

# Generalized Impoverishment

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Polyfunctionality and Underspecification  
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# Basic Ideas

- ▶ **Simplify Distributed Morphology** (Halle & Marantz 1993):  
Supplant subset-based underspecification by impoverishment
- ▶ **Continue the Research program of LSLOT (Chomsky 1955):**  
Implement markedness as an evaluation metric on grammars
- ▶ **Explicit Ø-Exponence is evil** (Matthews 1974, Anderson 1992)

# Claim

Markedness of a paradigm  $P$

$\approx$

the minimal number of impoverishment rules  
required to capture  $P$

# Overview

## Intro

## Underspecification and Impoverishment in Standard DM

## Supplanting Underspecification by Generalized Impoverishment

The Idea

A Case Study

## Deriving Typological Asymmetries

Deriving Baerman's Generalization

Deriving the Pertsova Hierarchy

Deriving the Markedness of Portmanteaus

# Underspecification, Competition, and Impoverishment in Standard DM

# Underspecification and Competition in Standard DM

	<b>masc</b>	<b>neut</b>
<b>Nom</b>	d-er	d-as
<b>Acc</b>	d-en	

**Syntax:** [+masc +nom]



## Vocabulary Items

[+masc +acc] ↔ **-en**  
 [+masc       ] ↔ **-er**  
 [               ] ↔ **-as**

[+masc]:**er**

(German Pronominal Inflection)

# The Subset Principle (Halle 1997)

1. Only VIs which specify a subset of a head's features can be inserted
2. Only the most specific VI is inserted

# Where the Subset Principle is not Enough

	present	
	indefinite	definite
1sg	olvas-o- <b>k</b>	olvas-o- <b>m</b>

	past	
	definite	indefinite
1sg	olvas-t-a- <b>m</b>	

## Vocabulary Items

[+1 -pl -def] ↔ **-k**  
 [+1 -pl ] ↔ **-m**

## Problem:

Violation of the  
Subset Principle

(Hungarian Verb Agreement)



# Impoverishment in Standard DM

**Syntax:**

[+1 -pl -def]

**Impoverishment:**

[def] → ∅ / \_\_\_\_\_ [+past]

[+1 -pl]

**Vocabulary Items**

[+1 -pl -def] ↔ **-k**  
 [+1 -pl ] ↔ **-m**

↑

[+1-pl]:m

(Hungarian Verb Agreement)

## Crucial Observation

(Enough)

impoverishment

makes underspecification unnecessary

(at the point of vocabulary insertion)

# Supplanting Underspecification by Generalized Impoverishment

# Supplanting the Subset Principle

## **Coextension Principle:**

A vocabulary item is inserted into a head if its morphosyntactic features are coextensive to the ones specified in the head

## **Consequence:**

Underspecified Vocabulary Items enforce massive impoverishment before insertion

# Minor Assumption

Impoverishment makes features unaccessible for insertion

but does not delete them

Context specifications/allomorphy/impoverishment

may still refer to impoverished features

(see Noyer 1992 for a similar claim on vocabulary insertion)

# Person Syncretism in Nobiin (Werner 1987)

	Indicative	Interrogative
<b>1sg</b>	-ir	-re
<b>2sg</b>	-nam	<b>-i</b>
<b>3sg</b>	-i	<b>-i</b>
<b>1pl</b>	-ir	<b>-ro</b>
<b>2pl</b>	-rokom	<b>-ro</b>
<b>3pl</b>	-inna	-inna

# Derivation of Singular Syncretism (Interrogative)

	1sg	2sg	3sg
<b>Impoverishment:</b>	[+1-3-pl]	[-1-3-pl]	[-1+3-pl]
<b>Insertion:</b>	[+1-3-pl]	[-1- <del>3</del> -pl]	[-1- <del>3</del> -pl]
	re:[+1-3-pl]	i:[-1-pl]	

**Impoverishment Rule:**  $3 \rightarrow \emptyset$  / [\_\_\_\_-pl][+int]

## Vocabulary Items

[+1-3-pl]	↔	<b>re</b>
[-1-3-pl]	↔	<b>nam</b>
[-1-pl]	↔	<b>i</b>

# Derivation of Plural Syncretism (Interrogative)

	1pl	2pl	3pl
<b>Impoverishment:</b>	[+1-3+pl]	[-1-3+pl]	[-1+3+pl]
<b>Insertion:</b>	[ <del>1</del> -3+pl]	[ <del>1</del> -3+pl]	[-1+3+pl]
	ro: [-3+pl]		inna: [-1+3+pl]

