Phonological Treatment

- Prerequisite skills
  - Able to read, write, and name key words for consonants and vowels (we typically use the 24 items from CART)
    - high frequency, concrete, regularly spelled nouns
    - used to retrain sound-letter (and letter-sound) correspondences
  - Train with lexical items for key words first if necessary (CART)
Example Key Words (trained with CART as needed)

Key words-Consonants

Set 1  rug, top, leaf, safe, net
Set 2  cake, fire, moon, pie, dog
Set 3  book, goat, zoo, ship, van
Set 4  hat, web, chin, judge, three

Key words-Vowels

Set 1  hat/van, cake/safe, ship/chin
       fire/pie, net/web, leaf/three
Set 2  top/dog, bone/goat, rug/judge
       moon/zoo, cow/mouth, foot/book

available at http://web.me.com/pelagie1/Aphasia_Research_Project/CART.html
“How did you select the key words?”

/d/ - dog
/v/ - Vail
/r/ - Rick
/k/ - Kim

Clinician

Say /p/

What is your key word for /p/? *(Show picture if necessary).*

Write your key word for /p/

Underline /p/ in your word

Now say the sound

Patient

/p/

“pie”

pie

pie

/p/

DVD or YouTube homework

Beeson, Rising, Kim, & Rapcsak, S. Z. (2010). *JSLHR.*
Phonological Treatment

Sound → Letter

/f/ - f [fire]

/d/ - d [dog]

Sound-to-letter correspondences: Using key word
Clinician

• Show the letter “s”
  • What is your key word for this?

• Show the picture if necessary
  • Your key word is “safe”, write “safe”

• What’s the 1st sound?

• Show the letter “s”
  • What is this sound?

Patient

“I safe”

“safe”

“ssss”

“ssss”
Phonological Treatment (Letter → Sound)

s - /s/

n - /n/

What sound goes with this letter?
Phonological Treatment

Conduction aphasia with Phonological Agraphia
Homework via DVD or YouTube
Treatment Sequence for Individuals with Phonological Impairment

Perisylvian Aphasia with Phonological Agraphia

Phonological Tx

Interactive Tx

5 weeks consonants
6 weeks vowels
5 weeks blending

retrain sound-letter correspondences and phonological manipulation skills

train problem-solving strategies to self-correct spelling errors

Direct Treatment Gains

L-S Consonants
S-L Consonants
L-S Vowels
S-L Vowels
Nonword Blending

Post
Pre
Interactive Spelling Treatment

- **Purpose**
  - Strengthen the interactive use of orthography and phonology

- **Goal**
  - To improve spelling accuracy by increasing self-detection and correction of errors

- **Approach**
  - Use residual or re-trained phonology to sound-out plausible spellings
  - Identify and correct errors
  - Use of electronic spell-checker to aid in error correction
Interactive Spelling Treatment: Problem-solving approach

1. Listen to the word.
2. Repeat it.
3. Sound out the word and try to write it.
4. Look at it. Is it correct?
5. Correct it. Try to get as close as you can.
6. Type in spell checker.
7. Is it correct?
8. If not, do you see the correct word?
9. Copy the correct spelling.
10. Circle the correct spelling.
Interactive Treatment

Interactive treatment promotes a problem-solving approach to spelling.

“Write ‘magic’”

He wrote:  *m a j c*

[typed into spellchecker]

→ magic

Conduction aphasia with Phonological Agraphia
Problem Solving at Sentence Level

1. Generate sentence using target spelling word.
2. Read sentence aloud.
3. Identify spelling errors and missing words.
4. Correct spelling errors using problem solving (sound out, examine for errors, use spell checker).
5. Note: grammatical/morphemic errors may also be detected/corrected.

- Wrote: *My surgeon approve me for surgery.*
- Read as, “My surgeon approved me for surgery.”
- Participant corrected *surgeon* using the spell checker, and sounded out and identified the missing /d/ in *approved.*
Interactive Treatment Homework
Example response to phonological and interactive treatment

Total treatment time:
- 16 weeks phonological
- 6 weeks interactive

![Graph showing Single Word Reading/Spelling and Phonological Skills]
**Before Tx**

Dog is cuming
Man is fly kite
sailboat
lady & guy the picnic and book
with wine

**After Tx**

The man a reading a book. The lady is pouring
wine or soda. A differt man the flyer a
kite, the dog help him. A man is fishing of
a pier. A couple is sailing a boat.

“This guy flying a kite. He’s
walking a dog, or his dog’s
walking him, I don’t know.
This man is fishing.”

Beeson, Rising, et al. (2016)
Neuropsychological Rehabilitation
Positive self-ratings after treatment
- Overall spelling ability:
  - “somewhat better”
- Ability to use strategies (e.g., detect and correct spelling errors):
  - “better”
- Overall confidence regarding written and spoken communication:
  - “better”

Reported increased confidence writing e-mails to friends and family

Was able to return to role as teaching assistant for Sunday school class
There is a house by the lake. The is a guy flying a kite with his dog. There was a man and woman relaxing in the yard. A man was reading a book. The woman was pouring a glass of soda. In the beach there is a guy playing in the sand.

