

INFLECTIONAL MORPHOLOGY IN A MINIMALIST GRAMMAR

Gereon Müller
Universität Leipzig

www.uni-leipzig.de/~muellerg
gereon.mueller@uni-leipzig.de

Compact Course
Spring School on Linguistic Diversity
Leipzig
March 31–April 4, 2008

Contents

1 Introduction	3
1.1 Basic Assumptions	3
1.2 Morphology/Syntax Mismatches	3
1.3 Distributed Morphology	7
1.4 Paradigm Function Morphology	19
1.5 Minimalist Morphology	26
2 Class Features	29
2.1 Introduction	29
2.2 Class Features in Morphology	29
2.3 Class Features in Syntax	34
2.4 Proposal	37
2.5 Further Issues	38
3 Fission and Impoverishment	39
3.1 Syncretism and Iconicity in Icelandic Noun Declensions	39
3.2 Global Impoverishment in Sierra Popoluca	44
3.3 A Pre-Syntactic Alternative	49
3.4 Appendix: Pike on German Verbs	50
4 Morphological Richness	52
4.1 Introduction	52
4.2 A Distributed Morphology Approach to German Verb Inflection	53
4.3 Pre-Syntactic Morphology	54
4.4 Pro-Drop	55
4.5 Pro-Drop in the Presence of Syncretism	58
4.6 Conclusion	61
4.7 Outlook	61
5 Enrichment	62
5.1 Introduction	62
5.2 Extended Exponence in Argument Encoding Systems	62
5.3 Distributed Morphology	64
5.4 Noyer's Analysis of Verb Inflection in Tamazight Berber	65
5.5 Enrichment	66

5.6 Verb Inflection in Swahili	66
5.7 Enrichment Rules for German, Archi, Timucua, and Sierra Popoluca	67
5.8 Conclusion	69
5.9 Pre-Syntactic Morphology	69
6 Paradigm Economy	69
6.1 Introduction	69
6.2 Paradigm Economy	70
6.3 Paradigm Economy as a Theorem	73
6.4 Conclusion	78

Chapter 1

Introduction

1.1 Basic Assumptions

Central questions:

1. To what extent can marker homonymies in inflectional paradigms be derived systematically?
2. What should a theory of inflectional morphology look like that is compatible with basic tenets of the minimalist program?

Central claims:

- (1) *Syncretism Principle* (meta-grammatical):
Identity of form implies identity of function (within a certain domain, and unless there is evidence to the contrary).
- (2) *Inflectional morphology in a minimalist grammar*:
 - a. is lexical-realizational (DM, PFM)
 - b. employs underspecification and specificity-based competition (DM, PFM, MM)
 - c. relies on decomposition of features for grammatical categories (case, person, number, gender, inflection class) (DM, PFM, MM)
 - d. is pre-syntactic (MM)

1.2 Morphology/Syntax Mismatches

Morpho-syntactic features between morphology and syntax

Morphology:

Inventory of inflection markers

Syntax:

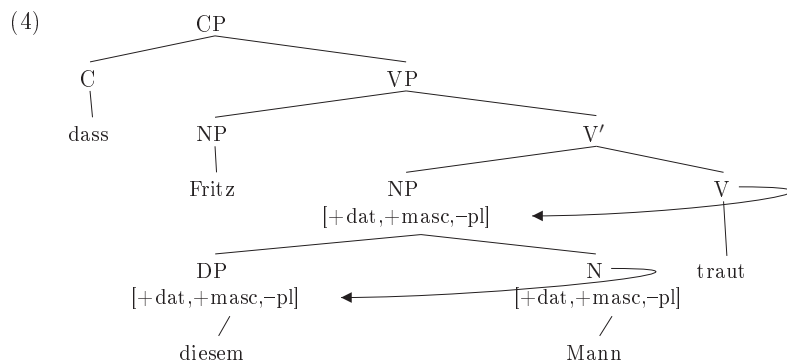
Distribution of inflection markers

Syntactic structure

Paradigm 1: Pronominal inflection in German

	[-pl]			[+pl]		
	[+masc]	[+neut]	[+fem]	[+masc]	[+neut]	[+fem]
[+nom]	-er	-es	-e	-e	-e	-e
[+acc]	-en	-es	-e	-e	-e	-e
[+dat]	-em	-em	-er	-en	-en	-en
[+gen]	-es	-es	-er	-er	-er	-er

(3) dass Fritz diesem Mann traut
that Fritz_{nom} this man_{dat} trusts



Observation:

Here it looks as though one could assume that the morpho-syntactic features that are relevant in the morphological component (inventory) and the morpho-syntactic features that are relevant in the syntax (distribution) are identical.

Asymmetries

Problem:

There are asymmetries between morphology and syntax with respect to morpho-syntactic features. Two examples:

- (i) Inflection class features are relevant in morphology, but irrelevant in syntax.
- (ii) Underspecification is relevant in morphology, but (typically) not in syntax.

Necessity of inflection classes

Observation (Aronoff (1994), Corbett & Fraser (1993), Fraser & Corbett (1994), Halle (1994)):

Independently motivated features (morpho-syntactic features like gender, phonological features like soft or hard stem ending, semantic features like animacy) do not suffice to correctly predict the inflection class for a given stem in all cases. It seems that specific inflection class features on stems are unavoidable.

Paradigm 2: Russian noun inflection, inflection class [1], singular : [+masc]

	I		
	zavod _m ('factory')	student _m ('student')	žitel _m ('inhabitant')
nom/sg	zavod-Ø	student-Ø	žitel'-Ø
akk/sg	zavod-Ø	student-a	žitel'-ja
dat/sg	zavod-u	student-u	žitel'-ju
gen/sg	zavod-a	student-a	žitel'-ja
inst/sg	zavod-om	student-om	žitel'-em
prep/sg	zavod-e	student-e	žitel'-e

Paradigm 3: Russian noun inflection, inflection class [2], singular: [+fem], [+masc]

	II			
	komnat _f ('room')	učitel'nic _f ('teacher')	nedel' _f ('week')	mužčin _m ('man')
nom/sg	komnat-a	učitel'nic-a	nedel'-ja	mužčin-a
akk/sg	komnat-u	učitel'nic-u	nedel'-ju	mužčin-u
dat/sg	komnat-e	učitel'nic-e	nedel'-e	mužčin-e
gen/sg	komnat-y	učitel'nic-y	nedel'-i	mužčin-y
inst/sg	komnat-oj(u)	učitel'nic-ej(u)	nedel'-ej(u)	mužčin-oj(u)
prep/sg	komnat-e	učitel'nic-e	nedel'-e	mužčin-e

Necessity of inflection classes

Observation:

Most of the variation concerns the choice of the plural marker. However, in the singular, too, inflection class features must be postulated in order to capture the assignment of stems to inflection classes: strong vs. weak masculine nouns. Again, independently motivated features of stems do not suffice here. (Cf., e.g., $[\pm\text{animate}]$ – see *Dirigent* 'conductor' vs. *Planet* 'planet').

Syncretism and underspecification

Observation:

There are many homonymies of inflection markers: *syncretism*. (There is a narrow notion of syncretism: one marker for more than one case. There is also a more general interpretation: formal identity of different cells in any given paradigm. I adopt the latter notion.) It is not a priori clear to what extent syncretism can be viewed as systematic, and to what extent it might be accidental. However, it is uncontroversial that at least some instances of syncretism are not accidental. Consequently, the question arises of how to account for the phenomenon.

Example and Analysis

Example:

There are 24 different paradigm cells in paradigm 1, but there are only 5 distinct markers: *-e*, *-er*, *-en*, *-es*, *-em*. Thus, there is only one marker for the morpho-syntactic feature specifications $[\text{+dat}, \text{+masc}, \text{-pl}]$ and $[\text{+dat}, \text{+neut}, \text{-pl}]$: *-em*; and this marker is

Paradigm 4: Russian noun inflection, inflection class [3], singular: [+fem]

	III		
	<i>tetrad'</i> _f ('notebook')	<i>myš'</i> _f ('mouse')	<i>doč'</i> _f ('daughter')
nom/sg	tetrad'-Ø	myš'-Ø	doč'-Ø
akk/sg	tetrad'-Ø	myš'-Ø	doč'-Ø
dat/sg	tetrad-i	myš-i	doč-er-i
gen/sg	tetrad-i	myš-i	doč-er-i
inst/sg	tetrad'-ju	myš'-ju	doč-er'-ju
prep/sg	tetrad-i	myš-i	doč-er-i

Paradigm 5: noun inflection in Russian (simplified)

	[-pl]			[+pl]		
	[1]	[2]	[3]	[1]	[2]	[3]
[+nom]	-Ø	-a	-Ø	-i	-i	-i
[+acc]	-Ø/-a	-u	-Ø	-i/-ov(-ej)	-i/-Ø	-i/-ej
[+dat]	-u	-e	-i	-am	-am	-am
[+gen]	-a	-i	-i	-ov(-ej)	-Ø	-ej
[+inst]	-om	-oj	-ju	-ami	-ami	-ami
[+prep]	-e	-e	-i	-ax	-ax	-ax

different from all the other markers in paradigm 1.

Analysis: natural classes and underspecification:

A common basis of the instances of a given syncretism is sought – a property that the different contexts exhibiting an identical marker have in common. This property characterizes a *natural class* of morpho-syntactic specifications. In the case at hand, [+dat,+masc,-pl]- and [+dat,+neut,-pl] contexts differ only with respect to gender information. Assumption: [+masc] and [+neut] form a natural class. Natural classes can be derived from a *decomposition* of the standard morpho-syntactic features into combinations of more abstract primitive features.

(5) *Decomposition of gender features in German:*

- masculine = [+masc,-fem]
- feminine = [-masc,+fem]
- neuter = [-masc,-fem]
- [] = [+masc,+fem]

Underspecification:

The idea then is that inflection markers do not have to be characterized by fully specified morpho-syntactic features; they can also be characterized by *underspecified* morpho-syntactic information. For instance:

The marker *-em* is not characterized as [+dat,+masc,-fem,-pl] or as [+dat,-masc,-fem,-pl]. Rather, this marker is characterized by a feature specifi-

Paradigm 6: German noun inflection, inflection classes [1]-[4]

	[1]	[2]	[3]	[4]
	<i>Hund</i> _m 'dog'	<i>Schaf</i> _n 'sheep'	<i>Baum</i> _m 'tree'	<i>Strahl</i> _m 'ray'
nom/sg	Hund-Ø	Schaf-Ø	Baum-Ø	Strahl-Ø
acc/sg	Hund-Ø	Schaf-Ø	Baum-Ø	Strahl-Ø
dat/sg	Hund-Ø	Schaf-Ø	Baum-Ø	Strahl-Ø
gen/sg	Hund-es	Schaf-es	Baum-es	Strahl-s
nom/pl	Hund-e	Schaf-e	Bäum-e	Büch-er
acc/pl	Hund-e	Schaf-e	Bäum-e	Büch-er
dat/pl	Hund-en	Schaf-en	Bäum-en	Büch-ern
gen/pl	Hund-e	Schaf-e	Bäum-e	Büch-er

Paradigm 7: German noun inflection, inflection classes [5]-[8]

	[5]	[6]	[7]	[8]I
	<i>Planet</i> _m 'planet'	<i>Ziege</i> _f 'goat'	<i>Maus</i> _f 'mouse'	<i>Drangsal</i> _f 'distress'
nom/sg	Planet-Ø	Ziege-Ø	Maus-Ø	Drangsal-Ø
acc/sg	Planet-en	Ziege-Ø	Maus-Ø	Drangsal-Ø
dat/sg	Planet-en	Ziege-Ø	Maus-Ø	Drangsal-Ø
gen/sg	Planet-en	Ziege-Ø	Maus-Ø	Drangsal-Ø
nom/pl	Planet-en	Ziege-n	Mäus-e	Drangsal-e
acc/pl	Planet-en	Ziege-n	Mäus-e	Drangsal-e
dat/pl	Planet-en	Ziege-n	Mäus-en	Drangsal-en
gen/pl	Planet-en	Ziege-n	Mäus-e	Drangsal-e

cation that is underspecified with respect to gender: [+dat,-fem,-pl].

Observation:

The same situation arises with case features. Consider again paradigm 1. The marker *-es* is employed for both nominative neuter and accusative neuter contexts. This syncretism is in line with a basic Indo-European principle, and thus certainly not accidental.

(6) *Reconstructed case system of Proto-Indo-European, singular only*

	*e/o stems		other stems	
	MASC/FEM	NEUT	MASC/FEM	NEUT
NOM	*-s	*-m	*-s/*-Ø	*-Ø
VOC	*-Ø	*-m	*-Ø	*-Ø
ACC	*-m	*-m	*-m	*-Ø

The syncretism with *-e* in nominative feminine and accusative feminine contexts in German looks systematic in the same way (the same may also hold for the plural).

Paradigm 8: Noun inflection in German (simplified)

	[1] _{m,n}	[2] _m	[3] _{n,m}	[4] _{m,n}	[5] _m	[6] _f	[7] _f	[8] _f
[+nom,-pl]	-∅	-∅	-∅	-∅	-∅	-∅	-∅	-∅
[+acc,-pl]	-∅	-∅	-∅	-∅	-(e)n	-∅	-∅	-∅
[+dat,-pl]	-∅	-∅	-∅	-∅	-(e)n	-∅	-∅	-∅
[+gen,-pl]	-(e)s	-(e)s	-(e)s	-(e)s	-(e)n	-∅	-∅	-∅
[+nom,+pl]	-(e)	-”(e)	-”er	-(e)n	-(e)n	-(e)n	-”(e)	-(e)
[+acc,+pl]	-(e)	-”(e)	-”er	-(e)n	-(e)n	-(e)n	-”(e)	-(e)
[+dat,+pl]	-(e)n	-”(e)n	-”ern	-(e)n	-(e)n	-(e)n	-”(e)n	-(e)n
[+gen,+pl]	-(e)	-”(e)	-”er	-(e)n	-(e)n	-(e)n	-”(e)	-(e)

Analysis (Jakobson (1962a,b), Bierwisch (1967)):

The cases are decomposed into combinations of primitive features.

(7) *Decomposition of case features in German:*

- a. nominative = [-obj,-obl]
- b. accusative = [+obj,-obl]
- c. dative = [+obj,+obl]
- d. genitive = [-obj,+obl]

Consequence:

Nominative and accusative form a natural class.

