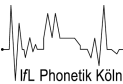


Gestural Planning in Italian Syllables

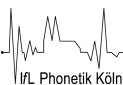
Anne Hermes, Martine Grice, Doris Mücke & Henrik Niemann
IfL Phonetik, University of Cologne

International Summerschool CPMSP2 2010, Berlin
Part III: Planning and Dynamics



Overview of talk

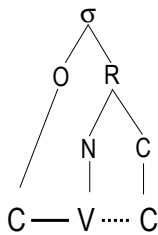
- Background
 - Coupling hypothesis of syllable structure
 - Gestural coordination as diagnostic for subsyllabic constituency
 - Italian ‚impure s‘
- Gestural coordination in word-initial clusters in Italian
- Modelling & Discussion



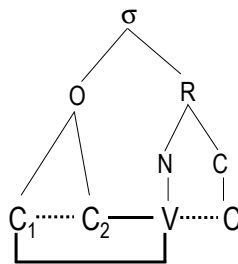
Coupling hypothesis of syllable structure

- Coordination between C and V gestures depends on syllable structure
 - Onsets: Strong coupling and tight coordination of C with nucleus
 - Articulatory coordination as a diagnostic for syllable constituency (Browman & Goldstein (2000), Goldstein et al. (2007), Hermes et al. (2008), Nam et al. (2009), Shaw et al. (2009), Marin & Pouplier (2010), Pouplier & Benus (2010))

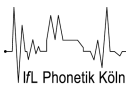
Simple Onset



Complex Onset



— in-phase
 anti-phase



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Hermes et al. – Gestural Planning in Italian Syllables

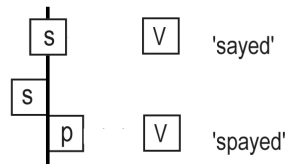
3

Coupling hypothesis of syllable structure

- Competitive coupling structure assumed for complex onsets:
 - e.g. English and Georgian (Browman & Goldstein (2000), Marin & Pouplier (2010), Goldstein et al. (2007))
- BUT: There are languages in which word initial clusters do not form complex onsets:
 - e.g. Tashlihyt Berber & Moroccan Arabic (Goldstein et al. 2007, Shaw et al. 2009)

English

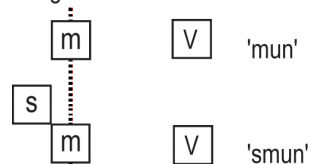
C-center



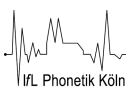
Adapted from Browman & Goldstein (2000)

Berber

Rightmost C



Adapted from Goldstein et al. (2007)



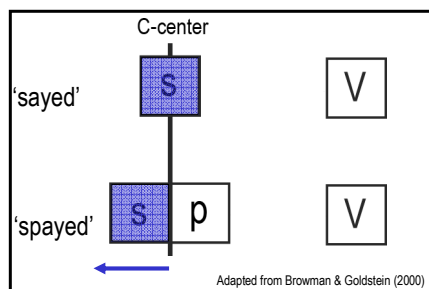
IfL Phonetik Köln

Hermes et al. – Gestural Planning in Italian Syllables

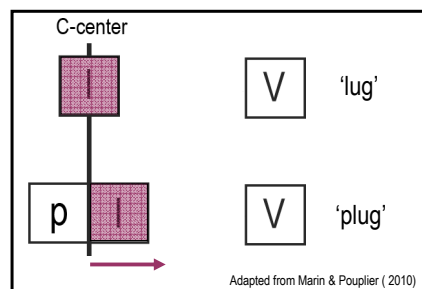
4

Diagnostic for syllable constituency

- C-center type coordination (Browman & Goldstein 2000)
 - Involves Leftward and Rightward Shift