“They’re have a picnic. I don’t know if they’re married, but the man is reading a book. And the woman is… I know she’s doing coffee. And I can see in the house, and she has her, the car. There’s a tree…”

Before Tx

Picnic
Lunch
Blanket
Shoes
He fly a kite
He is a the beach.
He is a dog.
There is a shovel of pail.
There is a sailboat, two people.

After Tx

There is a house by the lake. The is a guy flying a kite with his dog. There was a man and woman relaxing in the yard. A man was reading a book. The woman was pouring a glass of soda. In the beach there is a guy playing in the sand.
Treatment Sequence for Individuals with Phonological Impairment

Perisylvian Aphasia with Global Agraphia
- Lexical-Semantic Tx
  - retrain spelling for specific words

Perisylvian Aphasia with Phonological Agraphia
- Phonological Tx
  - retrain sound-letter correspondences and phonological manipulation skills

Interactive Tx
  - train problem-solving strategies to self-correct spelling errors

Perisylvian Aphasia with Phonological Agraphia
Phonological + Lexical Impairment

“Bobo ... one ... Bobo one ... bye... bye”

“House...trees....
car...cars...boy...girls...wine”
Wife’s Thoughts on Treatment

“The writing has really helped because he has started like writing down a few letters and then the word will come right out. And while I’m at work, he’ll call me. And then he starts talking, and I’m like, ‘I don’t know what you’re saying.’ And I’ll say, ‘Start to write it and put it in the spell checker and call me back with it.’ That has amazingly helped....”

“It really made a world of difference.”
Regained phonological awareness skills.

Pre-Treatment:

/d/-/l/-/g/ [dig]  
/p/-/A/-/t/ [pat]

Post-Treatment:

/d/-/l/-/g/ [dig]  
/p/-/A/-/t/ [pat]  
/b/-/oI/-/l/ [boil]  
/p/-/a/-/t/ [pot]

Anomic aphasia
- 1.9 years post onset when tx began
- WAB Aphasia Quotient 92.4 → 95.3
- Boston Naming Test 48 → 52
- Significant improvement in phonological skills and spelling
Response to Phonological Treatment

“Write the letter that goes with the sound.”

2/20 correct

Relearned grapheme-phoneme correspondences

(High Global Group)
Treatment Sequence for Individuals with Phonological Impairment

- Perisylvian Aphasia with Global Agraphia
  - Lexical-Semantic Tx
    - retrain spelling for specific words

- Perisylvian Aphasia with Phonological Agraphia
  - Phonological Tx
    - retrain sound-letter correspondences and phonological manipulation skills
    - train problem-solving strategies to self-correct spelling errors

- Interactive Tx

- Lexical Retrieval Cascade Tx
  - train lexical retrieval strategies including semantic and phonological self-cuing
Lexical Retrieval Cascade Treatment

Semantic elaboration

Write word
Oral reading
Phonemic cue

Write initial letter

Promoting self-cueing via

Spoken Production

Semantics
Orthography
Phonology
# Arizona Naming Assessment Cascade

<table>
<thead>
<tr>
<th>Task</th>
<th>Probing</th>
<th>Prompting</th>
</tr>
</thead>
<tbody>
<tr>
<td>“What is this.”</td>
<td>Lexical retrieval</td>
<td>Semantic self-cue</td>
</tr>
<tr>
<td>“Tell me about it.”</td>
<td>Semantic knowledge</td>
<td>Orthographic self-cue</td>
</tr>
<tr>
<td>“Can you write it?”</td>
<td>Orthographic knowledge</td>
<td>Phonemic self-cue</td>
</tr>
<tr>
<td>“Write 1ˢᵗ letter?”</td>
<td>Partial orthography</td>
<td></td>
</tr>
<tr>
<td>Written word choice</td>
<td>Reading comprehension</td>
<td></td>
</tr>
<tr>
<td>“Can you read this?”</td>
<td>Oral reading</td>
<td></td>
</tr>
<tr>
<td>“It starts with ___”</td>
<td>Phonemic cueing</td>
<td></td>
</tr>
<tr>
<td>Repeat after me</td>
<td>Motor control for speech</td>
<td></td>
</tr>
</tbody>
</table>
AZ Naming Assessment Cascade

What is it?
Tell me about it.
“cut it up … right now”
Can you write it?
  pineapple +
Can you say it?
Can you say the first sound?
  [p]
Which one is it?
“Pine….” “apple”
Lexical Retrieval Cascade Treatment

- Intended to
  - Strengthen weakened representations and processes to improve word retrieval
  - Help individuals solve lexical retrieval problems on their own by implementing self-cueing strategies
  - Provide partial information to help listener resolve communication breakdown
  - Provide alternative modality when spoken production is not successful

See case examples (PPA) using Lexical Retrieval Cascade: Henry, Rising, DeMarco, Miller, Gorno-Tempini, & Beeson (2013).
## Lexical Retrieval Cascade Treatment

Treatment procedure: Present Picture. “What is this?” Proceed through **self-cueing** and **stimulation** levels.