Genitive and dative form a natural class.

Accusative and dative form a natural class.

Nominative and genitive form a natural class.

Nominative and dative do *not* form a natural class.

Accusative and genitive do *not* form a natural class.

*Alternative accounts of syncretism**Side remark:*

Deriving syncretism by (feature decomposition and) underspecification is a well-established research strategy. However, there are also other theoretical approaches to syncretism, including those in (8) (none of these alternative approaches is inherently incompatible with underspecification).

(8) *Alternative approaches:*a. *Paradigm geometry*

Refs.: Johnston (1996), McCreight & Chvany (1991), Plank (1991b), Postma (1998), Gallmann (2004).

The main idea is that syncretism are derivable from an appropriate placement of the various paradigm cells (e.g., adjacency of paradigm cells in appropriately revised, or designed, paradigms).

b. *Rules of referral*

Refs.: Zwicky (1985), Corbett & Fraser (1993), Stump (2001)

Rules of referral state the identity of markers but make no further attempt to actually derive it.

c. *Impoverishment rules*

Refs.: Bonet (1991), Noyer (1992, 1998), Halle & Marantz (1993, 1994), Bobaljik (2002b), Frampton (2002)

Impoverishment rules are a central building block of Distributed Morphology. Impoverishment rules reduce morpho-syntactic feature specifications on the way from syntax to morphology; morphology then operates on simplified structures, and a *retreat to the general case* results.

Consequence of underspecification:

Underspecification typically has the effect of producing a *competition* of different markers for one and the same morpho-syntactic contexts.

1. Such a competition can be resolved by invoking an *extrinsic ordering* of inflection markers (alternatively, of rules that introduce these markers).
Refs.: Bierwisch (1967), Wurzel (1987, 1998), Halle (1994).
2. An alternative (and conceptually far more attractive) concept relies on the notion of *specificity*. Cf. the *Subset Principle* (accompanied by a notion of specificity), the *Elsewhere Principle*, the *Blocking Principle*, *Panini's Principle*, the *Proper Inclusion Principle*, etc.
Refs.: Kiparsky (1973), DiSciullo & Williams (1987), Fanselow (1991), Anderson (1992), Lumsden (1992), Noyer (1992), Williams (1994), Halle (1997), Williams (1997), Wiese (1999), Stump (2001).

*A simple approach employing underspecification**Preliminary assumption:*

Assume as given (a) a stem and (b) the smallest set of fully specified morpho-syntactic feature structures for this stem encoding the range of possible word forms. This set includes both features that are inherent to the stem, like (for nouns) inflection class and gender, and features that are variable and non-inherent, like (for nouns) case and number. This information creates a paradigm whose cells need to be filled. For each pair of (a) and (b), the correct word form (or filled paradigm cell) is determined by choosing a compatible inflection marker according to the Subset Principle.

Subset Principle (and Specificity)(9) *Subset Principle:*

An inflection marker *F* is merged with a stem *S* for a fully specified feature structure *M* iff (i) and (ii) hold:

- (i) The morpho-syntactic features of *F* are a subset of the morpho-syntactic features of *M*.
- (ii) *F* is the most specific inflection marker among those that satisfy (i).

(10) *Specificity of Inflection Markers:*

An inflection marker F_i is more specific than an inflection marker F_j iff F_i has more (relevant) morpho-syntactic features than F_j .

Theories of Inflection

Stump (2001) devises a useful taxonomy of theories of inflection.

(11) *Stump's taxonomy of theories of inflection:*

incremental	realizational
lexical	inferential

1. *Incremental analysis:*

Inflection markers add morpho-syntactic features that would otherwise not be present on a word form.

2. *Realizational analysis:*

Inflection markers do not add morpho-syntactic features; all pieces of morpho-syntactic information is independently available.

3. *Lexical analysis:*

Inflection markers are associated with (possibly abstract) morphemes that exist independently, as separate objects in the mental lexicon.

4. *Inferential analysis:*

Inflection markers do not have morpheme status and do not exist independently, as separate objects.

Some theories

- (12) a. lexical-incremental:
Lieber (1992), Wunderlich (1996, 1997b,a) (Minimalist Morphology)
- b. lexical-realizational:
Halle & Marantz (1993, 1994) (Distributed Morphology)
- c. inferential-incremental:
hardly attested
- d. inferential-realizational:
Matthews (1991), Anderson (1992), Corbett & Fraser (1993), Aronoff (1994), Stump (2001), Blevins (2004) (word (or stem) and paradigm approaches)

Differences Abstracting away from underspecification, (13) shows different treatments.

- (13) a. Lexical approaches (incremental or realizational):
 $studentu_{[+N,+dat,+masc,-pl]}$
 $\Leftarrow /student/_{[+N,+masc,class[1]]} + /u/_{[+dat,+masc,-pl,class[1]]}$
 $diesem_{[+N,+dat,+masc,-pl]}$
 $\Leftarrow /dies/_{[+D]} + /em/_{[+dat,+masc,-pl]}$
- b. Inferential-realizational approaches:
 $studentu_{[+N,+dat,+masc,-pl]}$
 \Leftarrow word form of the stem $/student/$ for the specification $[+dat,-pl]$

$diesem_{[+D,+dat,+masc,-pl]}$
 \Leftarrow word form of the stem $/dies/$ for the specification $[+dat,+masc,-pl]$

Comment

The type of theory sketched above is lexical (i.e., inflection markers exist as separate objects) and realizational (i.e., inflection markers do not contribute new features that the word form would not have otherwise). However, as will become clear, this approach differs significantly from Distributed Morphology.

1.3 Distributed Morphology

Lit.: Halle & Marantz (1994, 1993)

1.3.1 Halle & Marantz (1994) on clitic object pronouns in Spanish

Goal:

Halle and Marantz set out to introduce some basic assumptions of Distributed Morphology on the basis of the system of clitic object pronouns in Spanish.

Question:

Where does the name *Distributed Morphology* come from?

Answer (Halle & Marantz (1993, 111-112&171)):

“We have called our approach *Distributed Morphology* (hereafter DM) to highlight the fact that the machinery of what traditionally has been called morphology is not concentrated in a single component of the grammar, but rather is distributed among several different components.”

“The term *Distributed Morphology* and the general view that it incorporates resulted from discussions with David Pesetsky.”

Assumption:

The basic element of morphology is the *vocabulary item*. A vocabulary item pairs phonological features on the one hand with morpho-syntactic (and semantic) features on the other. The latter features encode the possible *context of insertion* of the vocabulary item; the former is also sometimes called *signal*.

- (14) *Structure of vocabulary items:*
 $/\text{phonological features}/ \leftrightarrow [\text{morpho-syntactic features}]$

Three central assumptions of Distributed Morphology:

- (i) *late insertion*
- (ii) *underspecification*
- (iii) *syntactic hierarchical structure all the way down*

1.3.1.1 Late Insertion

(15) *Late Insertion:*

Morphology follows syntax; morphology realizes abstract syntactic structures. The syntax itself merely deals with abstract categories that are bundles of morpho-syntactic and semantic features: so-called *f-morphemes* (functional morphemes) and so-called *l-morphemes* (lexical morphemes).

[At least, late insertion holds for f-morphemes; as for l-morphemes, proponents of Distributed Morphology do not necessarily agree, and both options have been pursued in Distributed Morphology.]

Syntactic X^0 categories (i.e., morphemes) are morphologically realized by insertion of vocabulary items (*vocabulary insertion*, VI). This way, (f-) morphemes get phonological features.

Consequences of late insertion

Remark:

A crucial assumption is the distinction between (abstract) *morphemes* and (concrete) *vocabulary items* (inflection markers, inflectional exponents). This difference is not recognized in (standard) theories that rely on *early insertion*.

Observation:

In contrast to early insertion, late insertion leaves room for possible modifications of syntactic structures with their morpho-syntactic features before morphological realization (vocabulary insertion) takes place. One such operation that changes syntactic structures before morphology applies is *impoverishment*.

1.3.1.2 Underspecification

(16) *Underspecification:*

The morpho-syntactic features (which make up the ‘context of insertion’) of vocabulary items are often underspecified. Such an underspecification makes a simpler, more economical description of inflectional systems possible, and it significantly contributes to an account of instances of syncretism.

Remark:

As a consequence of underspecification, constraints are needed that regulate the correct insertion of vocabulary items and decide the competition between different vocabulary items in the case of conflict: Subset Principle, Specificity.

1.3.1.3 Syntactic Hierarchical Structure All the Way Down

(17) *Syntactic Hierarchical Structure All the Way Down:*

Morphological insertion is sensitive to syntactic operations that manipulate (f- or l-) morphemes and create word forms: head movement, syntactic lowering.

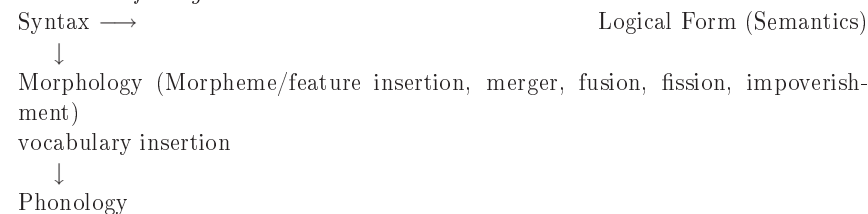
In addition, genuinely morphological operations (which apply after syntax but before insertion) manipulate syntactic items and respect syntactic principles (to a certain degree). Among these purely morphological operations are *merger*, *fusion*, *fission*, and *impoverishment*.

1.3.1.4 Structure of the Grammar

Observation:

In practise, Distributed Morphology typically (though not necessarily) envisages syntactic structures that employ many different functional categories. In that respect, the approach is very much compatible with a certain type of syntactic approach developed within the general Principles and Parameters framework (or, possibly, the Minimalist Program); see, e.g. studies based on *cartography*. (That said, in other respects, the approach will turn out not to be easily compatible with recent kinds of Chomskyan theories of syntax.)

(18) *Structure of the grammar:*



1.3.1.5 Impoverishment

An important concept: impoverishment:

Refs.: Bonet (1991), Noyer (1992, 1998), Halle & Marantz (1993, 1994), Bobaljik (2002b), Frampton (2002)

Impoverishment rules reduce morpho-syntactic feature bundles between syntax and morphology; rules of the morphological component (like vocabulary insertion) then operate on impoverished (simplified) structures, and this effects a *retreat to the general case*.

Note:

The classical concept of impoverishment fully corresponds to (and in a way complements) underspecification of vocabulary items:

- (i) underspecification of vocabulary items: “underspecification”
- (ii) underspecification of syntactic categories: “impoverishment”

1.3.1.6 Syntax vs. Morphology

Observation:

- (i) Normally, underspecification of morpho-syntactic features does not play any role whatsoever in the syntax.
- (ii) Therefore, impoverishment of syntactic structures can only apply *after* syntax has done its work.
- (iii) Hence, impoverishment (or, more generally, underspecification of syntactic structures) is possible only in theories that rely on late insertion.

1.3.1.7 Examples

(19) *An abstract example* (Halle & Marantz (1994)):

- a. *Category X:*
 - (i) $P_A \leftrightarrow [F_1, F_2]$ (vocabulary item A)
 - (ii) $P_B \leftrightarrow [F_1]$ (vocabulary item B)
- b. $[X F_1, F_2, F_3]$ (f-morpheme)
- c. $F_2 \rightarrow \emptyset / [X __ Y]$ (impoverishment)
- d. $[[X F_1, F_2, F_3] Y]$ (f-morpheme after impoverishment, before insertion)
- e. Insertion applies to P_B , not to P_A (even though the latter is more specific).

(20) *A concrete example: Adjectival markers in Norwegian* (Harley & Noyer (2003), Sauerland (1996)):

- a. *Vocabulary items:*
 - (i) $/t/ \leftrightarrow [-pl, +neut] / Adj __$
 - (ii) $\emptyset \leftrightarrow [-pl, -neut] / Adj __$
 - (iii) $/e/ \leftrightarrow [\] / Adj __$
- b. *Impoverishment:*
 - $[\pm neut] \rightarrow \emptyset$ in syntactic contexts with weak inflection

Paradigm 9: Adjectival markers in Norwegian

STRONG	[-neut]	[+neut]
[-pl]	\emptyset	/t/
[+pl]	/e/	/e/
WEAK	[-neut]	[+neut]
[-pl]	/e/	/e/
[+pl]	/e/	/e/

1.3.1.8 Clitic Object Pronouns in Spanish

- (21) *Structure of object clitics* (as with nouns):
 $[_{Det} [_{Det} Det Theme] Number]$

Assumption:

Vocabulary insertion applies cyclically, from left to right (from the stem to the edge), according to the *Subset Principle*.

Subset Principle and Specificity

(22) *Subset Principle* (Halle (1997)):

A vocabulary item V is inserted into a functional morpheme M iff (i) and (ii) hold:

- (i) The morpho-syntactic features of V are a subset of the morpho-syntactic features of M .
- (ii) V is the most specific vocabulary item that satisfies (i).

(23) *Specificity of vocabulary items:*

A vocabulary item V_i is more specific than a vocabulary item V_j iff V_i has more morpho-syntactic features than V_j .

Vocabulary Insertion 1: Det markers

(24) *Det markers* ('stems'):

- $/n/[I] \leftrightarrow [1.Pers] / __ [+pl]$
- $/m/[III] \leftrightarrow [1.Pers]$
- $/\emptyset/ \leftrightarrow [2.Pers] / __ [+pl]$
- $/t/[III] \leftrightarrow [2.Pers]$
- $/l/ \leftrightarrow [\] / __ [case]$
- $/s/[III] \leftrightarrow [\]$

Assumption:

After insertion of the stems, but *before* insertion of theme vowels and number markers, the two *redundancy rules* in (25-a) and (25-b) apply, in this order.

(25) *Redundancy rules:*

- a. $[\] \rightarrow [III] / __ [dat]$
- b. $[\] \rightarrow [II] / __ [+fem]$

Remark:

At least redundancy rule (25-a) should possibly be understood in such a way that it applies only in the context [3.Pers]:

$$[\] \rightarrow [III] / __ [dat], [3.Pers]$$

Otherwise, it seems that wrong predictions would be made for [2.Pers]-dative contexts. But see below.

