Clinical Application of Evidence-Based Treatments for Aphasia and Acquired Apraxia of Speech

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Dr. Wambaugh is receiving payment for this presentation.
Session Overview

Lexical retrieval treatments
Language production treatments
AOS diagnosis and assessment – new developments
AOS treatments – overview of new developments
Articulatory – Kinematic AOS treatment
Rate/rhythm control treatment
Word-Retrieval Treatments

Majority of evidence focused on confrontation naming of object names

Increasing research concerning action naming / verb retrieval
  ◦ Evidence supporting verb retrieval in isolation
  ◦ Evidence supporting verb retrieval in sentence contexts

Limited, but increasing research concerning other grammatical classes (e.g., adjectives)
Types of Treatment Effects

**Acquisition** – improvement of naming of trained items in probes (similar to tx)

**Response Generalization** - to untrained items
  ◦ *To untrained exemplars* – within category
  ◦ *To untrained items* - across categories

**Stimulus Generalization** - to untrained contexts (using trained behaviors in stimulus contexts that differ from treatment)
Semantic Feature Analysis (SFA)

Appears to have more evidence supporting its use relative to other approaches


Ongoing research using SFA.

Strengths

- Strong theoretical foundation
- Robust effects for treated items
- Positive, but inconsistent, generalization to untreated items
SFA

Originally developed for tx. of TBI (Haarbauer-Krupa et al., 1985)
  ◦ “structured thinking procedure”
  ◦ “for thought organization and verbal expression”

Adapted for use with persons with aphasia (Boyle & Coelho, 1995; Lowell, Beeson, & Holland, 1995)
  ◦ Strengthen semantic networks – within category generalization
  ◦ Use as a compensatory strategy – across (& within) category generalization
SFA – Basic Procedures

- Uses a standard template for each trial/presentation of target item
- Picture placed in center
- Semantic feature boxes (labels, but w/o specific features) surround the picture
- Therapist guides the PWA in retrieval of features associated with the target item
GROUP: Cooking thing
DESCRIPTION: Bowl, beater, stand, motor
FUNCTION: Mixes things

CONTEXT: In kitchen on counter
SPECIAL FEATURES: Heavy noisy
PERSONAL/OTHER: Grandma’s Chocolate cake
GROUP

Bird

DESCRIPTION

Feathers, wings, beak

FUNCTION

Lays eggs, we eat it

CONTEXT

On a farm, at a petting zoo

SPECIAL FEATURES

Doesn’t fly much, used for food

PERSONAL/OTHER

Neighbors have some
Considerations for Clinical Application of SFA
SFA: Typical Application in Research Studies

~ 3X per week
~ hourly sessions
8-10 items treated
Number of trials??
~30 min+ for a single trial
SFA: Candidates

PWA with significant word-retrieval deficits
Comprehension adequate for understanding feature labels
Types of aphasia: any, with exception of Global (but, limited data precluding)
Item Selection

One semantic category or across-category?
- No data comparing within vs. across
- Boyle suggests across-category may be preferred (anecdotal)

Evidence base for SFA – positive results based on repeated training with the SAME items
- i.e., NOT different items every session
- Items trained to criterion, then other items trained
- Boyle – many exemplars vs. few exemplars
Item Selection Cont.

What about typicality?
Exemplar Typicality (Kiran and colleagues)

Generalization within semantic categories

- Atypical → Typical
- Typical ← Atypical

Based on Plaut (1996) – computational modeling
Exemplar Typicality (Kiran & Thompson, 2003)
Why?

