Treating Bilingual Children with Language Impairment: Evidence and Options

Kathryn Kohnert, Ph.D., CCC-SLP
University of Minnesota, Minneapolis
How can we facilitate optimal language outcomes in bilingual children\(^1\) with primary language impairment (PLI)?\(^2\)
Bilingual Children

- Skills in at least one language WNL for age & experience-matched peers.
- Experience with & communicative need for two languages.
- Relative degree of skill in each language may vary.
Bilingual Children¹

• Skills in at least one language WNL for age & experience-matched peers.

• Experience with & communicative need for two languages.

• Relative degree of skill in each language may vary.

Bilingual PLI

• Skills in both languages low as compared to age & experience-matched peers.
(Monolingual) PLI²

• Unexplained inefficiency in “doing” language.

• Persistent impact on educational, social & vocational outcomes.

• Range of severity

• Subtle weaknesses in general cognitive processing system.
(Monolingual) PLI²

- Unexplained inefficiency in “doing” language.
- Persistent impact on educational, social & vocational outcomes.
- Range of severity
- Subtle weaknesses in general cognitive processing system.

Bilingual PLI

- Unexplained inefficiency in “doing” two languages.
Timely, effective treatment viewed as essential for optimal language outcomes.
Issue:
Clinician-Client Language Mismatch

ASHA Counts for Year End 2010. http://www.asha.org/uploadedFiles/2010-
Member-Counts.pdf#search=%22ASHA%22

- 285,797,349 US population > 5 yrs
- ~20% of US population [57 million] speaks LOTE
- 35,000,000 Spanish-speakers
- 126,219 ASHA Certified SLPs
- 4.9% of US SLPs [5,962] bilingual; 2.1% [2,613] in Spanish & English
Plan

I. Evidence: Treatment Studies
   – Preschool (SSED)
   – School-Age (SSED & Group Study)

II. Options: Summary & Extension
   – Common Factors
   – Structuring Tx based on empirical evidence
Evidence: Treatment Studies

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Rush University

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PhD Student, UMN

Giang, Pham, PhD, CCC
Post-doctoral Fellow, UMN

Bita Payesteh, MA, CCC
PhD Student, UMN
Effective Tx Results in Generalization
Cognitive Processing

Using computer interface, bilingual stimuli and an English-only speaking classroom aide consulting with a bilingual SLP.

FUNDING: National Institute of Child Health and Human Development (F31HD055113) and the National Institute of Deafness and Other Communication Disorders (R21DC010868).
Preschooler with PLI: Vietnamese (L1), English (L2)

- 10 min/session, 2 sessions/day, 2 days/wk
- In classroom by English-only teacher
- Used computer interface & pre-recorded audio files in (a) English-only & (b) Bilingual (Viet-Eng).
- DV = % of items correctly identified in each lang.

(Pham, Kohnert, & Mann, 2011)
Questions

**Study 1:**
Does bilingual presentation facilitate or interfere with new word learning in English?

**Study 2:**
Can an EO interventionist promote new learning in Vietnamese and English?

**Study 3:**
Can this method be used to promote generalization from recently learned concepts to other picture exemplars?

(Pham, Kohnert, & Mann, 2011)
**Study 1:**

Does bilingual presentation facilitate or interfere with new word learning in English?

**Study 2:**

Can an EO interventionist promote new learning in Vietnamese and English?

**Study 3:**

Can this method be used to promote generalization from recently learned concepts to other picture exemplars?
Study 1: Does bilingual presentation facilitate or interfere with new word learning in English?

→ Facilitates attention to task.

Study 2: Can an EO interventionist promote new learning in Vietnamese and English?

→ Yes. Receptive vocabulary gains in L1 & L2.

Study 3: Can this method be used to promote generalization from recently learned concepts to other picture exemplars?

→ Yes. At least in the case of receptive vocabulary.

(Pham, Kohnert, & Mann, 2011)
General Language Counts

Prior to Tx (age 3:11)

Vietnamese:
- 60 expressive vocab
- 1-2 word sentences

English:
- 10 expressive vocab
- Rote phrases

Following Tx (age 4:5)

Vietnamese:
- 200+ expressive vocab
- 4-6 word sentences
- Increased verbal initiations

English:
- 100+ expressive vocab
- 2-4 word sentences
- Increased social communication

(Pham, Kohnert, & Mann, 2011)
Conclusion:

- Feasible, in some cases, for a monolingual clinician to promote gains in the L1 as well as the L2 in preschool children with PLI through creative collaborations with bilingual colleagues and the use of technology.

