

**POLISH  
MORPHONOTACTICS:  
ACQUISITION AND  
MARKEDNESS**

by

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PLM 2007

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**Aim: to investigate cluster reduction in FLA according to the following criteria:**

- ❖ the presence/ absence of a morphological boundary
- ❖ the status of a cluster (4 classes)
- ❖ markedness as defined by Beats-and-Binding phonology (Dziubalska-Kołączyk, 2007)

# What is morphonotactics?

- Dressler and Dziubalska-Kořaczyk (2006) propose a distinct area of morphonology , namely *mophonotactics*.
- Morphonotactics is an area of interaction between morphotactics and phonotactics (Dressler & Dziubalska-Kořaczyk, 2006)

## Examples of derivational and inflectional affixes in Polish (Mizerski, 2000)

### **DERIVATIONAL PREFIXES (ending in a consonant)**

- **Nouns:** przeciw-, kontr-, nad-, super-, hiper-, eks- śród-, pod-, bez-, przed-
- **Verbs:** nad-, ob-, od-, pod-, przed-, roz-, dez-, nad-, od-, pod-, współ-,
- **Consonantal prefixes of verbs:** w-, wz-, ws-, z-, s-
- **Adjectives:** współ-, nad-, ponad-, hiper-, super-, bez-, przed-, post-,

### **DERIVATIONAL SUFFIXES (beginning in a consonant)**

- **Nouns:** (-da), -nie, -cie, -ka, -ctwo, -stwo, -two, -cja, -zja, -ki, -ba, -twa, -ca, -ciel, -nik, -nica, -niczka, -czy, -niczy, -nia, -dło, -szczyzna, -szczak, -na, -czyk -czuk, -sko, -sztyl, -cia, -cio
- **Verbs:** -nać, -nieć,
- **Adjectives:** -ny, -ki, -czy, -liwy, -ski, -ni,

### **INFLECTIONAL MORPHEMES**

- **Nouns:** -mi
- **Verbs:** -ł, -śmy, -ście, -my, -cie, -wszy,
- **Adjectives:** -szy, naj- (prefix)

**Morphological boundary was taken into account in a study by Bargiełówna (1950), which showed that as the cluster grows, it is more likely to contain a morpheme boundary. The occurrence of such patterns in Polish indicates that complex clusters are indeed tolerated in a language, especially when they fulfil a morphological function.**

# Clusters in FLA

- In the early phonological development the prevailing type of a syllable is CV or reduplicated CV (Clark, 2003) (the most universal type of a syllable, occurring in 70% of the world languages) (Maddieson, 1999).
- Clusters are reduced to CV or modified in some way

# Cluster modification strategies

- Reduction/ deletion e.g. sprzątać > pątać
- Substitution e.g. smoczek > sfoczek
- Epenthesis e.g. kupka > kup<sup>ə</sup>ka
- Syncope (syllable deletion) e.g. dalmatyńczyk > jatyńczyk

Sometimes the strategies can cooccur:

Kokardkę > kokafkę (reduction + substitution)

# Production of clusters

- Medials occur first
- They are followed by initials and finals
- Less complex before more complex  
(confirmed both in terms of size of a cluster but also articulatory diversity)  
(Dziubalska-Kołodziejczyk, 1999)



# Morphonotactics & FLA

- The aim of the study is to investigate the behaviour of morphonotactic clusters in the speech of children acquiring the native language.
- The hypothesis:  
Even though a language contains complex and marked morphonotactic clusters, they will be acquired or produced more accurately or easily by children since they fulfil a morphological function and introduce significant differences in meaning.

# Polish data

In the empirical research the recordings of Zosia have been used. Zosia is a normally developing monolingual child. She was recorded by her parents between the ages 1;7 and 3;2. The data were transliterated in the CHAT format (Mac Whinney, 2000) and examined auditorily.

