Phonological templates in French

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« How can there be so much individual variation, and yet such strong general tendencies? » Menn (1983)
Main Topics

- Developmental patterns in the acquisition of French phonology in a templatic model: a rhythmic template for French
- How the phonological system arises through templates and is constrained simultaneously by
  - typology (segmental and suprasegmental specificities of French)
  - markedness
  - individual preferences (continuity with babbling)
- Longitudinal comparison between children acquiring the same language: observation of the structures, the dynamic and the limits of the individual variation

Outline

1- Some aspects of French
2- Our hypotheses on French templates
3- French data in the ESRC project
4- Results: Segmental tendencies
5- Results: Rhythmic and syllabic tendencies
6- Conclusion
Some aspects of French and predictions

Segmental aspects

• Vowels
  - nasal vowels /ɛ̃, ɑ̃, ɔ̃/
  - front-rounded /y, ø, œ/
  - ATR alternation on mid-vowel /ɛ-e, œ-ø, ɔ-o/

• Consonants
  - fricatives /f, v, s, z, ʃ, ʒ, ʁ/
  - 3 main places (labial / coronal/ dorsal)
  - glides [w, u, j] with complex distributional constraints
Final prominence in French

• French is NOT a lexical-stress language

• French has a final prominence at the end of a group / an utterance and a counter-accent at the beginning

The final prominence falls on the last full syllable of a group (syntactic, semantic or breath group)

Marie aime son cheval (Mary loves her horse)
Marie aime son cheval noir (Mary loves her black horse)
Marie aime son cheval noir et blanc (Mary loves her black and white horse)

French metrics

• French is not an iambic mirror image of English

• The French metrical unit is the syllable. Verses are counted in syllables and not in feet

Voi/ci/ des /fruit/s/, des/ fleurs/, des/ feuille/s et/ des/ branches
Et/ puis/ voi/ci/ mon/ cœur/ qui/ ne/ bat/ que/ pour/ vous
Ne/ le /de/chi/rez/ pa/s a/vec/ vos/ deux/ mains/ blanches
Et/ qu'à/ vos/ yeux/ si/ beaux/ l'hum/ble/ pré/sent/ soit/ doux

Green, Verlaine

[vwa/si/de/fʁɛ̃./de/floe̯ // de/fœ./ja/ze/de/brɔ̃]
e/pʁi/vwa/si/mɔ̃/kœ̃ // ki/ na/ba/ka/pur/vu
na/la/de/ji/re/pa // [z]a/vɛk/vo/de/mœ̃/blɔ̃]
e/ka/vo/zjœ/si/bo // lœ̃/blɔ/pré/zǔ/swa/du]
French as a syllable-timed language

• French is considered as a syllable-timed language
  - No vowel reduction on unstressed syllables
  - Certainty of vowel counting (no ambisyllabicity)
  - Well-defined boundaries
  - Open syllabification, resyllabifications
    => enchaînements and liaisons
  - Perceived isochrony
  - No lexical stress
  - Verses are counted in syllables

• English is rather considered as a stress-timed language

Predictions: Templates in French

• Typological patterns will be expressed in
  - open syllabification
  - isochrony
  - well-defined boundaries

• Typological patterns will interface with markedness constraints and specific developmental patterns for each child

• If they are typologically constrained, templates in French should be built on open syllabification (CV structure), with first stops and vowels: i, a, u, o, e
### Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Birth date</th>
<th>Recordings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adeline</td>
<td>F</td>
<td>09/05/2008</td>
<td>13</td>
</tr>
<tr>
<td>Bastien</td>
<td>M</td>
<td>17/05/2008</td>
<td>14</td>
</tr>
<tr>
<td>Beryl</td>
<td>F</td>
<td>24/05/2008</td>
<td>12</td>
</tr>
<tr>
<td>Julien</td>
<td>M</td>
<td>30/06/2008</td>
<td>12</td>
</tr>
<tr>
<td>Marie</td>
<td>F</td>
<td>16/04/2008</td>
<td>13</td>
</tr>
<tr>
<td>Romuald</td>
<td>M</td>
<td>16/03/2008</td>
<td>8</td>
</tr>
<tr>
<td>Vincent</td>
<td>M</td>
<td>14/07/2008</td>
<td>12</td>
</tr>
</tbody>
</table>

