What is Evidence-Based Practice?

- Style of clinical practice
  - Integrate evidence with client’s needs and goals
  - Monitor progress to ensure that predicted gains are occurring

- What counts as evidence?
  - Non-treatment research
    - Identify the nature of a disorder
    - Identify processes that underlie acquisition (both normal & disordered)
  - Treatment research
    - Identify whether a treatment shows promise
    - Identify what components of a treatment are essential
    - Identify which clients the treatment is appropriate for
    - Identify which treatment is most effective (i.e. compare treatments)
  - Clinical experience
    - What treatments have been effective with similar past clients in this setting?

Finding Evidence

- Can be difficult!

- Possible databases to search
  - PsycINFO
  - PubMed/MEDLINE
  - ERIC
  - Wilson
  - Google Scholar (although usually you get lots of hits and many are irrelevant)
  - ASHA Journals

- Search terms
  - Age
  - Disorder or area of deficit (may need to try different synonyms)
  - Treatment or intervention

Research Continuum

- Stage 1 = Non-treatment research
  - Need to understand the processes that underlie the disorder so that an appropriate treatment can be created
  - Group designs (experiments, longitudinal, etc.)

- Stage 2 = Exploratory treatment research
  - Formulate a treatment and test with a few clients to determine treatment effects
  - Modify treatment as needed to improve effectiveness
  - Case studies, single subject design, retrospective studies, small groups

- Stage 3 = Efficacy/Effectiveness treatment research
  - Test a promising treatment in a rigorous way with a large number of clients
  - Clinical trial (comparison of groups, repeated testing, can be costly)
  - Field testing in typical clinical settings

Evaluating Treatment Research

- What is important in a research article?
  - Where do you find that information in the article?
  - What counts as “good”?
  - How to summarize information across a number of articles?
  - How to draw conclusions from that summary?

- See also:
  - The State of the Evidence, ASHA Leader, March 6, 2007
  - Making Evidence-Based Decisions, LSHSS, October, 2006
  - 5-Phase Model for Research, J of Comm Dis, Sept-Oct, 2004
Reading a Treatment Research Article: Step 1
- Read the abstract
  - Provides an overview of the article
- Does this article seem relevant to your client(s)?
  - If yes, keep reading
- What is the design of the study?
  - Case study
  - Single subject
  - Group/clinical trial
  - May not be clearly stated in the abstract (if not, watch for this info in the methods section)
- Are there any terms that you don’t understand?
  - Write these down
  - Skim the introduction to find the description or definition of these terms

Reading a Treatment Research Article: Step 2
- Determining the purpose of the research
  - Read the paragraph before the methods section
  - Usually summarizes purpose, questions, and/or hypotheses
- Does this fit your goals in reading this article?
  - If yes, keep reading
- Are there any terms you do not understand?
  - Write these down
  - Return to the introduction to find the description or definition of these terms

Reading a Treatment Research Article: Step 3
- Participants
  - Described in the participants section
  - Usually very DETAILED
- Want to determine how similar the participants are to your client(s)?
  - Consider age, ethnicity/SES, disorder and/or specific deficits, severity
- Judge quality (1 point max)
  - Score 1 point if description is detailed enough for research replication and/or clinical application

Reading a Treatment Research Article: Step 4
- Independent variable
  - What was manipulated or systematically varied
  - Usually found in methods section but may not be specifically labeled
  - Within Ss (1 group)
    - Manipulate tx
    - Ss comparable at baseline (age, severity, tx targets)
  - Between Ss (2 groups)
    - Manipulate tx
    - Tx 1 vs. Tx 2
    - +Comp vs. –Comp
    - Target 1 vs. Target 2
    - Vary order of cond
    - Randomly assign Ss to cond
    - Randomly assign Ss
    - Score 1 point if Ss are comparable at baseline on tx targets
  - Between Ss (2 groups)
    - Manipulate Ss
    - Young vs. Old
    - Severe vs. Mod
    - Score 1 point if Ss are comparable at baseline (age, severity, tx targets)

Reading a Treatment Research Article: Step 5
- Dependent variable
  - What outcome(s) was measured?
  - Found in methods section (e.g., materials, outcome measures)
- Typical dependent variables
  - Speech or language measure administered prior to, during, and/or after treatment
  - Number of sessions needed to meet criterion
  - Client or parent satisfaction
- Judge quality (2 point max)
  - Score 1 point if dependent variable is valid and reliable (reliability may be reported in a separate section)
  - Score 1 point if the person collecting/computing the dependent variable was unaware of the assignment of each participant (i.e., blind)

Reading a Treatment Research Article: Step 6
- Treatment
  - Usually described in a section labeled treatment or procedures
- Want to determine type of treatment provided
  - What was treated (i.e., treatment targets)
  - How it was treated (i.e., treatment activities)
  - Intensity of treatment (i.e., how often, how long)
  - Context of treatment (i.e., individual vs. group)
- Helps determine feasibility of treatment in your setting
- Judge quality (2 point max)
  - Score 1 point if description is detailed enough for research replication and clinical application
  - Score 1 point if fidelity of treatment is high
Reading a Treatment Research Article: Step 7

- Results
  - Found in the results section
  - Statistical tests and/or raw data presented in Tables/Figures
- How does the outcome (dependent variable) for condition/treatment/group 1 compare to that for condition/treatment/group 2 (independent variable)?
  - Statistical significance (if applicable)
  - Reliable difference (i.e., the pattern of what is best is the same across participants)
  - Impact (Is a difference of this magnitude clinically important?)
- Judge quality (2 point max)
  - Score 1 point if statistically and/or reliably different
  - Score 1 point if difference is clinically important

