Reading and Writing Treatments for Aphasia

Esther Kim, PhD, R.SLP, CCC-SLP
Assistant Professor,
Dept. of Communication Sciences & Disorders
University of Alberta
BCASLPA conference
October 24, 2015

Learning Objectives

- At the conclusion of this workshop, you should be able to:
  - Characterize the major alexia and agraphia syndromes
  - Describe single-word and text-based treatments for reading disorders for various alexia syndromes
  - Describe treatments for acquired agraphia based on underlying cognitive components that are impaired
  - Give examples of how reading and writing treatments can be implemented in a group setting

Acknowledgements

- Aphasia Research Project, University of Arizona
  - Pelagie Beeson, PhD
  - Kindle Rising, MS
  - Steven Rapcsak, MD, PhD
  - Funding for the development of agraphia treatments provided by Grants DC007646 and DC008286 from the National Institute on Deafness and Other Communication Disorders (NIDCD)

- Fabiane Hirsch, Tucson Aphasia Center
Roadmap

• Overview of alexia and agraphia syndromes
• Assessment of reading/writing
• Choosing goals to address reading/writing
• Reading Treatments
  • Single word
  • Text-based
• Writing Treatments
• Adapting Treatments for a Group Setting

Alexia is...

• An acquired impairment of reading
• Sometimes referred to as 'acquired dyslexia'
• A result of language deficits caused by left hemisphere brain damage
• Can occur in isolation, but most often occurs as part of an aphasia syndrome

Agraphia is...

• An acquired impairment of writing/spelling
• Usually accompanies aphasia and alexia
• Can be a result of damage to:
  • Central linguistic processing
  • Peripheral motor planning
    • Can result in an inability to write

Fig. 1. Henderson (2008), Neurology
How common is alexia/agraphia?

- ~12,000 Canadians become aphasic each year (Heart & Stroke Foundation, 2000)
- Nearly all individuals with aphasia have some degree of reading impairment (Webb & Love, 1983)
- Considering the prevalence of written language in everyday environments, alexia and agraphia can have devastating consequences

Review of Alexia/Agraphia Syndromes

- Cognitive model of single word processing
- Focusing on Central Linguistic Processing

Central linguistic processing components

- Semantics
- Phonology
- Orthography
What are the critical brain regions that support the central language processes?

![Brain Diagram]

- "FISH" Acoustic Analysis
- SEMANTICS
  - PHONOLOGY
    - Speech Motor Programs
  - ORTHOGRAPHY
    - Graphic Motor Programs

"FISH" Visual Analysis

Dual Route model

Lexical
- Phonological Lexicon
- Phonemes
- Word form
- Morpheme
- Sound
- Orthographic Lexicon
- Graphemes
- After sound
- Graphic Motor Programs

Sublexical
- Speech Motor Programs

"FISH" Fish
Cerebral Arteries

(Figure 6-5)

Cerebral arteries include:
- Anterior cerebral artery
- Middle cerebral artery
- Posterior cerebral artery

From Nolte (2002)

---

**Pure Alexia (Alexia without Agraphia, Letter-by-Letter (LBL) Reading)**

- **Characteristic Features**
  - Sequential letter identification (aloud/subvocal)
  - Word length effect
  - Slow rate for text reading
  - No other effects of word type in reading
  - Preserved recognition of oral spelling

- **Other clinical features:**
  - May have right homonymous hemianopia (right visual field cut)
  - Spoken language profile consistent with anomic aphasia

- **Considered a “peripheral” impairment**
  - Visual input does not have access to spelling knowledge (orthographic lexicon)
Sometimes pure alexia is not so pure...

- May see 'surface' errors in reading
- Phonologically plausible errors
- Regularity effect: Regular words > Irregular words
- May see letter identification errors
- Often accompanied by surface agraphia profile (more on this later...)

How might these processes be impaired?

