Approaches

- **Transcranial direct current stimulation** (tDCS; Crinion, 2016; Costa et al., 2015; de Aguiar et al., 2015; Floel et al., 2011; Wu et al., 2015)
 - ◆ Anodal tDCS ↑↑ vs. cathodal ↓↓ cortical excitability
 - ◆ Variety of stimulation parameters in concert with a variety of language treatments
 - ◆ Generally +ive outcomes
- **Transcranial magnetic stimulation** (TMS; Khedr et al., 2014; Naeser et al., 2005; Ren et al., 2014; Shah-Basak et al., 2016; Vuksanovic et al., 2015)
 - ◆ Slow (1 Hz) repetitive ↓↓ cortical excitability
 - ◆ Fast (5-20 Hz) repetitive ↑↑ cortical excitability
 - ◆ Expensive and cumbersome vs. tDCS
 - ◆ Variety of stimulation parameters with or without language tx
 - ◆ Generally +ive outcomes, similar in magnitude to tDCS

Telerehabilitation

- Remote aphasia treatment
 - ◆ Off-the-shelf and newly designed platforms or mobile applications
 - Synchronous and asynchronous
 - ◆ Support for its feasibility and usability (Choi et al., 2016; Timic et al., 2016; Woolf et al., 2016)
 - ◆ Positive tx outcomes (Agostini et al., 2014; Fumas & Edmonds, 2014; Woolf et al., 2016)

Future Needs

- Assessment and tx procedures for certain aphasia profiles
 - ◆ Severe aphasia
 - ◆ Mild aphasia/primarily discourse-level issues
 - ◆ Wernicke's aphasia
- Extra-linguistic cognitive assessments with standardized adaptations for people with aphasia
- Assessment procedures with stronger psychometric qualities
- Extra-linguistic cognitive tx procedures that:
 - ◆ focus on strategies vs. retraining
 - ◆ focus on neglect, episodic memory, EFs
- Assessment and tx procedures that address contextual factors

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