Reading a Treatment Research Article: Summarize Quality

- Add up points awarded in each category
  - Participants (max = 1)
  - Independent variable (max = 2)
  - Dependent variable (max = 2)
  - Treatment (max = 2)
  - Results (max = 2)
- Higher score = better quality

Summarize Multiple Studies

<table>
<thead>
<tr>
<th>Quality Score</th>
<th>Summary</th>
<th>Treatment Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 = Highest</td>
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<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = Leastest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Benefits of Summary Table

- Shows current research stage
- How much evidence supports this treatment?
- Highlights future research needs
- Shows quality of available research evidence
  - How strongly should we weight the available research?
- Can update summary table as more research becomes available
- Can add column to summarize your clinical experience
  - Could create your own rating system for your clinical experience
  - May want to consider the number of clients and behaviors you have applied this treatment to, the gains made by these clients, etc.

Background

- Increasing number of bilingual/ESL children
  - Should we use the same treatment strategies as the native speakers? Are they effective?
  - L1 Æ L2 transfer
  - L1 facilitates L2 learning
- Vocabulary is an important area that affects learning of other areas (e.g., reading, academic achievement)
  - Previous research
    - Bilingual vs. monolingual treatment conditions
      - Bilingual condition – L1 + L2
      - Monolingual condition – L2 only
  - Search terms
    - bilingual vocabulary, preschool, second language acquisition, word learning, L1, L2, language intervention

Vocabulary treatment for bilingual children

Junko Maekawa
Post-doctoral researcher
Speech-Language-Hearing
Article Overview

- Effectiveness of vocabulary training using native language (L1) and second language (L2 = target language)
- Single-subject alternating treatment design
- L1 Spanish/Navajo, L2 English (ages 4:11-6:3)
- Learning of new words in L2 English
- Bilingual vs. monolingual training conditions

Research Continuum

- Stage 1 = Non-treatment research
  - Need to understand the processes that underlie the disorder so that an appropriate treatment can be created
  - Group designs (experiments, longitudinal, etc.)
- Stage 2 = Exploratory treatment research
  - Formulate a treatment and test with a few clients to determine treatment effects
  - Modify treatment as needed to improve effectiveness
  - Case studies, single subject design, retrospective studies, small groups
- Stage 3 = Efficacy/Effectiveness treatment research
  - Test a promising treatment in a rigorous way with a large number of clients
  - Clinical trial (comparison of groups, repeated testing, can be costly)
  - Field testing in typical clinical settings
Step 1 – Read the Abstract

- Does this article seem relevant to your client(s)?
- Are your clients bilingual/L2 learners?
- Are you treating/teaching vocabulary?
- Is the age group similar to your client(s)?
- What is the design of the study?
- Single subject (single-subject alternating treatment)

Step 2 – Purpose of the Research

- What do we know?
- Purpose/questions
  
  - To compare the effectiveness of a bilingual training condition (L1-L2) and a monolingual training condition (L2 only) in receptive learning of L2 novel words, utilizing the presentation and stimuli from previous works
  
  - Experiment 1: L1 Spanish/L2 English
  
  - Experiment 2: Replication of Ex 1 with L1 Navajo/L2 English

- Hypothesis
  
  - "L2 words would be learned in fewer trials under a bilingual condition... than under a monolingual condition..."

Step 3 - Participants

- What do we know?
- Number and gender: 3 boys & 1 girl
- Ages: 4:11-5:3
- Selection criteria and how they were measured
  
  (a) Spanish as the dominant language
  
  (b) Active use of both Spanish & English
  
  (c) Normal hearing
  
  (d) Normal vision
  
  (e) Normal cognition

- Judge quality (1 point max)
  
  - Is description detailed enough for research replication and/or clinical application? – YES – 1 point
Step 4 – Independent Variable

What was manipulated? (Within Ss)
- Component of the treatment
  - Component = L1
  - Tx + component
  - bilingual condition (L1-L2)
  - Tx - component
  - monolingual condition (L2 only)

Step 5 – Dependent Variable

What was measured?
- Number of trials needed to meet criterion

"Each of these sets of novel words was considered learned when a minimum level of 80% correct responses was maintained on 2 of 3 consecutive days." (p. 710)
Step 6 – Treatment

- What type of training was provided?
- What was trained (i.e., training targets)
- How it was trained (i.e., training activities)
- Intensity of training (i.e., how often, how long)
- Context of training (i.e., individual vs. group)

What type of training was provided?

- learning of L2 novel words

What was trained (i.e., training targets)

- Naming puzzle figures, providing feedback

How it was trained (i.e., training activities)

- 15 minutes/day, 3-10 days

Intensity of training (i.e., how often, how long)

- Individual

Context of training (i.e., individual vs. group)

- Individual

Step 6 – Treatment

- Judge quality (2 point max)
- Score 1 point if description is detailed enough for research replication and clinical application
  
  → YES – 1 point

- Score 1 point if fidelity of treatment is high
  
  → No (not reported) – 0 point

Total points: 1 point

On each day, the puzzle pieces of each training condition (e.g., the same presented right before it) were included on a trial. Thus, on the monolingual condition, each L2 word was presented eight times. In contrast, under the bilingual condition of training, each L2 word was presented only five times because the first five word pairs were dedicated to L1 training and the last four to L2 training. Thus, the monolingual condition provided twice as many daily opportunities to learn the L2 novel words as did the bilingual condition. It is to be noted that the monolingual condition is referred to as level 1 for reference purposes.

