

Polish Clitics: Consequences for the Analysis of Optionality in OT

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1. Polish data: the clitic (verbal prefix or preposition) /z/

(1) Voicing assimilation

a. Voiced

z+ɔkna	‘from the window’
z+wapatɕ	‘to catch’
z+zɛgarkʲɛm	‘with a watch’

b. Voiceless

s+plɛɕɕ	‘to entwine together’
s+kfasɛm	‘with acid’
s+sunɔɕ	‘to slip down’

(2) Optional coronal place assimilation (CPA)

a. Alveolo-palatal

z+d̪zɛtɕmi	or	z+d̪zɛtɕmi	‘with children’
z+zɛbnɔɕ		z+zɛbnɔɕ	‘to become cold’
ɕ+tɕpɔnɛm		s+tɕpɔnɛm	‘with a junkie’
ɕ+ɕana		s+ɕana	‘from hay’

b. Postalveolar

ʒ+d̪ʒvi	or	z+d̪ʒvi	‘from the door’
ʒ+ʒabɔ		z+ʒabɔ	‘with a frog’
ʃ+tʃasɛm		s+tʃasɛm	‘with/in time’
ʃ+ʃaʒɛɕ		s+ʃaʒɛɕ	‘to become grey’

(3) Vowel epenthesis

a. Obligatory

zɛ+zvʲɛʒɛtɕitɕ ɕɛ	‘to become animal-like’
zɛ+znaɕʲɛm	‘with a sign’
zɛ+staʒɛtɕ ɕɛ	‘to become old’
zɛ+skawɔ	‘with a rock’

b. Optional

zɛ+zɛbaka	or	z+zɛbaka	‘from a colt’
zɛ+ɕʲatɛm		s+ɕʲatɛm	‘with the world’
zɛ+ʒbikʲɛm		z+ʒbikʲɛm	‘with a wildcat’
zɛ+ʃfɛtsʲi		s+ʃfɛtsʲi	‘from Sweden’

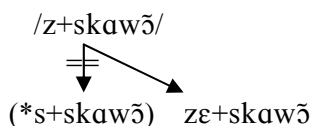
(4) Varying forms

a. z+zɛmi ~ z+zɛmi	‘from the ground’	b. zɛ+zɛrudwa ~ z+zɛrudwa	‘from a spring’
ɕ+tɕpɔnɛm ~ s+tɕpɔnɛm	‘with a junkie’	zɛ+ɕfitem ~ s+ɕfitem	‘with dawn’
ʒ+d̪ʒɛmɛm ~ z+d̪ʒɛmɛm	‘with jam’	zɛ+ʒbika ~ z+ʒbika	‘from wildcat’
ʃ+ʃɔku ~ s+ʃɔku	‘from shock’	zɛ+ʃpilkɔ ~ s+ʃpilkɔ	‘with a pin’

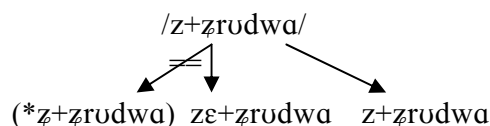
2. Analysis: avoidance of identical adjacent consonants (Baković 2005, Baković & Pająk 2008)

Epenthesis applies to avoid *identical* adjacent consonants in a cluster. If epenthesis did not apply, then – due to the independent processes of voicing assimilation (VA) and coronal place assimilation (CPA) – the result would be a sequence of identical consonants in a cluster.

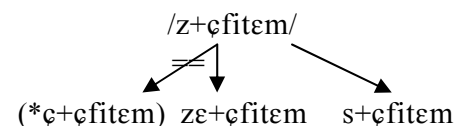
a. Obligatory VA



b. Optional CPA



c. Obligatory VA & optional CPA

3. Informal definitions of the OT constraints¹

NOGEM+C	A sequence of identical segments must not be followed by a consonant
DEP(V)	No vowel epenthesis
AGREE[voi]	Adjacent obstruents must agree in voicing
IDENT[voi]	Voicing of obstruents must not change from input to output
AGREE[cor]	Adjacent coronal stridents must agree in place of articulation
IDENT[cor]	Place of articulation of coronal stridents must not change from input to output

¹ For more information regarding the details of analysis and constraint definition see Pająk (in progress).

4. Analysis of optionality with tied constraints: ranking paradox

(i)	Input: /z+d̥ʒemem/	NOGEM+C	DEP(V)	AGREE[cor]	IDENT[cor]
a. →	[z+d̥ʒemem]			*	
b. →	[ʒ+d̥ʒemem]				*
c.	[zɛ+d̥ʒemem]		*!		