(Pham, Kohnert, Mann, 2011)
SSED Studies with School-age Children

**DV:** Repeated Measures & Standardize Tests

**Tx:** Nonlinguistic Cognitive Processing

Funded by US National Institute of Deafness and other Communication Disorders (R21DC010868).
## Nonlinguistic Cognitive Processing (NCP) Tx Activities

Intensive individual Tx: 4x/week for 3 weeks, 90 min; 1 SLP: 1 Child

<table>
<thead>
<tr>
<th>Name</th>
<th>Format</th>
<th>Description</th>
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<tbody>
<tr>
<td>Change⁰¹</td>
<td>Computer</td>
<td>React to appearance of target (vs. non-target) stimulus as quickly as possible. Target stimulus changes.</td>
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<td>Computer</td>
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¹Loutour Multimedia/Learning Fundamentals; ²Commercially available
NCP Tx Activities

Speed & Attention

Intensive individual Tx: 4x/week for 3 weeks, 90 min; 1 SLP: 1 Child
Reasoning:

**IF** cognitive deficits contribute causally to PLI **and** these skills are modifiable, **then** treatment of cognitive processing skills should generalize to improved language outcomes.

- **Subtle NCP weaknesses in children with PLI** (see reviews in Kohnert, Windsor, & Ebert, 2009; Ullman & Pierpont, 2005).

- **Cognitive processing weaknesses may underlie language learning deficits in PLI** (e.g., Leonard et al., 2007).

- **3 main areas of NCP deficit:**
  - Speed of processing (e.g., Kohnert & Windsor, 2004; Miller et al., 2001).
  - Sustained and selective attention (see Ebert & Kohnert, 2011 for meta-analysis).
  - Working memory (e.g., Danahy et al., 2007; Hoffman & Gillam, 2004).

- **Speed of processing & attention “modifiable” in other populations** (e.g., Ball, Edwards, & Ross, 2007; Cosper et al., 2010; Dye & Bavelier, 2010; Dye et al., 2009; Kerns et al., 2009; Stevens et al., 2008; Yildirim et al., 2010).
**SSED Study 1:**
Two Monolingual Participants **P1=8;0 & P2=7;1**

<table>
<thead>
<tr>
<th>Concepts &amp; Following Directions</th>
<th>Word Structure</th>
<th>Recalling Sentences</th>
<th>Formulated Sentences</th>
<th>CELF-4, Core</th>
<th>ROW-PVT</th>
<th>EOW-PVT</th>
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<tbody>
<tr>
<td><strong>P1</strong></td>
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<td>Pre</td>
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<td>46</td>
<td>86</td>
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<td>Post</td>
<td>3</td>
<td>5*</td>
<td>1</td>
<td>5*</td>
<td>60**</td>
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<td>4</td>
<td>3</td>
<td>3*</td>
<td>4*</td>
<td>60**</td>
<td>89</td>
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</tbody>
</table>

*Change in score is outside one-tailed 95% CI
**Change in score is outside two-tailed 95% CI

(Ebert & Kohnert, 2009)
**SSED Study 2:**

**Two Spanish-English Bilinguals:**

P1 = 8:4 yrs & P2 = 7:5 yrs

5 repeated measures tasks:
Sent Rep-E; NWR-E, NWR-S,
CVD-RT, RAN-RT

(Ebert, Disher, & Kohnert, under review)
### SSED Study 2:

#### Repeated Measures Effect Sizes

<table>
<thead>
<tr>
<th>Task</th>
<th>P1</th>
<th>P2</th>
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<tbody>
<tr>
<td>Choice Visual Detection</td>
<td>1.67</td>
<td>1.81</td>
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<tr>
<td>Rapid Automatic Naming</td>
<td>2.30</td>
<td>0.88</td>
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<tr>
<td>Sentence Repetition</td>
<td>2.03</td>
<td>1.80</td>
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<tr>
<td>Nonword Repetition, English</td>
<td>2.06</td>
<td>1.27</td>
</tr>
<tr>
<td>Nonword Repetition, Spanish</td>
<td>2.01</td>
<td>1.12</td>
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</tbody>
</table>

Effect sizes are in standard deviation units. They were calculated by subtracting the mean of the first three data points from the mean of the last three data points and dividing by the pooled standard deviation across all data points for an individual (Gillam et al., 2001).

