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 [ə , æ,e , ɛ, a] vowels
  - Within syllable preferences
    - labial consonants + central vowels [ba]
    - coronal consonants + front vowels [dɛ]
    - dorsal consonants + back vowels [kɑ]
  - 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

(Benedict, 1979 ; Bloom, 1973 ; Goldfield & Reznick, 1990 ; Nelson, 1973 ; Poulain-Dubois & Graham, 1994; Dromi, 1987 et Mervis & Bertrand, 1995)

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"

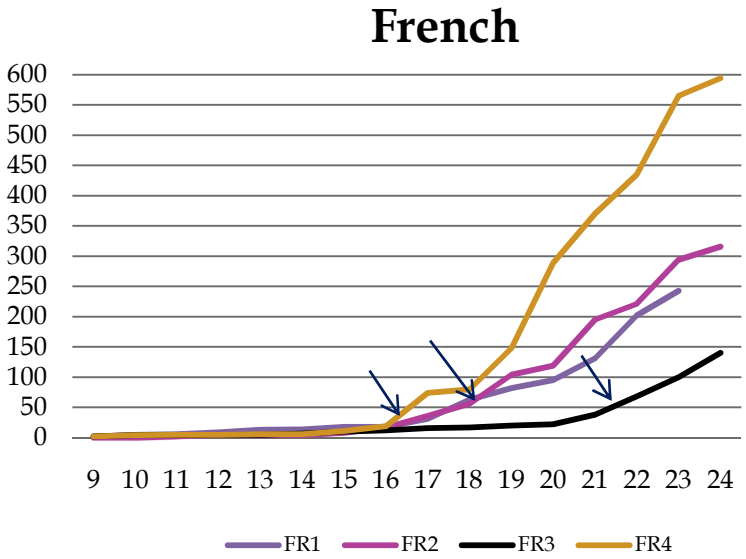
METHOD

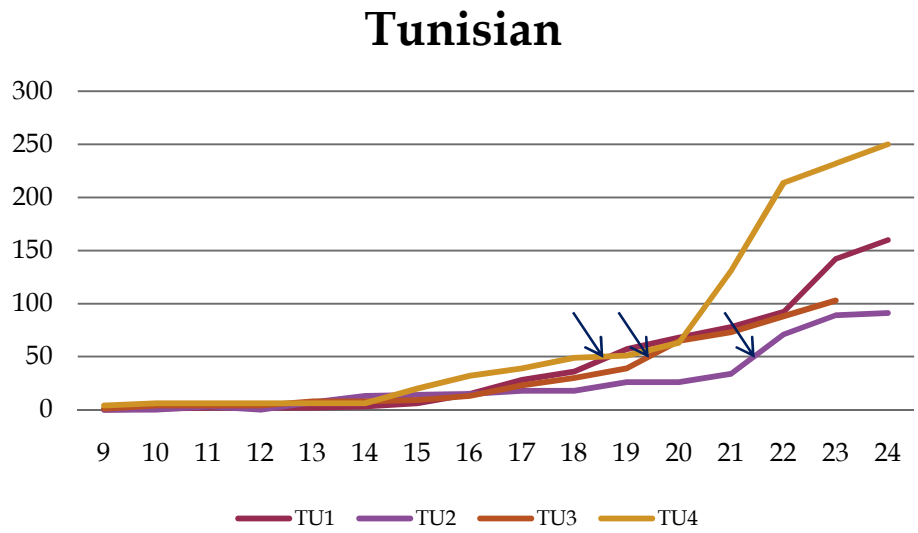
- Data processing
  - IPA transcriptions by native speakers of each languages
  - LIPP entering
  - Clan and Phon format (Yvan Rose, Brian MacWhinney, Carla Peddle)

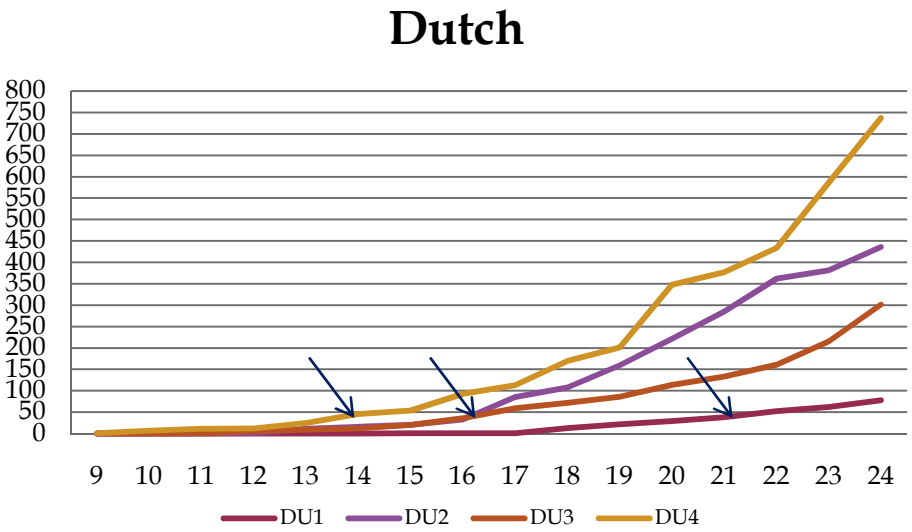
	Nber of 1 hour sessions	
Children	Early words	Later words
FR1	19	14
FR2	14	10
FR3	23	4
FR4	19	14
French total	***75***	***42***
RO1	16	-
RO2	21	6
RO3	23	-
Romanian total	***60***	***6***
DU1	18	5
DU2	11	17
DU3	12	16
DU4	15	19
Dutch total	***56***	***57***
TU1	15	6
TU2	19	7
TU3	22	8
TU4	22	6
Tunisian total	***78***	***27***
ALL	**269**	**132**

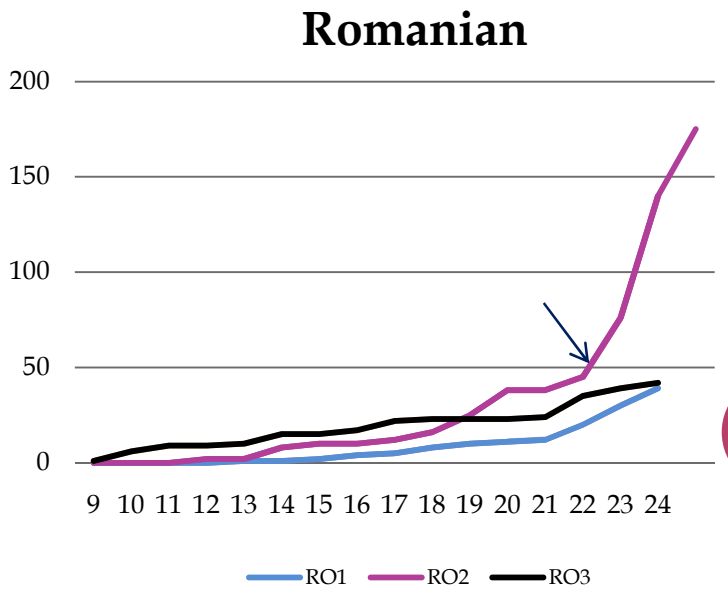
	Nber of segments	
Children	Early words	Later words
FR1	2,300	14,948
FR2	2,423	11,387
FR3	4,939	3,637
FR4	2,079	19,571
French total	***11,741***	***49,543***
RO1	5,078	-
RO2	557	7,805
RO3	2,368	-
Romanian total	***8,003***	***7,805***
DU1	4,305	3,833
DU2	1,333	9,460
DU3	2,101	19,655
DU4	1,189	31,504
Dutch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

