EMERGENT COMPLEXITY IN FIRST WORDS

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**COMPLEXITY?**

- What is complexity? Lack of definition
- Complex sounds vs Easy sounds
  - Infrequent vs. frequent in word languages
  - Late vs. early appearing in children
  - Early vs. late-mastered by children

>> Emergent complexity in first words = change from easy to complex sounds from 12 to 24 months of age
WHAT IS EASY AT 12 MONTHS OF AGE?

- Continuity between babbling and first words (Oller et al., 1976; Stark, 1980; Stoel-Gammon & Cooper, 1984; Vihman, Ferguson & Elbert, 1986)
  - Same sound preferences
    - oral stops [p, b, d, g], nasal stops [m, n] and glides [w, j]
    - labials and coronal consonants [b, m, d, t]
    - mid and low front and central [ɔ, æ, e, ɛ, a] vowels
  - Within syllable preferences
    - labial consonants + central vowels [ba]
    - coronal consonants + front vowels [de]
    - dorsal consonants + back vowels [ka]
  - Across syllable preferences
    - more high-low variegation than front-back vowel variegation
    - more manner than place consonant variegation

- “Frame then Content” (MacNeilage & Davis, 1993; 2000)
**LEXICAL SPURT?**

- First words production (around 12 months) (Fenson et al., 1993)

- Until 50 words: slow acquisition of new words
  - After 50 word mark: Increase of lexical rate > lexical spurt

**WHY?**

- Conceptual development: non verbal categorization  
  (Gopnik & Melzhoff, 1992; Poulain-Dubois et al., 1995; Gershkoff-Stowe et al., 1997)

- Memory retrieval (Dapretto & Bjork, 2000)

- New learning principles > fast mapping (Behrend, 1990; Markman, 1991; Mervis & Bertrand, 1995)

- Increase of communicative needs (Clark, 1993)

- Increase of articulatory control (Clark, 1993)
HYPOTHESES

- Children go through a lexical spurt before 24 months of age

- Children produce more easy sounds and sound structures than complex ones from 12 to 24 months of age

- Children’s productions are more complex after lexical spurt than before
METHOD

Languages
- 6 languages: French, Romanian, Dutch, Tunisian + Turkish, Tachelhit

Subjects
- 22 children – 4 FR, 3 RO, 4 DU, 4 TU, 4 TUR, 2 TA

Data collection
- One hour of audio-video recording every two weeks from 8 months of age till 25 months of age in the children’s homes 12;15 to 24;15 divided in “before 50 words” and “after 50 words”
METHOD

- Data processing
  - IPA transcriptions by native speakers of each languages
  - LIPP entering
  - Clan and Phon format (Yvan Rose, Brian MacWhinney, Carla Peddle)
<table>
<thead>
<tr>
<th>Children</th>
<th>Early words</th>
<th>Later words</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR1</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>FR2</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>FR3</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>FR4</td>
<td>19</td>
<td>14</td>
</tr>
</tbody>
</table>

**French total**

| RO1      | 16          | -           |
| RO2      | 21          | 6           |
| RO3      | 23          | -           |

**Romanian total**

| DU1      | 18          | 5           |
| DU2      | 11          | 17          |
| DU3      | 12          | 16          |
| DU4      | 15          | 19          |

**Dutch total**

| TU1      | 15          | 6           |
| TU2      | 19          | 7           |
| TU3      | 22          | 8           |
| TU4      | 22          | 6           |

**Tunisian total**

<p>| ALL      | 269         | 132         |</p>
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<thead>
<tr>
<th>Children</th>
<th>Early words</th>
<th>Later words</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR1</td>
<td>2,300</td>
<td>14,948</td>
</tr>
<tr>
<td>FR2</td>
<td>2,423</td>
<td>11,387</td>
</tr>
<tr>
<td>FR3</td>
<td>4,939</td>
<td>3,637</td>
</tr>
<tr>
<td>FR4</td>
<td>2,079</td>
<td>19,571</td>
</tr>
<tr>
<td><strong>French total</strong></td>
<td><strong>11,741</strong></td>
<td><strong>49,543</strong></td>
</tr>
<tr>
<td>RO1</td>
<td>5,078</td>
<td>-</td>
</tr>
<tr>
<td>RO2</td>
<td>557</td>
<td>7,805</td>
</tr>
<tr>
<td>RO3</td>
<td>2,368</td>
<td>-</td>
</tr>
<tr>
<td><strong>Romanian total</strong></td>
<td><strong>8,003</strong></td>
<td><strong>7,805</strong></td>
</tr>
<tr>
<td>DU1</td>
<td>4,305</td>
<td>3,833</td>
</tr>
<tr>
<td>DU2</td>
<td>1,333</td>
<td>9,460</td>
</tr>
<tr>
<td>DU3</td>
<td>2,101</td>
<td>19,655</td>
</tr>
<tr>
<td>DU4</td>
<td>1,189</td>
<td>31,504</td>
</tr>
<tr>
<td><strong>Dutch total</strong></td>
<td><strong>8,928</strong></td>
<td><strong>64,452</strong></td>
</tr>
<tr>
<td>TU1</td>
<td>2,282</td>
<td>2,230</td>
</tr>
<tr>
<td>TU2</td>
<td>2,515</td>
<td>8,538</td>
</tr>
<tr>
<td>TU3</td>
<td>4,492</td>
<td>10,626</td>
</tr>
<tr>
<td>TU4</td>
<td>4,717</td>
<td>3,532</td>
</tr>
<tr>
<td><strong>Tunisian total</strong></td>
<td><strong>14,006</strong></td>
<td><strong>29,722</strong></td>
</tr>
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<td><strong>ALL</strong></td>
<td><strong>42,678</strong></td>
<td><strong>151,522</strong></td>
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CUMULATIVE VOCABULARY

