Treatment at the Edges: Evaluating Innovations and Quality Features from High Tech to No Tech

Teresa A. Ukrainetz, Ph.D., S-LP(C)
Utah State University
LaVae M. Hoffman, Ph.D., CCC-SLP
University of Virginia

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Evidence-Based Practice
Scientific and clinical reasoning
Research-based features of effective treatments
How emerging research can inform clinical decision-making

Pre-Conditions to Effective Reasoning about EBP
- Honest doubt about suitability of a clinical action
- Openness to seeking reasons
- Seeking to really understand evidence before evaluation and application
- Keeping in mind the original concern and larger situation
- Willing to change positions given sufficient evidence
- Awareness of own preferences and biases, honesty and integrity
- Willingness to let strong evidence guide actions
- Mindfulness of ethical responsibilities and principles of beneficence, autonomy, justice


What Do I do When I Can’t Find a Study!?
No study on
my treatment
for my population
for my outcome
for my context & stakeholders
**More Research! Not Always the Answer**

1. Qns concerning social and personal values
   - Rights, resources, culture, job protection
2. Qns for which contrary findings are not accepted
   - I know it works the way I do it
3. Qns that require logical thinking
   - Concepts that need definition and differentiation
   - Superficial variations on a basic tx
   - Txs that don’t make sense

Siegel (1987)

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**Some Effective Attributes of Tx**

1. Goals, procedures, materials, activities linked to contexts of communicative use (Fey, 1986; McCaulley et al., 2017)
2. Explicit, intensive, systematic, supportive procedures (Berninger et al., 2003; Torgesen, Alexander, et al., 2001; Torgesen, Wagner, et al. 2010)
3. Focused attention, multiple learning trials, varied task complexity based on responses, progress rewards (Gillam et al., 2001; Gillam et al., 2008; Gillam & Gillam, 2012, 2014)
4. High frequency of consistent target input, high variability in non-target input, frequent correct retrieval of the new learning (Ai, 2018; Palma & Gomez, 2018)
5. Instructor modeling, practice with feedback, matching support to learner level, routinized format (Garsten et al., 2001; Rosenshine et al., 1996; Swanson & Hoskyn, 1998)
6. Number and duration of intervention sessions, distribution over time, learner grouping (Brossou-Lapré & Greenwell, 2019; Justice et al., 2016; Hoffman, 2009; Ukrainetz, 2009; Warren et al., 2007)

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**Boiling down the tx research: RISE+**

- Repeated opportunities for skill learning
- Intensity of instruction
- Systematic support of tx skills
- Explicit focus on targeted skills
  - **Learner Factor:** attention, motivation, & engagement

Across tx approaches, procedures, skills, modalities, disorders, ages


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**Repeated Opportunities**

- For learning and practice of target skill
  - 10,000 hours?
  - 200 repetitions of correct /s/ in a session?
  - 20 repetitions verb + object in a session?
  - How many expositions in a session?
- Plan many opportunities
  - Encounter, examine, create, revise, present, review
  - Within and across sessions
  - In other contexts
  - More careful/creative planning required the more contextualized/naturalistic the tx

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**Intensity of Tx**

- How often for how long with how many students at a time
  - Individual 200 minutes a day 5x/wk
  - Groups at 20 minutes 1x/wk
  - More time generally better but not always
  - Tx distribution
    - Massed practice for motor skill change and automatically/habit formation
    - Distributed practice to think about it and solidify/maintain

See Warren et al. (2007), Topics in Lang Dis (2009)

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**Systematic Support – Structural Scaffolding**

- Modify physical & social environment
  - Increase facilitating features, e.g., routines, visual supports, helpful peers
  - Reduce constraining features, e.g., distractions, interruptions, discomforts, rush
- Highlight and support tx skill with consistency, predictability, repetition, accessibility
  - Keep non-target skills variable and unremarkable
  - Simplify whole communicative activities
  - Make focused skill tasks more communicative
**Systematic Support – Interactive Scaffolding**