**Impoverishment Rule:**  $1 \rightarrow \emptyset / [ \text{---} +\text{pl} ] [ +\text{int} ]$

## Vocabulary Items

[-1+3+pl] ↔ **inna**  
 [-1-3+pl] ↔ **rokom**  
 [-3+pl] ↔ **ro**



# Derivation of Non-Syncretic Singular (Indicative)

## With Underspecification

	1sg	2sg	3sg
<b>Insertion:</b>	[+1-3-pl] ir:[+1-3-pl]	[-1-3-pl] nam:[-1-3-pl]	[-1+3-pl] i:[-1-pl]

## Without Underspecification

	1sg	2sg	3sg
<b>Impoverishment:</b>	[+1-3-pl] [+1-3-pl]	[-1-3-pl] [-1-3-pl]	[-1+3-pl] [-1-3-pl]
<b>Insertion:</b>	ir:[+1-3-pl]	nam:[-1-3-pl]	i:[-1-pl]

**Impoverishment Rule:** +3 → ∅ / [\_\_\_\_-pl]

# Deriving Typological Asymmetries

# Assumptions

- ▶ Strong Version of the Syncretism Principle (Müller 2004)
- ▶ The only person features are [+/-1] & [+/-3] (Nevins 2006)
- ▶ Learners prefer grammars with less impoverishment rules

## Assumption on the Learner

For a given paradigm  $P$ , learners prefer grammars with a minimal number of impoverishment rules

The markedness of a paradigm  $P \approx$  the number of impoverishment rules of a morphological grammar  $G(P)$  such that there is no grammar  $G'(P)$  with less impoverishment rules than  $G$

Learners prefer less marked paradigms

$\Rightarrow$  marked paradigms should be typologically rare

## Deriving Baerman's Generalization

## Baerman's Generalization

“In the nonsingular, 1/2 and 2/3 both occur in roughly equal measures, while 1/3 is less common. A similar distribution is found where number is irrelevant, with examples of 1/2 and of 2/3 predominating. . . . Thus, cross-linguistically, there seems to be a preference for syncretism of first with second person, and of second person with third,” (Baerman 2005:3)

# Baerman's Generalization

## Agreement

	singular	non-singular	number-neutral
1/3	Koiari*, Zoque	Aleut, German, Hindi	
2/3	Atakapa, Hindi, Nivkh*, Nubian	Amele, Kapau, Kewa, Kobon, Slovene	Chitimacha, Guambiano, Kiwai, Wambon
1/2		Burarra, Dogon, Manchad, Nubian, Prinmi Tetun	Hunzib, Ingush, Nez Perce, Sango Waskia

\* Person distinguished in singular only.

## Pronouns

	singular	non-singular	number-neutral
1/3		Dakar Wolof	
2/3		Amele*, Kalam*, Kamoro, Kobon, Korafe*, Meyah, Mansim, Nez Perce*, Sango*, Warekena*, Wolof	Kawesqar
1/2		Awa*, Fongbe, Slave*, Yimas	Winnebago

# Deriving Natural Person Syncretism

## 2/3 Syncretism

1	2	3
[+1-3]	[-1-3]	[-1+3]
[+1 <del>3</del> ]	[-1 <del>3</del> ]	[-1 <del>3</del> ]
[+1]		[-1]

 $3 \rightarrow \emptyset$ 

## 1/2 Syncretism

1	2	3
[+1-3]	[-1-3]	[-1+3]
<del>[+1]-3</del>	<del>[-1]-3</del>	<del>[-1]+3</del>
	[-3]	[+3]

 $1 \rightarrow \emptyset$



# Deriving Unnatural Person Syncretism

## 1/3 Syncretism

1	2	3
[+1-3]	[-1-3]	[-1+3]
[+1 <del>3</del> ]	[-1-3]	[-1 <del>3</del> ]
<del>1</del> ]	[-1-3]	<del>1</del> ]
[ ]	[-1-3]	[ ]

-3 → Ø/ <u>  </u> +1	+3 → Ø/ <u>  </u> -1
-1 → Ø/ <u>  </u> +3	+1 → Ø/ <u>  </u> -3

## Added Value of the Analysis

“We know of no model of person features that will account precisely for . . . the rarity of 1/3 syncretism . . . For example Harley and Ritter (2002), in a model designed to account for the person values of pronominal forms, predict that 1/2 pronouns should be found, but not 2/3. However, as we have seen, not only are 2/3 pronouns found, they appear to be more common than 1/2 pronouns.” (Baerman et al. 2005:60-61)

## Deriving the Pertsova Hierarchy

# The Pertsova Complexity Hierarchy for Syncretism

Type 0: No Syncretism

Type 1: Syncretism which can be captured by natural classes

Type 2: Syncretism which can be captured by natural classes and subset-based competition