French

Tunisian

Dutch

Romanian

FR1  FR2  FR3  FR4

TU1  TU2  TU3  TU4

DU1  DU2  DU3  DU4

RO1  RO2  RO3
RATE OF ACQUISITION

French

Number of words: 7, 5, 8, 6.5

Romanian

Number of words: 4, 3.25, 2.5

Dutch

Number of words: 8.5, 6, 14, 8

Tunisian

Number of words: 5.5, 6, 5, 4.25
CONSONANTS MANNER

Stops + glides (vs. other manners)

Early words  Later words  Percentages

FR1  FR2  FR3  FR4  RO1  RO2  RO3  DU1  DU2  DU3  DU4  TU1  TU2  TU3  TU4
CONSONANTS MANNER

Stops + glides (vs. other manners)

Percentages

Early words

Later words
CONSONANT - PLACE

Labials + coronals

Percentages

Early words

Later words

FR1
FR2
FR3
FR4
RO1
RO2
RO3
DU1
DU2
DU3
DU4
TU1
TU2
TU3
TU4
CONSONANT - PLACE

Labials + coronals

Early words

Later words

Percentages

FR1
FR2
FR3
FR4
RO3
DU1
DU2
DU3
DU4
TU1
TU2
TU3
TU4
VOWELS

Vowels from the left inferior part (vs. other V.)

Early words  Later words  Percentages

FR1  FR2  FR3  FR4  RO1  RO2  RO3  DU1  DU2  DU3  DU4  TU1  TU2  TU3  TU4
VOWELS – LATER WORDS

Vowels from the left inferior part (vs. other V.)

French: 55.7
Romanian: 61.5
Dutch: 44.8
Tunisian: 67.1
VOWELS

Vowels from the left inferior part (vs. other V.)

Percentages

Early words  Later words
## RESULTS - INTER-SYLLABIC COOCC

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</tr>
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<tr>
<td>RO</td>
<td>1.02</td>
<td>1.34</td>
<td>1.25</td>
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INTRA-SYLLABIC VOWEL CHANGE

Height (vs. backness)

Early words  Later words

Percentages

FR1
FR2
FR3
FR4
RO1
RO2
RO3
DU1
DU2
DU3
DU4
TU1
TU2
TU3
TU4
INTRA-SYLLABIC VOWEL CHANGE - LATER WORDS

Height (vs. backness)

French  Romanian  Dutch  Tunisian
INTRA-SYLLABIC VOWEL CHANGE

Height (vs. backness)

[Graph showing percentage changes in height and backness for variousFR1, FR2, FR3, FR4, RO3, DU1, DU2, DU3, TU1, TU2, TU3, TU4 across early and later words.]
INTRA-SYLLABIC CONSONANT CHANGE

Manner (vs. place)

Percentages

early words
later words

FR1
FR2
FR3
FR4
RO1
RO2
RO3
DU1
DU2
DU3
DU4
TU1
TU2
TU3
TU4
INTRA-SYLLABIC CONSONANT CHANGE

Manner (vs. place)

Percentages

early words

later words

FR1
FR2
FR3
FR4
RO3
DU3
TU1
TU2
TU3
TU4
CONCLUSION

- **Lexical spurt?**
  - 11 children (84.5%)
  - 2 RO <50 words, 1 DU and 1 TU had a linear development

- **More easy sounds and sound structures?**
  - Stops +glides > others
  - Labials+coronals > others
  - Vowels from the left inferior part of vocalic space > others (80% first words, 69% later words)
  - Expected CV co present except for Dutch
  - Slight preference for height changes in later words
  - No preference for manner changes over place changes

- **More complex sounds and sound structures after lexical spurt**
  - Decrease of stops and glides in 77% of children
  - Decrease of labials+coronals in 69% of children
  - Decrease of vowels from the left inferior part of vocalic space in 77% of children
  - No clear changes in the CV cooccurrences between early words and later words
  - No decrease of height changes
  - No decrease of manner changes
WHAT NEXT?

- **Influence of articulatory constraints** on early word segmental and structural forms?
  - Compare the complexity of targeted words by children with the complexity of their actual productions of those words.

- **Influence of input** (word frequency and neighborhood density) on first words?
  - Correlate the words produced by children to their frequency in CDS and Adult speech samples. We will also calculate the correlation between word frequency and order of acquisition.
  - Correlate the words produced by children to their neighborhood density in CDS and Adult speech samples.
MANY THANKS TO

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- Inge Zink, University of Leuven, Leuven, Belgium
- The children and their families
Many Thanks to

You for your attention