- Responsive dynamic moves of skilled clinician to highlight and support target skill
  - Matched to child need & task difficulty
  - Decrease in support and handover to child
  - Not just helping
- **Linguistic**: give info to help child create better response; expansions & recasts
- **Regulatory**: control beh & attn, gain responses, build toward self-control

**Internalization into automatized skills and self-regulated strategies**

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**Explicit Skill Focus**

Explicit attention to a few target skills
- Focus on the target skill within activities
- Avoid, assist, or ignore non-target skills
- Known by SLP and student
- Tx targets should be apparent to an observer

**For summarization tx goal using a science text**
1. **Avoid** difficult content & extended vocabulary discussions
2. **Assist** with word decoding & sentence meaning
3. **Ignore** sentence structure errors & eye contact

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**Learner “Buy-in” & Ownership**

1. **Attention**: Looking for *action, learning, liking* (Hogarth et al. 2010)
2. **Motivation**: Reasons & attitudes re: skill, activity, effort (Guthrie et al., 2013; Wigfield et al., 2008)
   - I enjoy reading. This task is hard but it is important. I believe I can succeed.
   - I hate reading. This reading task is too hard. Why am I doing this? How can I get out of this?
3. **Engagement**: Participation; “in the flow”, “in the zone”; behaviors during & attitude after activity

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**How Much RISE+?**

**Ease of Learning**

<table>
<thead>
<tr>
<th>R</th>
<th>I</th>
<th>S</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few ⇒ Some ⇒ Many</td>
<td>Class ⇒ Group ⇒ Individual</td>
<td>Occasional ⇒ Regular ⇒ Frequent</td>
<td>Short ⇒ Middling ⇒ Long</td>
</tr>
<tr>
<td>Little ⇒ Some ⇒ Lots</td>
<td>Implicit ⇒ Explicit ⇒ Meta</td>
<td>Passive &amp; minimal ⇒ Motivated, attentive ⇒ Self-directed, engaged</td>
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**Evaluating Evidence for Lo Tech – Active Learner Tx**

**Sketch and Speak**
Expository Strategy Tx

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**Re-Vision Disorders as Differences**

- Modify Interactions & Environments
- Teach Language & Learning Skills
- Skills in contexts of use & discourse level
- Isolated skill drill & word level
- Reprogram Neuropsychological Processes
- Cure/Fix Causes

**RISE+ for Levels of Intervention**

Sketch & Speak: Treatment & Learning Strategies

1. Quick & easy, enough-to-remember pictography of ideas from expository text
2. Turn into quick & easy, enough-to-remember bulleted notes
3. With oral formulation & rehearsal of own full sentences & whole reports
4. All with interactive oral scaffolding
   ➔ Integrated set of flexible strategies suited to SLPs and applicable to range of informational text activities

Core Sketch & Speak Tx Procedure

<table>
<thead>
<tr>
<th>Session 1 - Pictography Notes</th>
<th>Session 2 - Bulleted Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Read aloud text with print in view</td>
<td>1. Student says full report from pictography notes</td>
</tr>
<tr>
<td>2. Stop reading to identify important or interesting idea to remember</td>
<td>2. Claim check against article</td>
</tr>
<tr>
<td>3. Turn idea into quick &amp; easy, just enough to remember pictography note on formatted sheet</td>
<td>3. Say full sentence from picto then reduces to simple quick &amp; easy, just enough to remember bulleted note</td>
</tr>
<tr>
<td>4. Say full sentence from picto</td>
<td>4. Say full sentence again – revise if needed – but say it again</td>
</tr>
<tr>
<td>5. Say full sentence again – revise if needed – but say it again</td>
<td>5. Repeat #3-4 for each pictography to bulleted note</td>
</tr>
<tr>
<td>6. Repeat #1-5 for each text idea until text done with 7-10 pictos</td>
<td>6. Say opener/closer &amp; add notes</td>
</tr>
<tr>
<td>7. Say full oral report from pictos, and says it again</td>
<td>7. Say full report from bulleted notes, and say it again</td>
</tr>
</tbody>
</table>

#1: Ukrainetz (2019) Group Tx Experiment

- **Purpose**: Investigate effects on independent use on new-topic texts along with SLP perceptions

