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Evidence-Based Practice: Leading to Evolution of New Treatment Approaches for Aphasia

Emily Boss, MS, CCC-SLP

Moderated by: Amy Hansen, MA, CCC-SLP, Managing Editor, SpeechPathology.com

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Evidence-Based Practice:
Leading to Evolution of New Treatment Approaches for Aphasia

Current Best Evidence

Clinical Expertise  EBP  Client Values

Adapted from National Center for Evidence-Based Practice in Communication Disorders

Disclosures

- Financial Disclosures
  - Employed by VA Pittsburgh Healthcare System
  - SpeechPathology.com will be making a donation to the Veterans Research Foundation of Pittsburgh (VRFP), a 501c3 private, non-profit research corporation that is independent of the Veterans Health Administration (VHA). This donation is requested in lieu of presenter honoraria

- Non-financial Disclosures
  - Member of American Speech-Language-Hearing Association
    - Member of Special Interest Group 2 (Neurogenic Communication Disorders) and 13 (Swallowing and Swallowing Disorders)
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- Jim Schumacher and Dr. Michael Dickey
- Brooke Lang, Rebecca Owens, Alyssa Verlinich, and Ronda Winans-Mitrik
- Dr. Patrick Doyle
- PIRATE Staff

Lecture Series Overview: Part 1

- Review Evidence-Based Practice and provide an overview of relevant theory for the development of a new treatment approach
  - Review client profiles
  - Review underlying theory
  - Review current best evidence
  - Review existing treatment protocol
  - Introduce the impetus for SPICES
  - Briefly introduce SPICES treatment
Lecture Series Overview: Part 2

- Further introduce a step-by-step training for a newly proposed treatment approach, SPICES: Semantic Priming to Improve Comprehension and Expression of Sentences

- Present a case study of a client who participated in SPICES

Learning Objectives

- Participant will be able to:
  - Identify the three principles underlying Evidence-Based Practice (EBP).
  - Describe Spreading Activation Theory and Verb as Core as the theoretical basis for Verb Network Strengthening Treatment (VNeST).
  - Explain key principles that underlie the development and implementation of SPICES treatment.
Terms and key words

- **Agent:** The subject of a sentence
  - e.g. The boy throws the ball.
  - Agent=subject (boy)

- **Patient:** The object of a sentence
  - e.g. The boy throws the ball.
  - Patient=object (ball)

- **Client:** The person receiving services from the clinician

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**Evidence-Based Practice**

```
Current Best Evidence  
                        EBP  
                        
Clinical Expertise  
Client Values
```

*Adapted from National Center for Evidence-Based Practice in Communication Disorders*
Evidence-Based Practice

Current Best Evidence

Clinical Expertise

Client Values

Adapted from National Center for Evidence-Based Practice in Communication Disorders

Client Values

- Goal Discussions
  - Identify attainable, specific, functional goals
  - Identify primary communication partners
  - Identify primary communication environments
  - Identify topics of interest
Client Values

- Goal Discussions: Supported Communication

Lecture Overview

1. Review client profiles
2. Review underlying theory
3. Review current best evidence
4. Review existing treatment protocol
5. Introduce the impetus for SPICES
6. Briefly introduce SPICES treatment
Client 1 Profile

- **Client goal:** “Learn to speak in sentences”
- **Primary communication partner:** Wife
- **Primary communication environments:** At home
- **Interests:** News, politics, sports (Baltimore Ravens, college football, Baltimore Orioles)

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Client 1: Assessment

- **Comprehensive Aphasia Test (CAT)**
  - Naming Objects: Accurately named 19/24 items
  - Naming Actions: Accurately named 2/5 actions
  - Spoken Picture Description:
    - “Flower uh cat and um fish, fish... mm- knocked out kn-knocked it out. Sleeping uh book, book. Sleeping um cup, fl-flowers. Um...t- t- Tune, tune, tune, tune, tune. [pointing to radio]. Cat [pointing to boy], um boy, girl is uh sleeping, uh Boy is getting cat. Cat, cat. Fo-sofa, sofa, sofa, sofa.”
    - “…notable for use of fillers and the sample primarily consisted of nouns. Whole word repetitions were noted. [Client] used 2 verb phrases.”