Atypical exemplars are at the periphery of the semantic categories

Training features associated with atypical exemplars emphasizes the *variation* of features within a category

- **Ostrich** – runs, long legs
- **Penguin** – swims, eats fish
- **Robin** – lays eggs, has beak

Training features associated with typical exemplars emphasizes only the *core* features of the category
Exemplar Typicality (Kiran et al.)
Evidence Base

Demonstrated with animate & inanimate natural language categories, well-defined, & goal-derived categories

Confrontation naming & generative naming

Effects found for most, but not all participants

Effects most consistent with persons with FLUENT aphasia

Few nonfluent cases studied
SFA + Typicality Tx. (Wambaugh et al. 2013)

Typical and atypical exemplars treated with SFA + typicality treatment

Multiple categories trained sequentially

9 PWA (6 Broca’s, 2 Anomic, 1 Wernicke’s)

8/9 demonstrated gains in treated items

Limited generalization

- Atypical ≠ typical
- Typical ≠ atypical
Feature Labels: Which to Use?

Lowell et al. (1995)
- action/use, group, where, parts, properties, same group, other

Boyle (2004)
- group, use, action, properties, location, association

Wambaugh et al.
- group, description, function, context, special features, personal/other
Feature Labels Cont.

Animate & Inanimate Categories (living vs. artifact/non living)

Verbs (Wambaugh & Ferguson, 2007)
- subject (agent), purpose of action, body part/tool used, description, usual location, related objects/actions

Fewer categories
- Hashimoto (2011) used only 3 categories
Learning Theories: Application to SFA

Errorless vs. Errorful Learning
  ◦ Hebbian learning – neurons that fire together, wire together
  ◦ But...we do learn from errors

Retrieval vs. Study (relates to depth of processing)
  ◦ Additional testing has been shown to be more beneficial than additional study
So….

How often do you provide the name of the target (if at all)?
What group or category does a car (this?) belong to?

How would you describe a car (this)?

“What is this?”

Provides name or not?
So...how are features identified?

- Clinician provided (study only)
- Clinician provides choices (identification)
- Clinician ask PWA to generate (retrieval)
- Clinician provides cues? (assisted retrieval)
**Type of transportation**: 4 wheels
**Engine**: Made of metal
**Drive it places**: In garage
**1st car**: Goes fast
**Costs a lot**: 1st car was a Beetle
GROUP
Transportation
Or
Furniture?

DESCRIPTION
Legs?
Wheels?

FUNCTION
Ride in it?
Eat it?

CONTEXT
In garage?
In the sky?

SPECIAL FEATURES
Runs on gas?
Runs on water?

PERSONAL/OTHER

---

- Transportation or Furniture?
- Legs? Wheels?
- Ride in it? Eat it?
- In garage? In the sky?
- Runs on gas? Runs on water?
Consider a Hierarchy

1. Request a self-generated response
   *If no response or incorrect/inadequate...*

2. Provide response options
   *If incorrect...*

3. Provide cues
   *If incorrect...*

4. Provide the feature
Other Considerations Re: Features

How many features to elicit per category?

What if provided features are not the best but somewhat appropriate?

Session to session...same features or varied?
Testing Effects (Retrieval Effects)

Consider adding a “test” at the end of the session

Additional testing provides greater learning than additional study

Boyle’s generalization findings tend to be stronger than those of other investigators – probes conducted at the end of session

May want to test/probe generalization items relatively frequently
SFA: Application to Discourse

Peach & Reuter (2010)

Elicited samples of narrative (i.e., picture description) & procedural discourse (e.g., How do you trim a Christmas tree?)

Identified word retrieval failures in the discourse production

Then, applied SFA to the identified failures
SFA: Application to Groups

Antonucci et al. (2009)

Small group (n=3) – tx. 2X/week

Practiced SFA procedure with single pictures for a few session

Then, applied SFA using PACE-like procedures

Outcome measure = CIUs (correct information units)

- Found large increase in production of CIUs
- Production of words increased too, so % CIUs remained the same
Antonucci et al.: Progression of Tx.