Type 3: More complex syncretism

# A Simple Example Paradigm

$[-\text{masc } -\text{pl}]_1$	$[-\text{masc } +\text{pl}]_2$
$[\text{+masc } -\text{pl}]_3$	$[\text{+masc } +\text{pl}]_4$

 $\approx$ 

$\mathbf{a}_1$	$\mathbf{b}_2$
$\mathbf{c}_3$	$\mathbf{d}_4$

# Pertsova's (2008) Complexity Classes

**Type 0**

a	b
c	d

**Type 1**

a	b
---	---

**Type 2**

a	
	b

**Type 3**

a	b
b	a

# Deriving Type-0 Syncretism

	$[-m -p]$	$[-m +p]$	$[-+m -p]$	$[+m +p]$
<b>Insertion:</b>	a: $[-m -p]$	b: $[-m +p]$	c: $[-+m -p]$	d: $[+m +p]$

a	b
c	d

# Deriving Type-1 Syncretism

	$[-m \ -p]$	$[-m \ +p]$	$[+m \ -p]$	$[+m \ +p]$
<b>Impoverishment:</b>	$[-m \ ]$	$[-m \ ]$	$[+m \ ]$	$[+m \ ]$
<b>Insertion:</b>	$[-m]:a$		$[+m]:b$	

$p \rightarrow \emptyset$

a	b
---	---



# Deriving Type-2 Syncretism

	$[-m -p]$	$[-m +p]$	$[+m -p]$	$[+m +p]$
	$[-m -p]$	$[ \quad +p]$	$[+m -p]$	$[+m +p]$
	$[-m \quad ]$	$[ \quad \quad ]$	$[+m \quad ]$	$[+m \quad ]$
	$[-m \quad ]$	$[ \quad \quad ]$	$[ \quad \quad ]$	$[ \quad \quad ]$
	$[-m ]:a$	$[ \quad ]:b$		

$$-m \rightarrow \emptyset / [ \text{---} +p ]$$

$$p \rightarrow \emptyset$$

$$+m \rightarrow \emptyset$$

a	
	b

# Why Type-3 Syncretism Cannot Derived

$[-\text{masc } -\text{pl}]_1$	$[-\text{masc } +\text{pl}]_2$
$[+\text{masc } -\text{pl}]_3$	$[+\text{masc } +\text{pl}]_4$

 $\ast \Rightarrow$ 

<b>a</b>	<b>b</b>
<b>b</b>	<b>a</b>

To derive this paradigm, the single cells must be impoverished such that:

- (i)  $\text{Cell}_1 = \text{Cell}_4$
- (ii)  $\text{Cell}_2 = \text{Cell}_3$
- (iii)  $\text{Cell}_{1,4} \neq \text{Cell}_{2,3}$

## Why Type-3 Syncretism Cannot Derived

$[-\text{masc } -\text{pl}]_1$	$[-\text{masc } +\text{pl}]_2$
$[+\text{masc } -\text{pl}]_3$	$[+\text{masc } +\text{pl}]_4$

 $\ast \Rightarrow$ 

<b>a</b>	<b>b</b>
<b>b</b>	<b>a</b>

The only way to guarantee that  $\text{Cell}_1 = \text{Cell}_4$   
is to impoverish both cells to [   ]

The only way to guarantee that  $\text{Cell}_2 = \text{Cell}_3$   
is to impoverish both cells to [   ]

but this results in complete syncretism for all 4 cells ( $\text{Cell}_{1,4} = \text{Cell}_{2,3}$ )

# Work Around

Assume that all feature structures contain a generic categorial feature:

$[-\text{masc } -\text{pl } \Phi]_1$	$[-\text{masc } +\text{pl } \Phi]_2$
$[\text{+masc } -\text{pl } \Phi]_3$	$[\text{+masc } +\text{pl } \Phi]_4$

# Deriving Type-3 Syncretism

$[-m -p \phi]$	$[-m +p \phi]$	$[+m -p \phi]$	$[+m +p \phi]$
$[-p \phi]$	$[+p \phi]$	$[-p \phi]$	$[+p \phi]$
$[\phi]$	$[\phi]$	$[\phi]$	$[\phi]$
$[\ ]$	$[\phi]$	$[\phi]$	$[\phi]$
$[\ ]$	$[\phi]$	$[\phi]$	$[\ ]$
$[\ ]:a$	$[\phi]:b$	$[\phi]:b$	$[\ ]:a$

$$m \rightarrow \emptyset$$

$$p \rightarrow \emptyset$$

$$\phi \rightarrow \emptyset \ / [ \_ -m -p ]$$

$$\phi \rightarrow \emptyset \ / [ \_ +m +p ]$$

a	b
b	a

# Added Value of the Analysis

There is a unified criterion for complexity in syncretism

For Pertsova:

- ▶ type 0 and type 1 differ by underspecification
- ▶ type 1 and type 2 differ by blocking rules
- ▶ type 2 and type 3 differ by homonymous lexical entries

# Deriving the Markedness of Portmanteaus

# Markedness of Portmanteaus

Portmanteau markers are more marked

than singleton affixes

(Wurzel 1989)



# Portmanteau Agreement in Swahili (Past)

	V	IV	III	Stem
<b>1sg</b>		ni-	ta-	taka
<b>2sg</b>		u-	ta-	taka
<b>3sg</b>		a-	ta-	taka
<b>1pl</b>		tu-	ta-	taka
<b>2pl</b>		m-	ta-	taka
<b>3pl</b>		wa-	ta-	taka

**Positive**

<b>1sg</b>	<b>si-</b>		ta-	taka
<b>2sg</b>	<b>ha-</b>	u-	ta-	taka
<b>3sg</b>	<b>ha-</b>	a-	ta-	taka
<b>1pl</b>	<b>ha-</b>	tu-	ta-	taka
<b>2pl</b>	<b>ha-</b>	m-	ta-	taka
<b>3pl</b>	<b>ha-</b>	wa-	ta-	taka

**Negative**

# Portmanteau Agreement in Swahili (Future)

	V	IV	III	Stem
<b>1sg</b>		ni-	li-	taka
<b>2sg</b>		u-	li-	taka
<b>3sg</b>		a-	li-	taka
<b>1pl</b>		tu-	li-	taka
<b>2pl</b>		m-	li-	taka
<b>3pl</b>		wa-	li-	taka

**Positive**

<b>1sg</b>	<b>si-</b>		<b>ku-</b>	taka
<b>2sg</b>	<b>ha-</b>	u-	<b>ku-</b>	taka
<b>3sg</b>	<b>ha-</b>	a-	<b>ku-</b>	taka
<b>1pl</b>	<b>ha-</b>	tu-	<b>ku-</b>	taka
<b>2pl</b>	<b>ha-</b>	m-	<b>ku-</b>	taka
<b>3pl</b>	<b>ha-</b>	wa-	<b>ku-</b>	taka

**Negative**

# Portmanteaus as Allomorphy + Impoverishment

ha-	ni-
-----	-----



si-	∅-
-----	----

- ▶ Head<sub>1</sub> has an overt allomorph contextually restricted to Head<sub>2</sub>
- ▶ Head<sub>2</sub> is deleted by impoverishment contextually restricted to Head<sub>1</sub>

(cf. Trommer 2007)

# Portmanteaus as Allomorphy + Impoverishment: VIs

ta- ↔ [+Past]

ku- ↔ [+Fut]

li- ↔ [+Fut]

/ [+Neg] \_\_\_\_\_

**si-** ↔ **[+1-pl]**

/ \_\_\_\_\_ **[+Neg]**

ni- ↔ [+1-pl]

u- ↔ [+2-pl]

tu- ↔ [+1+pl]

**ha-** ↔ **[+Neg]** → **∅** / \_\_\_\_\_ **[+1-pl]**

ha- ↔ [+Neg]

Derivation of *si-ku-taka*, 'I won't want'

[+Neg]	[+1-pl]	[+Fut]	taka			
_____	_____	_____	_____	ta-	↔ [+Past]	
_____	_____	_____	<b>ku-</b> taka	ku-	↔ [+Fut]	/ [+Neg] _____
_____	_____	_____	_____	li-	↔ [+Fut]	
_____	_____	_____	<b>si-</b> ku-taka	si-	↔ [+1-pl]	/ _____ [+Neg]
_____	_____	_____	_____	ni-	↔ [+1-pl]	
_____	_____	_____	_____	u-	↔ [+2-pl]	
_____	_____	_____	_____	tu-	↔ [+1+pl]	
<b>[/Neg]</b>	_____	_____	si-ku-taka		[+Neg]	→ Ø/ _____ [+1-pl]
_____	_____	_____	_____	ha-	↔ [+Neg]	

# Markedness of Portmanteaus

Portmanteaus are more marked

because they require impoverishment rules

## Further Potential Extensions

Generalized Impoverishment can also derive:

- ▶ **Aalberse's Generalization:** Person syncretism is systematically sensitive to number, but not vice versa (Aalberse 2009)
- ▶ **The Plural-Dual Asymmetry:** Dual neutralizes frequently to dual, but not vice versa (Nevins 2007)

# Summary

- ▶ Conceptual simplification of theoretical machinery in DM
- ▶ Unified grammar metrics for the Pertsova hierarchy
- ▶ Unified grammar metrics for apparently diverse types of morphological markedness



# Thanks\*

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