**Altogether 8 hours of recordings were analysed. The data were divided into 4 periods.**

**PERIOD 1: 1;7- 1;9.1**

**PERIOD 2: 1;11 & 2;1**

**PERIOD 3: 2;8 – 2;9**

**PERIOD 4: 3;1-3;2**

**PERIOD ONE**

# Period one

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
INITIALS			pt > p <sup>1</sup> kr > k <sup>4</sup>	
MEDIALS	pt <sup>3</sup> wt <sup>1</sup>	pk <sup>1</sup> wk <sup>1</sup> jk <sup>1</sup>	mb > b <sup>2</sup> wt > t <sup>9</sup>	kt > t <sup>3</sup> k <sup>1</sup> btϕ > b <sup>1</sup> wk > k <sup>2</sup> tk > k <sup>3</sup>
FINALS				

# Zosia's reductions: period one

DOUBLES			
		LEX	MOR
INITIALS	TYPES	100%	-
	TOKENS	100%	-
MEDIALS	TYPES	50%	57%
	TOKENS	73%	77%
FINALS	TYPES	-	-
	TOKENS	-	-

# Period one: results

In period one most of the target clusters are reduced. Only two lexical and 3 morphotactic cluster types were produced correctly.

Not much morphology at this stage part from diminutives e.g. *kupka* or onomatopoeic reduplications e.g. *tiktak* (=zegar/clock) which nevertheless function as nouns.

No finals occur at this stage (neither lexical nor morphotactic ones). No morphotactic initials are targeted.

No triples in any position.

**PERIOD TWO**



# Period two: doubles

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
INITIALS	sk <sup>1</sup>		pt > p <sup>1</sup> dr > d <sup>6</sup> dw > d <sup>1</sup> gdz > dz <sup>1</sup> gw > g <sup>7</sup> tf > tɸ <sup>1 s</sup> xts > tɸ <sup>4 s</sup> ts <sup>7</sup> vw > j <sup>1</sup> ml > m <sup>1</sup> mr > m <sup>1</sup>	
MEDIALS	pt <sup>1</sup> nd <sup>7</sup> nt <sup>2</sup> ndz <sup>1</sup> ntj <sup>1</sup>	tk <sup>4</sup> tɸk <sup>1 s</sup> fk <sup>6</sup> mk <sup>6MV</sup>	ɸtɸ > ɸ <sup>1</sup> nt > t <sup>11</sup> nd > d <sup>1</sup>	mb > b <sup>1</sup>
FINALS	ɸt <sup>4S</sup>		tr > t <sup>1</sup> st > ɸ <sup>19 s</sup> s <sup>4 Ph</sup> ɸtɸ > ɸ <sup>1</sup>	

# Zosia's reductions: period two

DOUBLES			
		LEX	MOR
INITIALS	TYPES	91%	-
	TOKENS	97%	-
MEDIALS	TYPES	37.5%	20%
	TOKENS	52%	0.6%
FINALS	TYPES	75%	-
	TOKENS	86%	-

# PERIOD THREE

# Period three: double initials

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
<b>INITIALS</b>	pf <sup>33</sup> bz <sup>1</sup> dv <sup>5</sup> kf <sup>3</sup> kɸ <sup>9</sup> gz <sup>4</sup> bl <sup>1</sup> dl <sup>1</sup> kl <sup>5</sup> pw <sup>3</sup> gw <sup>3</sup> tft <sup>3</sup> sp <sup>4</sup> st <sup>12</sup> sk <sup>3</sup> fp <sup>1</sup> ɸp <sup>6</sup> xtɸ <sup>5</sup> xtɸ <sup>2</sup> fj <sup>2</sup> vw <sup>1</sup> PN sw <sup>5</sup> xw <sup>4</sup> mn <sup>3</sup> mj <sup>7</sup>	zb <sup>3</sup> zg <sup>1</sup> sk <sup>1</sup> sp <sup>2</sup> sx <sup>2</sup> zj <sup>4</sup>	pt> p <sup>1</sup> t <sup>3</sup> kt> t <sup>3</sup> tf>f <sup>1</sup> tr>t <sup>1</sup> dr>d <sup>7</sup> dl> j <sup>8</sup> l <sup>9</sup> o <sup>1</sup> n <sup>30</sup> pl> p <sup>1</sup> kr> k <sup>5</sup> tr> t <sup>6</sup> dw> d <sup>1</sup> gdz> dz <sup>6</sup> dzv> dz <sup>3</sup> fj > f <sup>8</sup> ɸ <sup>4</sup> s <sup>1</sup> x <sup>1</sup> vz > z <sup>1</sup> sp>p <sup>1</sup> ɸf> ɸ <sup>1</sup> xf>x <sup>1</sup> xtɸ> tɸ <sup>1</sup> sm>s <sup>2</sup> ɸj> ɸ <sup>4</sup> xl>x <sup>1</sup> vw> V5pn	vw > w <sup>1</sup> PN zn>z <sup>1</sup> zr> z <sup>5</sup> z <sup>1</sup> zj> z <sup>2</sup> s