APPENDIX A
ILLUSTRATION OF THREE DIMENSIONAL STIMULI

EXPERIMENT 1

Step 7 – Results

- How to compare?
  
  - Statistical significance (if applicable)

- Reliable difference (i.e., the pattern of what is best is the same across participants)

- Impact (Is a difference of this magnitude clinically important?)
Step 7 – Results

- Judge quality (2 point max)
  - Score 1 point if statistically and/or reliably different
    → YES – 1 point
      Pattern same across participants
  - Score 1 point if difference is clinically important
    → YES – 1 point
      Large difference across participants

Total points: 2 points

Reading a Treatment Research Article: Summarize Quality

- Add up points awarded in each category
  - Participants (max = 1) = 1
  - Independent variable (max = 2) = 2
  - Dependent variable (max = 2) = 1
  - Treatment (max = 2) = 1
  - Results (max = 2) = 2

- Total Score (max = 9) = 7

Conclusion

- Teaching L2 vocabulary using both L1 and L2 is more effective than using only L2.
- High quality evidence supporting the L1 use in treatment
- May need more studies to determine the clinical importance (e.g., different L1s, group studies)
Phonological Intervention

- The primary goal: to induce changes in a child’s linguistic knowledge.

- The fundamentals of phonological intervention:
  - What to teach?
    - Selection and sequencing of target sounds
    - Selection and sequencing of linguistic units
  - How to teach those sounds?
    - Selection and sequencing of treatment activities
    - Selection and sequencing of clinician feedback

“How to teach those sounds?”

- Treatment procedures that contrast sounds
  - Traditional minimal pair
    - unknown target paired with known substitute
    - e.g., unknown target /r/ and known substitute /w/
  - Alternatives
    - Unknown target paired with known sound that is not substitute
      - e.g., unknown target /r/ and known non-substitute /t/
    - Unknown target paired with unknown target
      - e.g., unknown target /r/ and unknown target /T/


Compare traditional to an alternative

Application: Research Continuum

- Stage 1 = Non-treatment research
  - Need to understand the processes that underlie the disorder so that an appropriate treatment can be created
  - Group designs (experiments, longitudinal, etc.)
- Stage 2 = Exploratory treatment research
  - Formulate a treatment and test with a few clients to provide initial support of effectiveness
  - Modify treatment as needed to improve effectiveness
  - Case studies, single subject design, small groups
- Stage 3 = Efficacy treatment research
  - Test a promising treatment in a rigorous way with a large number of clients
  - Clinical trial (larger groups & costly)

Application: Step 1 – Read the Abstract

- Summarize what they should get from reading the abstract
- Purpose of the study: to evaluate two phonological treatment approaches
  - Traditional minimal pair approach: one sound excluded from a child’s pretreatment inventory and one comparison sound that was its 1:1 substitute
  - Alternative treatment of the unknown set: two sounds excluded from a child’s pretreatment inventory

Application: Step 2 – Purpose of the Research

The present study addressed the general concern of whether the presentation of potentially homonymous forms associated with a child’s existing grammar is a necessary motivator of phonemic differentiation in the phonological system. The issue was evaluated by comparing the relative effectiveness of two different contrast treatments in improving the production of treated and unrelated sounds measured as probes. One treatment emphasized homonymous forms by contrasting 1:1 a desired nonsense sound with its corresponding replacement error from the child’s grammar, whereas the other contrast treatment involved the presentation of the unknown set (Gierut, 1991), two unrelated sounds were used to each other; there was no homonymy present in this situation. Predictably, if homonymy is the key factor in phonological change, greater improvements in new and related sounds would be expected from the conventional minimal pair approach to treatment. The results to emerge thus bear upon the status of homonymy in the motivation of phonological change and in the structure of phonological treatment.
Application: Step 2 – Purpose of the Research

- Summarize what they should get from reading the purpose
- Evaluate the relative effectiveness of two different contrast treatments in improving the production of treated and untreated errored sounds measured on probes.
- Traditional minimal pair approach vs. Alternative treatment
- Hypothesis: If homonymy is the key factor in phonological change, greater improvements in new and related sounds would be expected from the conventional minimal pair approach to treatment.

Application: Step 3 - Participants

Table 1. Results of intake testing for each subject

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age (letter month)</th>
<th>GFTA* (raw)</th>
<th>TOLD-3* (speech language quotient)</th>
<th>PMP* (standard score)</th>
<th>MLU* (oral language quotient)</th>
<th>Late* (oral language quotient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5-00</td>
<td>57</td>
<td>93</td>
<td>101</td>
<td>8.4</td>
<td>115</td>
</tr>
<tr>
<td>2</td>
<td>4-02</td>
<td>50</td>
<td>99</td>
<td>83</td>
<td>4.9</td>
<td>107</td>
</tr>
<tr>
<td>3</td>
<td>5-04</td>
<td>36</td>
<td>101</td>
<td>93</td>
<td>7.0</td>
<td>96</td>
</tr>
</tbody>
</table>

*GFTA from Test of Articulation (Goodglass & Finley, 1988).
*TOLD from Test of Language Development – 2 (Prather, Newcomer and Herrell, 1981).
*MLU from MacNeilage, Pys, & Saffran, (1992).
*Late from Internal Performance Scale (Martin, Alloppango, Loise, 1995).