(Swinburn, K., Porter, G., & Howard, D., 2004)
Client 1 Profile

- Diagnosis: Moderate Aphasia
  - Characterized by moderate comprehension impairments and verbal expression impairments with moderate-severe writing impairments
  - Deficits stemming from primarily semantic and syntactic deficits

- Speech was characterized by occasional production of appropriate nouns with frequent use of fillers and several automatic/perseverative phrases.

Client 2 Profile

- Client goal: “Talk on the phone”

- Primary communication partner: Significant other

- Primary communication environments: At home

- Interests: Did not provide topics of interest for conversation
Client 2: Assessment

- **Comprehensive Aphasia Test (CAT)**
  - Naming Objects: Accurately named 0/24 items
  - Naming Actions: Accurately named 0/5 actions
  - Spoken Picture Description:
    - “Uh dewy dewy dewy dewy and ah- de dewy dewy de dewy dewy and de dewy dewy dewy (made snoring sound) dewy dewy and dewy dewy dewy "Sh" dewy dewy…de dewy dewy”

- "[Client] did not produce any appropriate content units. Verbal productions did not demonstrate syntactic structure or grammaticality".

(Swinburn, K., Porter, G., & Howard, D., 2004)

Client 2 Profile

- **Diagnosis: Moderate-Severe Aphasia**
  - Characterized by moderate impairments in comprehension of written and spoken language and severe impairments in verbal output, repetition, oral reading and writing.

- Verbal production was characterized by frequent repetition and client stereotypie “dewy” and occasional verbalization of “um” or “well”.

(Swinburn, K., Porter, G., & Howard, D., 2004)
Client 3 Profile

- **Client goal**: “Increase verbal expression”
- **Primary communication partner**: Wife
- **Primary communication environments**: At home, within aphasia group
- **Interests**: Hanging out with his granddaughter, boxing, Pittsburgh sports

---

Client 3: Assessment

- **Comprehensive Aphasia Test (CAT)**
  - Naming Objects: Accurately named 5/24 items
  - Naming Actions: Accurately named 0/5 actions
  - Spoken Picture Description:
    - “Sleeping. Uh, kid playing. A cat was [neologism]. Moosic uh music. Clocks, coths, cloths. And this, uh [neologism]. Bowl uh him dess, dress. That’s it.”
  - “[Client’s] verbal output continues to be nonfluent with frequent phonological paraphasias and neologisms…Output tends to be single content words with occasional use of 2 word phrases and frequent audible pauses.”

(Swinburn, K., Porter, G., & Howard, D., 2004)
Client 3 Profile

- **Diagnosis: Moderate-Severe Aphasia**
  - Characterized by moderate-severe deficits in verbal expression and mild-moderate deficits in auditory comprehension.
  - Deficits stemming predominantly from phonological system deficits with impairments in syntactic processing; semantic system appears to be a relative strength.

- Verbal production was characterized by effortful speech comprised of mainly single content words and phonological paraphasias, neologisms, and motor speech errors.

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Client Comparison

<table>
<thead>
<tr>
<th></th>
<th>Client 1</th>
<th>Client 2</th>
<th>Client 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Naming</td>
<td>19/24</td>
<td>0/24</td>
<td>5/24</td>
</tr>
<tr>
<td>Action Naming</td>
<td>2/5</td>
<td>0/5</td>
<td>0/5</td>
</tr>
<tr>
<td>Primary Deficit</td>
<td>Primarily semantic and syntactic deficits</td>
<td>Phonological, semantic and syntactic deficits</td>
<td>Primarily phonological with syntactic deficits; semantics were a relative strength</td>
</tr>
<tr>
<td>Candidate for a verb strengthening tx?</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>
Lecture Overview