Vocabulary Insertion 2: Theme vowels

(26) *Theme vowels and inflection class features:*

- $/e/ \leftrightarrow [III]$
- $/a/ \leftrightarrow [II]$
- $/o/ \leftrightarrow [\]$

Vocabulary Insertion 3: Number markers

(27) Number markers:

/s/ ↔ [+pl]
 (∅ ↔ [])

All Vocabulary Items

(28) Det markers ('stems'):

/n/[I] ↔ [1.Pers] /__[+pl]
 /m/[III] ↔ [1.Pers]
 /Ø/ ↔ [2.Pers] /__[+pl]
 /t/[III] ↔ [2.Pers]
 /l/ ↔ [] /__[case]
 /s/[III] ↔ []

(29) Redundancy rules:

a. [] → [III] /__[dat,3.Pers]
 b. [] → [II] /__[+fem]

(30) Theme vowels and inflection class features:

/e/ ↔ [III]
 /a/ ↔ [II]
 /o/ ↔ []

(31) Number markers:

/s/ ↔ [+pl]
 (∅ ↔ [])

Paradigm 10: Clitic object pronouns in Spanish

[-pl]	[3.Pers]		[2.Pers]	[1.Pers]
	[+masc]	[+fem]		
Acc	/l/-/o/-∅	/l/[III]-/a/-∅	/t/[III]-/e/-∅	/m/[III]-/e/-∅
Dat	/l/[III]-/e/-∅	/l/[III]-/e/-∅	/t/[III]-/e/-∅	/m/[III]-/e/-∅
Refl	/s/[III]-/e/-∅	/s/[III]-/e/-∅	/t/[III]-/e/-∅	/m/[III]-/e/-∅
[+pl]	[3.Pers]		[2.Pers]	[1.Pers]
	[+masc]	[+fem]		
Acc	/l/-/o/-/s/	/l/[II]-/a/-/s/	∅-/o/-/s/	/n/[I]-/o/-/s/
Dat	/l/[III]-/e/-/s/	/l/[III]-/e/-/s/	∅-/o/-/s/	/n/[I]-/o/-/s/
Refl	/s/[III]-/e/-∅	/s/[III]-/e/-∅	∅-/o/-/s/	/n/[I]-/o/-/s/

1.3.1.9 Comments

Remark:

The inflection class features typeset in boldface in paradigm 10 do not come from inflection markers, but from the two redundancy rules.

Problem: How can the distribution of number markers be derived in the Refl-Plural domain?

Questions

- What is the theory-internal reason for the (few) differences between accusative and dative marking? And what is the reason for the (few) gender-related differences? *Not a single inflection marker (vocabulary item) bears case features; case features are only mentioned in redundancy rule (25-a). Similarly for gender features and (25-b).*
- The analysis involves a highly specific zero marker for stem positions. This assumption may not be completely unproblematic (from the point of view of iconicity at least). What is the theory-internal task of this zero marker? And why can the problem not be avoided by a slightly different specification of the context of insertion of some marker? How would the whole system have to be changed so as to be able to dispense with the highly specific zero marker? *The zero marker blocks /t/. /t/ could in principle be restricted to singular contexts; but then /l/ or /s/ would have to be inserted instead. Consequently, these latter markers would also have to be classified as incompatible with 2.Person contexts. Such an approach might eventually be viable, but it contradicts the assumption that one marker is usually radically underspecified. (We will come back to this issue.)*

Questions 2

- Inflection class [I] is the default class; the vocabulary item /o/ in (26) does not depend on the presence of this feature for insertion. Why, then, is the stem marker /n/ equipped with this feature in order to trigger subsequent /o/ insertion (in contrast to /l/ and /Ø/). Perhaps this assumption can simply be dispensed with? *A problem can only arise if a redundancy rule can apply in this context that instantiates a different inflection class feature. By assumption, [+fem] is irrelevant for [1.Pers]; therefore, the only problem would be created by the dative-related rule (25-a). However, as noted above, this rule may only hold for [3.Pers] contexts; would it also apply in [2.Pers] contexts, ∅ would also need class information ([I]). Thus, the sole remaining scenario under which [I] would be needed for /n/ would be one where (25-a) holds for [1.Pers] [3.Pers], but not for [2.Pers].*
- Why do vocabulary insertion and the redundancy rules have to apply cyclically, from the center to the periphery? *Insertion of a stem marker and the two redundancy rules create the context for theme vowel insertion. Among the redundancy rules, the order of application is*

crucial; and similarly, the fact that both rules only apply after insertion of stem markers is very important.

1.3.1.10 Observations

First observation:

In American varieties of Spanish, the clitic pronoun /os/ for 2. person plural contexts is missing.

Analysis:

This can be traced back to *impoverishment rule*.

(32) *Impoverishment rule for [2.Pers]:*

[2.Pers] → ∅ / [+pl]

Consequence:

There is a *retreat to the general case*: In the plural, the [2.Pers] features is deleted. Therefore, ∅ cannot be inserted, and the same goes for /t/. As a result, the most specific remaining stem marker is /l/. Consequently, /los/ shows up in the context [2.Pers,+pl,Acc]. Still, to ensure that the output form is /les/ and not /los/ in [2.Pers.,+pl,Dat] contexts, (25-a) needs to be able to apply before theme vowel insertion. (In this context, Halle & Marantz (1994, 283) state: “Note also that like other 3. Person clitics and unlike its singular counterpart, the erstwhile 2. Person Plural clitic is subject to Case distinctions.”) This means that the redundancy rule at hand cannot be confined to 3. Person. No problem arises if [3.Pers] is characterized by an absence of features.

Second observation:

“Spurious *se*”: *se* shows up if a clitic 3. Person Dative pronoun is adjacent to a clitic 3. Person Accusative pronoun.

Analysis:

Again, an impoverishment rule is at work.

(33) *Impoverishment rule for [Dative]:*

[Dat] → ∅ / ___ [+Acc]

Consequence:

In Acc-Dat contexts, /l/ is blocked for the dative position because there is no case feature left. Therefore, the maximally nonspecific form /s/ is used.

Spurious ‘se’

(34) *Spurious se* (based on Bonet (1995)):

a. el premio, lo dieron a Pedro ayer
the price [3.Acc] have[3.Pl] to Pedro yesterday

- b. A Pedro, le dieron el premio ayer
to Pedro [3.Dat] gave[3.Pl] the price yesterday
- c. A Pedro, el premio se lo dieron ayer (*le lo, *lo le)
to Pedro the price se [3.acc] gave[3.Pl] yesterday
‘Yesterday, they gave Pedro the price.’

Interaction of impoverishment rules

Prediction:

The two impoverishment rules just discussed can interact in varieties of American Spanish.

- (35) [2.Pers,Dat]+Theme+[+pl] & [3.Pers,Acc]+Theme+[-pl]
⇒ []+Theme+[+pl] & [3.Pers,Acc]+Theme+[-pl]
- a. *European Spanish:*
Os lo di ‘I gave it to you.’
- b. *American Spanish:*
Se lo di ‘I gave it to you.’

Syntactic structure all the way down:

So far, we have evidence for (i) late insertion (because of impoverishment) and (ii) underspecification (motivated by syncretism). What’s still missing is evidence for (iii) syntactic hierarchical structure all the way down. The argument can be provided on the basis of Spanish *imperatives*, which may co-occur with clitic object pronouns.

(36) *2.Pers.Plural imperatives with clitic pronouns, Spanish mit klitischen Pronomina, Standard-Spanisch:*

- a. d- e- n- l- o- s
give IMP 2.PL 3. ACC THEME PL
‘You give them (to someone).’
- b. d- e- n- m- e- l- o
give IMP 2.PL 1.DAT THEME 3.ACC THEME
‘You give it to me!’

(37) *2.Pers.Plural imperatives with clitic pronouns, Carribean Spanish :*

- a. d- e- n- l- o- s
give IMP 2.PL 3. ACC THEME PL
‘You give them (to someone).’
- b. d- e- m- e- l- o- n
give IMP 1.DAT THEME 3.ACC THEME 2.PL
‘You give it to me!’

Generalization:

In Carribean Spanish (or, more precisely, a version thereof), clitic pronouns that have no plural suffix end up in the middle of the imperative verb – after the imperative marker, but before the plural suffix of the verb.

In the syntax, there is a functional head *Case* and a functional head *Number* in nominal domains. In the case of fusional noun inflection in Indo-European languages, there is post-syntactic fusion of the two heads into a single morpheme.

Fission

(44) *Fission*; based on Halle & Marantz (1993, 166ff):

- a. Fission separates a feature bundle β from a terminal node (morpheme) M_α , such that two terminal nodes M_1 and M_2 come into existence.
- b. M_1 has the features β ; M_2 has the features of $M_\alpha - \beta$.

Note:

For Halle and Marantz, fission is the opposite of fusion: It takes a single morpheme and creates two morphemes by splitting of features.

Side remark:

The concept of *fission* in Noyer (1992) is different. (Noyer's version may be a bit more widely adopted in the recent literature.)

The two concepts of fission

(45) *Fission_a* (Halle & Marantz (1993)):

- a. Fission separates a feature bundle β from a terminal node (morpheme) M_α , such that two terminal nodes M_1 and M_2 come into existence.
- b. M_1 has the features β ; M_2 has the features of $M_\alpha - \beta$.

(46) *Fission_b* (Noyer (1992)): If insertion of a vocabulary item V with the morpho-syntactic features β takes place into a fissioned morpheme M with the morpho-syntactic features α , then α is split up into β and $\alpha - \beta$, such that (a) and (b) hold:

- a. $\alpha - \beta$ is available for further vocabulary insertion.
- b. β is not available for further vocabulary insertion.

1.3.3 Verb Agreement in Georgian

Example:

Agreement markers on the verb in Georgian (based on Anderson (1992); also see Stump (2001)). Halle & Marantz (1993, 116ff) analyse the agreement marking on the verb by presupposing functional clitic morphemes that have undergone fusion.

(47) *Paradigm*

With a 3.Pers object – X paints 3.Pers.:

- | | |
|-------------------------|--------------------------------|
| a. v-xatav | “I paint him.” |
| b. v-xatav-t | “We paint him.” |
| c. \emptyset -xatav | “You _{sg} paint him.” |
| d. \emptyset -xatav-t | “You _{pl} paint him.” |

- | | |
|------------------|--|
| e. xatav-s | “He paints him.” |
| f. xatav-en | “They paint him.” |
| | <i>With a 3.Pers subject – 3.Pers. paints X</i> |
| g. m-xatav-s | “He paints me.” |
| h. gv-xatav-s | “He paints us.” |
| i. g-xatav-s | “He paints you _{sg} .” |
| j. g-xatav-(s)-t | “He paints you _{pl} .” |
| k. xatav-s | “He paints him.” |
| l. xatav-s | “He paints them.” |
| | <i>With 1.Pers. and 2.Pers. – 1.Pers. paints 2.Pers. or 2.Pers. paints 1.Pers.</i> |
| m. g-xatav | “I paint you.” |
| n. m-xatav | “You paint me.” |
| o. g-xatav-t | “We paint you _{sg} /you _{pl} .” |
| | <i>or</i> |
| | “I paint you _{pl} .” |
| p. gv-xatav | “You _{sg} paint us.” |
| q. gv-xatav-t | “You _{pl} paint us.” |

Fusion \rightarrow *fission* \rightarrow *insertion*

Assumptions about fusion:

- (i) The clitic cluster incorporates, under a single head, all pronominal 1.Pers and 2.Pers arguments (normally, this does not hold for 3.person arguments; there are exceptions that will be ignored here).
- (ii) The terminal nodes in the clitic cluster fuse into a single terminal node.
- (iii) After fusion, the rule of fission in (48) applies.
- (iv) Finally, vocabulary insertion takes place.

(48) *Fission of clitic clusters in Georgian:*

[Cl ... [+pl] ...] + stem \rightarrow [+pl] + Cl + stem, where

- a. linear order is irrelevant; and
- b. fission does not apply if [+pl] is part of an argument bearing the features [+1],[DAT].

Further assumptions

1. A fused T/Agr-head (tense/agreement head) follows the clitic cluster and the verb stem. This head agrees with a [NOM]-marked argument with respect to person and number. the vocabulary items that are inserted in T/Agr are organised according to so-called “screeves”. (“Screeves”: loanword from Georgian; specific conjugation patterns that are roughly comparable to tenses.)
2. A (phonologically oriented) *readjustment rule* applying after vocabulary insertion deletes an /-s/ with 3.Pers.Sg. before a plural /-t/.
3. An *impoverishment rule* deletes a terminal plural-node if the latter follows some T/Agr-node with the features [+3],[+pl].

Vocabulary items

(49) Vocabulary items for clitic positions:

- a. /gv-/ ↔ [+1],[DAT],[+pl]
- b. /m-/ ↔ [+1],[DAT]
- c. /g-/ ↔ [+2],[DAT]
- d. /v-/ ↔ [+1]
- e. Ø ↔ [+2]

(5) Vocabulary items for plural:

- f. /-t/ ↔ [+pl]

(50) Vocabulary items for T/Agr in the examples above:

- a. Ø ↔ [+1] oder [+2]
- b. /-s/ ↔ [+3],[−pl]
- c. /-en/ ↔ [+3],[+pl]

Specificity problems

Question:

It is really clear whether the competition of vocabulary items in (49) can always be resolved by specificity. As noted by Halle and Marantz, additional assumptions may be called for for cases like (49), for the choice of (b) vs. (c) (in other contexts, where “both sets [in a clitic cluster] in principle might be DAT”; Halle & Marantz (1993, 120)). A similar reasoning applies in the case of (d) vs. (e). Halle and Marantz consider two options.

1. Specificity is sensitive to appropriate feature hierarchies, here:
[+1] > [+2].
2. There is an extrinsic ordering of vocabulary items.

Stump's Critique

Side Remark:

Stump (2001, 281, fn.3) claims that Halle & Marantz (1993) need an extrinsic ordering in their analysis of verb agreement in Georgian: “The ordering of /g-/ before /v-/ [...] is just stipulated.” This does not have to be the case: the vocabulary item /g-/ in (49) has more features in its context of insertion than the vocabulary item /v-/ in (49).

(An indeterminacy with respect to specificity could only arise if an element α can only be more specific than another element β if the features of α are a proper superset of the features of β . Something along these lines has indeed been proposed, but it is not the case under present assumptions.)

