Contingent Optionality

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Overview of the talk

- Presentation of Polish data
  - phonologically-conditioned allomorphy of the clitic /z/
  - what is obligatory, what is optional, and why
- A rule-based analysis fails to describe the data
  - *contingent optionality* between two rules is inexpressible
- A stochastic OT analysis succeeds
  - contingent optionality expressed, possibilities predicted
- *Probabilities* not correctly predicted
  - question raised: should grammar predict probabilities?

Polish clitic /z/: voicing assimilation

z + ignɔrɔvɑt͡ɕ	‘to ignore’
z + gɑzɛtɔ̃	‘with a newspaper’
z + zɛgɑrkɑ	‘from a watch’
s + kɔtɛm	‘with a cat’
s + sʊnɔ̃t͡ɕ	‘to slip down’

Agree[voi] >> Ident[voi]

Input: /z+kfasɛm/	AGREE[voi]	IDENT[voi]
a. [z+kfasɛm]	*!	
b. → [s+kfasɛm]		*

Polish clitic /z/: vowel epenthesis

Epenthesis before {z/s}C

zɛ + zvʲɛʒɛ̃t͡ɕit͡ɕ	‘to make animal-like’
zɛ + znɑkʲɛm	‘with a sign’
zɛ + stʃɛlit͡ɕ	‘to shoot down’
zɛ + skɑwɔ̃	‘with a rock’

No epenthesis

z + gʒɛʃɨt͡ɕ	‘to sin’
z + bʒdɛ̃kʲɛm	‘with a plunk’
s + frʊnɔ̃t͡ɕ	‘to fly down’
s + pʃt͡ʃɔwɔ̃	‘with a bee’
z + zamkʊ	‘from a castle’
s + sɛrɛm	‘with cheese’

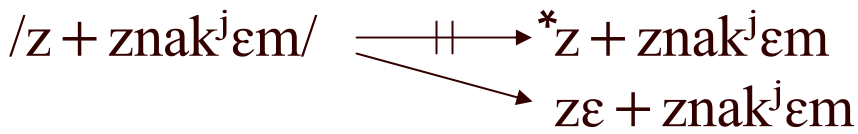
$\emptyset \rightarrow V / C_1 \_\_ C_2C$

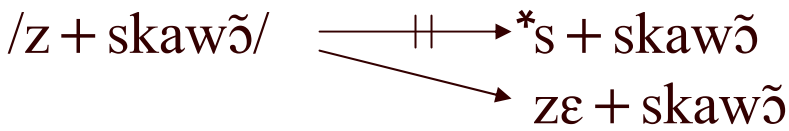
where C_1 and C_2 are ‘sufficiently identical’
(i.e., identical except for voicing)

Avoidance of identical consonants

Voicing assimilation is obligatory

- Epenthesis applies to avoid sequences of *identical* consonants in a cluster (not 'sufficiently identical').





Epenthesis – OT analysis

(following analysis of English and Lithuanian in Baković 2005, *Phonology*)

NoGem+C No adjacent identical consonants (geminate) as part of a cluster

NoGem+C >> Dep(V)

Input: /z+znakʲem/	NoGem+C	Dep(V)
a. [z+znakʲem]	*!	
b. → [zɛ+znakʲem]		*

Combining epenthesis and assimilation

Agree[voi] >> Dep(V)

Input: /z+skawõ/	NoGem+C	Agree[voi]	Dep(V)
a. [z+skawõ]		*!	
b. [s+skawõ]	*!		
c. → [zɛ+skawõ]			*

Dep(V) >> Ident[voi]

Input: /z+kfaɕit͡ɕ/	NoGem+C	Agree[voi]	Dep(V)	Ident[voi]
a. [z+kfaɕit͡ɕ]		*!		
b. → [s+kfaɕit͡ɕ]				*
c. [zɛ+kfaɕit͡ɕ]			*!	