1. Review client profiles

2. **Review underlying theory**

3. Review current best evidence

4. Review existing treatment protocol

5. Introduce the impetus for SPICES

6. Briefly introduce SPICES treatment

---

Evidence-Based Practice

![Diagram of Evidence-Based Practice](image)

Current Best Evidence

EBP

Clinical Expertise  Client Values

*Adapted from National Center for Evidence-Based Practice in Communication Disorders*
Verb Network Strengthening Treatment

- Semantic treatment

- Improve lexical retrieval of subjects, objects and verbs in a sentence context

- Promotes retrieval of verbs and their corresponding semantically related subject and object pairs.

(Edmonds, 2016)

Verb Network Strengthening Treatment (VNeST): Theoretical Models

- Spreading Activation Theory of Semantic Processing

- Verb as Core
Collins & Loftus, 1975

- Spreading-Activation Theory of Semantic Processing
- Spreading activation from concept nodes

Verb Centered Treatments:
Verb as Core

1. Verbs are central to sentence formulation
2. An increase in verb retrieval will support sentence production

Adapted from Loverso et al, 1986; Edmonds, 2009
Lecture Overview

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---

Verb Network Strengthening Treatment

- Theoretical framework for the semantic organization of verbs and their specific thematic roles
- Clients are required to generate subject-object pairs for a given verb
- Comprehension component of the treatment is focused at a sentence level

(Edmonds, 2016)
Verb Network Strengthening Treatment
(Edmonds et al., 2009 & 2011)

- Phase I and II Treatment Studies

- Phase 1 Results (Edmonds et al., 2009)
  - Generalization to lexical retrieval of content words during probes
  - Improved sentence production
  - Improved noun and verb naming
  - Increase in the number of complete utterances at discourse level

- Phase II Results (Edmonds et al., 2011)
  - First participant demonstrated limited generalization
  - Second participant demonstrated generalization on all untrained probe sets

- Discrepancy may be due to the change in protocol for the second participant
  - Verbal and written responses accepted
  - Oral reading of the subject, VERB, and object
Verb Network Strengthening Treatment
(Edmonds, 2016; Edmonds et al., 2015; Edmonds et al., 2014)

- Participants: 11 persons with aphasia due to stroke ranging from mild to moderate-severe

- Results
  - Improvement and maintenance on sentences containing trained and untrained words
  - Significant increase in noun and verb naming accuracy
  - Increase in percentage of complete utterances
  - Improvement in post-treatment WAB Aphasia Quotients

Examples of Semantically Related Verbs
(Edmonds et al., 2009)

<table>
<thead>
<tr>
<th>Verb List 1</th>
<th>Verb List 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throw</td>
<td>Kick</td>
</tr>
<tr>
<td>Chop</td>
<td>Slice</td>
</tr>
<tr>
<td>Sew</td>
<td>Knit</td>
</tr>
<tr>
<td>Read</td>
<td>Write</td>
</tr>
<tr>
<td>Bake</td>
<td>Fry</td>
</tr>
</tbody>
</table>
Generalization

- Spreading activation theory to untrained verbs
- Verbs prime semantically related verbs
  - McRae, Hare, Ferretti, & Elman (2001)
- Prior semantic noun and verb treatments
  - Edmonds, Obermeyer, & Keman (2014)
  - Boyle and Coehlo (1995)

Generalization of Verb Network Strengthening Treatment

- Generalization was evident across clients regardless of linguistic impairment patterns
- Sentence construction > lexical retrieval abilities corresponded to gains in both simple and complex sentence structures
- Negative impacting factors included pronoun production, light verb usage (e.g. put, give vs. throw), sentence construction difficulties and reduced self-monitoring

(Edmonds et al., 2015)
Lecture Overview

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6. Briefly introduce SPICES treatment

---

Verb Network Strengthening Treatment

1) Generation of a single subject/object pair
2) Read the triads aloud (e.g., Butcher-Chop-Steak)
3) Answer WH- questions about selected subject-object pair
4) Semantic judgments
5) Generation of target verb
6) Generation of subject-object pairs
Verb Network Strengthening Treatment

1) Generation of a single subject/object pair

2) Read the triads aloud (e.g., Butcher-Chop-Steak)
1) Generation of a single subject/object pair
2) Read the triads aloud
3) Answer WH- questions about selected subject-object pair
4) Semantic judgments
Verb Network Strengthening Treatment

The infant examines the crime scene.