Cumulative vocabulary

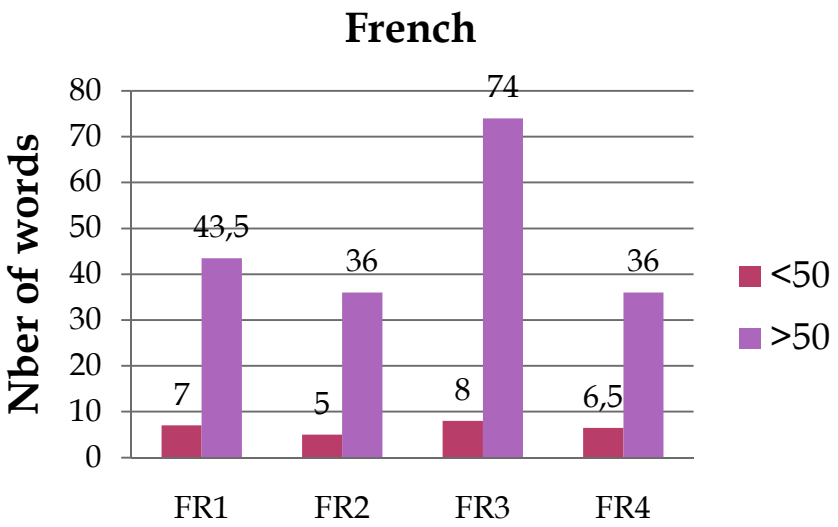


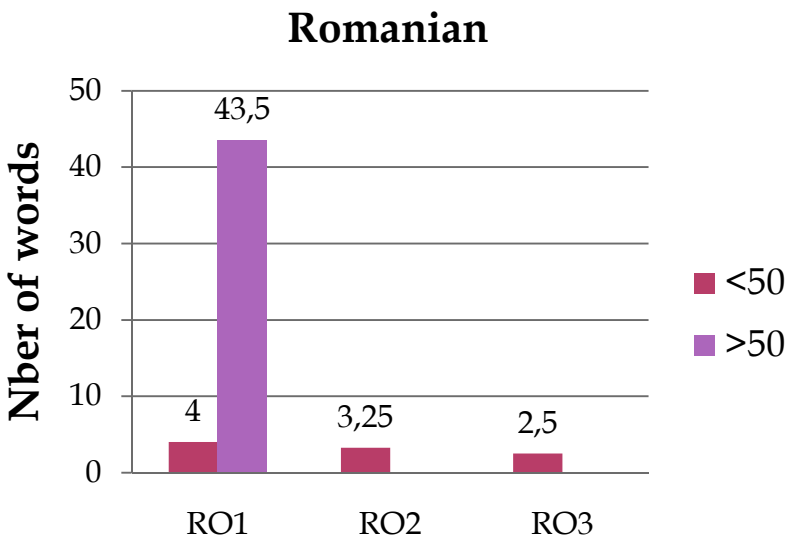


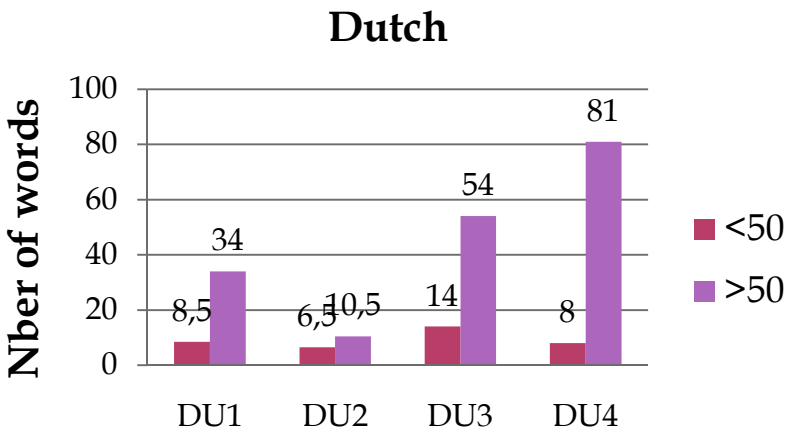


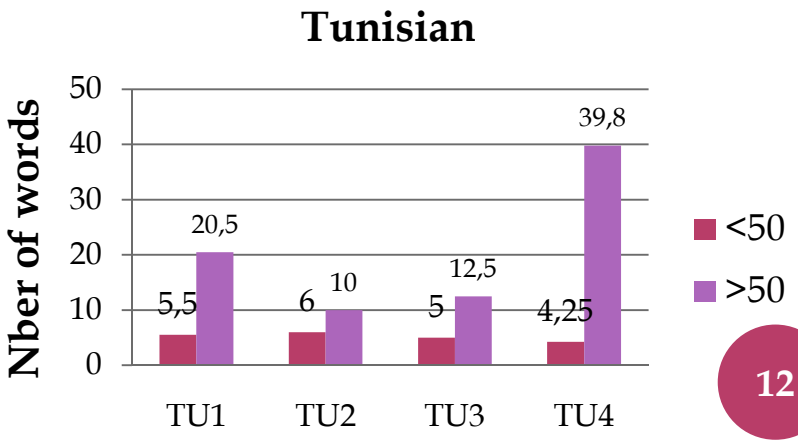


RATE OF ACQUISITION