Syntax

(51) Syntactic structure for vocabulary insertion:

- $$\begin{array}{cccc}
 1 & & 2 & 3 & 4 \\
 [C_1 \{Pers.,CASE,NUM\} \{Pers.,CASE,NUM\}] & [\text{stem}] & [T/Agr] & [+pl]
 \end{array}$$

Remarks on (51):

1. Position 1 contains the clitic cluster and up to two case and Φ feature bundles (1. or 2. Person).
2. Position 2 encodes the verb stem.
3. Position 3 contains a case and Φ feature bundle that realizes agreement with the subject (i.e., the nominative-marked argument).
4. Position 4 is only activated under fission. By assumption, it does not have to be stipulated that the [+pl] feature that has been split off from the clitic cluster is realized as a (final) suffix; this is supposed to follow from the suffixal status of the vocabulary item /-t/, which is the only one that fits in this context.

Derived paradigm for xatav in Georgian:

Subj→ Obj↓	1.Sg.	1.Pl.	2.Sg.	2.Pl.	3.Sg.	3.Pl.
1.Sg.	–	–	m-xatav-Ø	m-xatav-t	m-xatav-s	m-xatav-en
1.Pl.	–	–	gv-xatav-Ø	gv-xatav-t	gv-xatav-s	gv-xatav-en
2.Sg.	g-xatav-Ø	g-xatav-t	–	–	g-xatav-s	g-xatav-en
2.Pl.	g-xatav-t	g-xatav-t	–	–	g-xatav-(s)t	g-xatav-en
3.Sg.	v-xatav-Ø	v-xatav-t	Ø-xatav-Ø	Ø-xatav-t	Ø-xatav-s	Ø-xatav-en
3.Pl.	v-xatav-Ø	v-xatav-t	Ø-xatav-Ø	Ø-xatav-t	Ø-xatav-s	Ø-xatav-en

Comments:

- /-s/ in 3.Sg.→2.Pl. contexts is deleted via readjustment.
- In 1.Pl.→2.Pl. context, there should be two /-t/ markers if nothing else is said.
- In (e.g.) 1.Sg.→3.Pl. or 2.Sg.→3.Pl. contexts, there is no /-t/ because 3.Pers. clitics do not undergo incorporation.
Alternative (?): [±pl]-impoverishment with 3.Pers. in the clitic cluster.

Conclusion: Georgian verb agreement

Conclusion:

- *Fusion* is needed in this approach because two arguments need to be encoded in transitive contexts in Georgian, but evidently, there is only enough space for the encoding of one argument in the relevant position in front of the verb.
- *Fission* is needed in this approach because the argument that has “lost” in the pre-verbal (and is not encoded there) can at least be encoded with respect to number, in the post-verbal position (see 1.Pers.Pl.→2.Pers.Sg.: *g-xatav-t*).

1.3.4 Fission

Refs.: Frampton (2002)

1.3.4.1 Basic Assumptions

Central claims:

(i) Person features as they are standardly assumed (1, 2, 3) for verbal conjugations must be decomposed into combinations of more primitive features $[\pm 1]$, $[\pm 2]$. Vocabulary items can be underspecified with respect to these features. This captures instances of person syncretism.

(ii) The analysis requires post-syntactic operations: impoverishment and fission. As far as it can count as successful, it therefore provides an argument for Distributed Morphology.

(52) *Impoverishment:*

Impoverishment rules reduce morpho-syntactic feature bundles on the way from syntax to morphology; morphology then operates on simplified, “impoverished” structures, and we get a *retreat to the general case*.

Remark:

The concept of impoverishment employed here is the standard one. In contrast, fission is defined as in Halle & Marantz (1993) (*fission_a*), but rather as in Noyer (1992) (also see Trommer (1999a,b)).

(53) *Fission_a* (Halle & Marantz (1993)):

- a. Fission separates a feature bundle β from a terminal node (morpheme) M_α , such that two terminal nodes M_1 and M_2 come into existence.
- b. M_1 has the features β ; M_2 has the features of $M_\alpha - \beta$.

(54) *Fission_b* (Noyer (1992)): If insertion of a vocabulary item V with the morpho-syntactic features β takes place into a fissioned morpheme M with the morpho-syntactic features α , then α is split up into β and $\alpha - \beta$, such that (a) and (b) hold:

- a. $\alpha - \beta$ is available for further vocabulary insertion.
- b. β is not available for further vocabulary insertion.

Note:

Fission of a morpheme is recursive; i.e., after insertion of a vocabulary item, a morpheme (assuming that it has morpho-syntactic features left) is again subject to fission, and so on (until no features are left).

(55) *Subset Principle* (Halle (1997)):

A vocabulary item V is inserted into a functional morpheme M iff (i) and (ii) hold:

- (i) The morpho-syntactic features of V are a subset of the morpho-syntactic features of M .

- (ii) V is the most specific vocabulary item that satisfies (i).

Terminological remark:

Frampton calls this principle the “Principle of Decreasing Specificity” (PDS).

(56) *Specificity of vocabulary items:*

A vocabulary item V_i is more specific than a vocabulary item V_j iff V_i has more morpho-syntactic features than V_j .

1.3.4.2 Syncretism in English Verb Inflection

(57) a. *be*

	pres	past
1 sg	am	was
2 sg	are	were
3 sg	is	was
1 pl	are	were
2 pl	are	were
3 pl	are	were

b. *work*

	pres	past
1 sg	work	worked
2 sg	work	worked
3 sg	works	worked
1 pl	work	worked
2 pl	work	worked
3 pl	work	worked

(58) *Generalizations:*

- a. In past tense contexts, there is a syncretism of 1.Pers.Sg. and 3.Pers.Sg.
- b. In the plural, there are no person distinctions.

Assumption:

These two generalizations are not accidental. Therefore, they should not follow from arbitrary properties of vocabulary items. Rather, they should be derived from impoverishment rules that systematically reduce and simplify syntactic features structures for the purposes of morphological realization. Consequently, certain kinds of syncretism can be classified as system-defining properties.

Observation:

At least the 1./3. syncretism is a fundamental property of all Germanic languages. (It holds in Gothic, German, Icelandic, etc.)

Basic problem:

How can the 1./3. syncretism be derived by invoking the concept of natural classes of persons?

Plank (1991a, 19):

This shows that syncretism can show up without any “similarity in meaning”; the reason would be that 1. and 3.Pers. intuitively do not form a natural class (“no natural class on any plausible criterion”).

Assumption (Wiese (1994)):

1. and 3.Pers. are indeed a natural class (that can then be referred to by inflection markers via underspecification); the only thing that needs to be done is to decompose inflection markers accordingly.

(59) *Decomposition of inflection markers in Wiese's work:*

- a. [\pm demonstrative]
- b. [\pm addressing]

(60) *Persons in Wiese's system:*

- a. [$-d,-a$] = 1. Pers.
- b. [$+d,+a$] = 2. Pers.
- c. [$+d,-a$] = 3. Pers.
- d. [$-d,+a$] = - (1. Pers. incl.?)

Result:

1. and 3. Person form a natural class: [$-$ addressing]

Note:

Independently, Frampton suggests a similar decomposition (based on work by Noyer (1992)).

(61) *Decomposition of person features in Frampton's analysis:*

- a. [± 1]
- b. [± 2]

Consequently:

- (i) [$+a$] in Wiese's system = [$+2$]
- (ii) [$-a$] in Wiese's system = [-2] in Frampton's system
- (iii) [$+d$] in Wiese's system = [-1] in Frampton's system
- (iv) [$-d$] in Wiese's system = [$+1$] in Frampton's system

Result:

Again, 1.Person and 3.Person form a natural class: [-2].

(62) *Persons in Frampton's system:*

- a. [$+1,-2$] = 1. Pers.
- b. [$-1,+2$] = 2. Pers.
- c. [$-1,-2$] = 3. Pers.
- d. [$+1,+2$] = 1. Pers. inkl.

Note:

In Frampton's analysis, the primitive features are given semantic interpretations; whether [$+1,+2$] can be interpreted in a coherent way is assumed to be subject to language-specific parametrization. In (e.g.) Indo-European languages, the combination is not available, due to a lack of semantic coherence.

Side remark:

As will be discussed in chapter 4 below, the system of decomposed person features is not yet adequate to account for all cases of person syncretism that have been observed in the literature (for concreteness, there is good evidence that 1. and 2.Person also form a natural class). We can ignore this complication for the time being.

(63) *Vocabulary items: 'be':*

- a. /am/ \leftrightarrow [$+1,-2,-pl,-past$]
- b. /I/ \leftrightarrow [$-2,-pl,-past$]
- c. /are/ \leftrightarrow [$-past$]
- d. /was/ \leftrightarrow [$-2,-pl,+past$]
- e. /were/ \leftrightarrow [$+past$]

Problem:

The syncretism is now derivable by decomposing person features, but it is analyzed as going back to an arbitrary lexical entry (cf. (63-d)) rather than as a system-wide generalization.

Assumptions about syntactic structure

(64) a. *Simplified clause structure before head movement:*

[$_{AgrP}$ [$_{Agr'}$ Agr [$_{TP}$ [$_{T'}$ T [$_{VP}$... V ...]]]]]

b. *Result of head movement:*

[$_{Agr}$ [T V T] Agr]

Note:

This generates the abstract paradigms in (65). (These abstract paradigms are not to be viewed as genuine objects of the grammar; they have the status of generalizations about which fully specified categories need to be filled by vocabulary insertion. In line with virtually all work carried out in Distributed Morphology, Frampton assumes that paradigms are not entities that morphological constraints can refer to.)

(65) *Specifications that need to be realized by vocabulary items, version 1:*

- a. V + [$-past$] +

[$+1,-2,-pl$]	[$+1,-2,+pl$]
[$-1,+2,-pl$]	[$+1,+2,+pl$]
[$-1,-2,-pl$]	[$-1,-2,+pl$]
- b. V + [$+past$] +

[$+1,-2,-pl$]	[$+1,-2,+pl$]
[$-1,+2,-pl$]	[$+1,+2,+pl$]
[$-1,-2,-pl$]	[$-1,-2,+pl$]

Assumption:

(65) is simplified by impoverishment.

(66) *Impoverishment for plural contexts in English:*

[$\pm 1,\pm 2$] \rightarrow \emptyset /___[$+pl$]

(67) *Specifications that need to be realized by vocabulary items, version 2 (after impoverishment):*

- a. $V + [-\text{past}] + \begin{bmatrix} [+1,-2,-\text{pl}] [+pl] \\ [-1,+2,-\text{pl}] [+pl] \\ [-1,-2,-\text{pl}] [+pl] \end{bmatrix}$
- b. $V + [+past] + \begin{bmatrix} [+1,-2,-\text{pl}] [+pl] \\ [-1,+2,-\text{pl}] [+pl] \\ [-1,-2,-\text{pl}] [+pl] \end{bmatrix}$

Consequence:

There can be no vocabulary items that are sensitive to person differences in the plural (or if there are, they will never be able to surface).

1.3.4.3 Syncretism in Old English Verb Inflection

(68) Weak verbs: *dēmen* ('deem')

	pres	past
$[+1,-2,-\text{pl}]$	dēm-e	dēm-d-e
$[-1,+2,-\text{pl}]$	dēm-est	dēm-d-est
$[-1,-2,-\text{pl}]$	dēm-eþ	dēm-d-e
$[+1,-2,+pl]$	dēm-aþ	dēm-d-on
$[-1,+2,+pl]$	dēm-aþ	dēm-d-on
$[-1,-2,+pl]$	dēm-aþ	dēm-d-on

(69) Strong verbs: *singan* ('sing')

	pres	past
$[+1,-2,-\text{pl}]$	sing-e	sang
$[-1,+2,-\text{pl}]$	sing-est	sung-e
$[-1,-2,-\text{pl}]$	sing-eþ	sang
$[+1,-2,+pl]$	sing-aþ	sung-on
$[-1,+2,+pl]$	sing-aþ	sung-on
$[-1,-2,+pl]$	sing-aþ	sung-on

(70) Suppletive verbs: *sindon* ('be')

	pres	past
$[+1,-2,-\text{pl}]$	eam	wæs
$[-1,+2,-\text{pl}]$	eart	wær-e
$[-1,-2,-\text{pl}]$	is	wæs
$[+1,-2,+pl]$	sindon	wær-on
$[-1,+2,+pl]$	sindon	wær-on
$[-1,-2,+pl]$	sindon	wær-on

Assumption:

The instances of systematic syncretism in the plural, and with 1. and 3. Pers. Sg. in past tense contexts, are to be derived by involving impoverishment rules.

(71) *Impoverishment:*

- $[+\text{past}]$ becomes a privative feature $[\text{past}]$, $[-\text{past}]$ is deleted.
- $[+\text{pl}]$ becomes a privative feature $[\text{pl}]$, $[-\text{pl}]$ is deleted.
- $[\pm 1] \rightarrow \emptyset / [\text{past}] _$.
- $[\pm 1, \pm 2] \rightarrow \emptyset / _ [\text{pl}]$.

Note:

(71-cd) are the important rules.

(It is not fully clear to me whether (71-ab) are needed at all. Frampton introduces these rules as 'privativization rules', but it seems that we are dealing with impoverishment rules here.)

Consequence:

From (65), we don't just get (67); rather, we get the abstract paradigm (72). (72) exhaustively defines the possible insertion contexts for Old English verb inflection markers.

(72) *Specifications that need to be realized by vocabulary items, version 3 (after privativization and two applications of impoverishment):*

- $V + \begin{bmatrix} [+1,-2] [\text{pl}] \\ [-1,+2] [\text{pl}] \\ [-1,-2] [\text{pl}] \end{bmatrix}$
- $V + [\text{past}] + \begin{bmatrix} [-2] [\text{pl}] \\ [+2] [\text{pl}] \\ [-2] [\text{pl}] \end{bmatrix}$

(73) *Vocabulary items:*

- $/wæs/ \leftrightarrow \text{indon} / _ [-2, \text{past}]$
- $/wær/ \leftrightarrow \text{indon} / _ [\text{past}]$
- $\emptyset \leftrightarrow [\text{past}] / V_{\text{strong}} _$
- $/d/ \leftrightarrow [\text{past}]$
- $\emptyset \leftrightarrow [-2] / V_{\text{strong}}, [\text{past}] _$
- $/e/ \leftrightarrow [+2] / V_{\text{strong}}, [\text{past}] _$
- $/eþ/ \leftrightarrow [-1,-2]$
- $/est/ \leftrightarrow [+2]$
- $/e/ \leftrightarrow [-2]$
- $/on/ \leftrightarrow [\text{pl}] / [\text{past}] _$
- $/aþ/ \leftrightarrow [\text{pl}]$

- (74) a. $V + \begin{bmatrix} [+1,-2] [\text{pl}] \\ [-1,+2] [\text{pl}] \\ [-1,-2] [\text{pl}] \end{bmatrix}$ b. $V + [\text{past}] + \begin{bmatrix} [-2] [\text{pl}] \\ [+2] [\text{pl}] \\ [-2] [\text{pl}] \end{bmatrix}$

Problem:

Why are no inflection markers inserted with suppletive forms of *sindon* in the present tense?