- What do we know?
  - Number and gender: 2 boys & 1 girl
  - Ages: 4:02 – 5:04
- Selection criteria:
  - Functional phonological disorders
  - Normal hearing
  - Normal language
  - 0% accuracy for at least 6 sounds
  - Monolingual English-speaking
- Judge quality (1 point max)
  - Is description detailed enough for research replication and clinical application? → YES – 1 point

Application: Step 4 – Independent Variable

- What was manipulated?
  - Each child is treated with two treatments (tx 1 vs. tx 2).
  - Traditional minimal pair approach: one sound excluded from a child’s pre-treatment inventory and one comparison sound that was its 1:1 substitute
  - Alternative treatment: two sounds excluded from a child’s pre-treatment inventory

Table 2. Sounds excluded from each subject’s pre-treatment inventory and sounds selected for treatment

- Independent variable
  - What was manipulated or systematically varied
  - Usually found in methods section but may not be specifically labeled

<table>
<thead>
<tr>
<th>Ss comparable at baseline on tx targets (1 point)</th>
<th>Ss comparable at baseline (age, severity, tx targets)</th>
<th>Ss comparable at baseline (age, severity, tx targets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Ss (1 group)</td>
<td>Between Ss (2 groups)</td>
<td>Between Ss (2 groups)</td>
</tr>
<tr>
<td>e.g.</td>
<td>Tx 1 vs. Tx 2 +Comp vs. –Comp</td>
<td>Target 1 vs. Target 2 +Comp vs. –Comp</td>
</tr>
</tbody>
</table>
### Application: Step 5 – Dependent Variable

- What was measured?
- Speech or language measure administered prior to, during, and/or after treatment?
- Relative changes in treated and untreated speech sounds excluded from a child's pretreatment inventory?
- Number of sessions needed to meet criterion?
- Client or parent satisfaction

#### Measurement of relative phonological change

Relative changes in a child's phonological inventory of sounds were evaluated using the following speech measures:

1. **Speech or language measure administered prior to, during, and/or after treatment:**
   - Each grade contained a subset of the sounds included in the Child Phonology Inventory (CPI). The CPI was designed to assess a child's phonological system and was administered at the beginning of each treatment session. The sounds were scored based on the number of errors made.

2. **Relative changes in treated and untreated speech sounds excluded from a child's pretreatment inventory:**
   - Relative changes were calculated by subtracting the number of errors made in the treated sounds from the number of errors made in the untreated sounds. The difference was then divided by the total number of errors made in the untreated sounds. This difference was then multiplied by 100 to obtain a percentage.

3. **Number of sessions needed to meet criterion:**
   - The number of sessions needed to meet criterion was determined by the number of sessions in which the child made no errors.

4. **Client or parent satisfaction:**
   - Client or parent satisfaction was measured using a Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). The scale was administered at the end of each treatment session.

### Application: Step 6 – Treatment

- What to look for?
  - Usually described in a section labeled treatment or procedures
  - Type of treatment/training
  - Helps determine feasibility of treatment in your setting

- What type of training was provided?
  - What was trained (i.e., training targets)
  - Learning of 16 nonsense word (NSW) pairs (8 pairs for each treatment)

- How it was trained (i.e., training activities)
  - Sorting, matching, informal story-telling, disambiguation of word pairs

- Intensity of training (i.e., how often, how long)
  - 60 minutes, three times per week (1st treatment) → 10 min non-speech-related activity → 2nd treatment

- Context of training (i.e., individual vs. group)
  - Individual

### Application: Step 6 – Treatment

- Fundamentals identified for each participant

1. **Fundamentals identified for each participant**
   - Learning of 16 nonsense word (NSW) pairs (8 pairs for each treatment)
   - Sorting, matching, informal story-telling, disambiguation of word pairs
   - 60 minutes, three times per week (1st treatment) → 10 min non-speech-related activity → 2nd treatment
   - Context of training (i.e., individual vs. group)
   - Individual
Application: Step 6 – Treatment

- Judge quality (2 point max)
  - Score 1 point if description is detailed enough for research replication and clinical application
    → YES – 1 point
  - Score 1 point if fidelity of treatment is high
    → No (not reported) – 0 point

Total points: 1 point

Application: Step 7 – Results

- What to look for?
  - Found in the results section
  - Statistical tests and/or raw data presented in Tables/Figures

- How to compare?
  - Statistical significance (if applicable)
  - Reliable difference (i.e., the pattern of what is best is the same across participants)
  - Impact (Is a difference of this magnitude clinically important?)
Application: Step 7 – Results

What do we know?
- Statistical significance (if applicable) → N/A
- Reliable difference (i.e., the pattern of what is best is the same across participants) → YES
  - Greater accuracies of treated sounds in alternative treatment.
  - More new untreated sounds being added to the inventory in alternative treatment.

Impact (Is a difference of this magnitude clinically important?) → YES: The preliminary findings suggest clinical applications with alternative treatment over traditional minimal pair approach.

Judge quality (2 point max)
- Score 1 point if statistically and/or reliably different → YES – 1 point
- Score 1 point if difference is clinically important → YES – 1 point
Total points: 2 points

Reading a Treatment Research Article: Summarize Quality

Add up points awarded in each category
- Participants (max = 1) = 1
- Independent variable (max = 2) = 2
- Dependent variable (max = 2) = 1
- Treatment (max = 2) = 1
- Results (max = 2) = 2
Total Score (max = 9) = 7

Summarize Multiple Studies

<table>
<thead>
<tr>
<th>Quality Score</th>
<th>Treatment Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 = Highest</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gierut (1989)</td>
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<td>Gierut (1990)</td>
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<td></td>
<td>Gierut &amp; Neumann (1992)</td>
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<tr>
<td>6</td>
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<tr>
<td>5</td>
<td>Gierut (1991)</td>
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<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1 = Lowest</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

- Greater changes in probe performance of both treated and untreated sounds obtained with alternative treatment.
- Providing high quality evidence that phonological intervention with alternative treatment is more effective than with traditional minimal pair approach.