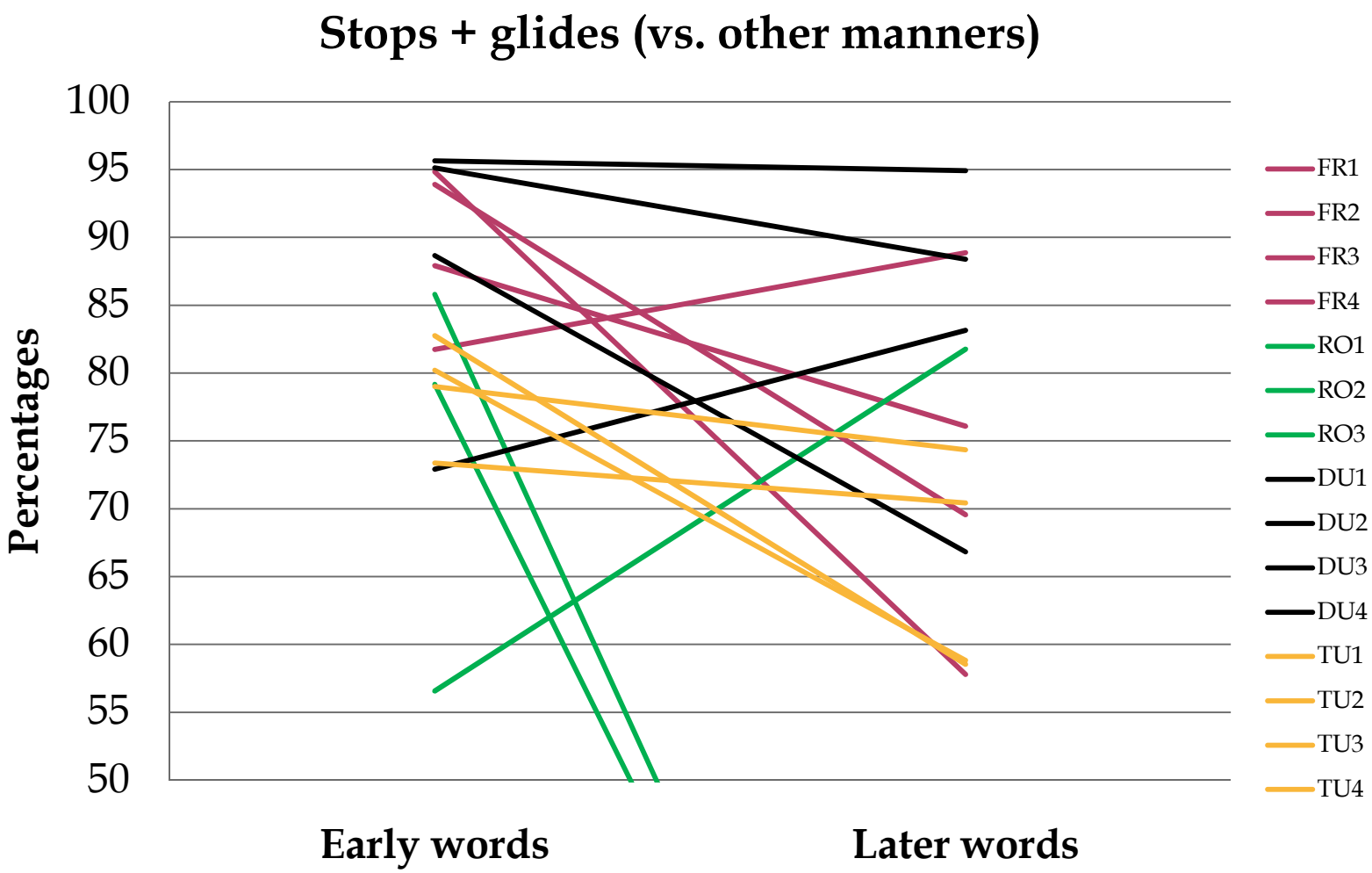








Consonants Manner



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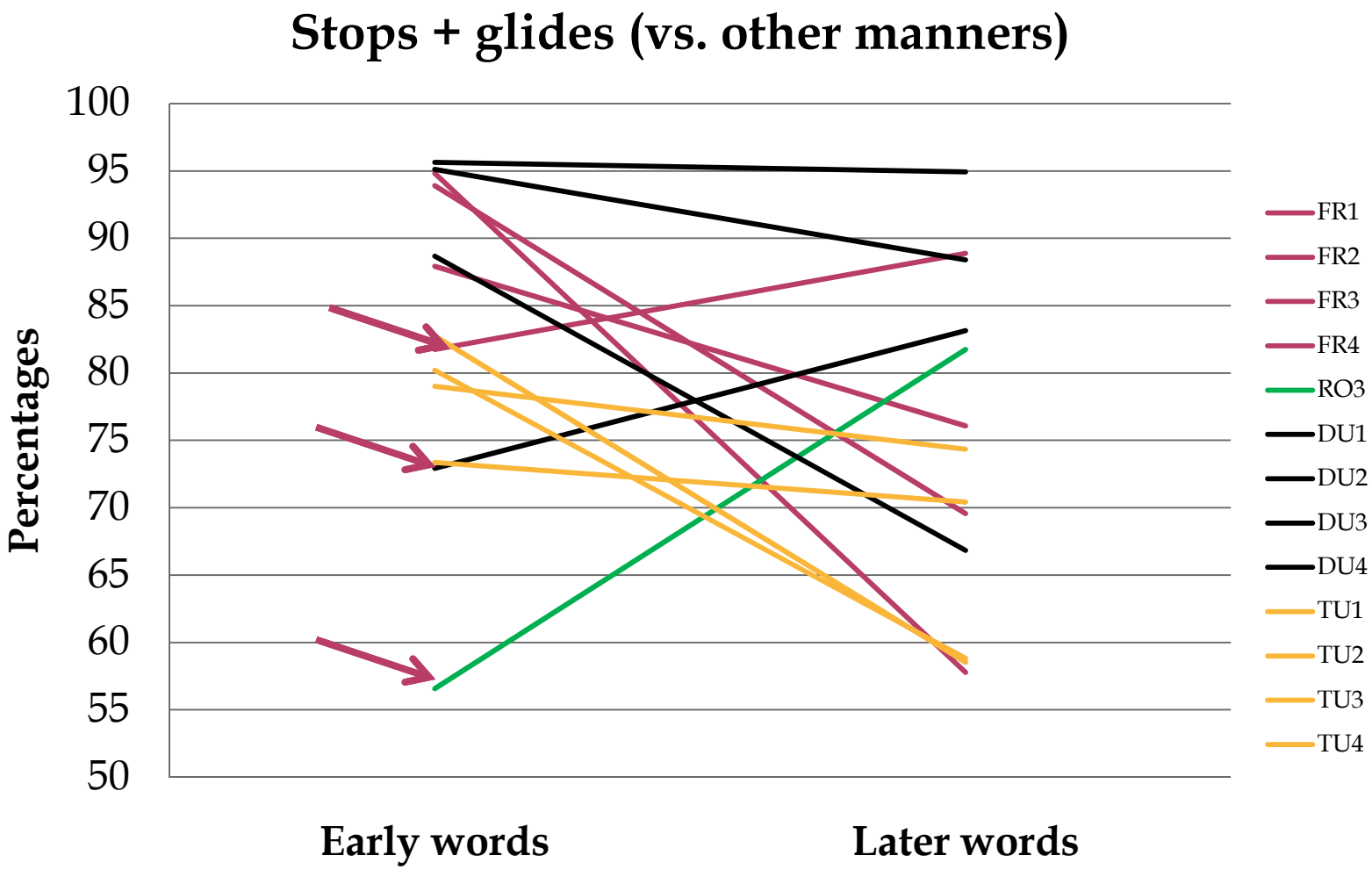
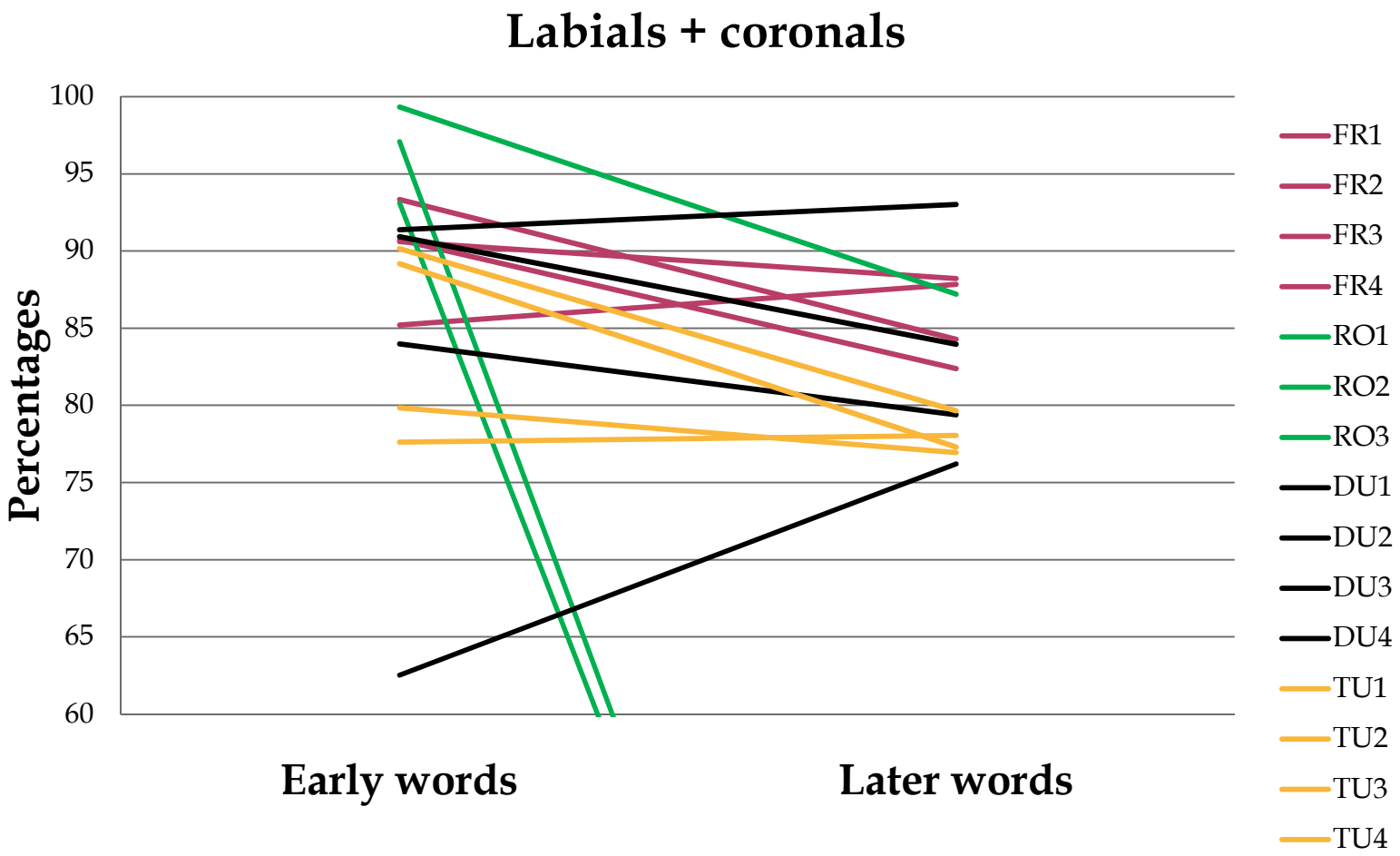