# Period three: double medials

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
<b>MEDIALS</b>	<p>pk<sup>2</sup> kt<sup>5</sup>            ps<sup>2</sup> g<sup>3</sup><sup>2</sup>            kl<sup>8</sup>            pw<sup>2</sup>            tsk<sup>1</sup>            tʃn<sup>1</sup>            vd<sup>1</sup> st<sup>26</sup> sk<sup>2</sup> zd<sup>2</sup>            ʒn<sup>1</sup>            ʃt<sup>1</sup>            ʃtʃ<sup>21</sup> ʃtʃ<sup>2</sup> ʒdʒ<sup>2</sup>            ʃm<sup>3</sup> ʒn<sup>1</sup>            sw<sup>2</sup>            nt<sup>1</sup> nd<sup>8</sup> ng<sup>5</sup>            nts<sup>1</sup> ntʃ<sup>7</sup> ndʒ<sup>8</sup>            lk            lj<sup>2</sup> PN            wt<sup>3</sup>            jdʒ<sup>4</sup>            wn<sup>2</sup></p>	<p>pk<sup>6</sup> tk<sup>9</sup>            ptʃ<sup>1</sup> ptʃ<sup>13</sup> pts<sup>2</sup>            bn<sup>1</sup> dn<sup>4</sup> kn<sup>1</sup> tɲ<sup>1</sup>            dɲ<sup>1</sup> gn<sup>1</sup>            pl<sup>2</sup>            gw<sup>2</sup> dw<sup>2</sup>            tʃk<sup>42</sup>            fk<sup>2</sup> ʃk<sup>10</sup> sk<sup>3</sup>            tʃm<sup>1</sup>            ʃn<sup>1</sup> ʒn<sup>1</sup>            ʃl<sup>2</sup>            ʃw<sup>3</sup>            mk<sup>2</sup> ɲk<sup>16</sup>            ntʃ<sup>PN3</sup>            mn<sup>3</sup>            lk<sup>4</sup>            ln<sup>2</sup> ln<sup>1</sup>            wk<sup>10</sup> jk<sup>2</sup>            jtʃ<sup>1</sup>            jn<sup>1</sup></p>	<p>tʃv &gt; v<sup>1</sup> t<sup>1</sup>            dm &gt; d<sup>1</sup>            dr &gt; d<sup>1</sup>            tsj &gt; t<sup>1</sup>            st &gt; t<sup>1</sup>            ʃtʃ &gt; tʃ<sup>1</sup>            tʃ &gt; tʃ<sup>2</sup> tʃ<sup>3</sup>            ʃt &gt; t<sup>2</sup>            sm &gt; s<sup>1</sup>            ɲk &gt; k<sup>1</sup>            ntʃ &gt; tʃ<sup>1</sup>            ndʒ &gt; dʒ<sup>3</sup>            lb &gt; b<sup>2</sup>            lk &gt; k<sup>9</sup>            rd<sup>PN</sup> &gt; d<sup>1</sup>            rv &gt; n<sup>3</sup>            ʒdʒ &gt; dʒ<sup>1</sup>            lm &gt; j<sup>1</sup>            rn &gt; n<sup>1</sup>            wt &gt; t<sup>1</sup></p>	<p>tp &gt; p<sup>1</sup>            tʃk &gt; k<sup>1</sup>            dn<sup>MV</sup> &gt; d<sup>1</sup> n<sup>3</sup>            dɲ &gt; ɲ<sup>1</sup>            tʃn &gt; tʃ<sup>1</sup>            zm &gt; s<sup>1</sup>            ʃl &gt; ʃ<sup>2</sup> ʃ<sup>1</sup></p>

