DOES EARLY SIGN LANGUAGE INPUT MAKE A DIFFERENCE ON DEAF CHILDREN WITH AUDITORY BRAINSTEM IMPLANTS?

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Jockey Club Sign Bilingualism and Co-enrollment in Deaf Education Programme
Acknowledgement

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Background

Children may suffer from different types of hearing loss – depends on the site of lesion.
Different types of hearing technology have been developed:

- Hearing Aids
- Cochlear Implants
- Auditory Brainstem Implants
Background

Auditory Brainstem Implant (ABI) was typically used for people with acoustic tumours.

It is now also an option for deaf children with no cochlear nerve or with cochlear disorders such as nerve that could not benefit from a CI e.g. absence of or incomplete development of cochlear nerve (Colletti & Shannon, 2005).
人工耳蝸 (Cochlear Implant)

Insertion of electrodes into the cochlear
Placing the electrodes onto the brainstem
Background

- Children with ABI still face the risk of inaccessibility to linguistic input in their oral language development.

- Recent advancement in research on sign linguistics and sign language acquisition has enabled us to reconsider the possibility that signed language may support spoken language development, no matter in their oral or written form (see Tang, Lam and Yiu, 2014).
About the Study

• A case study of two deaf children with ABI with one receiving signed language exposure at an early age of 1;3, and the other as late as 5;6.

• To examine their language development and explore the possible impact of early sign language learning to deaf children with ABI

• Both of them were admitted in a Sign Bilingualism and Co-enrolment (SLCO) Programme
ABOUT THE SUBJECTS: KC AND MY
KC

- M / 6;7
- Bilateral profound hearing loss with auditory neuropathy
- CI at 1;6 in 2008
- ABI done at 2;8 in 2009

Tested at 5;1
MY

- F / 6;8
- Bilateral profound hearing loss
- CI done at 2;10 in 2009; ABI done at 3;5 in 2010

Tested at 5;0
### Background information (as at June 2013)

<table>
<thead>
<tr>
<th></th>
<th>KC</th>
<th>MY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td><strong>Date of birth</strong></td>
<td>25 Nov, 2006</td>
<td>21 Oct, 2006</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>6;7</td>
<td>6;8</td>
</tr>
<tr>
<td><strong>Hearing loss</strong></td>
<td>Bilateral Profound</td>
<td>Bilateral Profound</td>
</tr>
<tr>
<td><strong>CI implantation</strong></td>
<td>1;6 (left)</td>
<td>2;10 (left)</td>
</tr>
<tr>
<td><strong>ABI implantation</strong></td>
<td>2;8</td>
<td>3;5</td>
</tr>
<tr>
<td><strong>Parents</strong></td>
<td>Hearing</td>
<td>Hearing</td>
</tr>
<tr>
<td><strong>Began to learn HKSL at</strong></td>
<td>1;3</td>
<td>5;6</td>
</tr>
<tr>
<td><strong>Admitted to the SLCO Programme</strong></td>
<td>3;10</td>
<td>5;6</td>
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<tr>
<td><strong>Before SLCO Programme</strong></td>
<td>Special Child Care Centre</td>
<td>Special Child Care Centre</td>
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</table>
ASSESSMENT BATTERIES
## Assessments (as at June 2013)

<table>
<thead>
<tr>
<th>Language</th>
<th>Area of Assessment</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signed (HKSL)</td>
<td>Grammatical Knowledge</td>
<td>Hong Kong Sign Language Elicitation Tool (developed by CSLDS)</td>
</tr>
<tr>
<td></td>
<td>- Comprehension</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Narratives</td>
<td>Narratives Assessment – Frog Story</td>
</tr>
<tr>
<td>Literacy (written Chinese)</td>
<td>Vocabulary</td>
<td>Pre-school and Primary Chinese Literacy Scale, PPCLS (Li, 1999)</td>
</tr>
<tr>
<td></td>
<td>- Picture selection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Word recognition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reading aloud</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Word/sentence making</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grammatical Knowledge</td>
<td>Assessment on Chinese Grammatical Knowledge (KG version, developed by CSLDS)</td>
</tr>
<tr>
<td></td>
<td>- Word re-ordering</td>
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</table>
## Assessments (as at June 2013)

<table>
<thead>
<tr>
<th>Language</th>
<th>Area of Assessment</th>
<th>Test</th>
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</thead>
<tbody>
<tr>
<td>Oral (Cantonese)</td>
<td>Speech Perception</td>
<td>Cantonese Basic Speech Perception Test (CBSPT) (Lee, 2006)</td>
</tr>
<tr>
<td></td>
<td>- Picture selection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Receptive Vocabulary</td>
<td>Hong Kong Cantonese Receptive Vocabulary Test (CRVT) (Lee, Lee &amp; Cheung, 1996)</td>
</tr>
<tr>
<td></td>
<td>- Picture selection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Acting out</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Picture description</td>
<td></td>
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<td></td>
<td>- ...</td>
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</table>
SIGN LANGUAGE
## KC & MY (HKSL - ET)

<table>
<thead>
<tr>
<th></th>
<th>Receptive Language</th>
<th>Productive language</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>KC</td>
<td>47.90%</td>
<td>45.20%</td>
<td>42.50%</td>
</tr>
<tr>
<td>MY</td>
<td>30.21%</td>
<td>4.69%</td>
<td>17.45%</td>
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</table>
**KC & MY (Narratives: Frog Story)**