References

Clinical decision: How to treat grammar/syntax?

- Goal 1: Elicit production of verb tense during treatment
- Goal 2: Achieve spontaneous use of verb tense during treatment

Possible treatment approaches:
- Selecting a particular structure to treat (e.g., early vs. late acquired)
- Selecting a particular method to treat multiple structures
- Imitation based treatment: Child is required to imitate a target following a clinician’s model and prompt
- Conversation/naturalistic based treatment: Clinician expands a child’s utterance syntactically during play/conversation while preserving the original meaning

Search terms:
- Language intervention/treatment, Specific Language Impairment (SLI), grammar/grammatical morphology/syntax

Research Continuum

- Stage 1 = Non-treatment research
  - Need to understand the processes that underlie the disorder so that appropriate treatment can be created
  - Group designs (experiments, longitudinal, etc.)
- Stage 2 = Exploratory treatment research
  - Formulate a treatment and test with a few clients to determine treatment effects
  - Modify treatment as needed to improve effectiveness
  - Case studies, single subject design, retrospective studies, small groups
- Stage 3 = Efficacy/Effectiveness treatment research
  - Test a promising treatment in a rigorous way with a large number of clients
  - Clinical trial (comparison of groups, repeated testing, can be costly)
  - Field testing in typical clinical settings
  

Reading the Article: Step 1


- Does this article seem relevant to your client(s)?
  - SLI (expressive impairment only; ages 4;0-6;10)
  - Grammatical morphemes and complex sentence targets
- What is the design of the study?
  - Within subjects design (1 group received BOTH treatment types)
- Are there any terms that you don’t understand?
  - Conversational Recasting
  - Imitative Treatment
Reading Camarata et al. (1994): Step 2

- Determining the purpose of the research
  - Compare conversational recasting to direct imitative procedures
  - Effectiveness in generating spontaneous production of grammarsyntax goals

- Does this fit your goals in reading this article?
  - Children with SLI (but normal comprehension)? Grammarsyntax goals? – Yes!

- Are there any terms you do not understand?
  - Conversational Recasting:
    - During play or conversation, maintain the basic semantic information in an utterance while providing the target grammarsyntactic structure.
  - Imitative Training:
    - Imitate a target following a prompt from the clinician.

Reading Camarata et al. (1994): Step 3

- Participants in Camarata et al. (1994)
  - How similar are the participants to your client(s)?
    - 1 female; 20 males
    - Ages 4:0-6:10
    - Delayed expressive language on TOLD-2-P & MLU
    - Normal hearing
    - Normal cognition
    - No history of neurological trauma or impairment, psychological disorders, emotional disturbance
    - Majority had normal language comprehension

- Judge quality (1 point max)
  - Score 1 point if description is detailed enough for research replication and/or clinical application – Yes; 1 point

### Table 1: Subject characteristics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Sex</th>
<th>Age (YR)</th>
<th>MLU</th>
<th>Expected MLU</th>
<th>MLU deviation</th>
<th>Language impairment</th>
<th>TOLD-2-P expressive</th>
<th>Letter IQ</th>
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</thead>
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<td>M</td>
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<td>95</td>
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<tr>
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<td>No</td>
<td>76</td>
<td>95</td>
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</table>
### Step 4: Treatment Technique

**Conversational recasting vs. Imitative training (AKA treatment 1 vs. treatment 2)**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Sex</th>
<th>Age (Y/M)</th>
<th>MLU</th>
<th>Expected MLU</th>
<th>MLE deviation score</th>
<th>Receptive language</th>
<th>TOL-P score</th>
<th>Letter IQ</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>M</td>
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<td>M</td>
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<td>3.15</td>
<td>6.13</td>
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<td>-0.19</td>
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<td>46</td>
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<td>0.00</td>
<td>6 (IQ 110)</td>
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<td>M</td>
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<td>5.5</td>
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<td>4.83</td>
<td>-1.38</td>
<td>0.08</td>
<td>6 (IQ 110)</td>
<td>110</td>
</tr>
</tbody>
</table>

### Step 4: Judge Quality (2 points max)

1. **Ss comparable at baseline on treatment targets?**
   - 1 point
   - Targets for training had to be absent from the pre-intervention sample, and for grammatical morphemes, must have been attempted a minimum of three times but produced incorrectly in these samples to be included. Also, any forms that were absent from the spontaneous samples were probed using elicitation procedures to ensure that they were indeed absent from the child's system (Target Selection section of article, p. 1416)

2. **Vary order of condition & randomly assign targets to condition?**
   - 1 point
   - To further enhance experimental control, the targets that met the above criteria were randomly assigned to either of the training conditions (Target Selection section of article, p. 1416)

**Total points:** 2
Reading Camarata et al. (1994): Step 5

- **Dependent variables**
  - Number of treatment sessions to elicited production and spontaneous use of target
  - Number of elicited and spontaneous productions
- **Judge quality (2 points max)**
  - Score 1 point if dependent variable is valid and reliable (reliability may be reported in a separate section) Yes, 1 point
  - 92% Interobserver agreement for target selection
  - 89% Interobserver agreement for child productions
  - Score 1 point if the person collecting/computing the dependent variable was unaware of the assignment of each participant (i.e., blind) Not specified, 0 points
- **Total Points = 1**