The dentist examines the soup.

The witness examines the prosecutor.

The seamstress examines the hem.

1) Generation of a single subject/object pair
2) Read the triads aloud
3) Answer WH- questions about selected subject-object pair
4) Semantic judgments
5) Generation of target verb

Edmonds, 2014
Verb Network Strengthening Treatment

1) Generation of a single subject/object pair
2) Read the triads aloud
3) Answer WH- questions about selected subject-object pair
4) Semantic judgments
5) Generation of target verb
6) Generation of subject-object pairs

A trial of VNeST is completed for a target verb using step 1.

No note cards or cues are used here.
Lecture Overview

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Evidence-Based Practice

Current Best Evidence

EBP

Clinical Expertise  Client Values

Adapted from National Center for Evidence-Based Practice in Communication Disorders
SEMANTIC PRIMING TO IMPROVE COMPREHENSION AND EXPRESSION OF SENTENCES

The impetus for development of SPICES treatment

- VNeST is an efficacious treatment approach for expansion of verbal output from words to sentences (Edmonds et al., 2009; Edmonds & Babb, 2011; see Edmonds, 2016, for review)

- However, many PWA show an inordinate difficulty with verb retrieval (verbs are supplied in VNeST treatment)

(Schumacher et al., 2016, 2017)
Clinical Observations

- Many persons with aphasia lack **specific** verbs in verbal output
- Many persons with aphasia produce mostly single nouns
- Many persons with aphasia demonstrate more difficulty with generating subjects than objects during VNeST treatment

(Schumacher et al., 2016, 2017)

"Flower uh cat and um fish, fish... mm- knocked out kn-
knocked it out. Sleeping uh book, book. Sleeping um cup, fl-
flowers. Um...t- t- Tune, tune, tune, tune, tune. [pointing to radio]. Cat [pointing to boy], um boy, girl is uh sleeping, uh
Boy is getting cat. Cat, cat. Fo-sofa, sofa, sofa, sofa."
Clinical Observations

- Many persons with aphasia lack **specific** verbs in verbal output.
- Many persons with aphasia produce mostly single nouns.
- Many persons with aphasia demonstrate more difficulty with generating subjects than objects during VNeST treatment.

**Semantic Priming to Improve Comprehension and Expression of Sentences (SPICES)**

- Clinical Need
  - More difficult to generate than objects
  - Non-Specific and/or missing
  - Relative Strength
  - A novel treatment approach which relies on good noun retrieval to facilitate retrieval of related actions and subjects.

(Schumacher et al., 2016, 2017)
Spices: An overview

- Novel picture-based treatment

- Uses good noun retrieval to facilitate retrieval of related actions or verbs.

(Schumacher et al., 2016, 2017)

Spices: An overview

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coach</td>
<td>Fumble</td>
</tr>
<tr>
<td>Running Back</td>
<td>Kick</td>
</tr>
<tr>
<td>Ben Roethlisberger</td>
<td>Pass</td>
</tr>
<tr>
<td>Football Player</td>
<td>Punt</td>
</tr>
<tr>
<td>Kicker</td>
<td>Deflate</td>
</tr>
</tbody>
</table>

Object

(Schumacher et al., 2016, 2017)
Spices: An overview

- Novel picture-based treatment
- Uses good noun retrieval to facilitate retrieval of related actions or verbs.