Polish clitic /z/: coronal place assimilation (CPA)

Alveolo-palatal

ʑ + d͡ʑɛt͡ɕmi	or	z + d͡ʑɛt͡ɕmi	'with children'
ɕ + ɕana		s + ɕana	'from hay'

Postalveolar

ʒ + ʒabɨ	or	z + ʒabɨ	'from a frog'
ʃ + t͡ʃkafkɔ̃		s + t͡ʃkafkɔ̃	'with hiccups'

optionality

Agree[cor] ~ Ident[cor]

Input: /z+ʑɛ̃bnɔ̃t͡ɕ/	AGREE[cor]	IDENT[cor]
a. → [z+ʑɛ̃bnɔ̃t͡ɕ]	*	
b. → [ʑ+ʑɛ̃bnɔ̃t͡ɕ]		*

constraint tie

Polish clitic /z/: optional epenthesis

/z + ʑrɛbakʲɛm/	z + ʑrɛbakʲɛm	or	zɛ + ʑrɛbakʲɛm	‘with a colt’
/z + ʒbikʲɛm/	z + ʒbikʲɛm		zɛ + ʒbikʲɛm	‘with a wildcat’
/z + ɕfʲata/	s + ɕfʲata		zɛ + ɕfʲata	‘from the world’
/z + ʃfɛt͡sʲi/	s + ʃfɛt͡sʲi		zɛ + ʃfɛt͡sʲi	‘from Sweden’

optionality

cf. *ʑ + ʑrɛbakʲɛm
*ʒ + ʒbikʲɛm
*ɕ + ɕfʲata
*ʃ + ʃfɛt͡sʲi

$$\emptyset \rightarrow V \,/\, C_1 \_\_\ C_2C$$

where C_1 and C_2 are ‘sufficiently identical’ (i.e., identical except for voicing and coronal place of articulation)

Summary of the variation pattern

/z + d͡ʒɛmɛm/ → ʒ + d͡ʒɛmɛm ~ z + d͡ʒɛmɛm

CPA — no CPA

*zɛ + d͡ʒɛmɛm

*epenthesis

/z + ʒbikʲɛm/ → zɛ + ʒbikʲɛm ~ z + ʒbikʲɛm

epenthesis — no CPA

*ʒ + ʒbikʲɛm

*CPA

Why a rule-based analysis fails

- Epenthesis is both optional and obligatory.
  - Optional only when adjacent coronal consonants disagree in place
    - e.g. /z + ʒbikʲɛm/ → [zɛ + ʒbikʲɛm]
      ~ [z + ʒbikʲɛm]
  - Obligatory when adjacent coronal consonants agree in place
    - e.g. /z + znakʲɛm/ → [zɛ + znakʲɛm]
      * [z + znakʲɛm]
- At minimum, two epenthesis rules are needed.

Two epenthesis rules

- $\emptyset \rightarrow V / C_1 \_\_ C_2C$
  $C_1 = C_2$ ignoring [voice]
  (obligatory)

- $\emptyset \rightarrow V / C_1 \_\_ C_2C$
  $C_1 = C_2$ ignoring [voice], [COR-place]
  (optional)

Two assimilation rules

- Voicing assimilation

  [–son] → [αvoice] / __ C[αvoice]

  (obligatory)

- Coronal place assimilation (CPA)

  [COR] → [αCOR-pl] / __ C[αCOR-pl]

  (optional)

Contingent optionality fails

1. $\emptyset \rightarrow V / C_1 \_\_ C_2C$
   $C_1 = C_2$ ignoring [voice], [COR-place] (optional)

2. Coronal place assimilation (CPA)
   $[COR] \rightarrow [\alpha COR\text{-pl}] / \_\_ C[\alpha COR\text{-pl}]$ (optional)

Epenthesis bleeds assim.