- Single scene pictures
- Single scene pictures – depicting a problem
- Picture sequences
- Telling story from picture sequence when pictures removed
- Fairy tale
- Movie plot
SFA: Application to Action Names

• Limited findings to date (Wambaugh & Ferguson, 2007; Wambaugh, Mauszycki, & Wright, 2014)

• Similar findings to object naming SFA studies

• Slightly different feature labels required.
SUBJECT: Pitcher

PURPOSE: Make batter miss; part of game

BODY PART/TOOL: Arm, ball

DESCRIPTION: Moves arm fast to throw ball

LOCATION: Ball park

PERSONAL/OTHER: Watching grandson
SFA: Outcome Measures

Correct naming of target item

Latency of naming

Use of circumlocutions (qualitative changes in naming errors)

Ability to generate features

Other??

When to measure?
  ◦ Probes
  ◦ Using tx. data
Consider Qualitative Scoring (e.g. qualitative scoring for verbs)

9   Accurate, immediate (<5 sec)
8   Accurate, delayed (>5 sec)
7.5 Uninflected or incorrectly inflected
7   Self-corrected
6A Phonemic paraphasia (single phoneme subs)
6B PP (recognizable with at least 50% of sound correct)
5.5 Partial retrieval (noun form, word embedded)
Qualitative Cont.

5  Semantic paraphasia (5N=noun)
4.5  Mixed semantic & phonemic pp
4  Appropriate gestural or written response
3  Circumlocution
2.5  Tangential speech
2  Neologism
1  Perseveration
0  No response
Using Tx. Data as Outcome Data

Wambaugh, Mauszycki, & Wright (2014)

SFA (verbs) – 4 participants

Compared probe data to 1st naming attempt during treatment application

3 participants (good responders) – high positive correlations ($r = 0.80$ to 0.94)

1 participant (poor responder) – mixed results

- One list – good performance in tx., but poor performance on probes ($r = 0.28$)
- One list – poor performance in tx. & probes ($r = 0.73$)
Typicality Tx.: Candidates for Tx.

Typicality effect (non tx. studies)
- Nonfluent pts. have been shown to be responsive to typicality effects in non tx. studies (e.g., can name typical exemplars faster than atypical – “normal” performance
- Fluent pts. often do not show the typicality effect in non tx. studies
  - Judging category membership
  - Ignore category boundaries

This tx. may be better for pts. who do not have typicality effect difficulties

Kiran et al. (2007) – semantic deficits associated with typicality effect (rather than aphasia type)
Symptoms of a Semantic Deficit

Semantic paraphasias

Categorization difficulties

Semantic judgment problems
  - Is it in the category of _____? (e.g., Is it a tool?)
  - Is is similar to a coordinate? (e.g., Is it similar to a wrench?)
  - Is it used by a(n) associate? (e.g., Is it used by a mechanic?)

Word – picture matching problems

Synonym – antonym task difficulties
Semantic Deficit Symptoms Cont.

Semantic relatedness judgments
- car: dog truck table glass

*Pyramids & Palm Trees* (Howard & Patterson, 1992)

*The Psycholinguistic Assessment of Language Processing in Aphasia* (*PALPA*; Kay et al., 1992)

Kiran (2008) - <85% on 3 *PALPA* subtests/PPT
Typicality Treatment: Item Selection

Select a semantic category to be trained
- Natural language categories (living & non living)
- Well-defined categories
- Ad hoc, goal-derived categories

Select ~ 8-10 atypical exemplars

Select other exemplars for measuring generalization

Typical – Atypical – Mid Typical

Existing literature or estimate

Considering evaluating pt.’s familiarity with items
### Examples: Birds

Kiran & Thompson (2003)

<table>
<thead>
<tr>
<th><strong>TYPICAL</strong></th>
<th><strong>ATYPICAL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluebird</td>
<td>Pheasant</td>
</tr>
<tr>
<td>Bluejay</td>
<td>Peacock</td>
</tr>
<tr>
<td>Cardinal</td>
<td>Pelican</td>
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<tr>
<td>Robin</td>
<td>Chicken</td>
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<tr>
<td>Crow</td>
<td>Ostrich</td>
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<tr>
<td>Woodpecker</td>
<td>Turkey</td>
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<tr>
<td>Hummingbird</td>
<td>Penguin</td>
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<tr>
<td>Parrot</td>
<td>Flamingo</td>
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</tbody>
</table>
### Examples: Vegetables

