Adquisició del component fonològic en nens bilingües i monolingües: segments i prosòdia

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Some issues in bilingual phonological acquisition

• The two phonological systems develop separately, but they interact

• Interaction appears as delay, acceleration or transfer

• Can we predict what type of interaction will appear?

• What factors should be taken into consideration?
Factors responsible for interaction

• Markedness of the category to be acquired

• Complexity of the category to be acquired
  – allophony, allomorphy

• Frequency of category in input
  – weak/strong presence
  – category is missing in one of the languages

• Ambient language
Data

• Monolingual Spanish longitudinal (PAIDUS: DFG)
  – José  – Miguel
  – María

• Monolingual German longitudinal (PAIDUS: DFG)
  – Britta  – Thomas
  – Marion  – Johannes
  – Bernd

• Bilingual German-Spanish longitudinal in Hamburg (SFB 538: DFG)
  – Nils  – Jens
  – Simon  – Manuel

• Bilingual German-Spanish cross-sectional in Madrid (SFB 538: DFG)
  4 children between 2;0 and 3;0:
  – Otilia 2;1  – Nando 3;1
  – Adela 2;5  – Elisa 3;1
VOCALES

ALEMÁN

alto

i: y:
I Y

e: ø:
ε ð

bajo

a

CASTELLANO

anterior posterior

anterior posterior

i
u

ε ð

o

a
Spanish vowels: Monolinguals

Monolingual children acquire vowels in Spanish very soon.

At 1;6 they already produce 80% of the Spanish vowels correctly.

At 2;6 about 95% are correctly produced.
Bilinguals acquire vowels in a similar fashion as monolinguals. At 1;6 they already produce more than 80% correctly. At 2;6 between 83% and 100% are correctly produced.
Acquisition of vowels

• Spanish vowels are acquired both by monolinguals and bilinguals very soon: at 1;6.

• Spanish vowels do not pose any challenge to their acquisition, as they constitute the unmarked, cardinal system.

• Besides, they are relatively similar to short German vowels, which makes them very frequent for German-Spanish bilinguals.
Vowel length in German: Monolinguals

German monolingual children already produce a significant difference between short and long vowels at 1;10-2;0.

At 2;3-2;6 the ratio of duration of long vowels over short ones is target-like.
Vowel length in German: Bilinguals

Bilinguals do not produce a significant difference between long and short vowels until about 3;0 (Jens a bit earlier), and the ratio of duration is not yet target-like.
Acquisition of vowels

- Spanish vowels are acquired both by monolinguals and bilinguals very soon: at 1;6.

- The contrast between short and long vowels in German is acquired at about 2;0 by monolinguals and about 3;0 by bilinguals.

- Vowel length, a marked phenomenon, is only distinctive in one of the languages.
Complex segmental category: Spirantization

German
There is no spirantization

/b, d, g/ → [b, d, g]

Spanish
Spirantization is obligatory

/b, d, g/ → [β, δ, γ]

/b, d, g/ → [b, d, g]
Distribution of spirants and stops in Spanish

\[\beta, \delta, \gamma\] - after vowels
- after certain consonants

\[b, d, g\] elsewhere:
- initial position
- after nasal
- [d] after /l/
Ejemplos de espirantización

Dentro de la PF

<table>
<thead>
<tr>
<th>[b, d, g]</th>
<th>[β, ð, ɣ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[b]arca</td>
<td>lo[β]o</td>
</tr>
<tr>
<td>som[b]ra</td>
<td>ár[β]ol</td>
</tr>
<tr>
<td>[d]enso</td>
<td>de[ð]o</td>
</tr>
<tr>
<td>on[d]a</td>
<td>or[ð]en</td>
</tr>
<tr>
<td>[g]ato</td>
<td>la[y]o</td>
</tr>
<tr>
<td>ran[g]o</td>
<td>al[y]o</td>
</tr>
</tbody>
</table>

Más allá de la PF

<table>
<thead>
<tr>
<th>[β, ð, ɣ]</th>
<th>[b, d, g]</th>
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</thead>
<tbody>
<tr>
<td>la [β]arca</td>
<td>son [b]arcas</td>
</tr>
<tr>
<td>niebla [ð]ensa</td>
<td>son [d]ensos</td>
</tr>
<tr>
<td>cuatro [y]atos</td>
<td>son [g]atos</td>
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</tbody>
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Ejemplos de espirantes y oclusivas: Monolingües