(Ebert, Disher, & Kohnert, under review)
Cognitive Processing

L1

L2
Group Study

Cognitive Processing

Funded by US National Institute of Deafness and other Communication Disorders (R21DC010868)
Project Coordinators
• Jill Rentmeester Disher, M.A., CCC-SLP
• Kerry Danahy Ebert, PhD., CCC-SLP
• Bita Payesteh, M.A., CCC-SLP
• Giang Pham, PhD., CCC-SLP

Community Collaborators
• Daniel Jakab, M.A.-SLP
• Nicole Root, M.A., CCC-SLP
• Frank Cirrin, Ph.D, CCC
• Staff and speech-language pathologists at the following MPS elementary schools:
  – Andersen
  – Armatage
  – Green Central
  – Jefferson
  – Nellie Stone
  – Ramsey
  – Whittier
  – Windom

Research Assistants
• Maura Arnoldy
• Shana Banas, Sheila Cina
• Bao Dang
• Mary DesChamps
• Jasmine Egli
• Laura Grueber
• Christina Heinzen
• Megan Jirschle
• Phyllip Johnson
• Jennifer Johnston
• Malka Key
• Laura Kawatski
• Angie Luther
• Olivia Matthys
• Amelia Medina
• Andrea Morales
• Emily Rodgers
• Bethany St. Martin
• Meg Introwitz Williams

Technical Support
• Edward Carney, PhD
Group Study Participant flow

Recruitment via school SLPs

Phone screen to determine eligibility/interest

Verify eligibility with nonverbal IQ test & hearing screen

Tx Groups quasi-randomly assigned

Post-Tx Assessment. Repeat pre-tx battery.

NCP Tx Group (~22 sessions; 6 weeks)

English Tx Group (~22 sessions; 6 weeks)

Bilingual Tx Group (~22 sessions 6 weeks)

Pre-Tx Assessment: English, Spanish, and cognitive processing skills.

3 Month Post-Tx Follow-up assessment.

> 45 contact hours per child completing treatment.
It's messy (but joyful).

Group Study
Just a few examples . . .

Site/ Personnel Logistics
• Reconciling intense Experimental Tx with educational times.
• School space
• Interruptions- Codes (blue, yellow, red); Conferences, ETC
• SLPs to deliver Tx

Child attendance
• Illness, vacations, competing demands
• Snow days, transportation
• Family stability, neighborhood crime

Measuring change
• Development
• Variability in relative L1-L2 levels
• Heterogeneity of bilingual learners & children with (P)L1
• Valid and sensitive measures
• Coding & interpreting data ("yo sabo, yo sabo: hey he’s stucking!")
Group TX Study Participants

• Age range = 6;2 to 9;11
• Clinical diagnosis c/w PLI
• L1 = Spanish; L2 = English
• Passed hearing screening & scored >80 on TONI.
• Scored ≥ 2 standard deviations below mean on Spanish AND English tests.
## Assessment Battery

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>English</th>
<th>Spanish</th>
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<tbody>
<tr>
<td>CVD (Kohnert &amp; Windsor, 2004)</td>
<td>CELF-4 (Core Subtests + RAN) (Semel et al., 2003)</td>
<td>CELF-4 (Core Subtests + RAN) (Wiig et al., 2006)</td>
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<tr>
<td>ASM (Windsor &amp; Kohnert, 2009)</td>
<td>ROWPVT (Brownell, 2000b)</td>
<td>ROWPVT (Brownell, 2001b)</td>
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<tr>
<td>SSA** (Ebert &amp; Kohnert, 2011)</td>
<td>EOWPVT (Brownell, 2000a)</td>
<td>EOWPVT-Bilingual (Brownell, 2001a)</td>
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<tr>
<td><strong>Post-test only:</strong> Parent satisfaction survey</td>
<td><strong>Post-test only:</strong> Child satisfaction survey</td>
<td><strong>Post-test only:</strong> Child satisfaction survey</td>
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<td>NWR (Dollaghan &amp; Campbell, 1998)</td>
<td>Narrative (story tell) (MLU, #utts, NDW, mazes etc) (Mayer, 1969; SALT)</td>
<td>Narrative Retell (story tell) (Mayer, 1969; SALT)</td>
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13 measures yielding > 70 potential DVs
e.g., of PLI Participants Relative L1-L2 Skills by Measure

*youngest to oldest...

