Spanish-speaking children who are deaf or hard of hearing and LENA (Language Environment Analysis)

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LENA: Language environment analysis
http://www.lenafoundation.org

DISCLOSURE: I am an unpaid member of the LENA Scientific Advisory Board
Methods: Naturalistic Daylong Recordings

Tool: LENA (Language ENvironment Analysis)

1. Place the recorder in the pocket. Record up to 16 hours.
2. At the end of the day upload recording to computer.
3. Automatic processing extracts information of interest.
Maternal Level of Education

- D/HH Spanish (N=13)
- TD Spanish (N=21)
- TD English (N=329)
- D/HH English (N=46)

% with some college or higher
Range: Conversational Turns

Number of Conversational Turns/day

Spanish D/HH
Typically Developing Spanish
Typically Developing English
English D/HH

3rd Quartile
1st Quartile
Range: Adult Word Count

Number of Adult Words Spoken/day

- Spanish D/HH
- Typically Developing Spanish
- Typically Developing English
- English D/HH

3rd Quartile
1st Quartile
Range: Child Vocalizations

Number of Child Vocalizations/day

- Spanish D/HH
- Typically Developing Spanish
- Typically Developing English
- English D/HH

Range:
- 3rd Quartile
- 1st Quartile
Spanish-speaking Deaf and Hard of Hearing versus English-speaking Deaf and Hard of Hearing versus Spanish-speaking Hearing
<table>
<thead>
<tr>
<th></th>
<th>Min:</th>
<th>Max:</th>
<th>Mean:</th>
<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td><strong>Typically Developing Spanish</strong></td>
<td>12%</td>
<td>20%</td>
<td>14%</td>
<td>2</td>
</tr>
<tr>
<td><strong>Spanish D/HH</strong></td>
<td>7%</td>
<td>25%</td>
<td>17%</td>
<td>5</td>
</tr>
<tr>
<td><strong>English D/HH</strong></td>
<td>5%</td>
<td>33%</td>
<td>20%</td>
<td>6</td>
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</tbody>
</table>
### TV:
**Spanish D/HH vs English D/HH**  
(in percent)  
*Normal Hearing Typical Development: 10%*

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<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td><strong>Typically Developing Spanish</strong></td>
<td>4%</td>
<td>31%</td>
<td>15%</td>
<td>10</td>
</tr>
<tr>
<td><strong>Spanish D/HH</strong></td>
<td>2%</td>
<td>33%</td>
<td>14%</td>
<td>10</td>
</tr>
<tr>
<td><strong>English D/HH</strong></td>
<td>2%</td>
<td>28%</td>
<td>8%</td>
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</table>
Distant Language: Spanish D/HH vs English D/HH (in percent)

Normal Hearing Typically Developing: 40%

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<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td>Typically Developing Spanish</td>
<td>15%</td>
<td>53%</td>
<td>32%</td>
<td>10</td>
</tr>
<tr>
<td>Spanish D/HH</td>
<td>10%</td>
<td>51%</td>
<td>30%</td>
<td>13</td>
</tr>
<tr>
<td>English D/HH</td>
<td>10%</td>
<td>39%</td>
<td>21%</td>
<td>7</td>
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<tr>
<td></td>
<td>Min:</td>
<td>Max:</td>
<td>Mean:</td>
<td>Standard Deviation</td>
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</tr>
<tr>
<td><strong>Typically Developing Spanish</strong></td>
<td>15%</td>
<td>61%</td>
<td>36%</td>
<td>13</td>
</tr>
<tr>
<td><strong>Spanish D/HH</strong></td>
<td>1%</td>
<td>20%</td>
<td>4%</td>
<td>6</td>
</tr>
<tr>
<td><strong>English D/HH</strong></td>
<td>1%</td>
<td>11%</td>
<td>3%</td>
<td>3</td>
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</table>
Silence:
Spanish D/HH vs English D/HH (in percent)

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<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Hearing Typically Developing</td>
<td>15%</td>
<td>61%</td>
<td>36%</td>
<td>13</td>
</tr>
<tr>
<td>Spanish D/HH</td>
<td>13%</td>
<td>59%</td>
<td>34%</td>
<td>14</td>
</tr>
<tr>
<td>English D/HH</td>
<td>20%</td>
<td>66%</td>
<td>47%</td>
<td>10</td>
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Averages in Typical Development
LENA Control

- N = 3384
- Meaningful Language: 19%
- Distant Language: 40%
- TV/Media: 10%
- Noise: 3%
- Silence: 28%
Expressive Vocabulary at 84 months

<table>
<thead>
<tr>
<th></th>
<th>Lower Quartile</th>
<th>Inter Quartile</th>
<th>Upper Quartile</th>
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<tbody>
<tr>
<td>Low SES</td>
<td>69.13</td>
<td>86</td>
<td>111</td>
</tr>
<tr>
<td>High SES</td>
<td>104</td>
<td>104</td>
<td>106</td>
</tr>
</tbody>
</table>

PARENT WORD FREQUENCY: EOWPVT III

Lower Quartile

Inter Quartile

Upper Quartile

Expressive Vocabulary at 84 months

Low SES

High SES
Language Comprehension at 84 months

- **Lower Quartile**
  - Low SES: 58
  - High SES: 88

- **Inter Quartile**
  - Low SES: 88
  - High SES: 94

- **Upper Quartile**
  - Low SES: 99
  - High SES: 94

PARENT WORD FREQUENCY: TACL
This research was supported by the Disability Research and Dissemination Center (DRDC) through its Cooperative Agreement Number 5U01DD001007, from the Association of University Centers on Disabilities, and from the Centers for Disease Control (CDC) and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the DRDC, AUCD or the CDC.