Reading Camarata et al. (1994): Step 6

- **Treatment**
  - What was treated in each child? Goal 1 = auxiliary (they are running) Goal 2 = third person singular (she runs to the store)
  - How it was treated? Imitative Training (Goal 1) Conversational Training (Goal 2)
  - Intensity of treatment Two 50-minute sessions each week for 12 weeks (24 total sessions)
  - Context of treatment Not specified
  - **Judge quality (2 point max)**
    - Detailed enough for research replication and clinical application? Yes, 1 point
    - Is fidelity of treatment high? Yes, 1 point
  - **Total points = 2**
TABLE 2. Targets assigned to each subject.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Conversation treatment</th>
<th>Initiation treatment target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Let's talk complex S</td>
<td>Prescriptive</td>
</tr>
<tr>
<td>2</td>
<td>Relative clause</td>
<td>Condition</td>
</tr>
<tr>
<td>3</td>
<td>Gerund</td>
<td>Auxiliary</td>
</tr>
<tr>
<td>4</td>
<td>Passive</td>
<td>Relative clause</td>
</tr>
<tr>
<td>5</td>
<td>Proportional complement</td>
<td>Mixed</td>
</tr>
<tr>
<td>6</td>
<td>Infinitive</td>
<td>Infinitive with different subjects</td>
</tr>
<tr>
<td>7</td>
<td>Modal</td>
<td>Passive</td>
</tr>
<tr>
<td>8</td>
<td>Relative clause</td>
<td>Auxiliary</td>
</tr>
<tr>
<td>9</td>
<td>Wh questions</td>
<td>Passive</td>
</tr>
<tr>
<td>10</td>
<td>Adjunctive</td>
<td>Auxiliary</td>
</tr>
<tr>
<td>11</td>
<td>Auxiliary</td>
<td>Third person singular</td>
</tr>
<tr>
<td>12</td>
<td>Stage IV question</td>
<td>Relative clause</td>
</tr>
<tr>
<td>13</td>
<td>Auxiliary</td>
<td>First person</td>
</tr>
<tr>
<td>14</td>
<td>Stage IV regulation</td>
<td>Relative clause</td>
</tr>
<tr>
<td>15</td>
<td>Third person singular</td>
<td>Passive</td>
</tr>
<tr>
<td>16</td>
<td>Third person singular</td>
<td>Infinitive with different subjects</td>
</tr>
<tr>
<td>17</td>
<td>Third person singular</td>
<td>Wh infinitive</td>
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</table>

Training Procedures

The training procedures included imitation-based and conversation-based interventions. This study compared the training procedures as described in the Methods section, Table 2, and Table 2. The training procedures were described in detail in the previous paragraphs of the Methods section of the paper. The training procedures included both imitation-based and conversation-based interventions. The training procedures were described in detail in the Methods section of the paper. The training procedures were described in detail in the Methods section of the paper.

Reading Camarata et al. (1994): Step 6

- *Intensity of the treatment*

   - Treatment Fidelity
   - From Settings and Transcriptions, p. 1418

   "Agreement for identifying clinician presentations (including prompts, presentations, and recasts) was 98%"

   - DV 1: Number of treatment sessions to elicited production and spontaneous use of target
   - Goal: Elicited production of target in treatment: Imitation > Conversation
   - Goal: Spontaneous production of target in treatment: Conversation > Imitations

<table>
<thead>
<tr>
<th>Imitative Training</th>
<th>Conversation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicited Production (p&lt; .05)</td>
<td>1 session</td>
</tr>
<tr>
<td>Spontaneous Use (p&lt; .05)</td>
<td>5.4 sessions</td>
</tr>
<tr>
<td>Elicited Production (p&lt; .05)</td>
<td>2.6 sessions</td>
</tr>
<tr>
<td>Spontaneous Use (p&lt; .05)</td>
<td>3.1 sessions</td>
</tr>
</tbody>
</table>

   - Comparison of treatment effects: Imitation vs. Conversation
   - Conversation training was more effective than imitation training in eliciting and eliciting spontaneous use of target.

   - Conversation training was more effective than imitation training in eliciting and eliciting spontaneous use of target.

   - Conversation training was more effective than imitation training in eliciting and eliciting spontaneous use of target.
Reading Camarata et al. (1994): Step 7

1. DV 1: Number of treatment sessions to elicited production and spontaneous use of target
   - Goal: Elicited production of target in treatment: Imitation > Conversation
   - Goal: Spontaneous production of target in treatment: Conversation > Imitations

<table>
<thead>
<tr>
<th>Imitative Training</th>
<th>Conversation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicited Production (p&lt;.05)</td>
<td>1 session</td>
</tr>
<tr>
<td>Spontaneous Use (p&lt;.05)</td>
<td>5.4 sessions</td>
</tr>
</tbody>
</table>

2. DV 2: Total number of elicited and spontaneous productions
   - Goal: Achieve a higher number of elicited productions: Imitation > Conversation
   - Goal: Achieve a high number of spontaneous productions: Conversation > Imitation

<table>
<thead>
<tr>
<th>Imitative Training</th>
<th>Conversation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicited Production (p&lt;.001)</td>
<td>230.9</td>
</tr>
<tr>
<td>Spontaneous Use (p&lt;.001)</td>
<td>5.5</td>
</tr>
</tbody>
</table>