# Period three: double finals

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
FINALS	st <sup>28</sup> ʃtʃ <sup>3</sup> ɛtɕ <sup>3</sup> nt <sup>1</sup> ŋk <sup>1</sup> nts <sup>4</sup> ntɕ <sup>1</sup> lk <sup>1</sup> wf <sup>1</sup> wn <sup>2</sup>	ɛtɕ <sup>5</sup>	st > s <sup>48</sup> Ph ɕ <sup>3</sup> s ɕ <sup>2</sup> ɛtɕ > ɕ <sup>1</sup> sw > s <sup>2</sup> ntɕ > tɕ <sup>1</sup> nts > ts <sup>1</sup> rf > f <sup>1</sup>	tw/dw > d <sup>2Ph</sup> ɛtɕ > ɕ <sup>5</sup>

# Zosia's reductions: period three

DOUBLES			
		LEX	MOR
INITIALS	TYPES	47%	40%
	TOKENS	48%	43%
MEDIALS	TYPES	38%	17.5%
	TOKENS	23%	0.7%
FINALS	TYPES	37.5%	67%
	TOKENS	57%	58%

# PERIOD FOUR



# Period four: double initials

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
INITIALS	kt <sup>1</sup> gdz <sup>2</sup> pf <sup>27</sup> kɛ <sup>3</sup> dv <sup>3</sup> bɜ <sup>2</sup> kf <sup>3</sup> tf <sup>2</sup> pl <sup>2</sup> pr <sup>1</sup> kl <sup>3</sup> kr <sup>1</sup> tr <sup>2</sup> dr <sup>1</sup> pw <sup>7</sup> gw <sup>2</sup> tʃt <sup>2</sup> ftʃl sp <sup>7</sup> st <sup>6</sup> sk <sup>3</sup> ɛp <sup>2</sup> xts <sup>9</sup> ftʃ <sup>1</sup> ʃtʃ <sup>1</sup> sf <sup>2</sup> fj <sup>6</sup> sm <sup>2</sup> zn <sup>6</sup> xw <sup>3</sup> vw <sup>3</sup> zw <sup>10</sup> mɲ <sup>7</sup> mn <sup>3</sup>	sp <sup>4</sup> zb <sup>2</sup> zd <sup>2</sup> fs <sup>1</sup> fj <sup>1</sup> sx <sup>1</sup> zm <sup>1</sup> zn <sup>6</sup> zj <sup>1</sup> zw <sup>1</sup> vw <sup>1</sup>	pt>t <sup>1</sup> kt>t <sup>3</sup> gdz>dz <sup>17</sup> pf>p <sup>1</sup> f <sup>1</sup> dl>n <sup>13</sup> dr>d <sup>1</sup> kr>k <sup>15</sup> dw>d <sup>1</sup> sp>p <sup>1</sup> fj>ʃ <sup>7</sup> ɛf>ɛ <sup>6</sup> ʃtʃ>f <sup>1</sup> xts>tɜ <sup>2</sup> xtɛ>tɛ <sup>1</sup> ɛf>ɛ <sup>1</sup> ɛɲ>ɛ <sup>1</sup> ɛl>ɛ <sup>2</sup> vr>l <sup>1</sup> vw>v <sup>1</sup> mɲ>ɲ <sup>1</sup>	zr>z <sup>11</sup> ɛtɛ>tɛ <sup>1</sup>