*Kiran & Thompson (2003)*

<table>
<thead>
<tr>
<th><strong>TYPICAL</strong></th>
<th><strong>ATYPICAL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrot</td>
<td>Scallions</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Parsley</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Artichoke</td>
</tr>
<tr>
<td>Lettuce</td>
<td>Kidney beans</td>
</tr>
<tr>
<td>Radish</td>
<td>Pumpkin</td>
</tr>
<tr>
<td>Spinach</td>
<td>Rhubarb</td>
</tr>
<tr>
<td>Celery</td>
<td>Olive</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Garlic</td>
</tr>
</tbody>
</table>
Typicality Treatment Tasks/Steps
Kiran et al.

Naming
Category sorting
Identifying semantic attributes
Yes/no questions concerning semantic features
Naming
Step 1: Naming

Show picture, ask pt. to name it

Regardless of accuracy, explain that he/she will be assisted in learning more about the item

Correction?

Modeling?

Practice in production?
Step 2: Categorization

Written category cards placed on table in random order
- Birds/vegetables, animals, fruits, instruments

60 pictures presented one at a time to sort into correct category
- 24 from target category
- 12 from each of 3 distractor categories

If incorrect, picture moved to correct location

Eliminated for each item after 100% correct sorting in 10 consecutive sessions – used only once at start of session
Step 3: Feature Selection

Board with slot for target picture and 6 semantic features

Examiner provided written semantic feature cards pertaining to the category (e.g., flies distance, swims, is eaten for food, lays eggs)

Pt. required to select 6 features that applied to target item

After selected, had to read aloud
Has feathers
Long legs
Runs
Long neck
Very large
Dangerous
Step 4: Yes-No Questions

Therapist asks 15 questions about the target item

5 acceptable about item
  ◦ Does it lay eggs?

5 unacceptable using features from target category
  ◦ Does it swim?

5 unacceptable from a different semantic category
  ◦ Is it made of metal?
Step 5: Naming

Same as Step 1
Treatment Materials Needed

Pictures

Category Labels for Sorting

Pictures for Sorting (12 for 3 distractors; 24 for target category)

Semantic features for each item & category in general (printed on cards)
Has feathers
Flies fast
Long beak
Sips nectar
tiny
Lays eggs
Yes – No?

Is it made of wood? (other category)
Does it fly fast? (item specific)
Does it eat fish? (same category)
Does it migrate in winter? (item specific)
Is it used for fixing things? (other category)
.....15 questions
Length of Tx.

2 sessions/week (Kiran & Thompson)

Max. 20 sessions per set of items (same items every session) (Kiran & Thompson)

Consider using behavioral criterion
  ◦ 90% correct naming in 3 sessions
  ◦ Verify with probe
Phonological Components Analysis (Leonard et al., 2008)

Limited study to date

However, recent findings by van Hees....

- 7/8 PWA had significant increases in naming with PCA
- 4/8 (same PWA) had significant increases in naming with SFA
- 12 sessions total – ½ with SFA ½ with PCA
Phonological Components

**Rhymes:** “What does this rhyme with?”

**First Sound:** “What sound does it start with?”

**1st Sound Associate:** “What other word starts with the same sound?”

**Final Sound:** “What sound does it end with?”

**# of Syllables:** “How many beats does the word have?”
Rhymes with

**fog**

First Sound

**d**

First Sound Associate

Ends With

**dad**

Syllables

**g**

2
Response Elaboration Training (RET)
RET (Kearns, 1985)

Designed to increase creative use of language (as opposed to focusing on predetermined, “correct” responses)

Intended to facilitate verbal productivity
  - content and length of utterances

Capitalizes on patient-initiated utterances

Modeling, forward-chaining, and feedback are used to expand utterances
Response Elaboration Training (RET)-Kearns et al.