Solution:

sindon (= V) and Agr fuse when they are adjacent (i.e., if T[past] does not intervene).

- (75) a. /eam/ ↔ *sindon*, [+1, -2]
 b. /eart/ ↔ *sindon*, [+2]
 c. /is/ ↔ *sindon*, [-2]
 d. /sindon/ ↔ *sindon*, [pl]

Complexity:

Frampton notes that, given the Subset Principle, (a) first the vocabulary items have to be determined that fit into a given context, and (b) then the most specific marker (among those that are compatible) must be determined. Assuming impoverishment, both processes are substantially shorter. Therefore (so the idea), a theory that employs impoverishment is attractive, and preferable, from the point of view of complexity (other things being equal).

1.3.4.4 Syncretism in German Verb Inflection

(76) Weak verbs: *believe*

	pres	past
[+1, -2, -pl]	glaub-e	glaub-te
[-1, +2, -pl]	glaub-st	glaub-te-st
[-1, -2, -pl]	glaub-t	glaub-te
[+1, -2, +pl]	glaub-en	glaub-te-n
[-1, +2, +pl]	glaub-t	glaub-te-t
[-1, -2, +pl]	glaub-en	glaub-te-n

(77) Strong verbs: *sing*

	pres	past
[+1, -2, -pl]	sing-e	sang
[-1, +2, -pl]	sing-st	sang-st
[-1, -2, -pl]	sing-t	sang
[+1, -2, +pl]	sing-en	sang-en
[-1, +2, +pl]	sing-t	sang-t
[-1, -2, +pl]	sing-en	sang-en

(78) Suppletive verbs: *be*

	pres	past
[+1, -2, -pl]	bin	war
[-1, +2, -pl]	bi-st	war-st
[-1, -2, -pl]	is-t	war
[+1, -2, +pl]	sind	war-en
[-1, +2, +pl]	seid	war-t
[-1, -2, +pl]	sind	war-en

(79) *Impoverishment rules, German:*

- a. [+past] becomes a privative feature [past], [-past] is deleted.
 b. [+pl] becomes a privative feature feature [pl], [-pl] is deleted.
 c. [±1] → ∅/[past]__.
 d. [±1] → ∅/__[pl].

(80) *Specifications that need to be realized by vocabulary items (after privatization and two applications of impoverishment):*

- a. V +

[+1, -2]	[-2, pl]
[-1, +2]	[+2, pl]
[-1, -2]	[-2, pl]

 b. V + [past] +

[-2]	[-2, pl]
[+2]	[+2, pl]
[-2]	[-2, pl]

(81) *Vocabulary items:*

- a. ∅ ↔ [past]/V_{strong}__
 b. /te/ ↔ [past]
 c. /e/ ↔ [+1, -2]
 d. /t/ ↔ [-1, -2]
 e. /n/ ↔ [-2, pl]
 f. /t/ ↔ [+2, pl]
 g. /st/ ↔ [+2]

- (82) a. V +

[+1, -2]	[-2, pl]
[-1, +2]	[+2, pl]
[-1, -2]	[-2, pl]

 b. V + [past] +

[-2]	[-2, pl]
[+2]	[+2, pl]
[-2]	[-2, pl]

1.3.4.5 Kabyle-Berber

Language: Afro-Asiatic, Algeria

Plot:

There is no evidence for impoverishment here in the domain of conjugation, but there is evidence for (i) the decomposition of person features, and (ii) fission.

(83) *Fission_b* (Noyer (1992)): If insertion of a vocabulary item V with the morpho-syntactic features β takes place into a fissioned morpheme M with the morpho-syntactic features α, then α is split up into β and α-β, such that (a) and (b) hold:

- a. α-β is available for further vocabulary insertion.
 b. β is not available for further vocabulary insertion.

(84) *Completive verbal paradigm:*

	sg	pl
1masc	wala-ŷ	n-wala
1fem	wala-ŷ	n-wala
2masc	t-wala-d'	t-wala-m
2fem	t-wala-d'	t-wala-m-t
3masc	i-wala	wala-n
3fem	t-wala	wala-n-t

(85) *Abstract paradigm:*

V +	[+1,-2,-pl,-fem]	[+1,-2,+pl,-fem]
	[+1,-2,-pl,+fem]	[+1,-2,+pl,+fem]
	[-1,+2,-pl,-fem]	[-1,+2,+pl,-fem]
	[-1,+2,-pl,+fem]	[-1,+2,+pl,+fem]
	[-1,-2,-pl,-fem]	[-1,-2,+pl,-fem]
	[-1,-2,-pl,+fem]	[-1,-2,+pl,+fem]

Note:

For every vocabulary item, it must be listed whether it is a suffix or a prefix (indicated by a hyphen accompanying the exponent in question).

(86) *Vocabulary items:*

- /i-/ ↔ [-1,-2,-pl,-fem]
- /-n/ ↔ [-1,-2,+pl]
- /n-/ ↔ [+1,+pl]
- /-ŷ/ ↔ [+1]
- /-m/ ↔ [+2,+pl]
- /-d'/ ↔ [+2]
- /t-/ ↔ [-1]
- /-t/ ↔ [+fem]/[-1,+pl]__

Extension of Frampton's analysis in Müller (2006)

(5) a. *Weak verb inflection: believe*

b. *verb inflection: call*

	Present	Past
[1,sg]	glaub-e	glaub-te
[2,sg]	glaub-st	glaub-te-st
[3,sg]	glaub-t	glaub-te
[1,pl]	glaub-en	glaub-te-n
[2,pl]	glaub-t	glaub-te-t
[3,pl]	glaub-en	glaub-te-n

	Present	Past
[1,sg]	ruf-e	rief
[2,sg]	ruf-st	rief-st
[3,sg]	ruf-t	rief
[1,pl]	ruf-en	rief-en
[2,pl]	ruf-t	rief-t
[3,pl]	ruf-en	rief-en

c. *Suppletive verb inflection: sein*

	Present	Past
[1,sg]	bin	war
[2,sg]	bi-st	war-st
[3,sg]	is-t	war
[1,pl]	sind	war-en
[2,pl]	seid	war-t
[3,pl]	sind	war-en

(87) *Two impoverishment rules for verb inflection in German:*

- [±1] → Ø/[-2,-pl,+past]__
- [±1] → Ø/[-2,+pl]__

(88) *Marker inventory:*

- /te/ ↔ [+past,-strong]
- /s/ ↔ [+2,-pl]
- /n/ ↔ [-2,+pl]
- /t/ ↔ [-1]
- /(e)/ ↔ []

(89) *Vocabulary insertion into impoverished T morphemes in German*

T	[-past]		T	[+past]	
	[-strong]	[+strong]		[-strong]	[+strong]
[+1,-2,-pl]	/e/	/e/	[+1,-2,-pl]	/te/	/Ø/
[-1,+2,-pl]	/s/-/t/	/s/-/t/	[-1,+2,-pl]	/te/-/s/-/t/	/s/-/t/
[-1,-2,-pl]	/t/	/t/	[-1,-2,-pl]	/te/	/Ø/
[+1,-2,+pl]	/n/	/n/	[+1,-2,+pl]	/te/-/n/	/n/
[-1,+2,+pl]	/t/	/t/	[-1,+2,+pl]	/te/-/t/	/t/
[-1,-2,+pl]	/n/	/n/	[-1,-2,+pl]	/te/-/n/	/n/

1.4 Paradigm Function Morphology

Lit.: Stump (2001)

1.4.1 Inferentiell-Realisationale Morphologie

Hintergrund Stump (2001) entwirft eine Taxonomie der Flexionstheorien.

(90) *Stumps Einteilung der Flexionstheorien:*

inkrementell	realisational
lexikalisch	inferentiell

1. *Inkrementelle Analyse:*

Flexionsmarker tragen morpho-syntaktische Merkmale bei, die ansonsten nicht da sind.

2. *Realisationale Analyse:*

Flexionsmarker tragen keine morpho-syntaktischen Merkmale bei; alle morpho-syntaktische Information ist unabhängig vorhanden.

3. *Lexikalische Analyse:*

Flexionsmarker sind korreliert mit (möglicherweise abstrakten) Morphemen, die als eigenständige Objekte im Lexikon existieren.

4. *Inferentielle Analyse:*

Flexionsmarker haben keinen Morphemstatus und existieren nicht als unabhängige Objekte.

Einige Theorien(91) *Einige Theorien:*

- a. lexikalisch-inkrementell:
Lieber (1992), Wunderlich (1996, 1997a) (Minimalistische Morphologie)
- b. lexikalisch-realisational:
Halle & Marantz (1993, 1994) (Distribuierte Morphologie)
- c. inferentiell-inkrementell:
kaum attestiert
- d. inferentiell-realisational:
Matthews (1991), Anderson (1992), Corbett & Fraser (1993), Aronoff (1994), Stump (2001), Blevins (2004) (Wort-(Stamm-)und-Paradigm-Ansätze)

Empirische Evidenz für realisationalen Theorien 1: Erweiterte Exponenz(92) *Erweiterte Exponenz:*

Die morphosyntaktischen Eigenschaften, die mit einem flektierten Wort (einer Wortform) assoziiert sind, können durch mehr als einen Exponenten in der Morphologie des Wortes ausgedrückt werden.

(93) *Pluralbildung bei Diminutiva im Bretonischen:*

- a. bagig 'kleines Boot'
- b. bagoùigoù 'kleine Boote'

(94) *Negative Präteritumformen im Swahili:*

- a. tu-li-taka 'wir wollten'
 - b. ha-tu-ku-taka 'wir wollten nicht'
- ku = neg.prät, ha = neg.

(95) *Partizip 2 im Deutschen:*

- a. sprechen
- b. ge-sproch-en (3 Exponenten)

Empirische Evidenz für realisationalen Theorien 2: Unterdeterminierung(96) *Unterdeterminierung:*

Die morphosyntaktischen Eigenschaften, die mit einem flektierten Wort (einer

Wortform) assoziiert sind, können die Eigenschaften, die mit dem Wort als ganzen assoziiert sind, unterdeterminieren.

(97) *Imperfekt und Aorist im Bulgarischen: krad ('stehlen'):*

	<i>Imperfekt</i>	<i>Aorist</i>
1sg	krad-'á-x	krád-o-x
2sg	krad-é-š-e	krád-e
3sg	krad-é-š-e	krád-e
1pl	krad-'á-x-me	krád-o-x-me
2pl	krad-'á-x-te	krád-o-x-te
3pl	krad-'á-x-a	krád-o-x-a

Problem:

Was stellt in einem inkrementellen Ansatz sicher, dass eine Form wie *krad-'á-x* mit der morphosyntaktischen Eigenschaft 1.Pers.Sg.-Kongruenz assoziiert wird?

Standardlösung:

Ein leeres Suffix tut dies (bzw. eine Regel, die keine Formveränderung bewirkt).

*Konzeptuelle Evidenz für realisationalen Theorien: Inhalt vs. Kontext**Unerwünschte Ambiguität:*

Ist eine morphosyntaktische Eigenschaft eines Flexionsmarkers eine Eigenschaft seines *Inhalts* oder eine Eigenschaft seines *Kontexts*?

Evidenz:

Im Bulgarischen gibt es eine Klasse von Verben, die ein besonderes Suffix *m* in der 1.Pers.Sg.Präs. haben: *dávam* ('ich gebe').

Entscheidungsproblem für die Analyse:

- (i) Ist *m* ein Suffix mit den Merkmalen 1.Pers.Sg., das einen Präsens-Stamm subkategorisiert?
- (ii) Ist *m* ein Suffix mit den Merkmalen 1.Pers.Sg.Präs.?

Ausweg:

Kein Problem in inferentiell-realisationalen Theorien, denn:

- (98) Exponenz ist die einzige Art der Assoziation von Flexionsmarkierung und morphosyntaktischen Eigenschaften.

Die Morphologie-Syntax-Schnittstelle(99) *Nullhypothese:*

Ein flektiertes Wort X der Kategorie Y, das mit einer Menge σ von morphosyntaktischen Eigenschaften assoziiert ist, wird als Kopf einer Phrase YP in der Syntax eingesetzt, deren morphosyntaktische Eigenschaften nicht von σ distinkt sind.

Beobachtung:

Es gibt vier mögliche Herausforderungen für diese Sichtweise:

- (i) Randeigenschaften
- (ii) Formalalternationen
- (iii) Superlexeme
- (iv) Periphrase

Randeigenschaften

- (100) Wenn X mit einer Randeigenschaft (rechts oder links) p assoziiert ist, dann wird X am (rechten oder linken) Rand einer Phrase eingesetzt, die p trägt.

Beispiel:

Ein Wort wie *children's* muss (a) wg. (100) am rechten Rand einer possessiven NP eingesetzt werden, und (b) wg. (99), als Kopf einer Plural NP eingesetzt werden.

Formalternationen

- (101) *Phonologisch bedingte Alternation beim indefiniten Artikel im Englischen:*

- a. a bird
- b. an apple

- (102) *Bretonische Väter:*

- a. ho tad 'euer Vater'
- b. e dad 'sein Vater'
- c. va zad 'mein Vater'

- (103) *Regeln:*

- a. Die Form *zad* wird eingesetzt nach einem Spirantisierungsauslöser wie *va*.
- b. Die Form *dad* wird eingesetzt nach einem Lenisierungsauslöser wie *e*.
- c. Die Form *tad* ist der elsewhere case.

*Superlexeme**Generalisierung:*

Eine morphologische Realisierung, mehrere (adjazente) syntaktische Positionen und morphosyntaktische Eigenschaften.