# Period four: double medials

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
MEDIALS	<p>pk<sup>7</sup> tk<sup>2</sup> ptɕ<sup>6</sup> ps<sup>1</sup> bɜ<sup>13</sup> bn<sup>1</sup> dŋ<sup>2</sup> br<sup>2</sup> pl<sup>4</sup> tl<sup>2</sup> gl<sup>4</sup> pw<sup>2</sup> kw<sup>7</sup> ɔzv<sup>1</sup> tsj<sup>1</sup> ɕt<sup>8</sup> st<sup>21</sup> sk<sup>5</sup> ʃk<sup>2</sup> vd<sup>3</sup> vɜ<sup>1</sup> ʃtʃ<sup>33</sup> ɕtɕ<sup>2</sup> ʒɔɕ<sup>1</sup> sm<sup>1</sup> zm<sup>1</sup> ʒn<sup>1</sup> ɕm<sup>3</sup> ɕŋ<sup>1</sup> ʃl<sup>1</sup> nk<sup>1</sup> ŋk<sup>9</sup> nt<sup>6</sup> nd<sup>26</sup> ntɕ<sup>3</sup> ndz<sup>69</sup> nts<sup>1</sup> ntʃ<sup>1</sup> mŋ<sup>2</sup> nn<sup>1</sup> lk<sup>1</sup> ln<sup>1</sup> jd<sup>6</sup> jɔɕ<sup>1</sup> jɜ<sup>4</sup> wn<sup>1</sup></p>	<p>tk<sup>15</sup> pk<sup>5</sup> db<sup>1</sup> gb<sup>1</sup> ptɕ<sup>5</sup> tn<sup>1</sup> tŋ<sup>2</sup> bn<sup>1</sup> dn<sup>3</sup> dl<sup>1</sup> dw<sup>1</sup> tsk<sup>3</sup> tʃk<sup>32</sup> tɕtɕ<sup>6</sup> ɔɕm<sup>1</sup> sk<sup>6</sup> ʃk<sup>19</sup> fk<sup>2</sup> fts<sup>1</sup> ʃtɕ<sup>1</sup> sts<sup>1</sup> tɕ<sup>1</sup> ss<sup>1</sup> vŋ<sup>2</sup> zj<sup>1</sup> nk<sup>1</sup> ŋk<sup>4</sup> mb<sup>1</sup> mt<sup>2</sup> mk<sup>1</sup> mts<sup>1</sup> ntɕ<sup>1</sup> rk<sup>1</sup> lk<sup>2</sup> ltɕ<sup>1</sup> jk<sup>6</sup> wk<sup>2</sup> jtɕ<sup>4</sup></p>	<p>dn<sup>MV</sup> &gt; n<sup>1</sup> ftʃ &gt; tʃ<sup>2</sup> mb &gt; b<sup>1</sup> nd &gt; d<sup>2</sup> ndz &gt; dz<sup>1</sup> lk &gt; k<sup>9</sup> rd &gt; d<sup>1</sup> rx &gt; x<sup>1</sup> jd &gt; d<sup>4</sup> jɔɕ &gt; ɔɕ<sup>1</sup> jm &gt; m<sup>1</sup></p>	<p>ɕtɕ &gt; ɕ<sup>1</sup> jl &gt; l<sup>1</sup></p>

# Period four: double finals

	DOUBLES			
	INTACT		REDUCED	
	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES	WITHIN A MORPHEME	ACROSS MORPHEME BOUNDARIES
FINALS	$nt\epsilon^2$ $st^{16}$ $\epsilon t\epsilon^2$ $jt\epsilon^2$ $ftj^1$ $wn^1$	$\epsilon t\epsilon^6$ $nt\epsilon^1$	$kt > k^3$ $st > s^{61} Ph \ z^1 \ \epsilon^2 s$ $rf > f^3$	$dw > t^{1Ph}$ $\epsilon t\epsilon > \epsilon^5$

# Zosia's reductions: period four

DOUBLES			
		LEX	MOR
INITIALS	TYPES	37%	15%
	TOKENS	36%	36%
MEDIALS	TYPES	19%	0.5%
	TOKENS	0.8%	0.1%
FINALS	TYPES	33%	50%
	TOKENS	74%	50%