**Rationale**: that overly structured treatment may inhibit the patient from using language creatively.

No “correct” or “target” response specified by therapist

Considered a “loose-training” procedure – approximates natural communication
RET Investigations

**RET: Kearns and colleagues**

- Options for AOS speakers
- Application to personal recounts
- Application to procedural discourse

**RET + SFA** (Conley & Coelho, 2003)
Accessing Early RET Reports

www.clinicalaphasiology.org

Tab – “Abstracts and Proceedings”

Select “Clinical Aphasiology University of Pittsburgh Library Archive”

Then...browse or search (>1600 documents)
Modified Version of RET (M-RET)

1. Present picture stimuli & elicit a response
   - model 2 response options (e.g., “you could say NP or VP”)
   - model a 1-word response - request repetition
   - use integral stimulation

2. Repeat patient’s production & reinforce

3. Ask a question to elicit an elaboration of the original response
   - model 2 response options (e.g., “you could say NP or VP”)
   - model a 1-word response - request repetition
   - use integral stimulation
Modified Version Cont.

4. Repeat & reinforce the new production; model combined productions (1 + 3)

5. Model combined production and request a repetition
   ◦ if correct - 3 more productions
   ◦ if incorrect - use integral stimulation to elicit multiple productions

6. Remove picture for 5 seconds - request repetition of description
   ◦ if correct - reinforce
   ◦ if incorrect or partial response - model and use integral stimulation to elicit response
Outcome Measures: Correct Information Units (Nicholas & Brookshire, 1993)

Content measure in discourse
Narrative & procedural discourse elicited systematically

Measures
- Total # words
- Total # CIUs
- Efficiency measure

Normative data
CIU Elicitation

4 single pictures (cookie thief, picnic scene, cat up tree, dog & birthday cake)

2 sequences of pictures

2 response to requests for personal information
- Do on Sundays?

2 procedural descriptions
- Doing dishes
- Write & send a letter
CIU Example

TREE: Ah how say that `cat cat da ah dog ahm man bird girl ah bike bike ahm how say that two men ahm how say that hm ah gi gi truck truck trunk

Words: 22
CIUs: 9
CIU Reference

# = additional sessions conducted following achievement of criterion to evaluate stability of gains and/or promote additional gains.
RET Tx. Session
RET Example Response

Speaker 1

- *Pretreatment*

- *Posttreatment*
RET: Pre and Post Treatment Samples

**PRE TX.**
- WAB AQ = 35.5
- PICA OVERALL = 36\textsuperscript{TH} \%TILE
- 4 CIUS
- 106 WORDS
- EFFICIENCY = 4%

**POST-TX.**
- WAB AQ = 47
- PICA OVERALL = 43\textsuperscript{RD} \%TILE
- 35 CIUS
- 385 WORDS
- EFFICIENCY = 9%
Pre vs. Post-treatment
M-RET for Clinical Application

Select picture stimuli for use (~10 pictures)
- Action pictures suggested
- Personal pictures?

Select outcome measures

Measure behaviors pre treatment
- May need repeated measurement – particularly for less severe pts.

Decide upon desired criterion for terminating tx.

Apply to picture set (see other handout)
- 1-2 trials per 45-60 min. session
Outcome Measures for M-RET

CIUs
MLU
Different words/lexical inventory
Word types
Phrase and/or sentence types/counts
Initiations in discourse
Turns in discourse
Candidates for M-RET (picture level)

Non fluent aphasia
- Most evidence in literature

Severity: moderate-severe to mild-moderate

Limited ability to describe pictures
- Few CIUs/picture
- MLU < 5-6

AOS ok

Severe word-retrieval difficulties??