(ii)	Input: /z+ʒbikʲem/	NOGEM+C	DEP(V)	AGREE[cor]	IDENT[cor]
a. →	[z+ʒbikʲem]			*	
b.	[ʒ+ʒbikʲem]	*!			*
c. →	[zɛ+ʒbikʲem]		*		

Other inputs of this type:

- /z+z̥emi/
- /z+t̥ɕpunem/
- /z+ʃɔku/

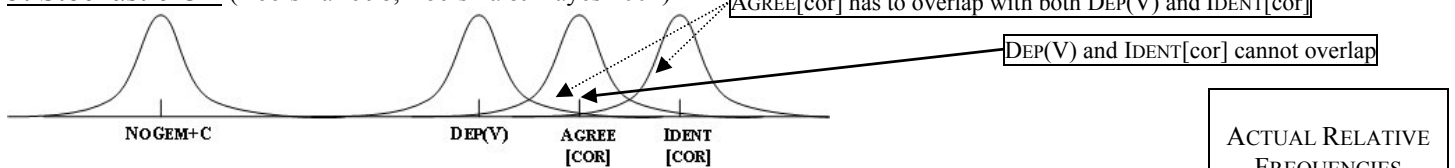
Other inputs of this type:

- /z+z̥rudwa/
- /z+ɕfitem/
- /z+ʃpilkɔ/

Under this analysis two conditions would have to be met at the same time:

DEP(V) >> AGREE[cor] (i) and DEP(V) ~ AGREE[cor] (ii)

5. Stochastic OT (Boersma 1998, Boersma & Hayes 2001)



Predictions regarding probabilities

- the most probable ranking: NOGEM+C >> DEP(V) >> AGREE[cor] >> IDENT[cor]
- predicted relative probabilities: [ʒ+d̥ʒemem] > [z+d̥ʒemem] and [zɛ+ʒbikʲem] < [z+ʒbikʲem]

6. Partially Ordered Grammars (POG) (Anttila 1997, 2002)

The crucial constraints: D - DEP(V) A - AGREE[cor] I - IDENT[cor]

One ordered pair present in the grammar: D >> I

Predictions regarding probabilities

- a candidate's probability of occurrence is equal to the number of tableaux in which this candidate wins divided by the total number of tableaux
- predicted relative probabilities: [ʒ+d̥ʒemem] > [z+d̥ʒemem] and [zɛ+ʒbikʲem] < [z+ʒbikʲem]

RANKING	INPUT-OUTPUT MAPPING	
	/z+d̥ʒ/	/z+ʒb/
D >> A >> I	ʒ	z
D >> I >> A	z	z
A >> D >> I	ʒ	zɛ

ACTUAL RELATIVE FREQUENCIES	
ʒ+d̥ʒemem	25%
z+d̥ʒemem	75% ²
zɛ+ʒbikʲem	99%
z+ʒbikʲem	1% ³

The predicted probabilities change depending on the number of relevant constraints and their possible interactions (as also noted by Smolensky 2007)

7. Conclusions

- Stochastic OT and POG are able to account for the Polish variation pattern (as described and analyzed here), but their predictions regarding probabilities are incompatible with the known relative frequencies
- Grammar provides possibilities, but probabilities are better predicted by other factors (e.g., morphological transparency)

Selected references

Anttila 1997. Deriving variation from grammar. In Hinskens, van Hout and Wetzels (eds) *Variation, change and phonological theory*. Amsterdam & Philadelphia: John Benjamins. Anttila 2002. Morphologically conditioned phonological alternations. *NLLT* 20. Baković 2005. Antigemination, assimilation and the determination of identity. *Ph* 22. Baković & Pająk 2008. Contingent optionality. *82nd LSA*, Chicago. Boersma 1998. *Functional Phonology: Formalizing the interactions between articulatory and perceptual drives*. PhD dissertation, U of Amsterdam. Boersma & Hayes 2001. Empirical tests of the Gradual Learning Algorithm. *LI* 32. Coetzee 2006. Variation as accessing non-optimal candidates. *Ph* 23. Laskowski 1975. *Studia nad morfonologią współczesnego języka polskiego*. Wrocław: Zakład Narodowy im. Ossolińskich. Osowicka-Kondratowicz 2004. Asymilacje spółgłosek zębowych i dźwiękowych do palatalnych w pozycji przed palatalnymi. *Uniwersytet Warmińsko-Mazurski w Olsztynie: Prace Językoznawcze* 4. Pająk in progress. *Geminates and optionality in OT: vowel epenthesis in Polish clitics*. Ms. UCSD. Prince & Smolensky 1993/2004. *Optimality Theory: Constraint interaction in generative grammar*. Oxford: Blackwell. Rose 2000. Rethinking geminates, long-distance geminates, and the OCP. *LI* 31. Rubach 1977. Changes of consonants in English and Polish. A generative account. Wrocław-Warszawa-Kraków-Gdańsk: Zakład Narodowy im. Ossolińskich. Smolensky 2007. Conceptual puzzles & theoretical elegance. Slides from *the Workshop on Variation, Gradience and Frequency in Phonology*. Stanford University.

² Based on a production study by Osowicka-Kondratowicz (2004) on 90 subjects. In general, non-application of CPA was found more common than its application. CPA across a clitic boundary (16 tokens) occurred, on average, with the frequency of 25%.

³ Based on a search through the IPI PAN Corpus of Polish (publicly available at <http://korpus.pl>). The corpus contains over 250 million segments, and about 44,000 occurrences of the clitic /z/ in the context that triggers optional epenthesis, of which the non-epenthetic forms constitute less than 1%.