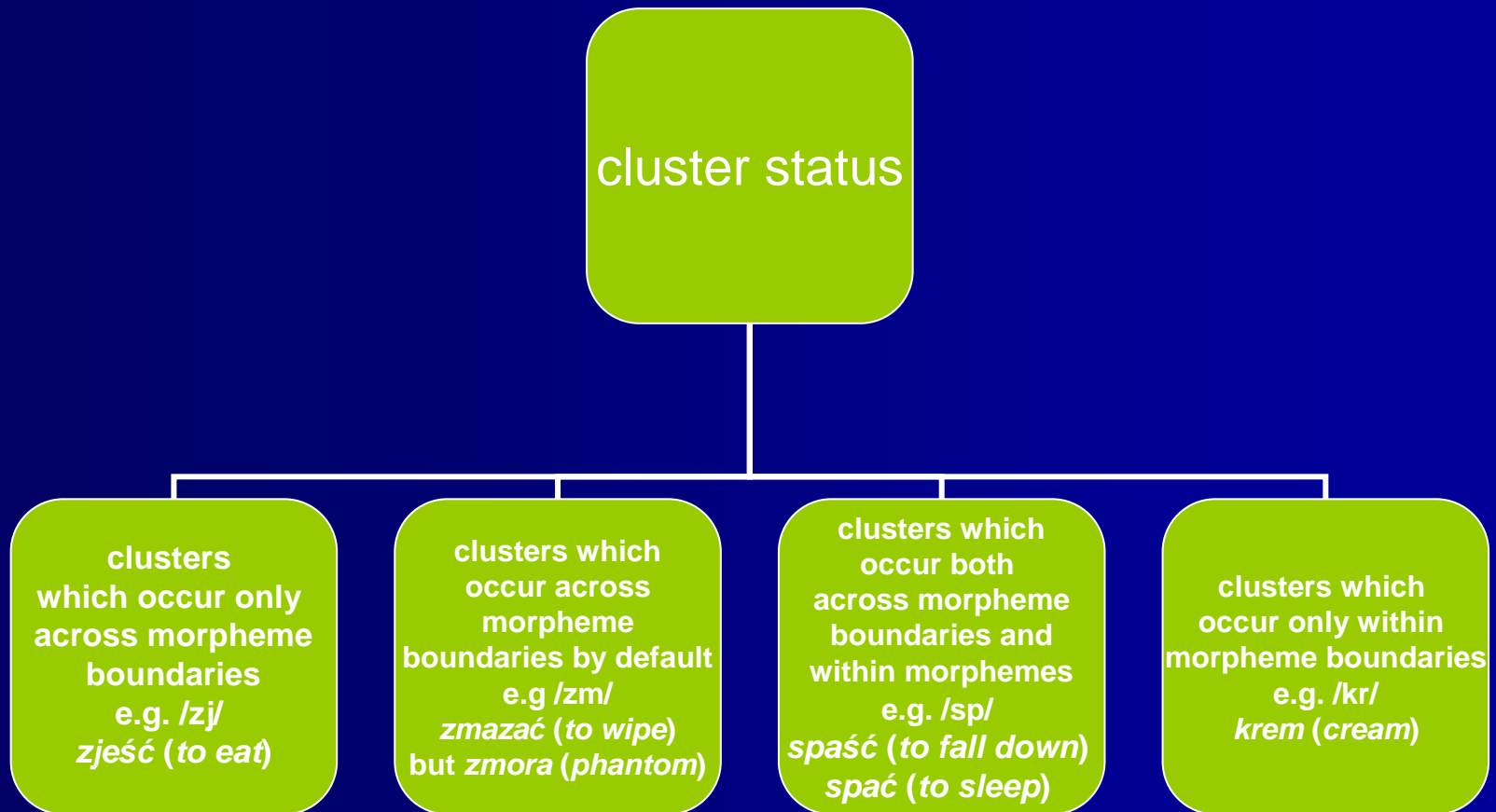
# Conclusions 1

## Polish doubles

- The tendency to retain morphotactic clusters is especially observable in period 3 and 4 where Zosia performs numerous morphological operations.
- The tendency is the most robust for medials (in period 2,3,4), then for initials (period 3 and 4); for finals the results are inconclusive.