- 3 girls et 4 boys
- Mean age at the beginning of the recording: 1;07 (19 mos)
Method

• Each recording 30 min, each month, one year
• Familiar surrounding: home
• Playing with one of the parents (no elicitation)

• Camera semi-pro Sony (2 separated audio channel)
• 2 microphones Sennheiser EW 122 p G3: 1 for the parent, 1 for the child
• Vest made for the children

Tools

• PHON software: transcription and phonological analyses

• Inventaire français du développement communicatif
  (F-CDI, Kern & Gayraud, 2007, 2010)
Results
Segmental tendencies

Results: segmental templates

- Idiosyncratic templates expressing individual preferences
  
  - on consonants

Bastien: Template Labial-V-Coronal-V (1;10,02)

<table>
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<tr>
<th>Selected words</th>
<th>Adapted words</th>
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<tbody>
<tr>
<td>Martin</td>
<td>Lapin (rabbit)</td>
</tr>
<tr>
<td>Malade (sick)</td>
<td>Marie</td>
</tr>
<tr>
<td>Ballon (balloon)</td>
<td>balu</td>
</tr>
</tbody>
</table>
Results: segmental templates

- Idiosyncratic templates expressing individual preferences:
  - on consonants

Romuald: Consonant Harmony (2;02,11)

<table>
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<tr>
<th>Selected words</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Dedans (inside)</td>
<td>[dado]</td>
</tr>
<tr>
<td>Bateau (boat)</td>
<td>[tato]</td>
</tr>
<tr>
<td>Bébé (baby)</td>
<td>[bɛbe]</td>
</tr>
<tr>
<td>Oiseau (bird)</td>
<td>[ʒaʒo]</td>
</tr>
<tr>
<td>Guitare (guitar)</td>
<td>[tata]</td>
</tr>
</tbody>
</table>

Segmental templates: conclusion

- Segmental material is unmarked
  - Place for consonants: Labial or Coronal
  - Vowels belong to the boundaries of the vocalic triangle: a/o

- Some patterns reduce segmental complexity: Consonant Harmony for instance (One consonant specification for the whole word)
Results
Syllabic tendencies

Tendencies of the quantitative analysis (6 child. / 5 sess.)

• Simple Structures : 89%
• Complex structures : 11%
Tendencies of the quantitative analysis (6 child. / 5 sess.)

**Longitudinal data : open syllables**

Variability between children

**Types of syllables 6 children / 5 sessions**
From the beginning and all along the 5 sessions

• Bastien : CV structures

• Béryl : Complex interaction of different open structures

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**VCV vs CV / CVCV ?**

• Interpretation of VCV structures
  (3 children for whom this structure is very well realized both for adapted and selected words)

• V is mainly a front or central vowel : [a] [ə] [e] [ɛ]

• Interpretation of the vowel in VCV < plurisyllabic words
  ex : [apo] => status of [a]?

  - internal vowel : CVCV => (C) + VCV
    chapeau => [apo] > [apo]

  - filler : V+ CVCV => V + (CV) CV => V + CV
    un chapeau => [ɛ]apo > [ɛ + po] > [apo]
BERYL (1;6,23)

<table>
<thead>
<tr>
<th>Main patterns</th>
<th>Other patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>[aΧo] : 13</td>
<td>[akpo] : 1</td>
</tr>
<tr>
<td>[oΧo] : 2</td>
<td>[pako] : 1</td>
</tr>
<tr>
<td>[oΧo] : 2</td>
<td>[εΧko] : 1</td>
</tr>
<tr>
<td>[oΧo] : 2</td>
<td>[koko] : 1</td>
</tr>
<tr>
<td>[ko] / [lΧo]</td>
<td>[akho] : 1</td>
</tr>
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- During the same session: 28 « micro »
- Analysable in V + x where x is quite always CV: [Χo, ko]