CONSONANT - PLACE



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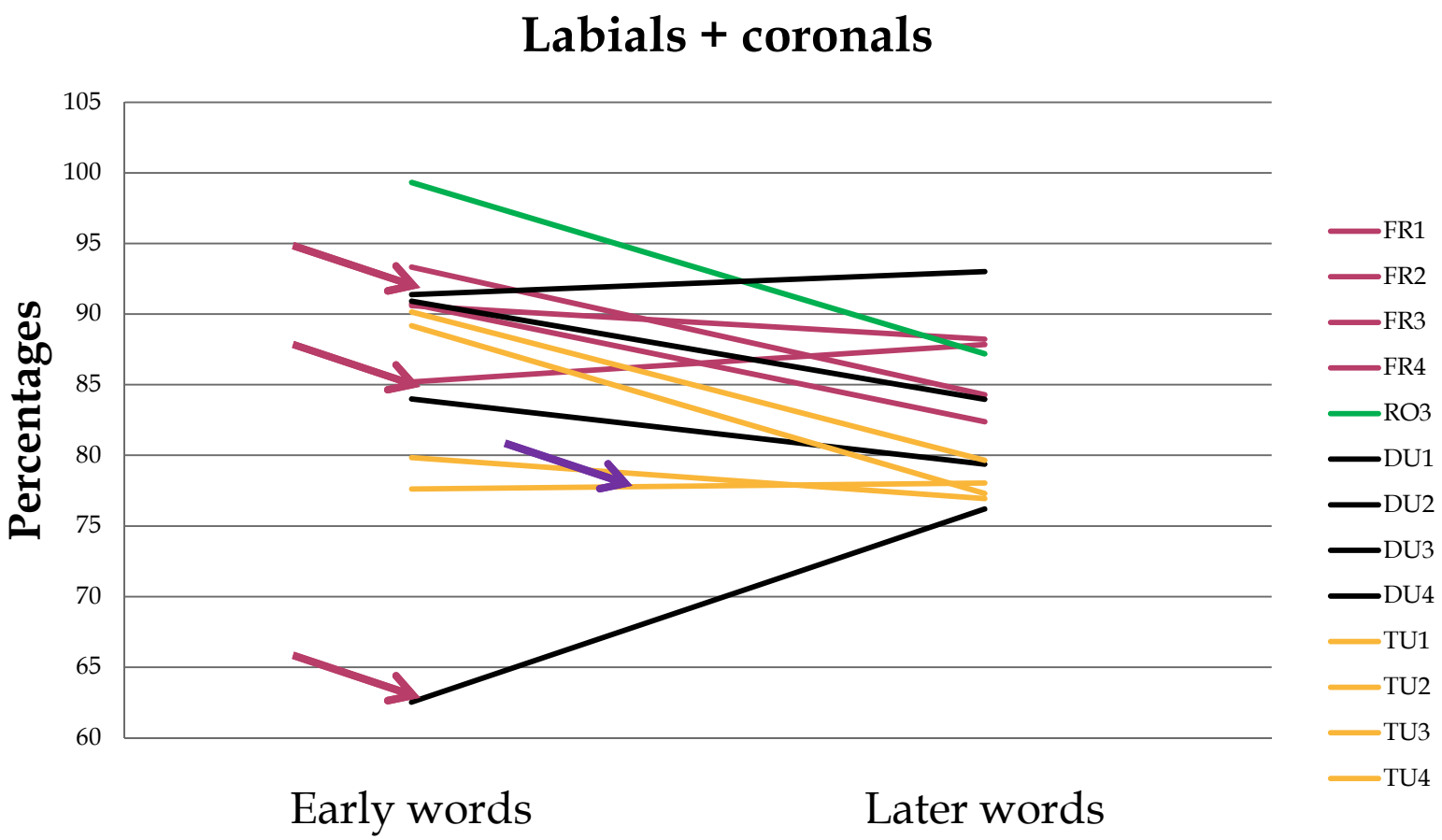