- Pure Alexia
  - Impaired access to orthographic lexicon
- Surface Alexia/ Surface Agraphia
  - Damage to orthographic representations

Diagram:

- CHORE
- Damage to Orthography
- SEMANTICS
- Visual Analysis
- Phonology
- Lexicon
- Phonemes
- Graphemes
- Speech Motor Programs
- Surface Alexia
- Surface Agraphia
- Phonologically plausible reading errors
- Phonologically plausible spelling errors
Surface Agraphia: Regularity Effect

regular words  |  irregular words  |  nonwords
---|---|---
Twin  |  Chrysis  |  sonet
Best  |  Broom  |  Citharch
Hound  |  Ironia  |  MBeeck
Stop  |  Spur  |  Flock
Pillow  |  Priest  |  Wesej
Outside  |  Pal  |  

---

How might these processes be impaired?
- Pure Alexia
  - Impaired access to orthographic lexicon
- Surface Alexia/ Surface Agraphia
  - Damage to orthographic representations
- Phonological Alexia/ Phonological Agraphia
  - Phonological impairment

---

(©) Esther S. Kim, PhD, October 2015
Phonological Alexia

- Lexicality Effect
  - Can correctly read words (regular, irregular)
  - Difficulty reading nonwords (i.e., words that must be sounded out using letter-sound correspondence)
- Other Lexical-Semantic Effects
  - Frequency effects (high frequency > low frequency)
  - Part of speech effects (content words > functors)
  - Imaggeability effects (concrete > abstract)

Phonological Agraphia: Lexicality Effect

Irregular
- yacht
- colonel
- blood
- bury
- effort
- island

Nonwords
- boke
- grest
- dusp
- sqate
- ked
- nar

How might these processes be impaired?

- Pure Alexia
  - Impaired access to orthographic lexicon
- Surface Alexia/ Surface Agraphia
  - Damage to orthographic representations
- Phonological Alexia/ Phonological Agraphia
  - Phonological impairment
- Deep Alexia/ Deep Agraphia
  - Severe phonological impairment + impaired access from semantics
Deep Agraphia
Writing to Dictation

How might these processes be impaired?

- Pure Alexia
  - Impaired access to orthographic lexicon
- Surface Alexia/ Surface Agraphia
  - Damage to orthographic representations
- Phonological Alexia/ Phonological Agraphia
  - Phonological impairment
- Deep Alexia/ Deep Agraphia
  - Severe phonological impairment + impaired access from semantics
- Global Alexia/ Global Agraphia
  - Severe damage to phonology, orthography and semantics
Severely impaired phonology, orthography, semantics

Phonology

Orthography

Morphology

Semantics

Visual Analysis

Acoustic Analysis

Speech Motor Programs

Graphic Motor Programs

Global Alexia

Global Agraphia

BROOM

HARD

EAGLE

GANG

MILE

DOUBT

LOSE

GRUMBLE

DRIVE

HONEST

CIRCUIT

SPRING

Phonological Text Alexia/Agraphia

(Friedman, 1996; Beeson et al., 2012)

- Continuum of Severity
  - Phonological Text Alexia/Agraphia
  - Phonological Alexia/Agraphia
  - Deep Alexia/Agraphia
  - Global Alexia/Agraphia

Difficulty with nonwords, suffixes, affixes in text (i.e., items with low semantic weight)

- Impaired sublexical processes and/or insufficient activation of phonological representations

Global Agraphia

- Impaired writing

Phonological Alexia/Agraphia

Deep Alexia/Agraphia

Global Alexia/Agraphia

Phonological Text Alexia/Agraphia

Continuum of Severity
Aphasia, Alexia & Agraphia

- There is no strict 1:1 correspondence between aphasia types and alexia/agraphia syndromes

- BUT you might be able to predict based on lesion location what types of alexia/agraphia profiles are associated with which aphasia types