- Subjective ratings by 4 native signers

<table>
<thead>
<tr>
<th></th>
<th>Content (15)</th>
<th>Language (15)</th>
<th>Cohesion (15)</th>
<th>Total (45/100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TKC</td>
<td>8</td>
<td>10</td>
<td>5.3</td>
<td>23.3 / 52%</td>
</tr>
<tr>
<td>TMY</td>
<td>3.5</td>
<td>4</td>
<td>2</td>
<td>9.5 / 21%</td>
</tr>
</tbody>
</table>
CHINESE LITERACY
Chinese Vocabulary: (PPCLS)
Grammatical Knowledge in Written Chinese (CGA-KG)

**KC**
- 2010-2011: 47.7%
- 2011-2012: 57.7%
- 2012-2013: 88.6%
- 2013-2014: 86.4%

**MY**
- 2012-2013: 54.5%
- 2013-2014: 61.4%
SPEECH PERCEPTION
## Speech Perception

<table>
<thead>
<tr>
<th>Test</th>
<th>Year</th>
<th>KC</th>
<th>MY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBSPT</td>
<td>2009-10</td>
<td>31%</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>2011-12</td>
<td>76.2%</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>2012-13</td>
<td>83.3%</td>
<td>59.5%</td>
</tr>
</tbody>
</table>
RECEPTIVE VOCABULARY
Receptive Vocabulary (CRVT)

KC

MY

Chronological Age (mth)

Receptive Vocabulary Age (mth)
MY (Information provided by Child Assessment Service)

- CA = 3;5 (in 4/2010)

Verbal Comprehension (informal test) = < 12 mth
- Severe delay
- Comprehended mainly by contextual and gestural cues

Verbal Expression (informal test) = <12 mth
- Severe delay
- Mainly produced single words & sometimes combined words
- Rare spontaneous speech
MY (Test: RDLS)

Chronological Age (mth)

- Receptive language age (month)
- Expressive language age (month)
- Chronological age (month)

2011-2012
2012-2013
KC (Test: RDLS)

Chronological Age (mth)

- Receptive language age (month)
- Expressive language age (month)
- Chronological age (month)
DISCUSSION
Signining skills and Literacy

• KC was better in HKSL grammatical knowledge than that of MY especially in the expressive ability
  – early sign language input may help

• KC showed better performance in vocabulary and grammatical knowledge in written Chinese
  - better signed and oral language may help
### Oral Language - Receptive (2012-13)

<table>
<thead>
<tr>
<th>Area of Assessment</th>
<th>KC</th>
<th>MY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech Perception</td>
<td>83.3%</td>
<td>59.5%</td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>47 mth</td>
<td>36 mth</td>
</tr>
<tr>
<td>Receptive Language</td>
<td>33 mth</td>
<td>26 mth</td>
</tr>
</tbody>
</table>

Receptive performance of KC: about 7 mth to 1 year better than that of MY.
Oral Language - Expressive (2012-13)

<table>
<thead>
<tr>
<th>Area of Assessment</th>
<th>KC</th>
<th>MY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expressive Language</td>
<td>76.5 mth</td>
<td>31 mth</td>
</tr>
</tbody>
</table>

Expressive performance of KC: 45.5 mth i.e. nearly 4 year better than that of MY.

Average growth rate: KC (2009-13): 1.83
MY (2012-13): 1.14
Frog Story in Cantonese

xxxx 青蛙，然後，然後，然後
xxxx frog, and then, then, then
Frog Story in Cantonese
Oral Language

Better speech reception scores of KC:
- In terms of language age, KC has ABI surgery received 9 mths earlier than MY; contributing to about 7-12 mths of earlier receptive skills

Advanced speech expression scores of KC:
- Earlier ABI surgery or older language age may not be able to explain the discrepancy
- Early sign language input, hence sign language competence seems having a significant contribution
Observation from parents

• Quite similar observations from parents:

  “after learning sign language, he/she was more able to communicate with me, and that helped a lot in my teaching of vocabulary and language concepts to him/her” (Parent of KC)

  “ once he/she learned the concepts in signed language, it was easier for them to articulate the words in speech and remember the vocabularies” (Parent of MY)
Observation from teacher

• A small study by Shek (2014) by teaching KC and MY 4-character words (idioms) in two different orders in terms of language of instructions: i) oral–sign; ii) sign-oral

• e.g. 車水馬龍 (car-water-horse-dragon)

• Figurative meaning: many carriages or vehicles; heavy traffic; a busy & crowded place
Recognition Task

• 4 choices
• HKSL: presented by a deaf teacher in a video
• Cantonese: presented by a hearing teacher in live voice
Observation from teacher

- KC learned faster and better when signed language was used as medium of instructions
- KC followed better through oral instructions after signed instructions was used (sign-oral better than oral-sign)
- MY showed limited understanding in both ways. Possible reasons are:
  - restricted speech perception and oral language ability;
  - Late input and development of signed language.
Conclusion

This preliminary study on deaf children with ABI who study in a sign bilingual and co-enrollment setting brought to our attention that early signed language input does not hinder spoken language development.

It opens up a new paradigm of research that examines whether enhanced signed language input supports the acquisition of spoken language by deaf children under adverse circumstances.
References


THANK YOU!

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