Shaping Support for Elderly Cochlear Implant Recipients –
The Role of Data Logging and LENA

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SCIC’s clients aged 60+yrs: Over 40%

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>0-20</td>
<td>2%</td>
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<tr>
<td>21-30</td>
<td>13%</td>
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<tr>
<td>31-40</td>
<td>9%</td>
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<tr>
<td>41-50</td>
<td>6%</td>
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<tr>
<td>51-60</td>
<td>12%</td>
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<tr>
<td>61-70</td>
<td>12%</td>
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<tr>
<td>71-80</td>
<td>7%</td>
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<tr>
<td>91-100</td>
<td>10%</td>
</tr>
<tr>
<td>&gt;100</td>
<td>0%</td>
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</tbody>
</table>

N=2930 (active recipients)
Implantation 60yr+ age group (2006-2015)

Increasing number of recipients aged 60yrs and older over time.
Project objectives

- Use of Language Environment Analysis (LENA©) would provide a platform for the investigation of communicative interactions, which when paired with data logging and an evaluation of functional listening (SSQ) could guide development of support for elderly clients following CI. Given the limitation in logistics of using LENA with all clients it was anticipated this study would identify features of datalogging and the functional questionnaires that would indicate which clients would benefit from use of LENA© to tailor their support and rehabilitative intervention.
Toolkit for shaping support

LENA™

SSQ

Datalogging

LENA™, www.lenafoundation.org

Speech, Spatial, Qualities, Gatehouse and Noble 2004

Client focused programme for communication support & device use – improving the communicative “diet” (Cantle Moore)
What features of data logging provide useful information?

• Data logged varies amongst manufacturers

• Duration of use
  Battery life
  Coil off errors
  Programs used
  Volume and sensitivity changes
  Intensity levels encountered
  Accessory usage
  Environments encountered
LENA – Language Environment Analysis

Recording: 1 day
Download: 8-12 hrs
Analysis: 8-12 hrs

Feasibility with adults (2014)
Li, Vikani, Harris and Lin
Changes in the audio environment are shown hour-to-hour also 5 minute intervals.

This Audio Environment analysis graph indicates:
- Considerable competing TV presence.
- On average meaningful speech represents less than 25% of the young child’s auditory diet

Meaningful speech registers at > 35 dBA
Duration of use

![Duration of use chart](chart.png)

**Subjects**

- LENA
- Dlog

**Hours**

1 2 3 4 5 6 7
Data logging – scene analysis

![Data logging diagram]

**Datalogging Environmental analysis**

- **1 (13 hours)**
  - Speech: 40%
  - Sp in noise: 10%
  - Noise: 20%
  - Music: 20%
  - Quiet: 10%

- **4 (15.3 hours)**
  - Speech: 30%
  - Sp in noise: 10%
  - Noise: 30%
  - Music: 10%
  - Quiet: 20%

- **5 (7.6 hours)**
  - Speech: 40%
  - Sp in noise: 20%
  - Noise: 20%
  - Music: 10%
  - Quiet: 5%

- **6 (13.9 hours)**
  - Speech: 35%
  - Sp in noise: 15%
  - Noise: 25%
  - Music: 10%
  - Quiet: 5%

- **7 (13.2 hours)**
  - Speech: 50%
  - Sp in noise: 20%
  - Noise: 15%
  - Music: 10%
  - Quiet: 5%
LENA™: environmental analysis

Case 1
- Speech: 3/10
- Spatial: 3/10
- Quality: 0/10
- 2% meaningful speech
- 2% DL

Case 2
- Speech: 4/10
- Spatial: 1.8/10
- Quality: 1.25/10
- 8% meaningful speech

Case 3
- Speech: 8/10
- Spatial: 8.25/10
- Quality: 1.5/10
- 15% meaningful speech
LENA™ Vocal Block Activity: Case 1

- Variety of conversation partners throughout Case 1’s day.
  42% vocal activity with an adult female; 33% with an adult male; 23% with a child.

- 40% of vocal exchanges had a duration shorter than 20 sec. suggesting simple phrases of acknowledgement?

- LENA Word Count ID indicated vocal exchanges were often initiated by Case 1’s conversation-partner.
LENA ™: SSQ comparison

**Case 4:**
- Lena ™: 2.6/10 Speech
- 2/10 Spatial
- 7/10 Quality

**Datalogging:**
- 10% meaningful speech
- 4% + 20% DL

**Case 5:**
- LENA™: 2/10 Speech
- 3/10 Spatial
- 3/10 Quality

**Datalogging:**
- 38% meaningful speech
- 15% + 18% DL
Active participation in conversation

Meaningful Speech in LENA™ and Speech in Datalogging does not reflect conversational turns – specific analysis needed to determine this
LENA™: environmental analysis

Case 6

Speech: 4.2/10
Spatial: 2/10
Quality: 8.7/10

10% meaningful speech
8% + 15% DL

Case 7

Speech: 4/10
Spatial: 4/10
Quality: 6/10

23% meaningful speech
85% + 3% DL
Pilot data – Outcomes so far

- Data logging in some devices provides a useful snapshot of acoustic environments and trends of use – more data needed to clarify if this is consistent across all devices as discrepancies evident.
- Adult cochlear implant recipients at risk of very limited “meaningful communication” as shown by LENA™.
- Quality of this limited communication very poor.
- Some good agreement with the data logging and SSQ but not always reflective (based on clients perspective).
How can we shape support?

• Unable to counsel about quality of communicative diet with datalogging alone unless environmental scenes accurately reflect the environment

• Additional qualitative information needed to assist in derivation of goals and support – battery of tools

• Counseling important to balance constructive feedback and optimise device usage

• Team approach to support adult clients and their families (if possible) with social worker (counsellor), working with audiologist and communication therapists