**Graph:**
- Elicited Production (p<.001) | 230.9 | 19.6
- Spontaneous Use (p<.001) | 5.5 | 16.4

**Graph:**
- Mean Number of Occurrences
- Elicited Production
- Spontaneous Use
Reading Camarata et al. (1994): Step 7

- Judge quality (2 points max)
  - Score 1 point if statistically and/or reliably different - Yes, 1 point
  - Score 1 point if difference is clinically important – Yes? No? 0 points
- DV 1: # of treatment sessions to elicited or spontaneous productions:
  - Elicited productions: Imitation (~1) > Conversation (~2.6)
  - Spontaneous production: Conversation (~3.1) > Imitation (~5-4)
- The difference is statistically significant, but the difference between the actual number of treatment sessions is small
- Total points = 1

Summarize Quality for Camarata et al. (1994)

- Add up points awarded in each category
- Participants = 1/1
- Independent variable = 2/2
- Dependent variable = 1/2 (blind examiner not specified)
- Treatment = 2/2
- Results = 1/2 (statistically different, but may not be clinically significant)
- Total Points = 7 (9 max)
- Higher score = better quality

Summarize Multiple Studies

<table>
<thead>
<tr>
<th>Quality Score</th>
<th>Treatment Research</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Case</td>
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<tr>
<td>9 = Highest</td>
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<td>8</td>
<td></td>
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<td>6</td>
<td>Camarata et al. (1994)</td>
</tr>
<tr>
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<tr>
<td>4</td>
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<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1 = Lowest</td>
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</table>

Conclusions

- Conversational recasting has potential as an effective approach to facilitate spontaneous use of grammar/syntax
- Imitation treatment > Conversation treatment if the goal is short-term elicitation of productions in treatment
- Conversation treatment > Imitation treatment if the goal is generalization of treatment or spontaneous use of targets
- Evidence for conversational recasting as an intervention technique has been applied to other populations (e.g., phonological disorders, autism, mental retardation) and has been used within the context of larger treatment programs (e.g., Fey et al., 1993, 1997; Leonard et al., 2006).
- Mid-High quality evidence on conversational recasting, but a limited number of studies have directly compared recasting to another technique in facilitating grammar/syntax in children with SLI.
Early studies measured the correlation between the frequency of home book reading practices and outcomes such as vocabulary size, emergent literacy, and early reading skills. Generally, positive correlations were found. Bus, van Ijzendorn, & Pellegrini (1995) meta-analysis found that frequency of parent book reading explained an average 8% of the variance in outcome measures. But, correlation does not imply causation.

More recently, many experimental studies have manipulated the act of storybook reading with the goal of determining the best way to teach new vocabulary knowledge. For example, studies have explored "active" vs. "passive" storybook reading, questioning vs. commenting, labeling vs. pointing, dialogic reading, adult reading style, storybooks read by adult vs. computer, storybook reading at home vs. school.

This review included treatment studies that have evaluated the use of storybook reading interventions to increase the vocabulary size of children who have, or are at risk for, difficulty acquiring English vocabulary. Children with identified language impairments, children with below-average vocabulary, children from low-SES backgrounds, children who are English Language Learners. Correlation studies and other non-treatment research were not included in the current review.

Research Continuum

Stage 1 = Non-Treatment research
- Need to understand the processes that underlie the disorder so that an appropriate treatment can be created
- Group designs (experiments, longitudinal, etc.)

Stage 2 = Exploratory treatment research
- Formulate a treatment and test with a few clients to determine treatment effects
- Modify treatment as needed to improve effectiveness
- Case studies, single subject design, retrospective studies, small groups

Stage 3 = Efficacy/Effectiveness treatment research
- Test a promising treatment in a rigorous way with a large number of clients
- Clinical trial (comparison of groups, repeated testing, can be costly)
- Field testing in typical clinical settings

Finding a pool of articles

Searched four databases:
- PSYC INFO
- ERIC
- Pub Med
- Web of Science
Also searched the reference lists of selected articles
- Search terms:
  - Vocabulary
  - Storybook reading
  - Shared book reading
  - Joint book reading

Reading the Article: Step 1

- Does this article seem relevant to your client(s)?
- What is the design of the study?
- Are there any terms that you don’t understand?
Reading the Article: Step 1

Step 2: Determine the purpose of the research

Reading Van Kleeck et al. (2006): Step 2
Determine the study purpose
- Mentioned in the structured abstract
- Also mentioned in article text (paragraph before Methods)
  - "the current study examined the effects of a repeated one-on-one book-sharing intervention on the literal and inferential language development of preschoolers with language impairment... We predicted that our book-sharing intervention would replicate previous research that used dialogic reading to improve children's literal language abilities (i.e., vocabulary needed to label and describe). Our study was designed to further ask whether the intervention would also improve the inferential language skills of preschool children with language impairments." (p. 87)

Reading Van Kleeck et al. (2006): Step 3
- How similar are the participants to my clients?
  - 30 children attending Head Start preschools in one northern and one southern state
  - 17 boys, 13 girls
  - 22 Caucasian, 8 African American
  - All have language impairments (SPELT-II at least 1.5 SD below the mean; above 70 on CMMS)
  - All from low socio-economic backgrounds
- Rationale for participant selection:
  - "We chose Head Start preschoolers and included a large percentage of African American children because, in addition to preschoolers with language delays, children in both of these groups are also at increased risk for difficulties with inferential language in the formal testing contexts...that abound in school." (p. 87)
- Quality judgment: Is description detailed enough for research replication and clinical application? YES