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<td>CELF -SS</td>
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</table>

= better score in Spanish  = Comparable performance in Spanish & English (≤ 10% difference)
3 Treatment conditions

- Administered by nationally certified SLP (1:2; 1:3)
- After school/summer school (school Tx in English)
- 75 minutes of treatment activities/session
- 4 sessions/week x 6 weeks
- 3 computer activities + 3 interactive activities (5/session)
- Videotaped sessions to establish treatment fidelity
- Planned Analyses: Individual; Absolute Group; Relative Group
# NCP Tx Activities

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\(^1\)Loutour Multimedia/Learning Fundamentals; \(^2\)Commercially available
# English Tx Activities

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Adjectives &amp; Opposites¹</td>
<td>Computer</td>
<td>Identify new vocabulary items by name and attributes; Identify opposite attributes.</td>
</tr>
<tr>
<td>Prepositions¹</td>
<td>Computer</td>
<td>Identify pictures that depict prepositional phrases.</td>
</tr>
<tr>
<td>Firefighter Fly²</td>
<td>Computer</td>
<td>Follow directions of increasing length and complexity.</td>
</tr>
<tr>
<td>Category Card Games³</td>
<td>Interactive</td>
<td>Categorize vocabulary items in multiple game formats.</td>
</tr>
<tr>
<td>Gram’s Cracker³</td>
<td>Interactive</td>
<td>Complete grammatical tasks including sentence completion and identification.</td>
</tr>
<tr>
<td>Plunk’s Pond³</td>
<td>Interactive</td>
<td>Name items based on description.</td>
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¹Laureate, ²Earobics, ³Linguisystems,
## Bilingual Tx Activities

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</thead>
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<tr>
<td>Early Classifying Games&lt;sup&gt;1&lt;/sup&gt; OR My Home, My Town&lt;sup&gt;2&lt;/sup&gt; (Sp until &gt;80%)</td>
<td>Computer</td>
<td>Identify new vocabulary items by name and attributes; Identify opposite attributes.</td>
</tr>
<tr>
<td>Rosetta Stone-Spanish</td>
<td>Computer</td>
<td>Identify pictures that depict prepositional phrases; Follow directions of increasing length and complexity.</td>
</tr>
<tr>
<td>Firefighter Fly (English)&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Computer</td>
<td>Follow directions of increasing length and complexity.</td>
</tr>
<tr>
<td>Category Card Games&lt;sup&gt;4,5&lt;/sup&gt; (Spanish-English)</td>
<td>Interactive</td>
<td>Categorize vocabulary items in multiple game formats.</td>
</tr>
<tr>
<td>Gram’s Cracker&lt;sup&gt;4,5&lt;/sup&gt; (Spanish)</td>
<td>Interactive</td>
<td>Complete grammatical tasks including sentence completion and identification.</td>
</tr>
<tr>
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<td>Interactive</td>
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</tr>
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1Super Duper, 2Laureate, 3Earobics, 4Linguisystems, 5Adapted into Spanish
Group Study Results SO Far . . .

**Nonlinguistic Cognitive Processing Group (n=12)**
- Gains on 7/8 English language measures.
- Gains on 8/8 Spanish language measures.
- Gains on 5/5 nonlinguistic processing measures.

**English-Only Language Group (n=8)**
- Gains on 7/8 English language measures.
- Gains on 6/8 Spanish language measures.
- Gains on 4/5 nonlinguistic processing measures.

**Bilingual Group (n=5)**
- Gains on 4/8 English language measures.
- Gains on 3/8 Spanish language measures.
- Gains on 4/5 nonlinguistic processing measures.
Percent Change: Standardized Test Scores

Percent Change from Pre- to Post-Tx

-10 -5 0 5 10 15 20 25

ENGLISH

NCP
EO
BI

SPANISH

NCP
EO
BI

CELFF
ROWPVT
EOWPVT
Percent Change: NWR & NDW from Narrative

Percent Change from Pre- to Post- Tx

-10 -5 0 5 10 15 20 25

ENGLISH

SPANISH

NCP
EO
BI
NCP
EO
BI

NWR
NDW
Percent Change: Nonlinguistic Cognitive Processing Measures by Tx Group

Percent Change from Pre- to Post-Tx

- SSAd-RT
- SSAd-A
- ASM-A
- CVD-RT

Legend:
- NCP
- EO
- Bi
Tentative Interpretation of work in progress

- All 3 Tx conditions effective
- Close (causal) associations between language & cognition in bilingual PLI.
- Cross-domain & cross-language generalization not unidirectional.
- Easier to take language out of cognition than cognition out of language.