  - **Method**
    - 44 4th-6th graders with IEPs in language, reading, writing
    - Tx vs No-tx conditions balanced on grade & CELF5
    - Six 30-min indiv or pair tx sessions (3 hrs)
    - Tx on unusual animal articles
    - Pre/post-test notes, oral & written reports on historical people articles

  - **Results**
    - Better quality post-test notes & oral reports
    - No better written reports 2 days later
    - Individual variation in improvements
    - 11 SLP instructors noted visible gains in tx from simplicity, pictos, complete sentences, oral practice, confidence, relevance

#2: Peterson, Ukrainetz, & Risueno Descriptive Case Study

- **Purpose**: Investigate effects of expanded tx and more verbal rehearsal on supported and independent strategy use

  - **Method**
    - Three gr 4-6 students with language impairment
    - 16 20-min individual tx over 9 weeks (5.3 hrs)
    - Tx on unusual animal and professional athlete articles
    - Pre/post-test on historical people articles
    - Pre/post notes, prep, oral & written reports, learner interview

  - **Results**
    - Benefits in final tx notes and oral presentations
    - Varied improvements in indep notes, verbal rehearsal, oral & written reports, strategy awareness
Beyond Averages: Revealing Moments

Self-regulation: Donal’s demand & Tyrone’s rehearsal

From Labeling to Reporting

Pete pre-test post-test

Beyond Averages: Revealing Moments

Revealing Moments

Reasoning about Sketch & Speak

SLPs tx underlying skills and strategies → more competent and independent communicators & learners

- Lack of SLP expository treatments for older students
  - Lo-tech, no-cost, simple, flexible
  - Makes clinical sense
  - Can be applied by SLPs in a school setting
  - Will result in noticeable, relevant gains
- Informed by and fits with bodies of knowledge
  - ComD research & practice
  - Educational research & practice
  - Basic language, learning & memory research
  - Common Core: expository comprehension & expression, complex texts, use of textual evidence, self-regulated learners

Learning Strategies, Note-Taking & Verbal Rehearsal

Strong research evidence on value of:
- Student awareness and regulation of mental processes
- Learning strategy instruction
- Taking and using notes
- Summarized, paraphrased, and re-organized notes
- Idea transformation into other notations & organizations
- Oral retrieval, recitation and rehearsal strength effects

S&S: Related Research on Pictography

- Improves child narrative retell and generation
- Easily used by weak and resistant writers
- Involves word-picto-word transform, re-organize, retrieve
- Children generate own expository pictography
- Visual schematics improve science learning


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Think about S&S & RISE+

R: 10+ opps per each spoken sentence across 2 sessions
I: 1-3 students, 30-45 min sessions 1-5x/wk, 3-6 hrs total
S: Systematic structural & interactive support
  - Routinized format: note it simply – say it fully – say it again
  - Pictographic and written notes
  - Formatted note sheet
  - Whisper rehearsal
  - Model, prompt, wait, extend, reformulate
E: Focus on integrated skills of info recall, specific vocabulary, full sentences, fluent delivery, organized expository discourse
+ Assist reading, avoid extensive writing, ignore spelling
Interesting topics & communicative products
Noticeable, relevant improvement
User-controlled tool

Evaluating Evidence for Hi Tech – Passive Learner Tx

Infra-Low Frequency High Definition Neurofeedback
(IFL-NFB)

NFB: How it piqued my interest

- Clinical intervention for
  - ADHD
  - PTSD
  - Anxiety
  - Depression
  - Addiction
  - ASD
  - Stroke rehab
  - Learning / Reading disabilities

Lisa Taylor, IntellectNFB.com

NFB: Infra-low Frequency HD

- “Othmer Method” EEGInfo.com
- Developed specifically for clinical disorders
- Education
  - Required
  - At least a masters degree &
  - License in a health profession
- Equipment:
  - Cygnet software
  - Neuroamp
  - BeeMedic