Shift to left of leftmost C



Shift to right of rightmost C

Word initial clusters

- English: Word onset = syllable onset
 - i.e. /sp/ and /pl/ are word onsets and at the same time syllable onsets (Browman & Goldstein (2000), Marin & Pouplier (2010))
- Italian: Not all word onset clusters have the same status
 - /st/, /sd/, /sp/, /zb/, /sk/, /sg/, /sf/, /zv/, /zm/, /zn/, /zl/, possibly also /pn/, /ps/
 - A number of these clusters are generally referred to as having an 'impure s' as the first C
 - involving allomorphy:
 - definite article alternation: *il premio* but *lo studente* (Davis 1990)
 - indefinite article alternation: *un toro* but *uno studente*
 - In fact, it is an open question as to whether these certain clusters form a complex onset or not (Bertinetto 2004)

Aim of this study

- Syllable constituency for non-sibilant clusters (CC) and sibilant clusters (SC) in Italian
 - Is the sibilant in a cluster part of a complex onset?
- Can one language have two distinct gestural patterns for word initial clusters?
 - Does Italian have word initial clusters like Tashlhiyt Berber & Moroccan Arabic as *well as* clusters like in English?
- Information on articulatory coordination of each individual gesture in a cluster
 - Leftward and Rightward Shift measurement

Speech Material

- Target words embedded in the carrier sentence:
'Per favore dimmi la _____ di nuovo.' ('Please say ____ again.)
 - Alternation of vowel height throughout the sequence

Simple onsets

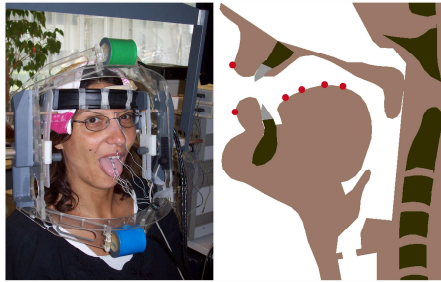
C		S	
/rima/	'rhyme'	/sita/	's/he lays'
/rema/	'rheme'	/sina/	logatome
/lina/ 🗨️	proper name	/sila/	logatome
/fila/	'line'	/sima/	logatome
/vita/	'life'		
/pina/ 🗨️	proper name		
/kina/	'slope'		

Clusters

CC		SC	
/prima/	'first'	/spina/	'thom'
/prema/	'press'	/sfila/	's/he unthreads'
/krema/	'cream'	/zvita/	's/he unscrews'
/plina/ 🗨️	logatome	/skina/	logatome

Recordings

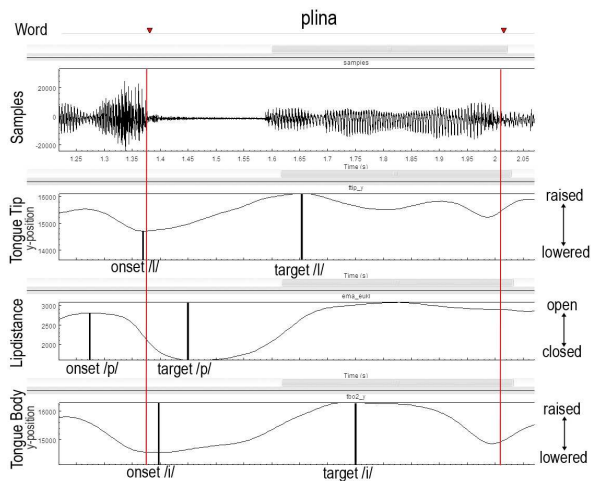
- Articulatory and acoustic recordings with EMMA
 - 4 native Italian speakers
 - Two female from Apulia (MS, AA)
 - One male from Trentino (AR)
 - One female from Bologna (MG)