<table>
<thead>
<tr>
<th>Alexia/Agraphia Characteristics</th>
<th>Lesion Location</th>
<th>Typical Aphasia Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Impairments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure Alexia</td>
<td>Word-length effect</td>
<td>Inferior occipito-temporal cortex</td>
</tr>
<tr>
<td>Global</td>
<td>Few words correct (&lt;30%)</td>
<td>Large perisylvian</td>
</tr>
<tr>
<td>Deep</td>
<td>Lexicality effect, irregularity effect, semantic errors</td>
<td>Large perisylvian</td>
</tr>
<tr>
<td>Phonological</td>
<td>Irregularity effect</td>
<td>Perisylvian</td>
</tr>
<tr>
<td>Extrasylvian Damage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>Regularity effect</td>
<td>*ATL atrophy (semantic dementia); extrapyramidal TPJC posterior IT regions affecting VWFA</td>
</tr>
</tbody>
</table>

*ATL = anterior temporal lobe; TPJC = temporo-parieto-occipital cortex; IT = inferior temporal; VWFA = visual word form area

Writing is typically more impaired than reading

- Spelling is more difficult than reading, therefore, most individuals demonstrate greater severity of agraphia than alexia

- Individuals may present with the following alexia/agraphia profiles:
  - Pure Alexia/LBL Reading + Surface Agraphia
  - Phonological Text Alexia + Phonological Agraphia
  - Phonological Alexia + Deep Agraphia
  - Deep Alexia + Global Agraphia
Assessment of Written Language & Choosing Goals

Assessment of Written Language

- General Principles
  - "Literacy history"
  - Interview client/family about premorbid reading skills and interests
- Cross-Modality considerations
  - Reading, recognition of oral spelling, writing, matching words to pictures, etc.
- Consider assessment of cognitive functions for higher level reading/writing impairments
- Informal Assessment – Functional Needs
  - ‘Survival skills’: reading menus, checkbooks, calendar; writing name, grocery lists, holiday cards, etc.

Assessment of Reading

- Comprehension is the primary target
- Aphasia batteries may not yield sufficient information
- Single Word
  - Word lists that vary lexical variables: frequency, spelling regularity, length, concreteness, etc.
  - Example: Arizona Battery for Reading and Spelling (ABRS)
    http://aphasia.arizona.edu/Aphasia_Research_Project/Assessment_Materials.html
- Non-words → assess grapheme-phoneme conversion skills
- Lexical decision tasks
- Make note of error types
Assessment of Reading (cont’d)

- Sentence/Paragraph
  - Comprehension assessed through: picture matching, multiple choice questions, story retell, close procedure

Examples of Reading Assessments
- Reading Comprehension Battery for Aphasia - 2 (RCBA-2; LaPointe & Horner, 1998)
  - Words, sentences, paragraphs, functional reading, supplemental lists for oral reading & lexical decision
- PALPA (Kay, Leske & Coltheart, 1992)
  - Single words varying in lexical variables, sentences manipulating syntactic variables
- JHU Dyslexia Battery (available in Beeson & Hillis, 2011)
  - Single words varying in lexical variables
- Gray Oral Reading Tests – 4 (GORT-4; Wiederholt & Bryant, 2001)
  - Graded passages in 2 alternative forms; measures fluency + comprehension

Assessment of Writing

- Complementary to reading assessments
  - no published writing assessments
- Consider typing vs. handwriting
  - Alternative modality may be easier for some
- Single word/sentence
  - Writing to dictation
- Paragraph
  - Picture description
  - Re-tell of reading assessments

Treatments for Acquired Alexia and Agraphia
World Health Organization's International Classification of Functioning, Disability and Health (ICF: WHO, 2001)

- Treatments that will be described mostly address Impairment level
- Can incorporate Activity/Participation levels
  - personally relevant stimuli
  - determine reading/writing needs
    - e.g. reading aloud to grandchildren
    - Writing grocery lists

Treatments for Acquired Alexia

- **Word-Level Approaches**
  - Cross-Modality Cuing for Pure Alexia/LBL Reading
    - see table
  - Treatments for other alexia syndromes will be discussed in the context of treatment for agaphia