Fluent aphasia
- Some evidence - consider
LIV Cards (Life Interests and Values; Haley et al., 2010)

121 cards – to “facilitate self-determination and autonomy” in the process of management of communication disorders

95 cards depicting activities of interest to adults – corresponding composite cards

- Home/community activities
- Relaxing & creative activities
- Physical activities
- Social activities

Sorting process used to prioritize interests

LIV: Home & Community Activities
LIV: Home Maintenance
LIV: Physical Activities
LIV: Racquet Sports
RET Applied to Personal Recount

• no picture stimuli
• patient instructed to “Tell me something about anything that you would like to talk about.”
• treatment hierarchy applied as before
• at least 14 topic attempts elaborated upon per session
Speaker 3

Baseline | Treatment | Maintenance | 4 week f/u

Average Number of CIUs Produced per Picture

Set 1

Set 2

Set 3

Trained Items
Untrained Items

Average Number of CIUs/min

Personal Recount

* = began collecting 6 min. samples
Results from Personal Recount Tx.

• Positive findings for 3/9 participants
• Consider as an option
• May need to follow picture level M-RET
Procedural M-RET

Pool of Procedural Items
*Tell me in detail how you would go about....*

- Getting groceries
- Putting up a fence
- Planting a tree
- Having a party
- Making the bed
- Making lemonade
- Buying a car
- Fixing a dripping faucet
- Seeing a doctor
- Giving a talk
- Making a tuna sandwich
- Getting ready for church
- Washing a car
- Doing the laundry
- Getting gas
- Getting the oil changed
- Shaving
- Fixing breakfast
- Laying a cement pad
- Moving to a new house
Modified RET – Procedures

1. “Tell me how you would go about ________”
   ◦ model 2 response options (steps in procedure)
   ◦ model a 1-word response - request repetition
   ◦ use integral stimulation

2. repeat patient’s production & reinforce

3. request elaboration or clarification about specific step in the procedure
   ◦ model 2 response options
   ◦ model a 1-word response - request repetition
   ◦ use integral stimulation
Modified RET: Procedures

4. paraphrase step being targeted and request a repetition.
5. wait 5 seconds and request a repetition of step 4
Personal Recount Condition

Procedural Condition

Set 1

Set 2

Untreated Procedural Condition

Probe Sessions

Baseline  Treatment  Maintenance  Follow-up

d = -0.19

d = 6.67

d = 7.1
# Number of Novel Words

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<th>Condition</th>
<th></th>
<th>Highest Baseline</th>
<th>End of Tx.</th>
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## Pre vs. Post-tx. Assessment

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<th>P1 post</th>
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<th>P2 post</th>
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<td># CIUS</td>
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<td>59%</td>
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</table>
P1: How to give a party

Post Treatment: uh xx pick uh xx right people that will be with you at the party then have a party that it won’t be so noisy and that will be respectful with the people

Last Baseline: first get a big group uh can’t do it can’t do this this story decide what to do at the party (cue) no

First Baseline: I don’t have any parties (cue) loud ones and bunch of music that’s about all I know
P2: Baseline #1...How to give a talk

talk um go to the pay’by (probably) the the usually thum the x the x know the subject well I don’t know but the or the um the topic the write down all the heals on notes here the fork and go to the computer the type everything here thum th-th-the printed here go to the um thum the go to the thum invitation or the church or thum xx talk and x go to the um sit down the talk x in a nice dress xxx (C) xx nope
P2: End of Tx...How to give a talk

X went to the computer the rechurch the research the topic the um I the um x the type the rough draft first thum thum out pashe no outline first here thum go to the um thum the mirror my mirror the give my talk to myself the um call the two friends come to my apartment thum I the um I may the three copies myself and the my friends too thum I x x word x x the I’ll x leave my talk to my friends they always x criticize me the um the slow down enunciate the the thum x mumbling x x always but thum but thum I my friend my friend left I thum wash my hair dress here take a shower everything comb my hair dress x dress up for the church or the audi word gym x x audi x auditorium x close x thum I go drove to the um the church or the auditorium x park the go to the um the place here I waiting for the x my time to speak the give the x talk again or the church the um the um the sit down drove back home yes (C) nope
P3: Post-tx - How to fix a leaky faucet