- (104) *Verschmelzungsformen:*

- a. zu der, zu dem
- b. zur, zum
- c. I would
- d. I'd

- (105) *Klammerparadoxe im Sanskrit:*

amhór uru-cákrih 'causing relief from distress'
 amhór 'distress' (abl.sg.)
 uru- 'relief'
 cákrih 'causing'

- a. *Syntaktische Struktur:*

[_{AP} [_{NP} [_{NP} amhór] [_N uru-]] cákrih]

- b. *Morphologische Struktur:*

[_N amhór] [_A [_N uru-] [_A cákrih]]

- (106) *Klammerparadoxe im Deutschen:*

- a. gekochte Schinkenplatte
- b. Genschers Beliebtheitskurve bei den Wählern

Periphrase

Es gibt in (synthetischen) Paradigmen oft Lücken, die systematisch durch analytische Formen aufgefüllt werden. Hier gilt:

Generalisierung:

Mehrere morphologische Realisierungen, ein morphosyntaktisches Merkmalsbündel (eine syntaktische Position?).

- (107) *Lateinische Verbflexion:*

- a. amat Präsens Aktiv: 'Er liebt'
- b. amator Präsens Passiv: 'Er wird geliebt'
- c. amavit Perfekt Aktiv: 'Er hat geliebt'
- d. amatus est Perfekt Passiv: 'Er ist geliebt worden'

1.4.2 Paradigmenfunktionen*Hintergrundannahmen 1*

- (108) *Grundannahme:*

Die Verknüpfung eines Wortes mit einer bestimmten Menge von morphosyntaktischen Eigenschaften determiniert eine Kette von Regelanwendungen, die die Flexionsform des Wortes bestimmen.

- (109) *Traditionelle Terminologie:*

- a. *Wort* ('Wort', 'Lexem'): z.B. BUCH; Wörter haben Paradigmen.
- b. *Wortform* ('Flexionsform des Wortes'): z.B. *Buches*; Wortformen sind Teile von Paradigmen.

- (110) *Paradigmen* (Behauptung):

In dieser Theorie sind Paradigmen keine Epiphänomene; vielmehr "konstituieren sie ein zentrales Prinzip der morphologischen Organisation". Paradigmen sind das Ergebnis von *Paradigmenfunktionen*

- (111) *Drei Typen morphologischer Ausdrücke:*

- a. *Wurzel* ('root'): die "ultimative Default-Form" eines Lexems (Wortes).
- b. *Stamm* ('stem'): ein Ausdruck, an den Flexionsexponenten angefügt werden können (jede Wurzel ist ein Stamm, nicht jeder Stamm ist eine Wurzel).

- c. *Wortform* ('word'(!)): eine freie, voll flektierte Form, die eine Paradigmenzelle besetzt

Hintergrundannahmen 2

- (112) *Realisierungsregeln*:
Paradigmenfunktionen werden durch speziellere Realisierungsregeln definiert.
- (113) Informelles Beispiel:
Der Wert der Paradigmenfunktion ($\langle \text{Mutter-}, \{\text{dativ, plural}\} \rangle$) ergibt sich aus dem Ergebnis der Anwendung zweier Realisationsregeln – einer, die die Umlautvariante des Stammes wählt, und einer, die *-n* suffigiert.

Terminologie:

$\langle \text{Mutter-}, \{\text{dativ, plural}\} \rangle$ ist ein *FPSP* ('form/property-set pairing').

- (114) *Regelblöcke*:
- Die Realisierungsregeln einer Sprache sind in Blöcke organisiert.
 - Regeln im selben Block konkurrieren miteinander; nur die spezifischste Regel kann applizieren (Paninis Prinzip; Spezifitätsprinzip).
 - Regeln in verschiedenen Blöcken konkurrieren nicht; so treten in einer Wortform verschiedene Exponenten hintereinander.

Bemerkung:

Die Exponenten kommen durch Regeln in eine Wortform und haben keinen eigenständigen Status. Die Theorie ist also *amorphematisch* (vgl. Anderson (1992)).

Slogan: *Paradigmenfunktionen sind statische Wohlgeformtheitsbedingungen für Zellen.*

Definitionen

- (115) *Wohlgeformte Menge morphosyntaktischer Eigenschaften*:
Eine Menge τ von morphosyntaktischen Eigenschaften für ein Lexem der Kategorie C ist wohlgeformt in einer Sprache L nur dann, wenn τ die folgenden Bedingungen in L erfüllt.
- Für jede Eigenschaft $F:v \in \tau$ gilt: $F:v$ ist für Lexeme der Kategorie C zugänglich und v ist ein erlaubter Wert für F .
 - Für jedes morphosyntaktische Merkmal F , das v_1, v_2 als mögliche Werte hat, gilt: Wenn $v_1 \neq v_2$ und $F:v_1 \in \tau$, dann $F:v_2 \notin \tau$.
- (116) *Extension*:
Falls σ und τ wohlgeformte Mengen morphosyntaktischer Eigenschaften sind, ist σ eine Extension von τ gdw. (a) und (b) gelten.
- Für jedes atomwertige Merkmal F und jeden erlaubten Wert v für F gilt: Wenn $F:v \in \tau$, dann $F:v \in \sigma$.
 - Für jedes mengenwertige Merkmal F und jeden erlaubten Wert p für F gilt:

Wenn $F:p \in \tau$, dann $F:p' \in \tau$, wobei p' eine Extension von p ist.

- (117) *Unifikation*:
Falls σ und τ wohlgeformte Mengen morphosyntaktischer Merkmale sind, ist die Unifikation ρ von σ und τ die kleinste wohlgeformte Menge von morphosyntaktischen Eigenschaften, so dass ρ eine Extension sowohl von σ , als auch von τ ist.
- (118) a. $\{\text{TNS:pres,AGR:}\{\text{PER:1,NUM:pl}\}\}$ ist Extension von $\{\text{AGR:}\{\text{PER:1,NUM:pl}\}\}$, $\{\text{AGR:}\{\text{NUM:pl}\}\}$, $\{\}$, usw.
b. $\{\text{TNS:pres,MOOD:ind,AGR:}\{\text{PER:1,NUM:pl}\}\}$ ist die Unifikation von $\{\text{TNS:pres,AGR:}\{\text{PER:1}\}\}$ und $\{\text{TNS:pres,MOOD:ind,AGR:}\{\text{NUM:pl}\}\}$

Definitionen 2

- (119) *Eigenschaftskookkurrenzrestriktionen* (bulgarische Verbformen; Ausschnitt):
Eine Menge τ von morphosyntaktischen Eigenschaften für ein Lexem der Kategorie V ist wohlgeformt nur, wenn τ eine wohlgeformte Extension σ hat, so dass gilt:
- σ ist eine Extension von $\{\text{VFORM:fin}\}$ gdw. für ein zulässiges α gilt: σ ist eine Extension von $\{\text{MOOD:}\alpha\}$. (wenn Finitheit, dann Modus (Ind oder Konj))
 - Wenn σ eine Extension ist von $\{\text{MOOD:impv}\}$, dann ist σ eine Extension von $\{\text{AGR:}\{\text{PER:2}\}\}$. (wenn Imperativ, dann 2. Person)
 - Für jedes zulässige α gilt: σ ist eine Extension von $\{\text{TNS:}\alpha\}$ gdw. σ eine Extension ist von $\{\text{MOOD:indic}\}$ oder von $\{\text{VFORM:ppl}\}$. (V hat Tempus wenn es Ind. oder Partizip ist)
 - Für jedes zulässige α gilt: σ ist eine Extension von $\{\text{AGR:}\{\text{GEN:}\alpha\}\}$ gdw. σ eine Extension ist von $\{\text{VFORM:ppl}\}$, und σ ist eine Extension von $\{\text{AGR:}\{\text{PERS:}\alpha\}\}$ gdw. σ eine Extension ist von $\{\text{VFORM:fin}\}$. (Wenn Genus, dann Partizip; wenn Person, dann Finitheit)
- (120) *Vollständigkeit* von Mengen morphosyntaktischer Merkmale:
Eine Menge σ von morphosyntaktischen Merkmalen für ein Lexem einer Kategorie ist vollständig gdw. (a) und (b) gelten:
- σ ist wohlgeformt.
 - Für jede Menge morphosyntaktischer Merkmale τ (so dass σ nicht eine Extension von τ ist) gilt: die Unifikation von τ und σ ist nicht wohlgeformt.

Definitionen 3

Paradigmenfunktionen:

Eine Paradigmenfunktion ist eine Funktion in der Menge der FPSPs, die auf einem *Wurzelpaar* $\langle X, \sigma \rangle$ appliziert (wobei X die Wurzel eines Lexems L ist und σ eine vollständige Menge morphosyntaktischer Eigenschaften für L ist) und eine σ -Zelle $\langle Y, \sigma \rangle$ im Paradigm von L ergibt.

(121) *Format von Paradigmenfunktionen:*

$$PF(\langle X, \sigma \rangle) = \langle Y, \sigma \rangle$$

Realisierungsregeln ('realization rules', 'rules of exponence'):

Eine Realisierungsregel ist eine Funktion in der Menge der FPSPs. Im Unterschied zu einer Paradigmenfunktion muss aber das Argument nicht unbedingt ein Wurzelpaar sein, und der Wert muss nicht unbedingt eine Paradigmenzelle sein.

(122) *Format von Realisierungsregeln:*

$$RR_{n,\tau,C}(\langle X, \sigma \rangle) = \langle Y', \sigma \rangle$$

Terminologie:

- n : Blockindex
- τ : Eigenschaftsmengenindex (die wohlgeformte Menge morphosyntaktischer Eigenschaften, die die Regel durch ihre Anwendung realisiert; σ muss Extension von τ sein \rightarrow *Unterspezifikation*)
- C : Klassenindex (Klasse der Lexeme, deren Paradigmen die Regel mit definieren kann)
- Y' : im Default Y , aber Möglichkeit der Überschreibung durch morphologische Regeln

Bulgarische Verbflexion

(123) *Vier imperfektive Verben im Bulgarischen:*

- a. KRAD ('stehlen'): 1.St. = *krad*, 2.St. = *krád*
- b. IGRÁJ ('spielen'): 1.St. = *igráj*, 2.St. = *igrá*
- c. KOVA ('fälschen'): 1.St. = *kov*, 2.St. = *kova*
- d. DÁVA ('geben'): 1.St. = *dáva*, 2.St. = *dáva*

Zwei Stämme:

1. Stamm: Präsens, Imperfekt
2. Stamm: Aorist

Zwei abstrakte binäre Flexionsklassenmerkmale: $[\pm t(\text{runcating})]$, $[\pm c(\text{onsonantal})]$:

$[-t]$: 1./2. Stamm: identisch zur Wurzel

$[+t]$: 1. Stamm: C , 2. Stamm: V

Auf diese Flexionsklassenmerkmale (auch unterspezifiziert) wird in Realisierungsregeln und morphologischen Regeln Bezug genommen.

- (124) a. KRAD: $[-t, +c]$
 b. IGRÁJ ('spielen'): $[+t, +c]$
 c. KOVA ('fälschen'): $[+t, -c]$
 d. DÁVA ('geben'): $[-t, -c]$

Paradigmen der bulgarischen Verbflexion

(125) *Abstrakte Paradigmen des Indikativs ohne morphologische Regeln:*

Konjugation		KRAD [-t, +c]	DÁVA [-t, -c]	IGRÁJ [+t, +c]	KOVA [+t, -c]
Präsens	1sg	<i>krad-e-ə</i>	<i>dáva-e-m</i>	<i>igráj-e-ə</i>	<i>kov-e-ə</i>
	2sg	<i>krad-e-š</i>	<i>dáva-e-š</i>	<i>igráj-e-š</i>	<i>kov-e-š</i>
	3sg	<i>krad-e-e</i>	<i>dáva-e-e</i>	<i>igráj-e-e</i>	<i>kov-e-e</i>
	1pl	<i>krad-e-m</i>	<i>dáva-e-me</i>	<i>igráj-e-m</i>	<i>kov-e-m</i>
	2pl	<i>krad-e-te</i>	<i>dáva-e-te</i>	<i>igráj-e-te</i>	<i>kov-e-te</i>
	3pl	<i>krad-e-ət</i>	<i>dáva-e-ət</i>	<i>igráj-e-ət</i>	<i>kov-e-ət</i>
Imperfekt	1sg	<i>krad-A-x</i>	<i>dáva-A-x</i>	<i>igráj-A-x</i>	<i>kov-A-x</i>
	2sg	<i>krad-A-x-e</i>	<i>dáva-A-x-e</i>	<i>igráj-A-x-e</i>	<i>kov-A-x-e</i>
	3sg	<i>krad-A-x-e</i>	<i>dáva-A-x-e</i>	<i>igráj-A-x-e</i>	<i>kov-A-x-e</i>
	1pl	<i>krad-A-x-me</i>	<i>dáva-A-x-me</i>	<i>igráj-A-x-me</i>	<i>kov-A-x-me</i>
	2pl	<i>krad-A-x-te</i>	<i>dáva-A-x-te</i>	<i>igráj-A-x-te</i>	<i>kov-A-x-te</i>
	3pl	<i>krad-A-x-a</i>	<i>dáva-A-x-a</i>	<i>igráj-A-x-a</i>	<i>kov-A-x-a</i>
Aorist	1sg	<i>krád-o-x</i>	<i>dáva-o-x</i>	<i>igrá-o-x</i>	<i>kova-o-x</i>
	2sg	<i>krád-e</i>	<i>dáva-e</i>	<i>igrá-e</i>	<i>kova-e</i>
	3sg	<i>krád-e</i>	<i>dáva-e</i>	<i>igrá-e</i>	<i>kova-e</i>
	1pl	<i>krád-o-x-me</i>	<i>dáva-o-x-me</i>	<i>igrá-o-x-me</i>	<i>kova-o-x-me</i>
	2pl	<i>krád-o-x-te</i>	<i>dáva-o-x-te</i>	<i>igrá-o-x-te</i>	<i>kova-o-x-te</i>
	3pl	<i>krád-o-x-a</i>	<i>dáva-o-x-a</i>	<i>igrá-o-x-a</i>	<i>kova-o-x-a</i>

Realisierungsregeln

(126) a. *Block A:*

A1 $RR_{A,\{TNS:aor\},V}(\langle X, \sigma \rangle) =_{def} \langle Y', \sigma \rangle$, wobei Y der 2. Stamm von X ist.