Spices: An overview

- Rooted in semantic-priming models (Collins & Loftus, 1975)
- Used to facilitate retrieval of verbs and their arguments (subjects and objects)
- PWA were cued to identify and produce semantically-related subjects and actions in response to pictured objects.
- Speed is a focus of treatment activities

(Schumacher et al., 2016, 2017)
The Impetus for Development of SPICES Treatment

- Research has supported bidirectional semantic priming between verbs and their arguments (Ferretti et al., 2007; Hare et al., 2009; McRae et al., 2005)

- Objects (including pictured objects) may prime related subjects and verbs (Hare, et al., 2009)

- Noun retrieval may be a strength compared to verb retrieval for many PWA, possibly contributing to telegraphic output – see Verb as Core (Loverso, Selinger & Prescott, 1979)

- Both top-down knowledge of commonplace events (e.g., McRae & Matsuki, 2009) and personally-relevant associations often trigger generative responses of related actions and subjects (Hare, et al., 2009)

Goal: To explore sentence-level treatment that would maximize number of treatment trials, as well as focus on efficiency of successful subject and verb retrieval.

(Schumacher et al., 2016, 2017)
VNeST vs. SPICES

<table>
<thead>
<tr>
<th>VNeST*</th>
<th>SPICES</th>
</tr>
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<tbody>
<tr>
<td>Supplied <strong>verb</strong> <em>(printed word)</em> serves as the semantic primer</td>
<td>Supplied <strong>object</strong> <em>(a pictured object)</em> serves as the semantic primer</td>
</tr>
<tr>
<td>Comprehension component focuses on plausibility of subject-object pairs at the <strong>sentence level</strong></td>
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<tr>
<td>Verb is <strong>supplied</strong>; Subjects and Objects are <strong>generated</strong>.</td>
<td>Object is <strong>supplied</strong>; Subjects and Verbs are <strong>generated</strong>.</td>
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</table>

*Edmonds et al. (2009, 2011)

Lecture Overview

1. Review client profiles
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5. Introduce the impetus for SPICES
6. Briefly introduce SPICES treatment
Set-up

- Client is presented with a field of 10 pictured objects. SVO sentence structure is visible for reference.

- Training is completed using block trials of 10 stimuli for the following groups:
  - Comprehension of Subjects
  - Comprehension of Verbs
  - Production of Subjects
  - Production of Verbs

Clinician: “Quarterback”
“Right; The QUARTERBACK THROWS the FOOTBALL”
“Right; The RUNNING BACK FUMBLES the FOOTBALL”

<table>
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<th>Comprehension of Agents</th>
<th>Comprehension of Verbs</th>
<th>Production of Agents</th>
<th>Production of Verbs</th>
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</thead>
</table>

Clinician points to a pictured object and requests verbal generation of a semantically related subject.
**Client:** “MUSICIAN”

**Clinician:** “Right; Please use it in a sentence.”

**Client:** “The MUSICIAN plays the GUITAR.”

---

Clinician points to a pictured object and requests verbal generation of a semantically related verb.
**Client:** “Strum”

**Clinician:** “Right; Please use it in a sentence.”

**Client:** “The music teacher STRUMS the GUITAR.”

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<tbody>
<tr>
<td>1</td>
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**VNeST vs. SPICES**

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*Edmonds et al. (2009, 2011, 2016)
SPICES

- Improved retrieval of actions and subjects was hypothesized to improve both SVO sentence generation and processing speed.

- Pre-Phase I investigation provided SPICES as an adjuvant to VNeST to (2) PWA and later as a stand-alone treatment to (2) PWA.

(Schumacher et al., 2016, 2017)

Review

Current Best Evidence

EBP

Clinical Expertise

Client Values

Adapted from National Center for Evidence-Based Practice in Communication Disorders
What’s next?

- Further explore a step-by-step training for a newly proposed treatment approach, SPICES: Semantic Priming to Improve Comprehension and Expression of Sentences.

- Present a case study of a client who participated in SPICES.

Questions?
References


McRae, K., & Matsuki, K. (2009). People use their knowledge of common events to understand language, and do so as quickly as possible. Language and Linguistics Compass, 3(5), 1417–1429.