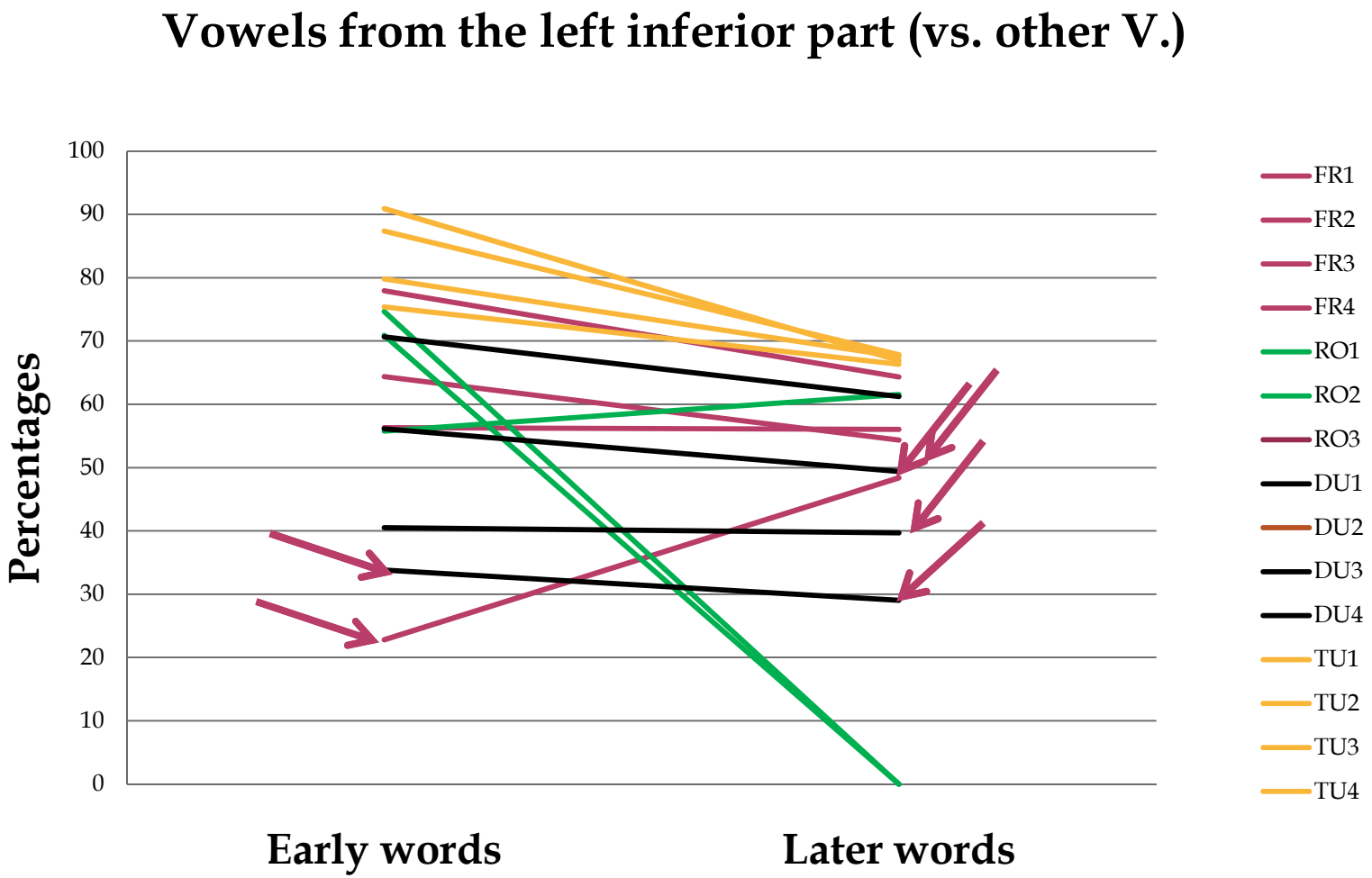
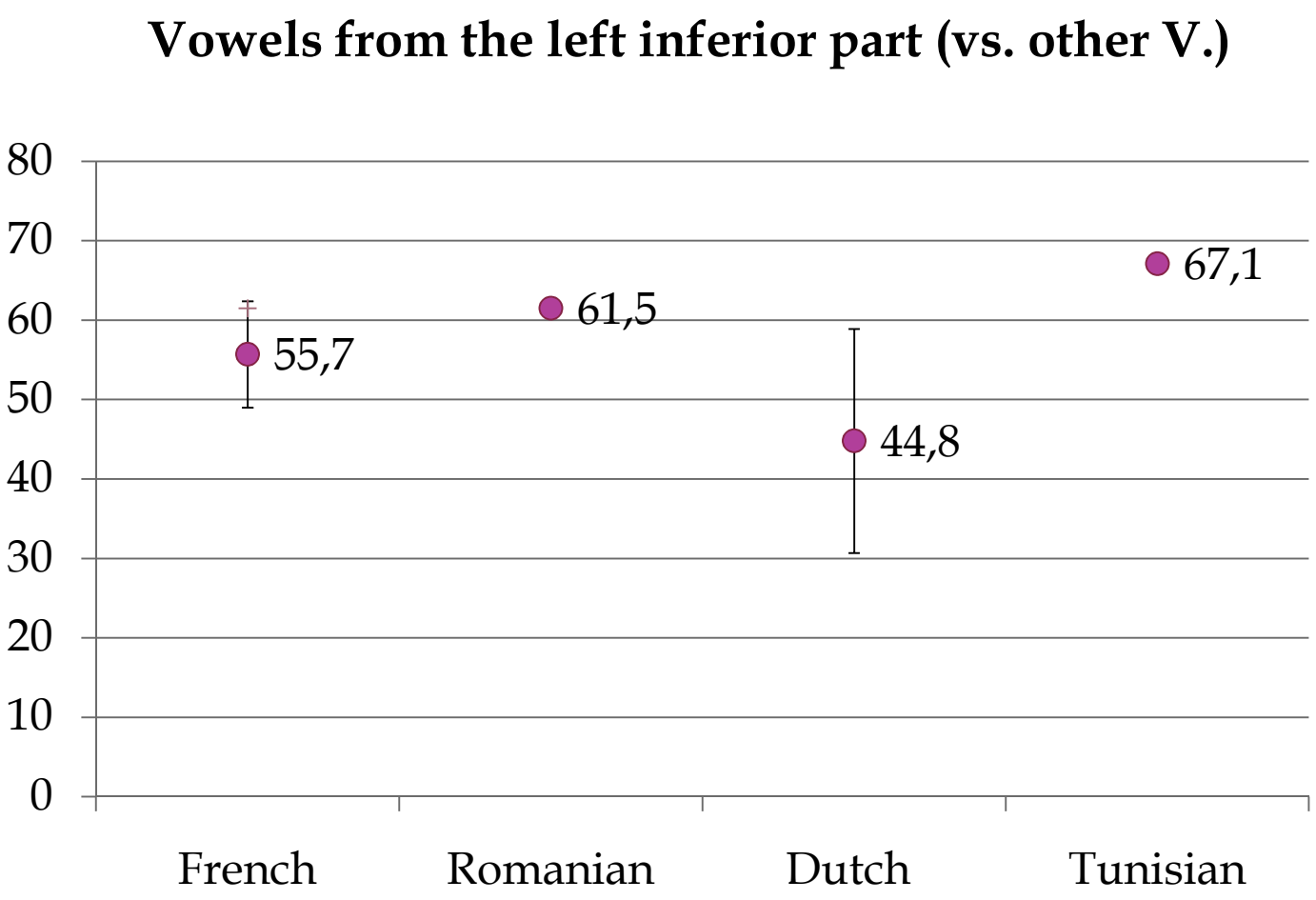