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<tbody>
<tr>
<td>'nadj:j</td>
<td>nada</td>
<td>José</td>
<td>(1;10)</td>
</tr>
<tr>
<td>hɔtʃ'yakɔ</td>
<td>otro gato</td>
<td>José</td>
<td>(2;3)</td>
</tr>
<tr>
<td>gaβessa</td>
<td>cabeza</td>
<td>Miguel</td>
<td>(2;3)</td>
</tr>
<tr>
<td>do.tu.ya</td>
<td>tortuga</td>
<td>Miguel</td>
<td>(2;6)</td>
</tr>
</tbody>
</table>
Voiced stops in Spanish: Monolinguals and Bilinguals

Monolinguals
Percentages of correct production of voiced stops and spirants by Spanish monolinguals

Bilinguals (from Hamburg)
Percentages of correct production of voiced stops and spirants by bilinguals in Spanish
Bilingual children begin with a relatively high rate of spirantization in Spanish (slightly lower than monolinguals)

Slight reduction between 1;7 and 2;4

After 2;4-2;6 there is a drastic reduction of spirants, which are not produced again until at about 5;0 or later
In comparison to the bilinguals from Hamburg, percentages of spirants are higher and percentages of stops are lower. Both results are closer to those of Spanish monolinguals.
Acquisition of spirantization

- Monolingual children produce spirants targetlike from the beginning of word production.

- Bilinguals from Hamburg produce less spirants and percentages are reduced to a minimum after 2;7.

- Bilinguals from Hamburg produce more voiced stops in Spanish than monolinguals.

- Bilinguals from Madrid produce percentages of spirants as well as voiced stops at the same level as monolinguals.

- Production of stops in German is not influenced in bilingual acquisition.

- Interaction between the two languages is due to the complexity of spirants (allophonic alternation), the fact that spirants are less frequent in the bilingual context (in Germany) and possibly Markedness.

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Conclusions about Spirantization in bilinguals

- Bilinguals in Hamburg (after 2;6) show Transfer from German to Spanish, substituting the German hierarchy for the Spanish one: AGREE[cont] is not outranking

- Before 2;6 bilinguals had the same Grammar as monolinguals

- Bilinguals from Madrid have the Spanish hierarchy in their grammars, in which AGREE[cont] is outranking, as in those of monolinguals
Assimilation of Nasals to PA

Spanish
/m/, /n/, /ŋ/
cama, cana, caña

German
/m/, /n/, /ŋ/
rammen, rannen, rangen

Assimilation of PA within and beyond the Prosodic Word, up to the Intonation Phrase

/n/ assimilates to PA within morphemes and Prosodic Words, but not beyond
Ejemplos de asimilación de PA en español

[um.pero] un perro ‘a dog’
[um.fœyo] un fuego ‘a fire’
[un.taxo] un tajo ‘a cut’
[un.tʃoke] un choque ‘a collision’
[un.gato] un gato ‘a cat’

Nota: En español las codas (finales) no asimiladas sólo pueden tener /n/ sin especificación de PA (diferencias dialectales)
Assimilation of PA in Spanish: Monolinguals

“1” = until 1;11, “2” = until 2;6. Spanish monolingual children correctly assimilate to 100% within words, and to ca. 90% beyond word boundaries (José 90%, Miguel 86%)
Assimilation of PA in Spanish: Bilinguals (Hamburg)

At age 2;0 bilinguals from Hamburg have different percentages within the word: Jens only 23% but Simon 81%. Beyond word boundaries there is almost no assimilation: Jens 20% and Simon 12%.
Assimilation of PA in Spanish: Bilinguals (Madrid)

One of the bilinguals from Madrid assimilates targetlike within the word. Beyond word boundaries, all three children show very high percentages of assimilation, to a minimum of 80%.
Nasal assimilation of PA

- Spanish monolingual children correctly assimilate to 100% within words and almost 90% beyond word boundaries.
- Bilinguals growing up in Hamburg do not assimilate beyond word boundaries, and only one child assimilates within words to about 80%.
- Bilinguals growing up in Madrid correctly assimilate both within words and beyond word boundaries.
- Assimilation of Nasals implies complexity, i.e. allomorphy, with violation of UNIFORMITY.
- Bilinguals seem to avoid violating UNIFORMITY.
German has more than 60% of closed syllables, whereas Spanish has less than 30%

Closed syllables are marked, as they violate the NOCODA constraint

The two factors, Markedness and Frequency, are thus in contradiction in German closed syllables, which suggests a crucial role for them in bilingual acquisition
Closed syllables in Spanish and German

Monolingual German children produce more than 80% of codas after 1;11, but monolingual Spanish do not yet produce 50% of codas at 2;4.