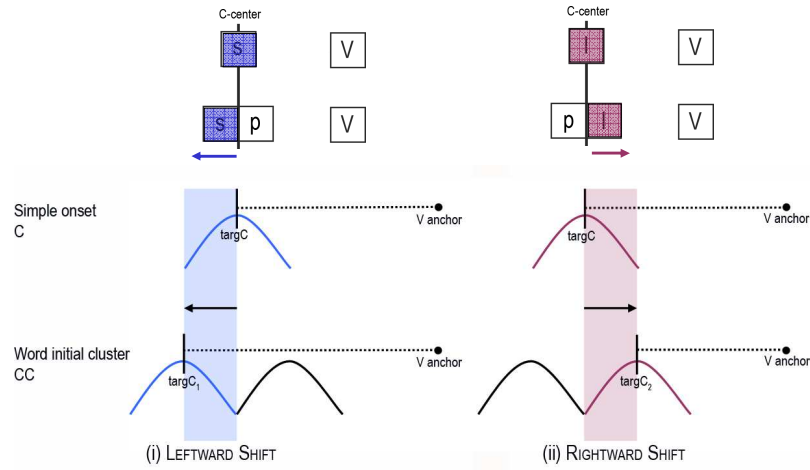
Labelling

Articulatory record:

- C gestures: onsets, maximum targets of primary constrictor
- Lip Aperture Index (Byrd 2000)
- V-to-V articulation: onset and target for vocalic gesture



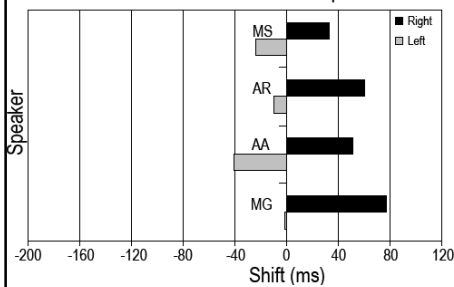
Measurement of Leftward and Rightward Shift



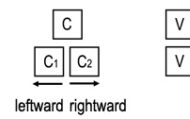
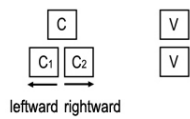
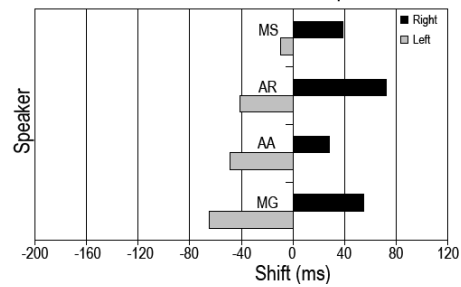
Results: Non-sibilant clusters

- /pr/-cluster: Leftward (MS, AA) and Rightward Shift (all)
- /pl/-cluster: Leftward (AR, AA, MG) and Rightward Shift (all)