A2 $RR_{A,\{ \},V}(\langle X, \sigma \rangle) =_{def} \langle Y', \sigma \rangle$, wobei Y der 1. Stamm von X ist.

b. *Block B & Block C:*

B1 $RR_{B,\{TNS:pres\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

B2 $RR_{B,\{TNS:impf\},V}(\langle X, \sigma \rangle) =_{def} \langle XA', \sigma \rangle$

B3 $RR_{B,\{TNS:aor,PRET:yes\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

B4/C1 Wenn $n = \mathbf{B}$ oder \mathbf{C} :

$RR_{n,\{TNS:aor,PRET:yes,AGR:\{PER:3,NUM:sg\}\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

C2 $RR_{C,\{PRET:yes\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

c. *Block D:*

D1 $RR_{D,\{TNS:pres,AGR:\{PER:1,NUM:sg\}\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

D2 $RR_{D,\{TNS:pres,AGR:\{PER:1,NUM:sg\}\},\{CONJ:-T,-C\}}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

D3 $RR_{D,\{TNS:pres,AGR:\{PER:2,NUM:sg\}\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

D4 $RR_{D,\{AGR:\{PER:3,NUM:sg\}\}}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

D5 $RR_{D,\{TNS:pres,AGR:\{PER:1,NUM:pl\}\},\{CONJ:+T\} \cup \{CONJ:+C\}}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

D6 $RR_{D,\{AGR:\{PER:1,NUM:pl\}\},V}(\langle X, \sigma \rangle) =_{def} \langle X', \sigma \rangle$

- D7** $RR_{D,\{AGR:\{PER:2,NUM:pl\}\},V}(\langle X,\sigma \rangle) =_{def} \langle Xte',\sigma \rangle$
D8 $RR_{D,\{TNS:pres,AGR:\{PER:3,NUM:pl\}\},V}(\langle X,\sigma \rangle) =_{def} \langle X\theta',\sigma \rangle$
D9 $RR_{D,\{AGR:\{PER:3,NUM:pl\}\},V}(\langle X,\sigma \rangle) =_{def} \langle Xd',\sigma \rangle$

- (127) *Verweisregel* ('rule of referral'; informelle Variante):
 Im Präteritum (Aorist und Imperfekt) richtet sich die 2.Pers.Sg. nach der 3.Pers.Sg.

Regelanwendung 1: Spezifität

- (128) *Paninis Prinzip*:
 Es sei σ eine vollständige Menge von morphosyntaktischen Eigenschaften für Lexeme der Kategorie V. Dann ist $PF(\langle X,\sigma \rangle) =_{def} Nar_D(Nar_C(Nar_B(Nar_A(\langle X,\sigma \rangle))))$
- (129) *Nar_n-Notation*:
 Falls $RR_{n,\tau,C}$ die **engste** Regel in Block n ist, die auf $\langle X,\sigma \rangle$ **anwendbar** ist, so repräsentiert 'Nar_n($\langle X,\sigma \rangle$)' das Resultat der Anwendung von $RR_{n,\tau,C}$ auf $\langle X,\sigma \rangle$.
- (130) *Enge und Anwendbarkeit* (vereinfacht):
 a. $RR_{n,\sigma,C}$ ist enger als $RR_{n,\tau,C}$ gdw. σ eine Extension von τ ist und $\sigma \neq \tau$.
 b. $RR_{n,\tau,C}$ ist anwendbar auf $\langle X,\sigma \rangle$ gdw. $RR_{n\tau,C}(\langle X,\sigma \rangle)$ definiert ist.

- (131) *Regel-Argument-Kohärenz*:
 $RR_{n\tau,C}(\langle X,\sigma \rangle)$ ist definiert gdw. (a) σ eine Extension von τ ist (s.o.); (b) $L-Index(X) \in C$ ist; und (c) σ eine wohlgeformte Menge von morphosyntaktischen Eigenschaften für $L-Index(X)$ ist.

Regelanwendung 2: Identitätsfunktion

- (132) *Default der Identitätsfunktion*:
 $RR_{n,\{ \},U}(\langle X,\sigma \rangle) =_{def} \langle X,\sigma \rangle$

Bemerkung:

Dies ist so etwas wie ein Nullmarker, der als minimal spezifische Regel in jedem Block (n ist eine Variable über allen Regelblöcken, U über allen Lexemklassen) zur Verfügung steht und dafür sorgt, dass es immer weiter geht. Beispiel:

- (133) Beispiel:
 a. $\sigma = \{VFORM:fin, VCE:act, TNS:pres, PRET:no, MOOD:indic, AGR:\{PER:1,NUM:pl\}\}$
 b. $Nar_C(\langle kradé,\sigma \rangle) = RR_{C,\{ \},U}(\langle kradé,\sigma \rangle) = \langle kradé,\sigma \rangle$

Regelanwendung 3: Verweisregeln und Synkretismus

Manche Synkretismen kann man im Prinzip durch *Unterspezifikation*, auch bzgl. *abstrakter morphosyntaktischer Merkmale* ableiten ([pret:yes/no] ist ein solches); oder durch vollständige Unterspezifikation bzgl. einer grammatischen Kategorisierung (vgl. den Synkretismus bei der 3.Pers.Pl. im Aorist und Imperfekt: D9 vs. D8). Es gibt aber

auch andere Synkretismen, wo Stump nicht diesen Weg geht: Bisher hatten wir die folgende informelle Version einer Verweisregel, die einen systematischen Synkretismus bei der 2.Pers.Sg. und der 3.Pers.Sg. ableitet.

- (134) *Verweisregel* (informelle Variante):
 Im Präteritum (Aorist und Imperfekt) richtet sich die 2.Pers.Sg. nach der 3.Pers.Sg.

Jetzt kann die Regel präziser formuliert werden:

- (135) *Verweisregel* (saubere Variante):
 Angenommen, (a)–(c) sind der Fall:
 a. τ ist eine beliebige vollständige Extension von $\{PRET:yes, AGR:\{PERS:2,NUM:sg\}\}$.
 b. n ist ein beliebiger Regelblock in A-D.
 c. $\sigma' = \sigma / \{AGR:\{PER:3\}\}$. (lies: σ modifiziert durch $\{AGR:\{PER:3\}\}$)
 Dann gilt:
 $RR_{n,\tau,V}(\langle X,\sigma \rangle) =_{def} \langle Y,\sigma \rangle$, wobei $Nar_n(\langle X,\sigma' \rangle) = \langle Y,\sigma' \rangle$

Konkrete Paradigmen des Indikativs inkl. Morphologie

Konjugation	KRAD	DÁVA	IGRÁJ	KOVA
	[-t,+c]	[-t,-c]	[+t,+c]	[+t,-c]
Präsens	1sg <i>krad-ǎ</i>	<i>dáva-m</i>	<i>igráj-ǎ</i>	<i>kov-ǎ</i>
	2sg <i>krad-é-š</i>	<i>dáva-š</i>	<i>igrá-e-š</i>	<i>kov-é-š</i>
	3sg <i>krad-é</i>	<i>dáva</i>	<i>igrá-e</i>	<i>kov-é</i>
	1pl <i>krad-é-m</i>	<i>dáva-me</i>	<i>igrá-e-m</i>	<i>kov-é-m</i>
	2pl <i>krad-é-te</i>	<i>dáva-te</i>	<i>igrá-e-te</i>	<i>kov-é-te</i>
3pl <i>krad-ǎt</i>	<i>dáva-t</i>	<i>igráj-ǎt</i>	<i>kov-ǎt</i>	
Imperfekt	1sg <i>krad-'á-x</i>	<i>dáva-x</i>	<i>igrá-ex</i>	<i>kov-'á-x</i>
	2sg <i>krad-é-š-e</i>	<i>dáva-š-e</i>	<i>igrá-e-š-e</i>	<i>kov-é-š-e</i>
	3sg <i>krad-é-š-e</i>	<i>dáva-š-e</i>	<i>igrá-e-š-e</i>	<i>kov-é-š-e</i>
	1pl <i>krad-'á-x-me</i>	<i>dáva-x-me</i>	<i>igrá-e-x-me</i>	<i>kov-'á-x-me</i>
	2pl <i>krad-'á-x-te</i>	<i>dáva-x-te</i>	<i>igrá-e-x-te</i>	<i>kov-'á-x-te</i>
3pl <i>krad-'á-x-a</i>	<i>dáva-x-a</i>	<i>igrá-e-x-a</i>	<i>kov-'á-x-a</i>	
Aorist	1sg <i>krád-o-x</i>	<i>dáva-x</i>	<i>igrá-x</i>	<i>ková-x</i>
	2sg <i>krád-e</i>	<i>dáva</i>	<i>igrá</i>	<i>ková</i>
	3sg <i>krád-e</i>	<i>dáva</i>	<i>igrá</i>	<i>ková</i>
	1pl <i>krád-o-x-me</i>	<i>dáva-x-me</i>	<i>igrá-x-me</i>	<i>ková-x-me</i>
	2pl <i>krád-o-x-te</i>	<i>dáva-x-te</i>	<i>igrá-x-te</i>	<i>ková-x-te</i>
3pl <i>krád-o-x-a</i>	<i>dáva-x-a</i>	<i>igrá-x-a</i>	<i>ková-x-a</i>	

Annahme:

Für jede Realisierungsregel gibt es eine ungeordnete Menge Φ_R von morphologischen Regeln, die bei jeder Anwendung die Evaluation der Realisierungsregel beschränken.
Morphologische Regeln und Metageneralisierungen

- (136) *Regeln* (Φ_R): Falls $RR_{n,\tau,C}(\langle X,\sigma \rangle) =_{def} \langle Y',\sigma \rangle$, so gilt:
- Wenn der L-Index(X) \in [CONJ:-T,-C] und $Y = X[\text{Vokal}]Z$, dann fehlt [Vokal] in Y' .
 - Wenn $X = W[\text{Vokal}_1]$ und $Y = X[\text{Vokal}_2]Z$, dann fehlt [Vokal₁] in Y' , und [Vokal₂] wird betont in Y' gdw. [Vokal₁] in Y betont wird.
 - Wenn $X = W[\text{Vokal}_1]$ und $Y = X[\text{Vokal}_2]Z$, dann fehlt [Vokal₂] in Y' .
 - Wenn Y unbetont ist, dann wird Y' auf seiner letzten Silbe betont.
 - Wenn $X = WC$ (C ein Velar mit \check{C} als alveopalatalem Gegenstück), $Y = XVZ$, und V ein vorderer Vokal, dann hat Y' \check{C} anstelle von C .
 - Wenn $Y = W\acute{A}Z$, dann hat Y' ein e anstelle von \acute{A} .
 - Wenn $Y = W\acute{A}C_1VZ$ und V ist ein vorderer Vokal, dann hat Y' ein \acute{e} anstelle von \acute{A} .
 - Wenn $Y = W\acute{A}Z$, dann hat Y' \acute{a} (mit Palatalisierung eines unmittelbar vorangehenden Konsonanten) anstelle von \acute{A} .
- (137) *Metageneralisierungen*:
- Für jede Regel R in Block **B**, **C** oder **D** gilt: (136-ae) $\in \Phi_R$.
 - Für jede Regel R in Block **B**, **C** oder **D** gilt: (136-b) $\in \Phi_R$ gdw. R eine Extension von {TNS:pres} realisiert; ansonsten: (136-c) $\in \Phi_R$.
 - Falls R in Block **B** ist, gilt: (136-d) $\in \Phi_R$.
 - Falls R in Block **D** ist, gilt: (136-fh) $\in \Phi_R$.
 - (136-g) $\in \Phi_{D4}, \Phi_{B1}$.

1.4.3 Wettbewerb

Argumentkodierung im Georgischen

Stand der Dinge bisher:

Der Wettbewerb zwischen Realisierungsregeln in einem Block wird durch die spezifischste (engste) Regel gewonnen (das Paninische Prinzip). Es stellt sich aber heraus, dass es hiermit Probleme geben kann, so dass noch mehr gesagt werden muss.

Beispiel:

Realisationsregeln für argumentkodierende Präfixe im Georgischen in (138) (Stump (2001, 70)). (Das System der Argumentkodierung im Georgischen ist notorisch komplex; hier wird nur ein ganz kleiner Ausschnitt abgehandelt.)

- (138) a. $RR_{\text{pref},\{AGR(su):\{PER:1\}\},V}(\langle X,\sigma \rangle) =_{def} \langle vX',\sigma \rangle$
 b. $RR_{\text{pref},\{AGR(ob):\{PER:1\}\},V}(\langle X,\sigma \rangle) =_{def} \langle mX',\sigma \rangle$
 c. $RR_{\text{pref},\{AGR(ob):\{PER:1,NUM:pl\}\},V}(\langle X,\sigma \rangle) =_{def} \langle gvX',\sigma \rangle$
 d. $RR_{\text{pref},\{AGR(ob):\{PER:2\}\},V}(\langle X,\sigma \rangle) =_{def} \langle gX',\sigma \rangle$

Problem:

Was ist die korrekte V-Realisierung für "Ich werde dich töten"? Die morphosyntaktischen Merkmalsmengen von (138-a) und (138-d) stehen nicht zueinander in einem Extensionsverhältnis; also sollten beide passen. Empirisch ist aber korrekt, dass (138-d)

angewendet wird und so (138-a) blockiert.

	Präverb	Präfix	Stamm	Suffix	
(139)	mo-	g-	klav		'Ich werde dich töten'
	*mo-	v-	klav		'Ich werde dich töten'
	mo-	g-	klav	-t	'Ich werde euch töten'

Lösungen für das Dilemma

- (140) *Extrinsische Regelordnung* (Anderson (1992)):
 Regel (138-d) appliziert per Stipulation vor Regel (138-a).
- (141) *Expandierter Modus* (Stump (2001)):
 Regeln können aufgeblasen werden und sind dann maximal spezifisch.
- (142) *Regelformate*:
- Unexpandierter Modus:
 $RR_{n,\tau,C}(\langle X,\sigma \rangle) =_{def} \langle Y',\sigma \rangle$
 - Expandierter Modus:
 $RR_{n,\leftarrow\tau\rightarrow,C}(\langle X,\sigma \rangle) =_{def} \langle Y',\sigma \rangle$

" $\leftarrow\tau\rightarrow$ " bedeutet vereinfacht, dass τ maximal erweitert wird.

Konklusion: Regel (138-d) im Georgischen arbeitet im expandierten Modus:

- (143) $RR_{\text{pref},\leftarrow\{AGR(ob):\{PER:2\}\}\rightarrow,V}(\langle X,\sigma \rangle) =_{def} \langle gX',\sigma \rangle$

1.4.4 Synkretismus

Typen von Synkretismus

Erste Unterscheidung:

Ganzwortsynkretismen vs. *Blocksynkretismen*. Beide sollen erklärt werden (vgl. dazu aber Baerman et al. (2005)).