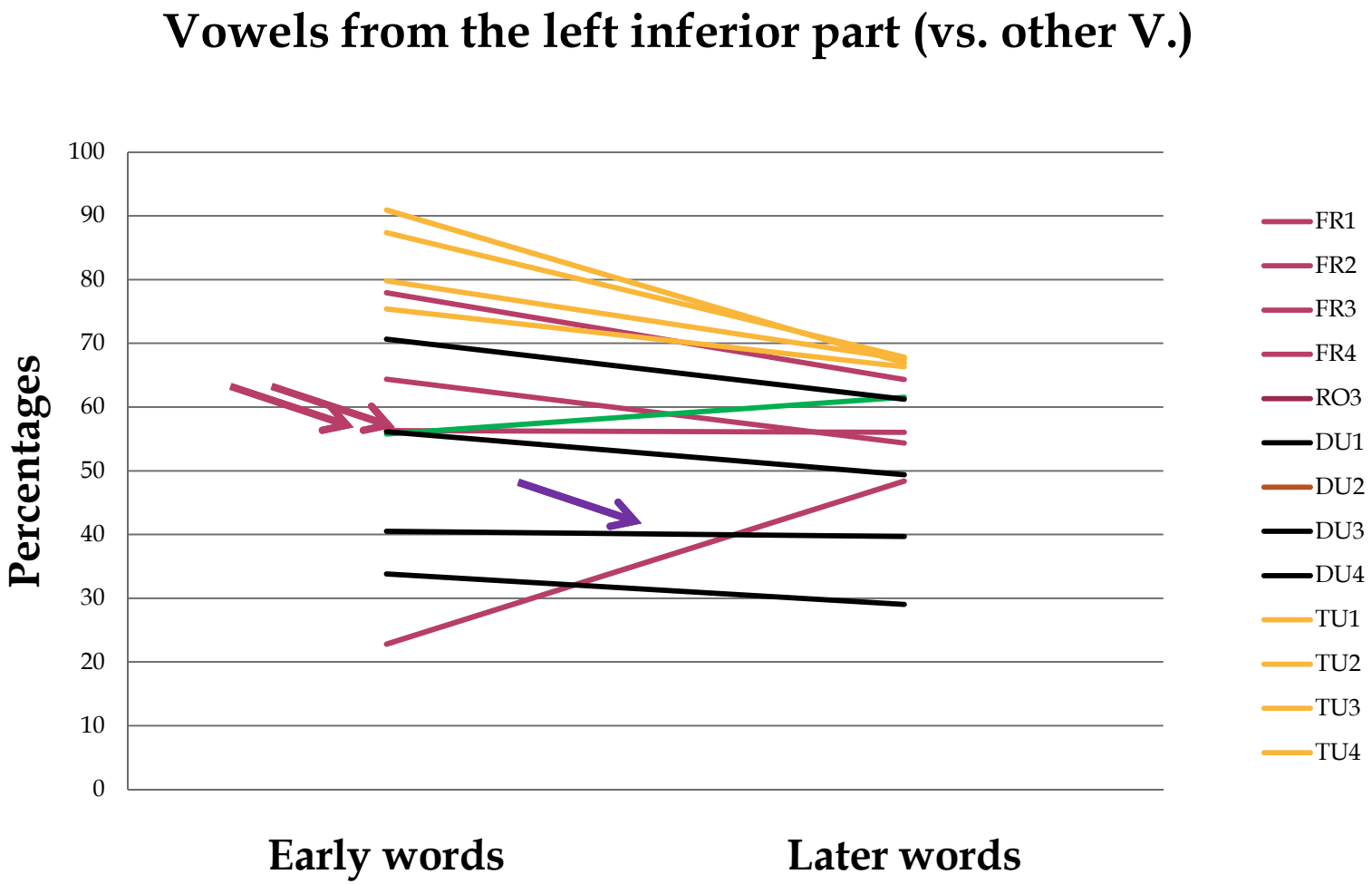
VOWELS


Vowels from the left inferior part (vs. other V.)
Percentages
100
90
80
70
60
50
40
30
20
10
0
Early words
Later words
FR1
FR2
FR3
FR4
RO1
RO2
RO3
DU1
DU2
DU3
DU4
TU1
TU2
TU3
TU4

VOWELS – LATER WORDS



VOWELS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DU4
TU1
TU2
TU3
TU4

RESULTS- INTER-SYLLABIC COOCC

	Coronal + front		Labial + central		Dorsal + back	
	<50	>50	<50	>50	<50	>50
FR	1.23 (1LF)	1.08 (1LF)	1.43	1.27	1.8 (1CB)	1.56
RO	1.02	1.34	1.25	1.92	0.49 (3CB)	1.41
DU	1.17 (1DF)	0.98 (1DC+1DF) DF: 1.37	1.17	0.72 (3CC+1DC)	0.96 (1LB+1CB)	0.98 (4LB)
TU	1.19 (1DF)	1.17	1.50	1.86	1.84 (2CB)	1.32