NFB: Infra-low Frequency HD

- Below 1 Hz
- Individualized intervention
- Symptom-driven treatment
  - Brain function: neural timing & connectivity
    - Regulation:
      - Stable
      - Flexible (responsive)
    - Dysregulation:
      - Inflexible timing & connectivity
      - Prone to instabilities

Image from http://www.braintrainuk.com/results-history/how-neurofeedback-works/
Evaluating Txs at the Edges

NFB: Infra-low Frequency HD
- Below 1 Hz
- Individualized intervention
- Symptom-driven treatment
  - Brain function: neural timing & connectivity
  - Symptoms are indicators of brain dysregulation
    - Arousal level (excitability): excessive, low
    - Stability / instability
    - Inhibitory control

INF-NFB Feasibility Study
- Single case design
  - Pre-tx data:
    - Formal assessment measures
    - 3 language samples
  - Intervention phase data: language samples
  - Post-tx data:
    - Formal assessment measures
    - 3 language samples

2 Multi-Year Post Stroke Complex Clinical Profiles

Adult 1
- Fluent Aphasia w/ relatively good auditory comprehension
- 3 years post
- Apraxia of Speech
- Anxiety disorder w/ panic
- Hypertension
- Hx substance dependency/abuse
- Some symptoms of mood disorder
- Estranged from offspring

Adult 2
- Anomic aphasia w/ dysgraphia
- 8 years post
- Apraxia of Speech
- Anxiety disorder w/ panic
- Disorder of written language
- PTSD
- Sleep disorder
- Severe leg cramps of unknown origin
- Estranged from offspring

Intervention
- 2x/week
- Each session: 1 hr
  - Review symptoms since last session
  - Modify tx plan, if needed
  - 30 minutes of INF HD NFB
    - Watch animations or movies
    - Optimize training frequency
    - 2 to 8 electrode placement sites
  - Wrap up
- Total of 20 sessions

NFBF01 Aphasia 3 yrs post

Pre ILF HD NFB

Post ILF HD NFB
Pre-Post Number of Symptoms

Total Number of Reported Symptoms (out of 176 possible)

Pre-Post Severity of Symptoms

Mean Severity of Symptoms Scores

Pre-Post Language Sample Data

Pre-Post Language Sample

Quality of Life: Beyond the Numbers...

By Session 20:
- NFBF01 & 02: Increased social activity
  - Daily headaches ended
  - Sleep improved
  - Decreased anxiety, worry, depression
  - Improved familial relations

Post Tx:
- NFBF01: Moved out of senior living facility, apt w roommates
- NFBF02: Went back to work, then got a new job

Adult: 3 years post stroke
Adult: 8 years post stroke

Adults: Comm Effectiveness Index

Communicative Effectiveness Index: Mean Scores

Pre-Post Language Sample: MLU - M

Words per Minute

Within Utterance Pauses

Between Utterance Pauses
Evaluating Txs at the Edges

Ukrainetz & Hoffman

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Level of Tx Intercept

Re-Vision Disorders as Differences
Modify Interactions & Environments
Teach Language & Learning Skills
Skills in contexts of use
Isolated skill drill
Reprogram Neuropsychological Processes
Cure/Fix the Cause

Ukrainetz (2015)

Think about IFL-NFB & RISE+

- continuous multi-sensory input during NBF session
- 20 one-hour NBF sessions per individual over 2 to 20 weeks
- Identify symptoms and corresponding initial treatment factors: electrode placement, training frequency and duration
- Continuing communication about symptoms between sessions
- Responsive dynamic clinical decisions regarding tx factors
- No explicit skill focus. IFL-NFB exploits brain’s continuous implicit learning
- Willingness to comply and report

Q & A?

Thank you

- Teresa Ukrainetz: teresa.ukrainetz@usu.edu
- LaVae Hoffman: lmh3f@Virginia.edu

For the handout, see:
https://comdde.usu.edu/services/research/schoolage-language/

Take-Home Messages on Evaluating SLP Txs

- Make sense from established knowledge
- Be open to evidence with critical reasoning
- Be conscious of RISE+
- Think about level of tx: neural pathways, skill, activity, environment

Some Useful References