BASELINE

xxx um fixing a dripping faucet um my wife does all that kind of stuff um you gotta get under the sink to find the hole um and then find a hole um xxx that’s for a clog um make sure the water’s off and then replace the sink I don’t know idea have no idea (cue) no

POST TX.

um first of all under sneak under the sink um I need check there any loose fitting clamps or pipes and then after that I call Batley Plumbing in the yellow pages because Dairy Gary’s dad is a plumber and he doesn’t charge me for the diagnostic fee he only charge me for the repair he does if he doesn’t have the tools he’ll wait a couple of days then he’ll fix it for free all I gotta do is pay him for the parts (cue) uh-un
Combined Aphasia and Apraxia of Speech Treatment (CAAST)
RET (M-RET) → CAAST

RET was designed to increase production of content and length of utterance (Kearns, 1985)

Robust literature supporting effects

Modified-RET

For use with persons with aphasia & AOS

- Similar language outcomes to RET
- No measurement of impact on speech
- Increased productivity, but speech production difficulties are not addressed
CAAST

Sentence frame introduced (1X)

M-RET

Picture stimuli used to elicit any utterance (models, repetition, integral used as needed)

Utterance is reinforced, written in frame and then elaborated

Elaborated utterance is presented for repetition

Sound errors are targeted using SPT
SPT

Designed to improve articulation of preselected problematic sounds produced in the context of words/phrases/sentences

Response contingent hierarchy
◦ Modeling/repetition
◦ Orthographic cuing
◦ Integral stimulation
◦ Articulatory cueing

Consistently results in improved production of targets in treated items with generalized production to untrained items
<table>
<thead>
<tr>
<th>Doer</th>
<th>Action</th>
<th>Theme</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAN</td>
<td>SHAVE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CAAST Steps – see handout
CAAST Tx. Example
Outcome Measures

CIUs (Correct Information Units; Nicholas & Brookshire, 1993)
- With experimental stimuli (trained & untrained pictures)
- With N & B stimuli

Percent Consonants Correct – sentence repetition
- With printed sentences
- Without printed sentences

Word Intelligibility
Initial CAAST Findings (Wambaugh et al., JSLHR, 2014)

All 4 participants (chronic AOS+aphasia)- CIUs for 2 applications of CAAST

Positive generalization to untrained sets

Gains were seen for 2/4 Ps on the Nicholas & Brookshire (1993) task

↑ in speech intelligibility for 1/4 Ps

↑ in accuracy of articulation in sentence repetition for 2/4 Ps
Participant 2

Baseline

Treatment

Maintenance

Follow Up

Probe Sessions

SET 1: # CIUs

SET 2: # CIUs

SET 3: # CIUs

Baseline Treatment Maintenance Follow Up 2 & 6 weeks

adjusted trend line

adjusted mean line

d=5.41

d=6.11

d=3.8
Participant 4

Baseline Treatment Maintenance Follow Up 2 & 6 weeks

SET 1: # CIUs
- Adjusted mean line: d=5.79
- Adjusted trend line

SET 2: # CIUs
- Adjusted mean line: d=13.64

SET 3: # CIUs
- Adjusted mean line: d=16.01
Modifications for 2\textsuperscript{nd} CAAST study

8 pictures instead of 10

SPT completed one additional time with each elaborated utterance

Generalization practice (one picture per session)

“\textit{We’re going to practice talking about this picture like we do in our probes. We want you to be able to put words together in longer phrases or sentences as much as you can...}”

“That’s great. \textit{There are probably many more sentences you could make about this picture, but we won’t practice them now. Of course, when talking about this picture, it is also fine to say as much as you can using individual words. But, we hope therapy helps you put the words together as well.}”
Summary of CAAST-2 Findings

3/4 participants CIU production with experimental stimuli
  ◦ Trained pictures
  ◦ Untrained pictures

4/4 participants CIU productions in Nicholas & Brookshire task

4/4 participants PCC in sentence repetition at 2 weeks – larger increases with written stimuli; but 3/4 maintained at 6 weeks

3/4 participants intelligibility