- **Text Level Approaches**
  - Approaches for improving reading comprehension
  - Why text-level treatments?
    - Text is ultimate treatment goal
    - CATE: Complexity Account of Treatment Efficacy (Thompson et al., 2004)

---

Acquired Alexia Syndromes

<table>
<thead>
<tr>
<th>Alexia Syndrome</th>
<th>Characteristic Feature</th>
<th>Treatment Goal</th>
<th>Word level Treatment Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure</td>
<td>Word length effect (impaired access to orthographic input lexicon)</td>
<td>Support whole-word recognition, reduce reliance on letter-by-letter strategy OR Increase efficiency of LBL strategy</td>
<td>Speeded stimulus presentation (Rothi &amp; Moss, 1992; Friedman &amp; Lott, 2000); Cross modality cueing (Hou et al., 1991; Lott et al., 2010)</td>
</tr>
<tr>
<td>Surface</td>
<td>Phonologically plausible errors (over-reliance on sublexical routes)</td>
<td>Strengthen lexical reading route</td>
<td>Homophone training (Corbit, 1994); irregular word training (Weekes &amp; Coltheart, 1996)</td>
</tr>
<tr>
<td>Phonological</td>
<td>Can’t read nonwords (impaired sublexical route)</td>
<td>Strengthen sublexical procedures</td>
<td>Grapheme-Phoneme conversion training; Phonological awareness training (Fridman &amp; Lott, 1991; Basso et al., 2012)</td>
</tr>
<tr>
<td>Phonological text alexia</td>
<td>Can’t read nonwords, function/affix in text (impaired sublexical)</td>
<td>Strengthen sublexical procedures</td>
<td></td>
</tr>
<tr>
<td>Deep</td>
<td>Semantic errors (impaired sublexical &amp; lexical-semantic route)</td>
<td>Strengthen sublexical &amp; lexical-semantic processes</td>
<td></td>
</tr>
</tbody>
</table>

* see resources at slide

(C) Esther S. Kim, PhD, October 2015
Why focus on writing to improve reading?

- Reading and writing impairments can be treated concurrently
- But if you have to choose one, treating writing impairment provides more 'bang for your buck'
- Consider CATE (Complexity Account of Treatment Efficacy; Thompson, Kiran et al.)
  - Writing is inherently more difficult than reading
  - Writing (spelling) impairments usually more pronounced than reading impairments after stroke
- by treating writing impairments, you are addressing the underlying processes for both reading and writing

---

Pure Alexia: Cross-Modality Cueing
(Maher et al., 1998; Lott et al., 1994; 2010)

- AKA Tactile/Kinesthetic Treatment
  - Useful for pure alexics with poor letter identification/naming
  - Trace letter into palm of hand, or copy/trace letter with finger
  - Information from tactile/kinesthetic modality helps to facilitate visual letter recognition
  - Once letter naming is 'trained up' focus on increasing speed/accuracy of reading

---

Text Level Treatments: MOR
(Beeson et al., 2005; Tuomainen & Laine, 1991; Kim et al., 2015)

- What is the method?
  - Repeated oral reading of text passages with goal of increasing reading rate and accuracy
  - Semantic/syntactic context thought to provide top-down facilitation of whole-word recognition
  - Relies on home practice (at least 30 min/day)

---
Text-level Treatments: MOR (cont’d)

- Who are the likely candidates?
  - pure alexia (Moyer, 1979; Moody, 1988; Tuomainen & Laine, 1990; Benson, 1998; Benson et al., 2005)
  - phonological alexia (Bresen & Insalaco, 1998; Cherney, 2004)
  - phonological text alexia (Lacey et al., 2007; Lacey et al., 2010)
  - mixed alexia (Mayer & Murray, 2002; Kim et al., 2010)
  - deep alexia (Kim & Russo, 2005)

- What are the expected outcomes?
  - improved reading rate and accuracy for practiced and novel texts
  - improved reading comprehension (based on improvements in reading fluency → more resources to devote to comprehension?)