LEFTWARD and RIGHTWARD SHIFT in /pr/-cluster

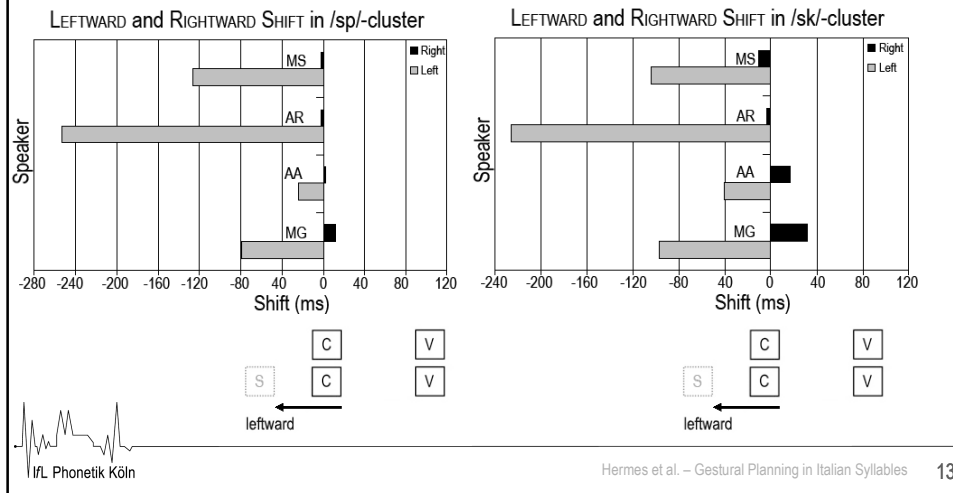


LEFTWARD and RIGHTWARD SHIFT in /pl/-cluster



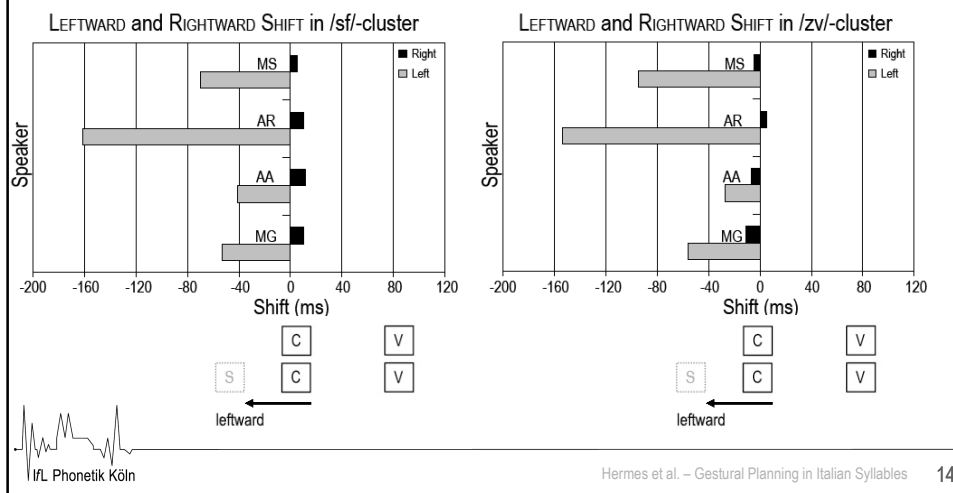
Results: Sibilant clusters

- /sp/-cluster: Leftward (all) and NO Rightward Shift (all)
- /sk/-cluster: Leftward (all) and NO Rightward Shift (all)


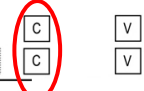


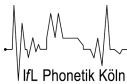
Results: Sibilant clusters

- /sf/-cluster: Leftward (all) and NO Rightward Shift (all)
- /zv/-cluster: Leftward (all) and NO Rightward Shift (all)



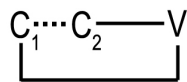
Summary

		Leftward Shift				Rightward Shift			
		MS	AR	AA	MG	MS	AR	AA	MG
Non-sibilant clusters Temporal coordination:  Shift: leftward rightward Analysis: complex onset	/pr/	**	n.s.	**	n.s.	***	***	**	***
	/pl/	n.s.	*	***	***	***	***	**	***
Sibilant clusters Temporal coordination:  Shift: leftward Analysis: no complex onset	/sp/	***	***	***	***	n.s.	n.s.	n.s.	n.s.
	/sk/	***	***	**	***	0.04	n.s.	0.04	0.04
	/sf/	***	***	***	***	n.s.	n.s.	n.s.	n.s.
	/zv/	***	***	**	**	n.s.	n.s.	n.s.	n.s.

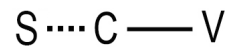


Modelling & Discussion

Non-sibilant clusters



Sibilant clusters



- CC do form complex onsets
 - Both C gestures are coupled directly with the V gesture ('competitive coupling')
 - Adjustment of rightmost C to make room for added C
- SC do *not* form a complex onset
 - Only the rightmost C gesture is coupled directly with V gesture (non-competitive structure)
 - No adjustment of rightmost C

Two distinct patterns of gestural planning assumed as being part of speakers' phonological representation

