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 \(\rightarrow\) sounds
    - Sounds \(\leftarrow\) 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
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
  - \(\downarrow\) 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](http://www.u.arizona.edu/~pelagie/ancds/index.html)
  - Aphasia treatment tables
- [www.ancds.org](http://www.ancds.org)
  - Links to systematic, evidence-based reviews of treatments for a variety of neurogenic communication disorders
- [www.speechbite.com](http://www.speechbite.com)
  - speechBite - evidence-based practice resource for communication and/or swallowing disorders treatments
  - 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)
  - \( \uparrow \) problematic process(es) and/or capitalize on more intact process(es)

- **Cognitive**
  - Directly or indirectly address compromised non-linguistic cognitive abilities to \( \uparrow \) 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):
  - 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** (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** (Ansaldo 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
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


Selected References


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