Multiple Oral Rereading: Steps

- #1: Assessment of Text Reading
  - (eg.) Gray Oral Reading Test-4 (Wiederholt & Bryant, 2001)
    - measures of reading rate (words per minute) and error rate (per 100 words)

- #2: Choose Reading Materials
  - Choose text passages for practice and generalization probes
  - Higher level reading passages or personally relevant text
  - Choose passages of ~ 200–500 words for practice
  - Determine reading level using Microsoft Word
    - Flesch-Kincaid grade level

Microsoft Word 2010
May need to enable “Readability Statistics” in Options → Proofing
MOR: Therapy Sessions

- #3: Collect reading rate and accuracy data
  - Baseline: Three sessions prior to starting treatment
  - Probes on novel text at the beginning of each session

- Calculating reading rate and accuracy:
  - **Rate** (words per minute) =
    - \( \frac{\text{#words}}{\text{#seconds}} \times 60 \text{ sec/min} \)
  - **Accuracy** (errors per 100 words) =
    - \( \frac{\text{#errors}}{\text{#words}} \times 100 \)
  - May also want to assess comprehension (questions/re-tell)

Note: 'Normal' reading rates ~150-200 wpm

MOR: Therapy Sessions

- Repeated oral reading of text.
- Clinician points out errors and provides assistance with difficult words or passages.
- Daily homework is key!
  - Oral reading of practice text at least 3-5 times per day
  - Homework log for accountability

Text-level Treatments: ORLA

- Oral Reading for Language in Aphasia (ORLA)
  - What is the method?
    - based on stimulation approach - repetitive multimodality stimulation is presented to elicit a response
    - person with aphasia repeatedly reads aloud sentences and/or short paragraphs, first in unison with SLP then independently
  - Steps:
    1. SLP reads aloud, pointing to each word.
    2. SLP reads aloud again, patient points to each word.
    3. SLP + patient read together, pointing to each word.
    4. SLP states a word, patient identifies it.
    5. SLP points to a word, patient reads it aloud.
    6. SLP + patient read in unison again.
Text-level Treatments: ORLA (cont’d)

- Who are the likely candidates?
  - deep alexia (Cherney, 2004)
  - mixed alexia/aphasia across a range or severities (Cherney et al., 1986; Cherney, 2010)
- What are the expected outcomes?
  - multimodality improvements (Cherney et al., 1986; Cherney, 2010)
  - improved oral reading fluency
  - improved reading comprehension
  - improved oral expression
  - improved auditory comprehension
- has been shown to be effective in the treatment of apraxia of speech (Cherney, 1995)

Addressing Reading Comprehension

- Attentive Reading and Constrained Summarization
  (ARCS; Rogalski & Edmonds, 2008; Rogalski et al., 2013; Webster et al., 2013)
- What is the method?
  1. Read whole passage aloud
  2. Read again silently in 2-3 sentence chunks (attentive reading)
  3. Produce a short oral summary (constrained summarization)
    - Constraints: no opinion, no pronouns (he, she, it), no non-specific words (stuff, thing)
    - Could make this a short written summary to address writing goals

Strategies to Improve Reading Comprehension

- Planning/organization strategies:
  - Overview of text
  - Listing main ideas
  - Outlining
  - Creating “Mind Maps”
    - A good resource on how to create mind maps (directed towards college students):
Creating Mind Maps

- Write down key ideas
- Main idea in the middle
- Look for relationships
  - Use lines, arrows, branches, etc. to connect ideas
- Leave lots of space
  - Can return and add to it after each reading