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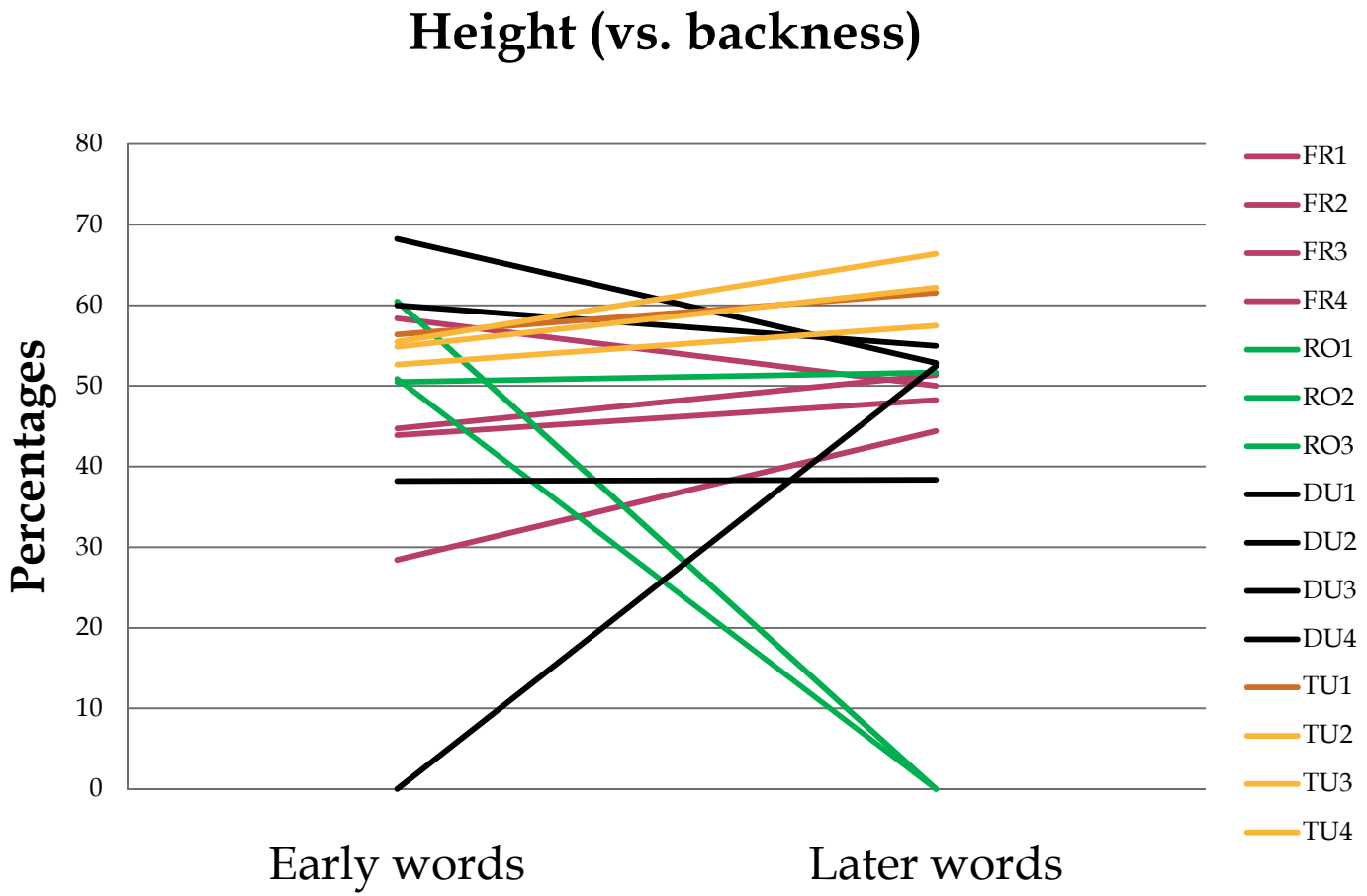
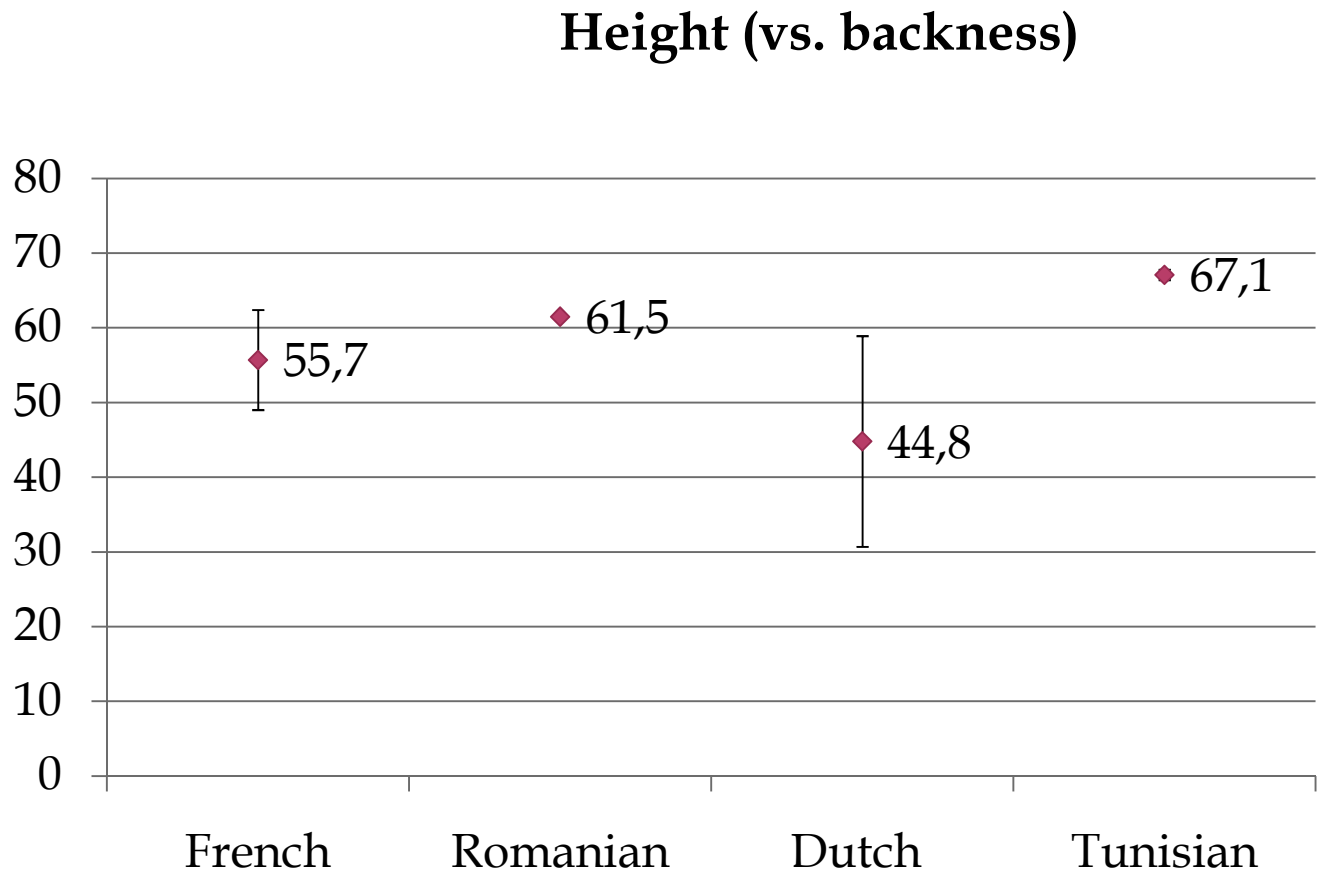
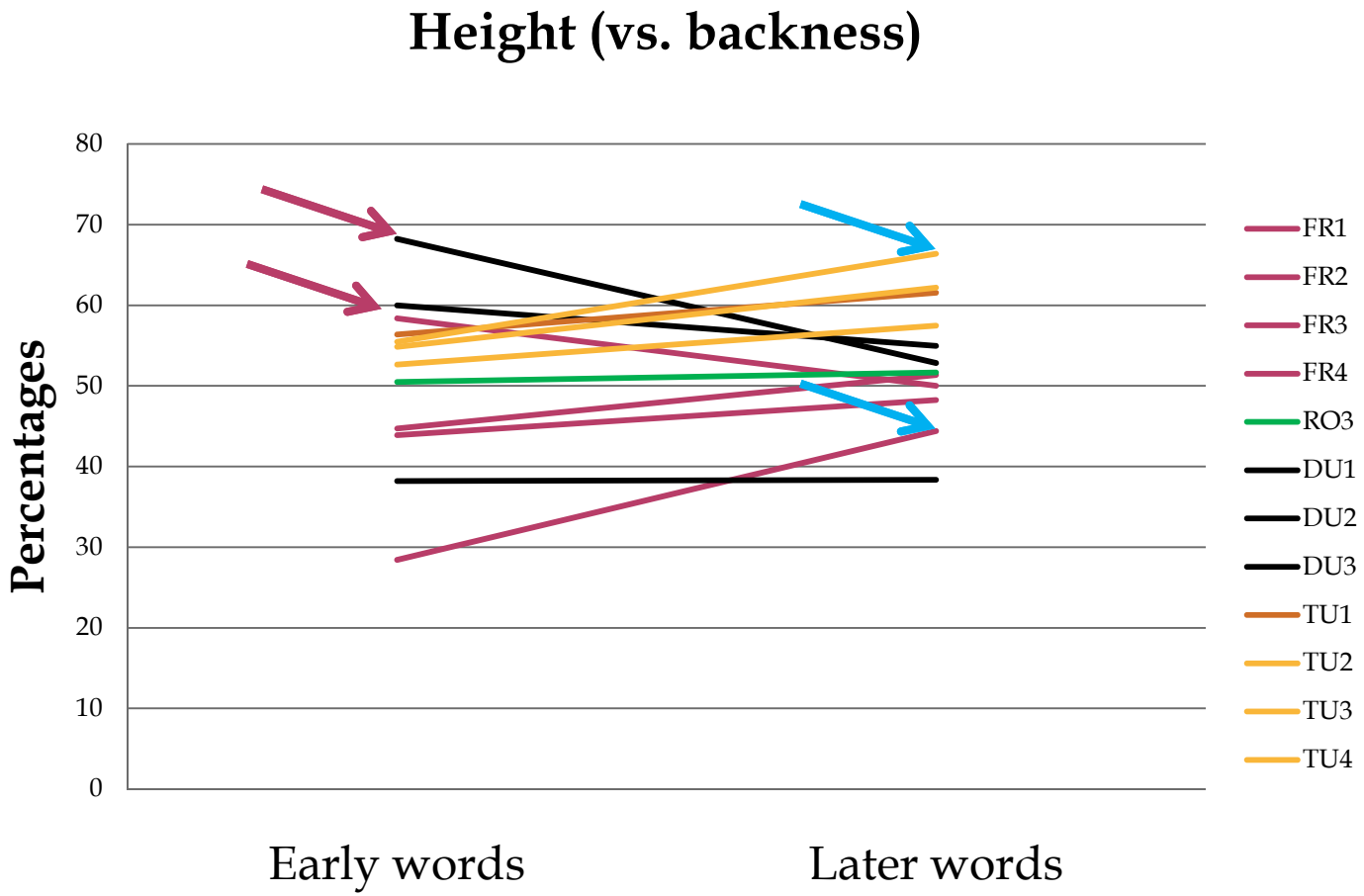
Intra-syllabic Vowel Change