# **Analysis 2: cluster status**

# Cluster status

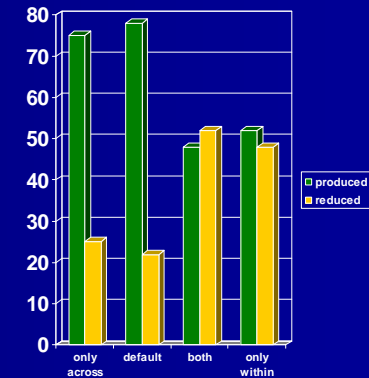


# Cluster status: initials

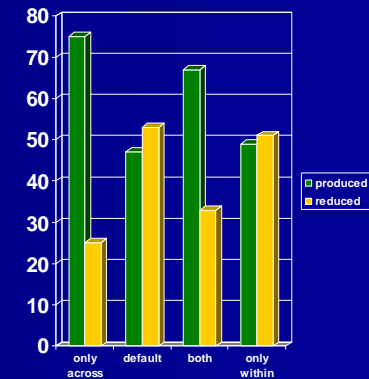
## Hierarchy of reductions (types & tokens)

(counting from the least frequently reduced ones)

### TYPES



### TOKENS





# Why is the default category disobedient token-wise?

- Culprit: /zr/ !!!
  - reduced 16x
  - never produced accurately!
  - sometimes realised as /zl/
  - though /zr/ is an unmarked cluster, it is reduced due to the articulatory difficulty of /r/
  - in the reduction however, the morphological information is conveyed as z-prefix is left intact and it is /r/ that gets dropped

# Cluster status: finals

## Hierarchy of reductions (types & tokens)

(counting from the least frequently reduced ones)

### TYPES

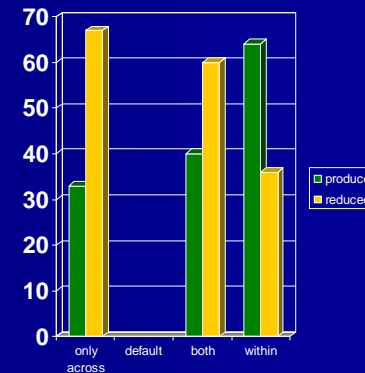
only within morphemes



both within and across morphemes



only across morphemes



### TOKENS

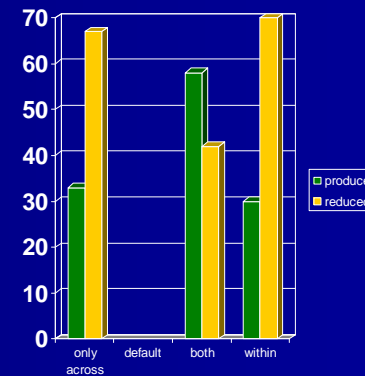
both within and across morphemes



only across morphemes



only within morphemes



# Why are word final suffixes deleted?

Word final inflectional suffixes are:

- Infinitive: <ć> i.e. /t͡ɕ/
- Past tense: <ł> i.e. /w/

Reductions of word final suffixes e.g. *iść* (*to go*), *nieść* (*to carry*), *wyść* (*to leave*) do not cause morphological information loss as they are distinct enough from other forms in the paradigm e.g. *iść-ideę*, *nieść-niosę*

# Similarly,

## Reduced past tense affixes in verbs

*poszedł (he went)*

*umarł (he died)*

*niósł (he was carrying)*

do not cause morphological confusion  
as they are distinct enough from other  
forms in the inflectional paradigm

## Conclusion 2

Cluster status has stronger effects in the case of initials than finals (medials were not under investigation)

# Markedness

Net Auditory Distance (Dziubalska-Kołodziej, 2007)

- manner of articulation (MOA),
- place of articulation (POA)
- voicing (Lx)

# NAD conditions

## doubles

**initial:**  $\text{NAD} (C1, C2) \geq \text{NAD} (C2, V)$

**final :**  $\text{NAD} (V, C1) \leq \text{NAD} (C1, C2)$

**medial:**  $\text{NAD} (V1, C1) \geq \text{NAD} (C1, C2)$   
 $\leq \text{NAD} (C2, V2)$

# Conclusion 3

## Markedness: work in progress (doubles; types)

- Preliminary NAD calculations show that lexical preferred medial cluster types tend to be reduced less frequently than dispreferred ones (period 1, 2, 3, 4).
- The same observation holds true for lexical finals (period 3, 4)
- In the initial position preferred cluster types seem to be problematic → preferred clusters often contain an approximant as the second element (e.g. /r/) which is problematic for articulatory reasons in FLA. On the other hand, good medials frequently involve 2 obstruents.
- preferred morphotactic medials are reduced less frequently in period 2 & 3.



# References:

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**Thank you**