=> Status of the initial vowel => filler

A vocalic melody in a template

Beryl (1;06,23)

- vocalic melody a/o on a aCo template

<table>
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<th>Adult words</th>
<th>Child’s productions</th>
</tr>
</thead>
<tbody>
<tr>
<td>agneau [apo] lamb</td>
<td>[alo]</td>
</tr>
<tr>
<td>bateau (7) [bato] ship</td>
<td>[asto]</td>
</tr>
<tr>
<td>poisson (2) [pwasɔ] fish</td>
<td>[apo]</td>
</tr>
<tr>
<td>éléphant [elefɔ] elephant</td>
<td>[sfo]</td>
</tr>
<tr>
<td>crapaud [kɔapo] toad</td>
<td>[ako]</td>
</tr>
</tbody>
</table>
**CV vs CVCV?**

- Two kinds of CVCV
  - « true » CVCV with a CVCV target: ballon, chapeau
  - « reduplicated CVCV » with a $C_1V_1C_1V_1$ target dodo, papa

- Structures $C_1V_1C_1V_1$: highly frequent in French CDS

- In our data: $C_1V_1C_1V_1$ structures are highly frequent, early and accurately produced whereas the « true » CVCV arise later

**CVCV as a prosodic template**

Bastien: Template Labial-V-Coronal-V (1;10,02)

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<td>Malade (sick)</td>
<td>[mana] Marie</td>
</tr>
<tr>
<td>Ballon (baloon)</td>
<td>[ba] Bernard banane (banana) [mana]</td>
</tr>
</tbody>
</table>

[mana]: 3 target words => 1 pattern
labial-coronal on CV positions, nasal harmony
• Properties shared by all the children: no differences on the prosodic shape of the French early unit
  - Open syllable structures
  - Early stability of the nuclei
  - Avoidance of consonant clusters
  - Syllabic markedness is expressed mainly by consonant deletion

• Stable objects
  - CV < final syllable most of the time ([kɔ] « encore») or a mix of initial and final syllables ([ki] « musique», [bu] « bisou »)
  - VCV where V is rather a central or open vowel: [a] [ə] [e] [ɛ]
  - CVCV where CV is reduplicated or in which both C are harmonized

=> CV, VCV, CVCV as rhythmic templates?

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**Summary**

**Why rhythmic templates?**

• What is one of the first tasks for a baby?
  Segmentation of the speech wave to isolate meaningful chunks

• We know that infant speech segmentation is hugely constrained by the rhythm of the target language (Ramus et al. 1999). Speech rhythm is one of the first linguistic properties that infants employ to distinguish languages (Nazzi et al., 2000)

• How might a template help?
  - The template can be a way to filter the speech wave and to deal with the temporal organization of speech
  - A limited domain to build the phonology (categories and distributions)
Templates

- A temporary structural response provided by the child to deal with:
  - metrical structure
  - syllabic organization
  - rhythm
  - stress, accent
  - the prosodical organization of speech

- Domain of acquisition of phonology:
  - number of fixed syllabic positions (ex: VCV, CVC)
  - segmental content (features / melodies) associated to syllabic positions
    ex: a/o sur VCV ou labial / coronal sur CVCV

- Meaningful unit: « proto-word »

Rethinking universality & innateness

3 levels

- Universal – Innate sensitivity to speech rhythm, speech timing
  (cf. Mehler, Nazzi, Ramus)

- Typological properties which emergence is constrained by markedness:
  accentual pattern, salient features of the target language
  - geminates (Arabic, Finnish, Hindi, Italian)
  - medial complex consonant clusters (Polish, Hindi)
    - open syllabification (French)

- Individual variation: every child provides specific responses =
  Output forms that fit the templates that markedness allows in his / her target language