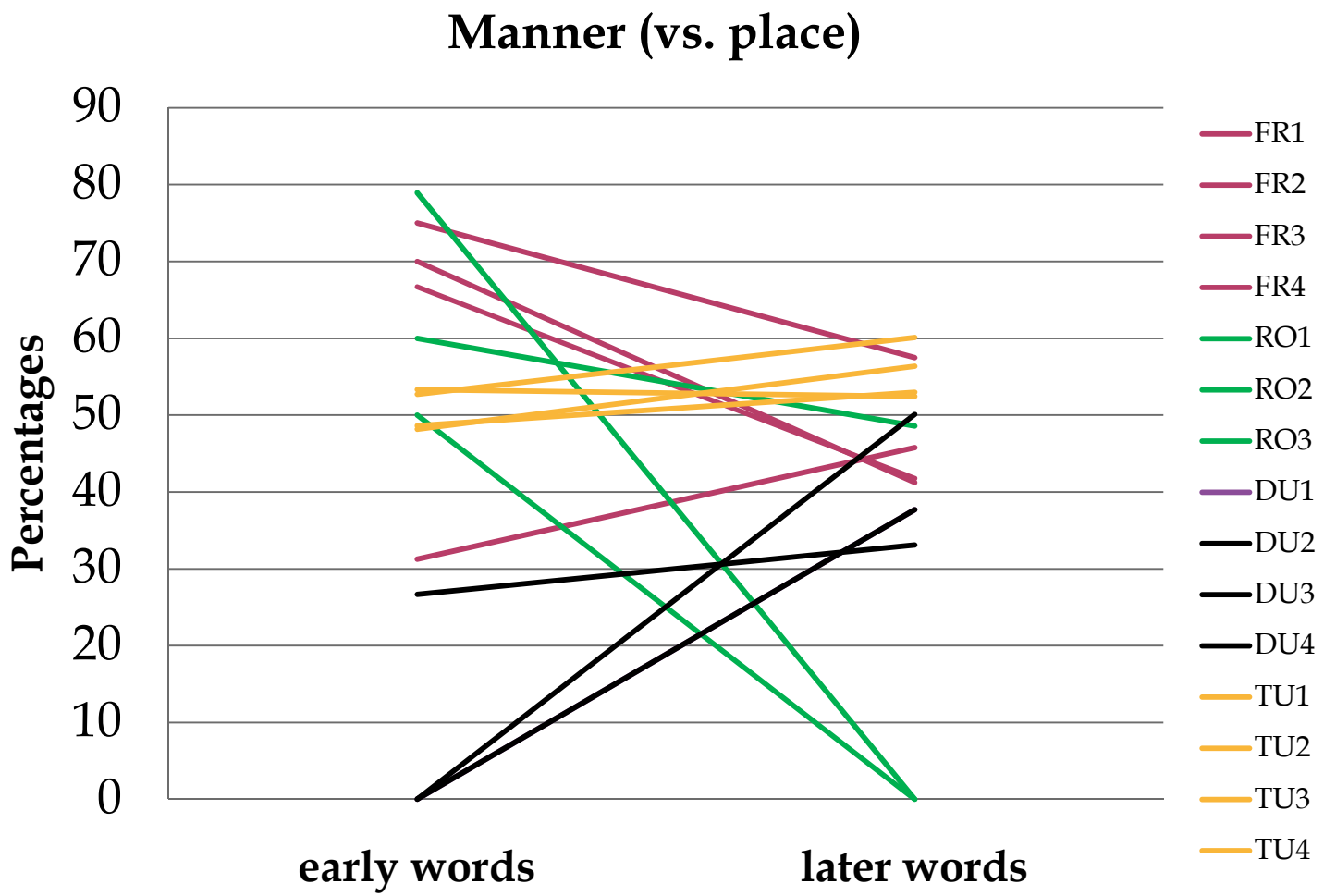
Intra-syllabic Vowel Change - Later words



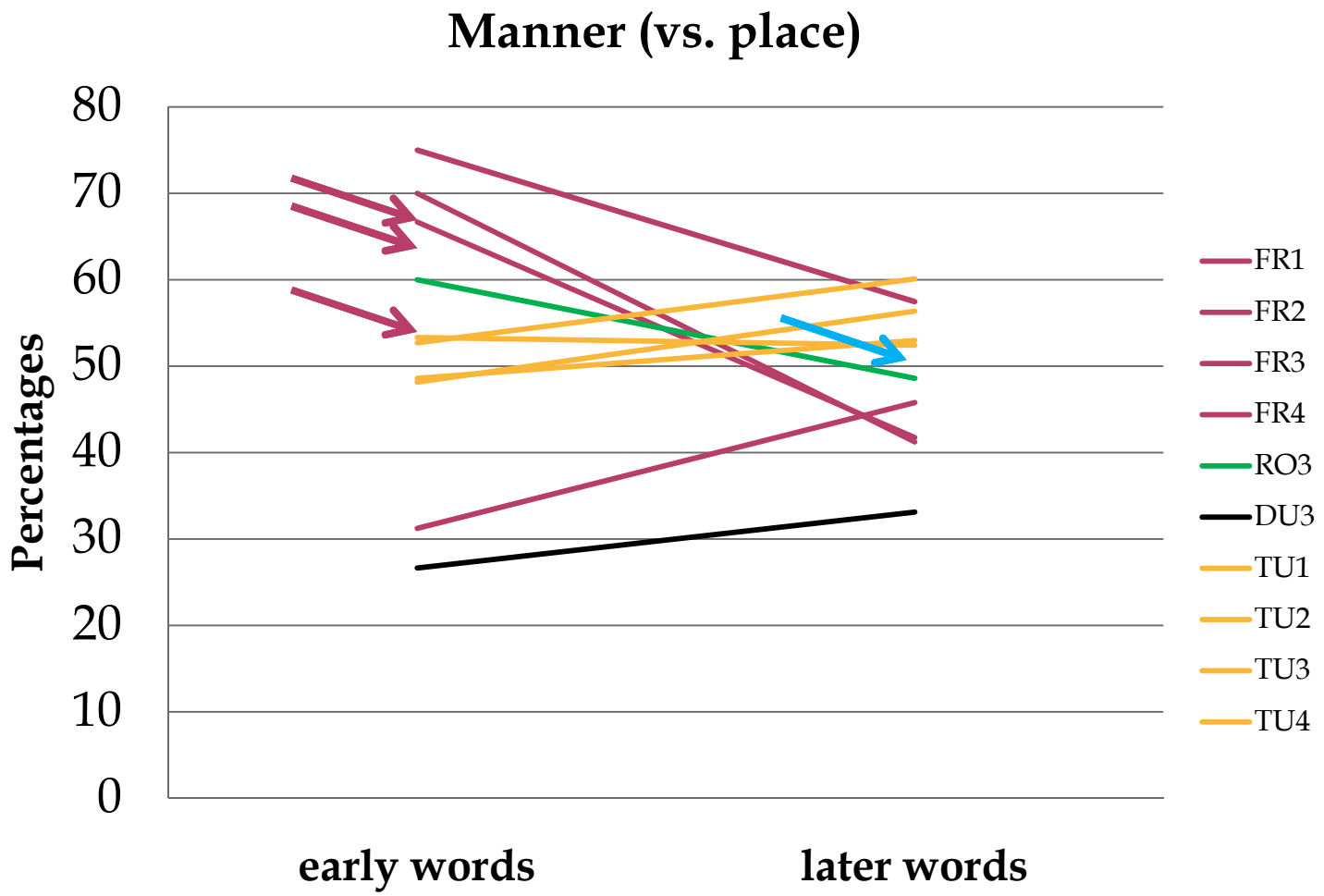
Intra-syllabic Vowel Change



Intra-syllabic Consonant Change



Intra-syllabic Consonant Change



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 chidren
  - Decrease of labials+coronals in 69% of children
  - Decrease of vowels from the left inférior 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.

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- The children and their families

Many Thanks to

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