Treatments for Acquired Agraphia

<table>
<thead>
<tr>
<th>Agraphia Syndrome</th>
<th>Characteristic Feature</th>
<th>Treatment Goal</th>
<th>Word-Level Treatment Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Phonologically plausible errors (over-reliance on sublexical route)</td>
<td>Improve use of residual sublexical &amp; lexical abilities</td>
<td>Interactive spelling treatment (Beeson et al., 2000)</td>
</tr>
<tr>
<td>Phonological</td>
<td>Can't spell nonwords (impairment sublexical &amp; lexical-semantic route)</td>
<td>Strengthen sublexical &amp; lexical-semantic processes</td>
<td>Grapheme-Phoneme conversion training; Phonological awareness training (Friedman &amp; Lott, 1996; Beeson et al., 2010*)</td>
</tr>
<tr>
<td>Deep</td>
<td>Semantic errors (impairment sublexical &amp; lexical-semantic route)</td>
<td>Strengthen sublexical &amp; lexical-semantic processes</td>
<td>Phonological awareness training (Friedman &amp; Lott, 1996; Beeson et al., 2010*)</td>
</tr>
<tr>
<td>Global</td>
<td>Minimal residual spelling ability</td>
<td>Strengthen lexical-semantic processes</td>
<td>Lexical Spelling Treatment; ACT; CART (Beeson et al., 2003)</td>
</tr>
</tbody>
</table>
Lexical Spelling Treatment

- Copy and Recall Treatment (CART; Beeson, Rising & Volk, 2003)
  - Who are the likely candidates?
    - Individuals with limited spoken language ability (severe aphasia)
  - Focus: retraining spelling (and reading) of specific words
    - Words should be functional for the client
    - Identify 20-25 items, train in sets of 5-6

CART Procedures

What is this? “Fish”
Can you write ‘fish’?
Correct: present next word
Incorrect: provide written model

CART relies on daily homework

- Factors associated with success of CART (Beeson et al., 2003):
  - Consistent, accurate completion of daily homework

Homework sheets
“Talking” photo album
Digital story-telling apps e.g. “StoryKit”
Lexical Spelling Treatment

- What are the expected outcomes?
  - Relearn spelling for specific words; limited generalization

- Writing may be more amenable to treatment when spoken communication is resistant
  - Orthographic representations better preserved than phonological representations
  - Graphomotor skills may be better than motor control for speech production
  - No time constraints as for spoken production

Acquired Agraphia Syndromes

<table>
<thead>
<tr>
<th>Agraphia Syndrome</th>
<th>Characteristic Features</th>
<th>Treatment Goal</th>
<th>Word-level Treatment Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Phonologically plausible errors (low reading accuracy)</td>
<td>Improve use of residual sublexical &amp; lexical abilities</td>
<td>Interactive spelling treatment (Beeson et al., 2000)</td>
</tr>
<tr>
<td>Phonological</td>
<td>Can’t spell nonwords (impaired sublexical route)</td>
<td>Strengthen sublexical procedures</td>
<td>Grapheme-phoneme conversion training; Phonological awareness training (Friedman &amp; Lott, 1996; Beeson et al., 2010*)</td>
</tr>
<tr>
<td>Global</td>
<td>Minimal residual spelling ability</td>
<td>Strengthen lexical-semantic processes</td>
<td></td>
</tr>
</tbody>
</table>

Phonological Treatment

- Purpose
  - To strengthen sound-to-letter correspondences and phonological manipulation.

- Goal
  - To use phonological information to assist in retrieval of orthography.

- Approach
  - Establish "Key Words" for 20 consonants (trained as 4 groups of 5) and 12 vowels (trained as 2 groups of 6).
  - Use cueing hierarchy to train sound-letter/letter-sound correspondences for each targeted phoneme.
  - Also relies on homework to establish sound-letter correspondences
  - Train sound blending in the context of regular words or nonword spelling.
Establishing Key Words

- Work with client to select key words
  - select words that the patient can easily say, read, and write
- Train spelling for key words as needed using lexical treatment approach
  - Copy and Recall Treatment (CART)
- Key words may be those that are pictureable, but it is not always necessary