- /z + ʑrɛbakʲɛm/
1. zɛ + ʑrɛbakʲɛm
2. —*bled*—
- ✓ [zɛ + ʑrɛbakʲɛm]

Both rules are skipped

- /z + ʑrɛbakʲɛm/
1. —*skip*—
2. —*skip*—
- ✓ [z + ʑrɛbakʲɛm]

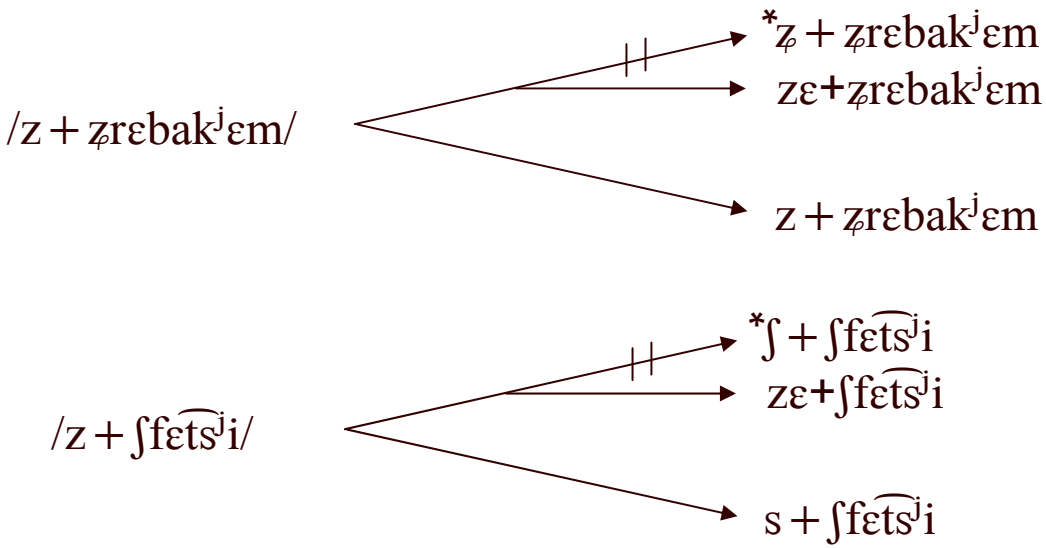
Assimilation must be skipped!

- /z + ʑrɛbakʲɛm/
1. —*skip*—
2. ʑ + ʑrɛbakʲɛm
- * [ʑ + ʑrɛbakʲɛm]

- If epenthesis is skipped, assimilation must also be.

Contingent optionality explained

- The optionality of CPA makes epenthesis optional in just those cases where it is.



- Epenthesis is obligatory whenever adjacent identical consonants would otherwise arise due to assimilation (optionally or not).

Optionality induces a ranking paradox
(Pająk 2007, WECOL)