Bilinguals produce more than 50% of codas in Spanish after 1;9.

Coda production by bilinguals in German does not differ from that of monolinguals.
Bilingual development of closed syllables in Spanish

Three bilinguals growing up in Madrid also reach high percentages of coda production in Spanish.

One of the bilinguals in Madrid produces only ca. 40% of codas at age 2;7
Bilingual acquisition of closed syllables in Spanish

• There is a clear acceleration effect for bilinguals in Spanish, as all bilinguals produce more codas than monolinguals.

• The ambient language does not seem to play a crucial role (with one exception: Pedro), as we have relatively similar values in Hamburg and in Madrid.

• Factor Markedness can be dismissed.

• Factor Ambient Language can possibly be dismissed, as well.

• High frequency of codas in German seems to play the most crucial role for acceleration.
Development of syllable types in Spanish monolinguals

CV
V
CV<sub>iV</sub><sub>j</sub>
CVC<sub>m</sub>
CVC<sub>f</sub>
VC<sub>m,f</sub>
CCV, CCVC

CVC<sub>f</sub>
CVC<sub>m</sub>
Bilingual results (Spanish)

- Monolinguals produce closed syllables about 6 months later than onsetless syllables. Bilinguals produce them at about the same time.
- Bilinguals produce final codas before medial ones.
- Bilinguals do not use glides as substitutes for consonantal codas.
Prosodic structure of words

\[
\begin{array}{c}
\text{PW} \\
\sigma \\
\sigma \\
\sigma \\
\sigma
\end{array}
\]

za  pa  to

\[
\begin{array}{c}
\text{PW} \\
\sigma \\
\sigma \\
\sigma \\
\sigma \\
\sigma
\end{array}
\]

ma  ri  po  sa
Truncation of unfooted syllables

Monolingual Spanish begin to produce unfooted syllables very early, whereas German children have much truncation until 2;0 and later.

Bilinguals have about as much truncation of unfooted syllables in Spanish as German monolinguals until about 2;0.
Development of Prosodic Words

Monolinguals

\[ ('(\sigma\sigma)_{Ft}]_{PW} \]
\[ [(\sigma)_{Ft}']_{PW} \]
\[ [\sigma'(\sigma)_{Ft}]_{PW} \]
\[ [\sigma'(\sigma\sigma)_{Ft}]_{PW} \]
Development of Prosodic Words

Monolinguals

\[ '(\sigma \sigma)_{Ft}\]_{PW} \]
\[ [\sigma'(\sigma)_{Ft}]_{PW} \quad [\sigma'(\sigma \sigma)_{Ft}]_{PW} \]
\[ ['(\sigma)]_{PW} \]
\[ [(\sigma \sigma)_{Ft}'(\sigma \sigma)_{Ft}]_{PW} \]

Bilinguals

\[ '(\sigma \sigma)_{Ft}\]_{PW} \]
\[ ['(\sigma)]_{PW} \]
\[ [\sigma'(\sigma)_{Ft}]_{PW} \quad [\sigma'(\sigma \sigma)_{Ft}]_{PW} \]
\[ [(\sigma \sigma)_{Ft}'(\sigma \sigma)_{Ft}]_{PW} \]

Bilinguals in Spanish go from initial trochaic disyllables to monosyllables, whereas Spanish monolinguals begin producing monosyllables later on (after iambic disyllables and trisyllables).
We have found interaction as

Quantitative and Qualitative differences:

- Delay
- Acceleration
- Transfer
- Variation in acquisition order
CONCLUSIONS

Crucial factors to predict type of Interaction are:

• Frequency
• Presence/absence in the other language
• Complexity of the category
• Violation of UNIFORMITY
• Markedness
Thank you

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