<table>
<thead>
<tr>
<th>Cueing Level</th>
<th>Clinician</th>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semantic <strong>Self Cue</strong></td>
<td>“Tell me about it.”</td>
<td>“It’s in the kitchen. I use it for pancakes.”</td>
</tr>
<tr>
<td>Orthographic <strong>Self Cue</strong></td>
<td>“Can you write any part of the word?”</td>
<td>s</td>
</tr>
<tr>
<td>Phonemic <strong>Self Cue</strong></td>
<td>“What sound does that letter make?”</td>
<td>/s/</td>
</tr>
<tr>
<td>Oral Reading</td>
<td>Provide written name. <strong>spatula</strong></td>
<td>Patient attempts to read word. <strong>spatula</strong></td>
</tr>
<tr>
<td>Copy</td>
<td>“Copy the word. Does that help you to say it?”</td>
<td><strong>spatula</strong></td>
</tr>
<tr>
<td>Repetition</td>
<td>“It’s a spatula.”</td>
<td>“spatula”</td>
</tr>
</tbody>
</table>
Clinician cue, “What do you do if you get stuck?”

Response, “I talk, yeah, I talk…. It’s huge. Even the baby is huge. She keeps it to almost three years before it comes out….And it’s almost ready to walk within an hour or two…. “an elephant … Elephant!”

- Named picture using semantic self cueing
- Immediately moved to next step of Cascade (writing)
Homework

- Daily homework
- Stimuli presented in recordable photo album.
  - Homework can also be presented in video format via recordable DVD or Youtube.

1. Look at picture. Try to say the name.
2. Talk about the picture. Try to say the name.
3. Try to write the name of the picture. Try to say the name.
4. Look at the first letter. Try to write the word.
5. Listen to the first sound. Try to say the word.
6. Look at the written word. Read it out loud.
Lexical Retrieval Cascade Treatment

Orthographic self-cue
  Writing served to cue correct spoken production (stabilized phonology in conduction aphasia)

Naming: Phonemic paraphasias

Semantic elaboration with good information, but still with phonemic paraphasias.

Wrote BUFF which cued “butterfly.”
Lexical Retrieval Cascade Treatment

[Talk about it.] – good semantic information
[Write it.]
Prompt: What sound does that make?
\[b\ \text{bell}\]
Phonemic self-cue successful

[Talk about it.] – good semantic information
Prompt: Can you write it?
Prompt: What is that first letter that you wrote there?
\[t – \text{Tom (key word)}\ \text{t t t – toaster}\]
Phonemic self-cue successful
Using phonology to self-correct semantic errors.

“...It’s good too for you, this one. It’s a b c /k/ /k/ /k/ /k/ ca... ca ...ca.... caaabbage, cabbage, cabbage.”

“This one is a ... ssssssh.. sh sh shoelace... no that’s something. This one is a ssssssock, sock. There is it, finally, thank you.”
“No, there’s too many things… too many things different… There’s too many things”

“p...pa... puh... piles”

“kofale….We have thousands of those in our …. all around it… where we live. They’re all over the place… And they’re good to eat.”
Response to Lexical Retrieval Cascade Tx

71 yo
Conduction Aphasia
4 years post stroke

Trained to implement cascade ...
Talk about it.
Write it – Try to say it.
If not correct, try to get first sound – for phonemic self-cue.

(note: some generalization on Set 4)
Benefit of Treatment Sequences

Lexical → Phonological → Interactive → Lexical Retrieval Tx

Conduction aphasia: WAB AQ 49.5 at 1.3 years post stroke
Used written word to stabilize phonology for spoken production (decrease paraphasias)
Greater improvement in written than spoken language  WAB AQ 49.5 → 53.3
Using orthography to cue phonology

Lexical $\rightarrow$ Phonological $\rightarrow$ Interactive $\rightarrow$ Lexical Retrieval

Orthography $\rightarrow$ Semantic self cue.
Orthography $\rightarrow$ Phonology: Phonemic self cue.
How do we maximize recovery from aphasia?

- Remediate the core phonological deficit
- Implement treatment sequences that strengthen underlying skills and provide support to advance to next level

- **Lexical-Semantic Tx**
  - 4-6 weeks

- **Phonological Tx**
  - 6-16 weeks

- **Interactive Tx**
  - 6 weeks

- **Lexical Retrieval Cascade Tx**
  - 6 - 10 weeks
This research is supported by RO1 DC007646 and RO1 357030 from the National Institute on Deafness and other Communication Disorders
References


- Fein, M., Bayley, C., Rising, K., & Beeson, P. M. (2019-online pre-publication). A structured approach to train text messaging in an individual with aphasia. *Aphasiology, 1-17."

- Resources available at our website [http://www.aphasia.arizona.edu/](http://www.aphasia.arizona.edu/)