/z + d͡ʒɛmɛm/ → ʒ + d͡ʒɛmɛm ~ z + d͡ʒɛmɛm
CPA — no CPA

*zɛ + d͡ʒɛmɛm
*epenthesis

/z + ʒbikʲɛm/ → zɛ + ʒbikʲɛm ~ z + ʒbikʲɛm
epenthesis — no CPA

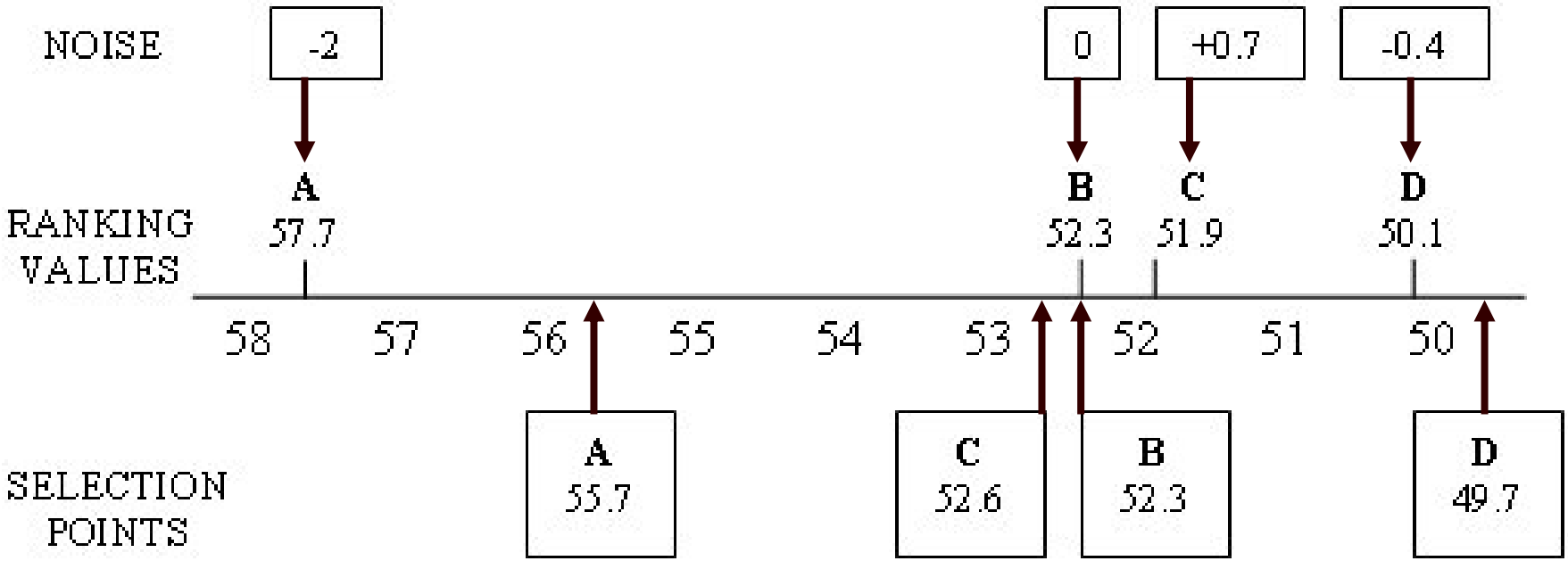
*ʒ + ʒbikʲɛm
*CPA

Input: /z+d͡ʒɛmɛm/	NoGem+C	Dep(V)	Agree[cor]	Ident[cor]
a. → [z+d͡ʒɛmɛm]			*	
b. → [ʒ+d͡ʒɛmɛm]				*
c. → [zɛ+d͡ʒɛmɛm]		*		

Input: /z+ʒbikʲɛm/	NoGem+C	Dep(V)	Agree[cor]	Ident[cor]
a. → [z+ʒbikʲɛm]			*	
b. [ʒ+ʒbikʲɛm]	*!			*
c. → [zɛ+ʒbikʲɛm]		*		

Stochastic OT

(Boersma 1998, Boersma & Hayes 2001)



Stochastic OT: Polish data

- ʒ + d͡ʒɛmɛm ~ z + d͡ʒɛmɛm

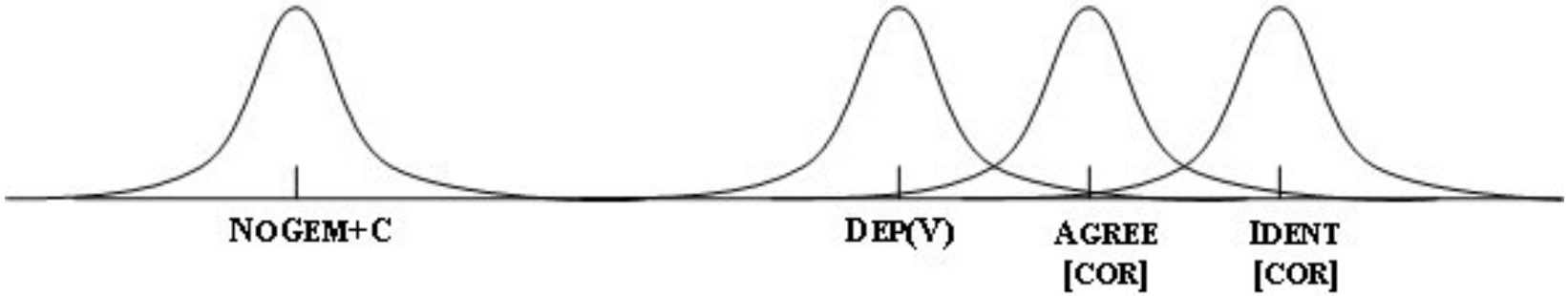
Dep(V) >> Ident[cor] / Agree[cor]
Agree[cor] ~ Ident[cor]