Example of Key Words to Cue Letter-Sound Correspondence

<table>
<thead>
<tr>
<th>r</th>
<th>d</th>
<th>s</th>
<th>l</th>
<th>f</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>d</td>
<td>h</td>
<td>l</td>
<td>n</td>
<td>w</td>
</tr>
<tr>
<td>e</td>
<td>a</td>
<td>e</td>
<td>e</td>
<td>e</td>
<td>i</td>
</tr>
<tr>
<td>r</td>
<td>a</td>
<td>i</td>
<td>e</td>
<td>y</td>
<td>o</td>
</tr>
<tr>
<td>l</td>
<td>a</td>
<td>h</td>
<td>e</td>
<td>e</td>
<td>e</td>
</tr>
<tr>
<td>e</td>
<td>e</td>
<td>e</td>
<td>e</td>
<td>e</td>
<td>e</td>
</tr>
</tbody>
</table>

Phonological Treatment: Homework

- A homework DVD/video provides a means for client to ensure sound/letter correspondence are solidified
  - 2 parts:
    - Provide sound, client writes keyword and/or letter
    - Provide keyword or letter, client produces sound
Sample Phonological Treatment: Homework (sound to letter)

**Clinician**
- Say /p/
- What is your key word for /p/? (Show picture if necessary).
- Write your key word for /p/ "pie"
- Underline /p/ in your word "pie"
- Now say the sound /p/

**Client**
- /p/

---

Sample Phonological Treatment: Homework (letter to sound)

**Clinician**
- Show the letter "p" "pie"
- Reveal written key word "pie"
- Say it again, "pie" "pie"
- Now just say the first sound "puh"
- It’s /p/
- Show the letter "p" "puh"
- Now say the sound again "puh"

**Client**
- "p"

---

Phonological Treatment

- Observed outcomes
  - Improved reading and spelling of "regular" words
  - Reduction in semantic errors
  - Access to phonology blocks semantic errors
  - Improved spoken production
  - Use of written word for phonemic self-cueing
- Pitfalls
  - Reliance on phonology leads to phonologically plausible errors in reading and spelling (like that observed in surface alexia and agraphia)
  - Next phase of treatment to promote problem-solving to resolve errors (interactive treatment)
Acquired Agraphia Syndromes

<table>
<thead>
<tr>
<th>Agraphia Syndrome</th>
<th>Characteristic Feature</th>
<th>Treatment Goal</th>
<th>Word-Level Treatment Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Phonologically plausible errors (over-reliance on sublexical route)</td>
<td>Improve use of residual sublexical &amp; lexical abilities</td>
<td>Interactive spelling treatment (Beeson et al., 2000)</td>
</tr>
<tr>
<td>Phonological</td>
<td>Graphophonological errors (under-reliance on sublexical route)</td>
<td>Strengthen sublexical &amp; lexical-semantic processes</td>
<td>Grapheme-Phoneme conversion training; Phonological awareness training (Kwok et al., 1994; Beeson et al., 2010*)</td>
</tr>
<tr>
<td>Deep</td>
<td>Semantic errors (under-reliance on lexical-semantic route)</td>
<td>Strengthen lexical-semantic processes</td>
<td>Lexical Spelling Treatment: ACT; CART (Beeson, 1999; 2003)</td>
</tr>
<tr>
<td>Global</td>
<td>Minimal residual spelling ability</td>
<td>Strengthen lexical-semantic processes</td>
<td>Lexical Spelling Treatment: ACT; CART (Beeson, 1999; 2003)</td>
</tr>
</tbody>
</table>

Interactive Spelling Treatment

- **Goal**
  - to improve spelling accuracy by taking advantage of interaction between lexical and nonlexical spelling routes
  - Establish problem-solving procedures
  - use phonology to sound-out plausible spellings
  - self-detection and correction of errors
  - electronic spell-checker or app

Interactive Treatment: A Problem-Solving Spelling Approach

- Use of electronic spell checker

<table>
<thead>
<tr>
<th>Target</th>
<th>Problem-Solving</th>
</tr>
</thead>
<tbody>
<tr>
<td>debate</td>
<td>debate → debate</td>
</tr>
<tr>
<td>local</td>
<td>local → local*</td>
</tr>
<tr>
<td>mistake</td>
<td>mistake → mistake</td>
</tr>
<tr>
<td>former</td>
<td>former* → former</td>
</tr>
</tbody>
</table>