**NOTE:** Things may change with bigger N, at 3 mo f/u, with DV selection, with age, starting points, relative L1-L2 proficiency and PLI severity factored in ETC!
OPTIONS:
SUMMARY & EXTENSION
SPECIFIC INGREDIENTS (Unique & Essential)

COMMON FACTORS (Essential but not unique)

(The Great Psychotherapy Debate by Wampold, 2001)
Potential “Common Factors” contributing to Tx outcomes in SLP

1. Clinician
2. Client
3. Structure

(Ebert & Kohnert, 2010)
1. Clinician as a Factor in related fields

- In psychotherapy, individual clinicians account for ~6-9% of variance in tx outcomes (Wampold, 2001).

- Individual psychiatrists accounted for more variance than medication (vs. placebo) in depression tx (McKay, Imel, & Wampold, 2006).
Clinician as a Factor in SLP

Reanalysis of phonological tx comparison data reported by Rvachew & Nowak (2001) showed differences by SLP as well as tx.

(see Ebert & Kohnert, 2010 for reanalysis)
“When people believe they can make a difference, they usually do.”

~JFK
Exploration of Clinician Factor in SLP  
(Ebert & Kohnert, 2010)

Phase 1

Q: What factors related to the SLP may result in more effective tx, given the same client and the same tx program?

Themes in Qualitative Data
Phase 2

Of the 25 factors listed, 158 SLP respondents chose the 3 they felt had the greatest power to **positively** influence tx outcomes.

- Rapport
- Functional Context
- Communication with client
- Willingness to change
- Theoretical framework
- Communication with family
- EBP
- Reconsider progress
- Motivation
- Creativity
- Communication with other providers
- Consistency in Approach
- Experience with disorder

(Ebert & Kohnert, 2010)
Clinician Features Key to Tx Effectiveness with Bilingual PLI:

WELL-DEVELOPED RAC⁴KS

- Resourceful
- Advocate
- C⁴ onviction, creative problem solver,
  critical thinker, caring professional
- Knowledgeable
- Skilled
2. Client /Family Factor

- Motivation
- Buy-in
- Attendance

Q: How do we promote motivation & buy-in when there is a mismatch in languages?
3. Tx Structure Factor

- Systematic, scripted
- Frequency
- Intensity
- Context
- Partners (peer, classroom teacher)
INTEGRATED APPROACH:

*Acknowledge and exploit both.*
e.g., Structure: Integrate Common Factors with theoretically & empirically-motivated factors to organize Tx to support two languages.

(Kohnert & Derr, 2004)
Overlapping surface features & Meta-systems:
e.g., Cognates, compare & contrasting features, translation
tasks, organization & discourse; communication strategies.

Common Underpinnings:
Attention to auditory & visual details; timed tasks & memory
activities e.g., Learning Fundamentals & Earobics
software, Blink; Eye Spy; Uno; Simon Trickster, Luminosity.
Essential Components of Effective Tx

Common Factors

Theoretically-motivated & empirically validated procedures.

Tools & Activities
Aside 1.

- Effective Treatment **Action Plans** include multiple direct and indirect strategies to maximize generalization.

Kohnert, 2008
Aside 2:

- To know if Tx is working, look beyond trained tasks, in BOTH languages (even when treating only one) using multiple sources of evidence.
When faced with language-mismatch, can SLPs facilitate optimal language outcomes in bilingual children with primary language impairment?
YES!
SLPs with good “RAC³KS”
can use theoretical
frameworks, empirical
evidence & creative
collaborations to
structure treatment in
ways that promote both
languages in bilingual
children with PLI.
Thank you!

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Language

- Self-identity
- Across Generation
- Relationships
- Social-Emotional Well-being
- Literacy
- Education
- Cognition
- Vocation
- Community engagement

Diagram showing connections between different aspects of language development, such as relationships, social-emotional well-being, literacy, education, cognition, career, and community engagement.