Distribution (normal) of selection point

- zɛ + ʒbikʲɛm ~ z + ʒbikʲɛm

NoGem+C >> Dep(V)
Agree[cor] ~ Dep(V)

Stochastic OT: probabilities



- Ranking with the highest probability:

  (1) NoGem+C >> Dep(V) >> Agree[cor] >> Ident[cor]

- Rankings with lower probability:

  (2) NoGem+C >> Dep(V) >> Ident[cor] >> Agree[cor]

  (3) NoGem+C >> Agree[cor] >> Dep(V) >> Ident[cor]

Stochastic OT: probabilities

(1) NoGem+C >> Dep(V) >> Agree[cor] >> Ident[cor]
(2) NoGem+C >> Dep(V) >> Ident[cor] >> Agree[cor]
(3) NoGem+C >> Agree[cor] >> Dep(V) >> Ident[cor]

RANKING	PREDICTED WINNER			
	ʒ+d͡ʒɛmɛm ~ z+d͡ʒɛmɛm		zɛ+ʒbikʲɛm ~ z+ʒbikʲɛm	
(1)	W			W
(2)		W		W
(3)	W		W	

Ranking with the highest probability

ACTUAL RELATIVE FREQUENCIES			
ʒ+d͡ʒɛmɛm < z+d͡ʒɛmɛm		zɛ+ʒbikʲɛm > z+ʒbikʲɛm	
25%	75%[1]	99%	1%[2]

[1] Based on an experimental study by Osowicka-Kondratowicz (2004)
[2] Based on a search through a written corpus of Polish

Morpheme perceptibility scale

(based on an idea originally due to Matt Goldrick, p.c.)

99% 1%

$zɛ + ʒbik^jɛm > z + ʒbik^jɛm >$ $*ʒ + ʒbik^jɛm$

epenthesis most effectively separates clitic from stem

no CPA keeps clitic narrowly distinct from stem-initial C

CPA makes clitic identical with stem-initial C

- Grammar rules out CPA; epenthesis > no CPA

75% 25%

$*zɛ + \widehat{dʒ}ɛmɛm > z + \widehat{dʒ}ɛmɛm > ʒ + \widehat{dʒ}ɛmɛm$

epenthesis most effectively separates clitic from stem

no CPA keeps clitic narrowly distinct from stem-initial C

CPA makes clitic near-identical with stem-initial C

- Grammar rules out epenthesis; no CPA > CPA

It can't be the grammar

- If morpheme perceptibility is a constraint (call it MP) in the grammar, it will prefer epenthesis — resulting in another ranking paradox:
  - Dep(V) >> MP – z + d͡ʒɛmɛm > ʒ + d͡ʒɛmɛm | *zɛ + d͡ʒɛmɛm
  - MP >> Dep(V) – zɛ+ʒbikʲɛm > z + ʒbikʲɛm | *ʒ + ʒbikʲɛm
- Our current hypothesis
  - The grammar generates possibilities alone.
  - Extragrammatical factors, such as morpheme perceptibility, determine probabilities.

Conclusions

- Epenthesis in 'sufficiently identical' $C_1\_\_C_2C$ = geminate avoidance + assimilation. (Baković 2005)
- The optionality of epenthesis is *contingent* on the optionality of coronal place assimilation.
- A rule-based analysis fails to capture both aspects of epenthesis-assimilation interaction.
- A Stochastic OT (-like) grammar works.
  - The grammar generates possibilities alone.
  - Other factors (e.g., morpheme perceptibility) determine probabilities. (Pająk 2007)

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Thank you