*entered into Spell Checker
### A Continuum for Writing Treatment

- **Lexical approach**
  - Retraining specific words
- **Phonological approach**
  - Retraining sound-letter correspondences
- **Interactive approach**
  - Training interactive use of residual lexical and phonological knowledge

### Adapting Treatments for a Group Setting

### Groups for Reading/Writing... beyond conversation groups

- **Why groups for reading/writing?**
  - Same benefits of conversation group treatment can be extended into the written language domain
  - Participating in reading/writing activities enhances quality of life
- **How do you ensure group treatment doesn’t become individual treatment administered in a group setting?**
  - Group collaboration is key
  - Peer-to-peer mentoring
  - Make individual goals and strategies explicit
  - Structured individual tasks can still be completed
Reading Groups

- Goals:
  - Improve speech fluency: oral reading (in sessions, homework)
  - Improve reading comprehension: reading & discussing reading materials
- Reading Materials:
  - Can be books, short stories, paragraphs, news articles
- Group Format:
  - Members can take turns reading aloud (with varying levels of support)
  - Encourage discussion of material
  - Can supplement with MOR in session or as homework

Aphasia Book Clubs

- Function as regular book clubs, with the addition of:
  - “Reading Ramps” → make books accessible to people with aphasia
    - Advanced organizers - support story line/main ideas
    - Simplify grammar
    - Abridged versions of popular texts
    - Audio books to supplement print
- Resources:
  - The Book Connection™ - Aphasia Center of California
  - Facilitator’s Manual by Bernstein-Ellis & Elman included with Book Connection™ materials

Writing Groups

- Goals:
  - Improve specific writing skills (e.g., word-finding, spelling, syntax)
  - Utilize writing in daily life activities (e.g., grocery lists, email)
  - Develop and complete writing projects (e.g., newsletter)
- Activities:
  - Dependent on skill level of group
    - Word level (ACT/CART) as a group
    - Picture description, recap of reading materials, etc.
  - Cooperative group editing
    - E.g., projection capabilities with computer – homework is brought in and collectively edited (also works on reading)
Resources for Reading Materials

- Resources:
  - Talkpath News (Lingraphica): http://talkpathnews.aphasia.com/
  - Learning English with CBC (Govt of Alberta/CBC Edmonton Initiative): http://www.cbc.ca/edmonton/learning-english/
  - Newsela: http://newsela.com (must sign up to access all features – educator credentials)
  - Scholastic News: http://magazines.scholastic.com/ (directed towards children but some content appropriate)
  - An article on aphasia book clubs started by the LA City Library: https://lareviewofbooks.org/essay/the-aphasia-book-club

Resources

- Assessment Materials:
  - Arizona Battery for Reading and Spelling
    - 40 regular, 40 irregular words (balanced for length, frequency, imageability), 20 pronounceable nonwords
    - helps to characterize alexia profile
    - http://aphasia.arizona.edu/Aphasia_Research_Project/Assessment_Materials.html

- Treatment Protocols:
  - Copy and Recall Treatment:
    - http://aphasia.arizona.edu/Aphasia_Research_Project/CART.html
  - Phonological Treatment Protocol
    - http://aphasia.arizona.edu/Aphasia_Research_Project/Phonological_Tx.html
  - Interactive Spelling Treatment
    - http://aphasia.arizona.edu/Aphasia_Research_Project/Interactive_Tx.html

Questions?
References: Specific Treatment Approaches

Pure Alexia (Single Word Approaches)


Combined Reading Battery for Aphasia (CBR-A) (2nd Ed.) Austin, TX: Pro-Ed.

References: Specific Treatment Approaches

Multiple Oral Reading (MOR)


Attentional Reading and Constrained Summarization (ARC)


Agraphia Treatments


Thank you!

Esther Kim, PhD, R.SLP, CCC-SLP
Assistant Professor, Dept. of Communication Sciences & Disorders
University of Alberta

esther.kim@ualberta.ca