Reading Van Kleeck et al. (2006): Step 4
Independent variable
- Treatment technique: Treatment vs. No-treatment (control)
  - Within Ss (1 group) Manipulate tx  Between Ss (2 groups) Manipulate tx  Between Ss (2 groups) Manipulate Ss
  - 1. p.  T x 1 vs. T x 2 +Comp vs. ~Comp Target 1 vs. Target 2  T x 1 vs. T x 2 +Comp vs. ~Comp Target 1 vs. Target 2
  - Young vs. Old Severe vs. Mod
  - Randomly assign Ss to cond Randomly assign Ss to cond Randomly sample Ss
  - Score 1 Vary order of cond Score 1 Vary order of cond Score 1 Vary order of cond
  - Ss comparable at baseline on tx targets Ss comparable at baseline (age, severity, tx targets) Ss comparable at baseline (age, severity, tx targets)
Reading Van Kleeck et al. (2006): Step 4

**Independent variable**
- Treatment technique: Treatment vs. No-treatment (control)

<table>
<thead>
<tr>
<th>Within Ss (1 group)</th>
<th>Between Ss (2 groups)</th>
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<tbody>
<tr>
<td>Manipulate tx</td>
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<td>e.g.</td>
<td>Tx 1 vs. Tx 2 + Comp</td>
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<tr>
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</tr>
</tbody>
</table>

Reading Van Kleeck et al. (2006): Step 4

**Dependent Variables**
- Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997)
  - Form A as Pretest
  - Form B as Post-test
- Preschool Language Assessment Instrument (PLAI; Blank, Rose, & Berlin, 1987)
  - Levels I-II assess literal language
  - Levels III-IV assess inferential language

**Quality Judgment**
- Are dependent variables valid and reliable?
  - Valid: YES
  - Reliable: probably, but reliability is not reported

Reading Van Kleeck et al. (2006): Step 6

**Treatment**
- What kind of treatment was provided?
  - Is it feasible for my setting?
  - In this case, the treatment was the scripted book reading.
  - All children continued to receive their regular interventions through the Head Start program.

**Quality Judgment**
- Is the description of the treatment detailed enough for research replication and clinical application?
Reading Van Kleeck et al. (2006): Step 6

- What kind of treatment was provided?
- Is it feasible for my setting?
- In this case, the treatment was the scripted book reading.
  All children continued to receive their regular interventions through the Head Start program.

Quality Judgment ➔ Is the description of the treatment detailed enough for research replication and clinical application?
- YES

Quality Judgment ➔ Is the fidelity of treatment reported and high?
- YES? NO?

Reading Van Kleeck et al. (2006): Step 7

Results
- How does the outcome for the treated group compare to the outcome of the control group?

- Here, there was a significant difference between the groups at post-test. So, ANCOVA was used to determine whether the treatment group showed significantly better improvement.
- Significant difference between groups on post-test; medium-to-large effect size reported (omega squared = .13).

- Note that there was no difference between groups on pretest standard scores on the PPVT–III, Form A, t(28) = 1.16, p = .26 (p. 89), so groups were similar at baseline.
- Significant difference between groups on post-test; large effect size reported (omega squared = .15).
Reading Van Kleeck et al. (2006): Step 7

Results

- How does the outcome for the treated group compare to the outcome of the control group?

- The two groups were found to be equivalent at pretest, $t(28) = 1.70, p = .10$.

- Significant difference between groups on post-test; medium-to-large effect size reported ($\omega^2 = .13$).

- Treatment group showed more improvement on all three measures than control group.

- Quality judgment: Is the difference between groups statistically or reliably different?

  - YES

- Quality judgment: Is the difference clinically important?

  - Medium to large effect sizes
  - (could also judge based on clinical value)

  - YES

Summarize Quality for Van Kleeck et al. (2006)

- Add up points awarded in each category
  - Participants = 1/1
  - Independent variable = 2/2
  - Dependent variable = 0/2 or 1/2 (reliability of measures not specified; examiners weren’t blinded)
  - Treatment = 1/2 or 2/2 (treatment fidelity mentioned but not specified)
  - Results = 2/2
  - Total Points = 6-8 (Max is 9)
  - Higher score = better quality

Summary

- Moderate-to-high evidence that shared storybook reading activities are beneficial for increasing the vocabulary knowledge of populations included in this review
  - Children with identified language impairments
  - Children described with below-average vocabulary
  - Children from low-SES backgrounds
  - Children who are English Language Learners
  - Vocabulary growth appears to be greater when elaborations or explanations of word definitions are included in the storybook reading activity, as opposed to "incidental" exposure

Summary of Multiple Studies

<table>
<thead>
<tr>
<th>Quality Score</th>
<th>Non-treatment Research</th>
<th>Treatment Research</th>
<th>Group/Trial</th>
</tr>
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</table>
| 9 = Highest
| 8
| 7
| 6
| 5
| 4
| 3
| 2
| 1 = Lowest |

- According to some studies, the learning rate of children with language impairments and/or below-average vocabulary is slower than that of typically developing children

- At least one study has shown that ELLs learn new words faster than native English children from low SES backgrounds (although they start out at a lower level, they catch up to the native English speakers by the end of treatment)

- Joint book reading can be considered an effective supplement to explicit vocabulary instruction

- It does not appear that shared reading activities alone are enough to close the vocabulary gap between at-risk and typically developing children (except, possibly ELLs)