Zweite Unterscheidung:

- unidirektionaler Synkretismus Verweisregel
- bidirektionaler Synkretismus Bidirektionales Verweisprinzip
- unstipulierter Synkretismus Unterspezifikation
- stipulierter (z.B. symmetrischer) Synkretismus Metaregeln für symmetrischen Synkretismus

Unidirektionaler Synkretismus Der Synkretismus in der 2./3.Pers.Sg. Prät (Aorist und Imperfekt) im Bulgarischen ist unidirektional:

- In allen Tempora können Formen der 3.Pers.Sg. eine Endung *-e* haben.

- Nur in den Präteritaltempora haben Formen der 2.Pers.Sg. eine Endung *-e*.

(144) *Verweisregel* (mit expandiertem Modus):

Wenn n ein beliebiger Regelblock in A-D ist, dann gilt:

$$\text{RR}_{n, \leftarrow \{ \text{pret:yes, agr:} \{ \text{per:2, num:sg} \} \rightarrow, V \} (\langle X, \sigma \rangle)} =_{\text{def}} \langle Y, \sigma \rangle, \quad \text{wobei}$$

$$\text{Nar}_n(\langle X, \sigma / \{ \text{AGR:} \{ \text{PER:3} \} \} \rangle) = \langle Y, \sigma / \{ \text{AGR:} \{ \text{PER:3} \} \} \rangle$$

Bidirektionaler Synkretismus 1

Rumänische Verbflexion:

- Alle außer 1. Konjugation: 1.Sg. = 3.Pl. in indikativischen Paradigmen.
- Manchmal ist die 3.Pl. der abhängige Teil: *a umplea*, *a ști*. (Die *u*-Form taucht nur in der 1.Sg. in der 1. Konjugation auf.)
- Manchmal ist die 1.Sg. der abhängige Teil: *a fi*. (Der Stamm *sînt* taucht auch sonst im Plural auf.)

(145) Präsens-Indikativ-Formen einiger rumänischer Verben:

	<i>a invita</i>	<i>a umplea</i>	<i>a ști</i>	<i>a fi</i>
	einladen	füllen	wissen	sein
Konjugation: 1	2	4	4	
1sg	invít	úmpl-u	ștí-u	sínt
2sg	invít-i	úmpl-i	ștí-i	èțt-i
3sg	invít-a	úmpl-e	ștí-e	éțt-e
1pl	invítá-m	úmpl-e-m	ștí-m	sínte-m
2pl	invítá-ți	úmpl-ți	ștí-ți	sínte-ți
3pl	invít-a	úmpl-u	ștí-u	sínt

Bidirektionaler Synkretismus 2

Annahmen:

- Jede Verweisregel $\text{RR}_{n, \tau, C}$ hat eine *Verweisdomäne* D , mit C als Teilmenge von D .
- Die Existenz einer Verweisregel impliziert die Existenz einer inversen Verweisregel, gemäß (146).

(146) *Bidirektionales Verweisprinzip*:

Die Existenz einer Verweisregel ' $\text{RR}_{n, \tau, C}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle$, wobei $\text{Nar}_n(\langle X, \sigma / \rho \rangle) = \langle Y, \sigma / \rho \rangle$ ' mit Verweisdomäne D impliziert die Existenz einer zweiten Verweisregel ' $\text{RR}_{n, \tau / \rho, D-C}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle$, wobei $\text{Nar}_n(\langle X, \sigma / \tau \rangle) = \langle Y, \sigma / \tau \rangle$ ' mit Verweisdomäne D .

(Wenn eine Regel C als Verweisdomäne hat – der Normalfall –, dann ist die inverse Regel uninteressant, weil sie sich auf eine leere Menge von Ausdrücken beziehen muss.)

Bidirektionaler Synkretismus 3

(147) Erste Verweisregel:

Falls $n = 0$ oder 1 : $\text{RR}_{n, \{ \text{agr}(su): \{ \text{per:1, num:sg} \} \}, a \text{ fi}}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle$, wobei $\text{Nar}_n(\langle X, \sigma / \{ \text{AGR}(su): \{ \text{PER:3, NUM:pl} \} \} \rangle) = \langle Y, \sigma / \{ \text{agr}(su): \{ \text{per:3, num:pl} \} \} \rangle$
Verweisdomäne: V

(148) Implizierte Verweisregel:

Falls $n = 0$ oder 1 : $\text{RR}_{n, \{ \text{agr}(su): \{ \text{per:3, num:pl} \} \}, V-a \text{ fi}}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle$, wobei $\text{Nar}_n(\langle X, \sigma / \{ \text{AGR}(su): \{ \text{PER:1, NUM:sg} \} \} \rangle) = \langle Y, \sigma / \{ \text{AGR}(su): \{ \text{PER:1, NUM:sg} \} \} \rangle$
Verweisdomäne: V

Symmetrischer Synkretismus

Verbflexion im Hua (auch: Yagaria; Neu Guinea):

Formen der 2.Sg. und der 1.Pl. haben immer dieselbe Endung (ein Blocksynkretismus, kein Ganzwortsynkretismus), in allen Tempora und Modi. Man sieht aber nicht, wie es sich hier um eine natürliche Klasse handeln könnte; und der Synkretismus ist auch nicht direktional.

(149) *Metaregel für symmetrischen Synkretismus*:

$$\text{RR}_{n, \tau, C}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle \leftrightarrow \text{RR}_{n, \tau / \rho, C}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle$$

(150) *Metaregel für Hua*:

Es sei τ eine Extension von $\{ \text{AGR}(su): \{ \text{PER:2, NUM:sg} \} \}$. Dann:
 $\text{RR}_{II, \tau, V}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle \leftrightarrow \text{RR}_{II, \tau / \{ \text{agr}(su): \{ \text{per:1, num:pl} \} \}, V}(\langle X, \sigma \rangle) =_{\text{def}} \langle Y, \sigma \rangle$

Alternative (Chomsky (1965), Chomsky & Halle (1968a)): α -Notation: Variable über Merkmalswerten.

- (151) a. $[+1, -2], [+pl]$
b. $[-1, +2], [-pl]$
c. α -Notation: $[\alpha 1, -\alpha 2], [\alpha pl]$

1.5 Minimalist Morphology

1.5.1 Basic Assumptions

Refs.: Wunderlich (1996, 1997b)

- pre-syntactic approach
- lexical-incremental approach
- no abstract morphemes
- no zero affixes
- maximal underspecification

- no inflection class features
- three information sources:
 - lexical entry of the stem (plus stem alternations)
 - lexical entry of the affix
 - organization of paradigm structures
- paradigms as filtering devices blocking overgeneration: compatibility and specificity

(152) *Principles of affixation:*

- a. Monotonicity: The output of affixation must be more informative than the input.
- b. Adjacency: The input requirements of affixes must be met locally.
- c. Affix order: The order of affixes must conform to the hierarchy of functional categories, i.e., affixes that express lower ranked categories must be attached first.

(153) *Paradigm principles:*

- a. Completeness: Every cell of a paradigm must be occupied.
- b. Uniqueness: Every cell of a paradigm is uniquely occupied.

Observation:

Most candidate word forms have fewer specifications than the form that defines the paradigm.

(154) *Selection Principles:*

- a. Output Specificity: Word forms with more feature specifications take precedence over those with fewer feature specifications.
- b. Input Specificity: Word forms with underlying (lexically specified) feature values take precedence over those with derived values.
- c. Simplicity: Strings made of fewer affixes take precedence over those made up of more affixes.
(Note: Simplicity is ranked below Output Specificity.)

Basic assumption:

Word forms that are maximally specific define the dimensions of a paradigm!

Consequence:

In contrast to what is the case in DM and PFM, specificity does not select the most specific (underspecified) form for a *fully specified* (= syntactic) context; rather, it selects the most specific (underspecified) form for a paradigm, which need not be fully specified.

(155) *Affixes* (verb inflection in German):

- a. /t/ → [+2,+pl]

- b. /st/ → [+2]
- c. /n/ → [+pl]
- d. /te/ → [+pret]
- e. /e/ → [+1]/_[-pret]
- f. /t/ → []/_[-pret]

(156) *Simple application* (weak verbs, present tense):

	[+pl]	[-pl]
[+2]	bau-t	bau-st
[-2]	bau-n	bau-e

Note:

Given that affixation by (the most specific marker) /t/ instantiates the dimensions of the present tense (indicative) paradigm, it seems that an additional assumption might be necessary to integrate 3.SG. forms into the paradigm: [±1] is not a dimension introduced by the most specific marker. Then again, /t/ may define a subparadigm of its own.

(157) *Candidate word forms* (strong verb inflection in German):

warf-t	[+2,+pl,+pret,+V]	
warf-n-t	[+2,+pl,+pret,+V]	*Simp
warf-n-st	[+2,+pl,+pret,+V]	*Simp
werf-te-t	[+2,+pl,+pret,+V]	*In-Spec, *Simp
werf-te-n-t	[+2,+pl,+pret,+V]	*In-Spec, *Simp
werf-te-n-st	[+2,+pl,+pret,+V]	*In-Spec, *Simp
warf-st	[+2,+pret,+V]	
werf-te-st	[+2,+pret,+V]	*In-Spec, *Simp
warf-n	[+pl,+pret,+V]	
werf-te-n	[+pl,+pret,+V]	*In-Spec, *Simp
warf	[+pret,+V]	
werf-te	[+pret,+V]	*In-Spec, *Simp

1.5.2 Feature Deletion by Constraint Interaction

Background:

MM has a technical means that is comparable in its effects to impoverishment (DM) and rules of referral (PFM): The interaction of violable constraints in an optimality-theoretic system may lead to unfaithful output realization of features that are part of the input (MAX, DEP violations).

Empirical domain:

Genitive/accusative syncretism with animate nouns tems in Russian

Refs.: Wunderlich (2004)

(158) *Russian nouns with animacy split in forms that are used in accusative contexts*

	inanimates				animates		
	class 2	class 3	class 1	class 4	class 2	class 3	class 1
	fem. 'map'	fem. 'door'	masc. 'table'	neut. 'word'	fem. 'squirrel'	fem. 'mother'	masc. 'student'
N.sg.	kárt-a	dver'	stol	slov-o	bélk-a	mat'	studént
A.sg.	kárt-u	dver'	stol	slov-o	bélk-u	mat'	studént-a
G.sg.	kárt-y	dvér-i	stol-á	slov-á	bélk-i	máter-i	studént-a
N.pl.	kárt-y	dvér-i	stol-ý	slov-á	bélk-i	máter-i	studént-y
A.pl.	kárt-y	dvér-i	stol-ý	slov-á	bélok	máter-ej	studént-ov
G.pl.	kart	dver-ěj	stol-óv	slov	bélok	máter-ej	studént-ov

(159) *Case features:*

- Nom = ()
- Acc = (+hr)_V
- Gen = (+hr)_N

(160) *Suffixes*

- /-y/, +pl N.pl (class 1,2 & 3)
- /-a/, +pl/neuter N.pl (class 4)
- /-u/, (+hr)_V / a] A.sg (class 2)
- /-y/, (+hr)_N / a] ∨ PAL] G.sg (class 2 & 3)
- /-a/, +hr / C] ∨ o] A/G.sg (class 1 & 4)
- C], +pl,+hr / a] ∨ o] A/G.pl (class 2 & 4)
- /-ej/, +pl,+hr / PAL] A/G.pl (class 3)
- /-ov/, +pl,+hr A/G.pl (class 1)

(161) *Lexical entries for some Russian case affixes*

	inanimates			animates		
	class 2	class 3	class 1	class 2	class 3	class 1
	'map'	'door'	'table'	'squirrel'	'mother'	'student'
N.sg.	a]	PAL]		a]	PAL]	
A.sg.	/-u/, (+hr) _V			/-u/, (+hr) _V		
G.sg.	/-y/, (+hr) _N		/-a/, +hr	/-y/, (+hr) _N		/-a/, +hr
N.pl.	/-y/, +pl			/-y/, +pl		
A.pl.						
G.pl.	C], +pl,+hr	/ej/, +pl,+hr	/ov/, +pl,+hr	C], +pl,+hr	/ej/, +pl,+hr	/ov/, +pl,+hr

Observation:

The interaction of the suffixes alone does not yet make the correct predictions in all cases.

Assumption:

In addition, the distribution of suffixes is regulated by a system of violable constraints

in an optimality-theoretic approach.

(162) *Constraints*

- *(+hr)_V inanim. Do not realize the feature [+hr] in accusative contexts of inanimate nouns.
- MAX(+hr). Realize the feature [+hr].
- Ranking of the constraints:
*(+hr)_V inanim \gg MAX(+hr) \gg *(+hr)_V anim

(163) *More constraints*

- MAX(+hr) / -pl, a]
- SPECIFICITY
Choose the affix with the more specific selectional information.
- COMPATIBILITY
Do not insert a form in a context in which the categorial specifications are incompatible.

(164) *Ranking of the constraints*

SPEC, COMP, MAX(+hr) / -pl, a] \gg *(+hr)_V -anim \gg MAX(+hr)

Put into words: "Realize both accusative and genitive, unless inanimate nouns occur in accusative contexts, excluding class 2 nouns (ending in -a, where there exists the accusative morpheme /-u/)."

(165) *Selection of optimal forms in an accusative singular context*

- Inanimate class 2 nouns (a])

	SPEC	COMP	MAX(+hr) / -pl, a]	*(+hr) _V -anim	MAX(+hr)
karta			*!		*
kart-y		*!			
☞ kart-u					

- Inanimate class 1 nouns (masc)

	SPEC	COMP	MAX(+hr) / -pl, a]	*(+hr) _V -anim	MAX(+hr)
☞ stol					*
stol-a				*!	
stol-y		*!			

- Animate class 1 nouns (masc)

	SPEC	COMP	MAX(+hr) / -pl, a]	*(+hr) _V -anim	MAX(+hr)
student					*!
☞ student-a					
student-y		*!			

- Animate class 3 nouns (PAL])

	SPEC	COMP	MAX(+hr)/ -pl, a]	*(+hr)/ _V -anim	MAX(+hr)
☞ mat'					*
mater'-i		*!			

(166) *A/N and A/G syncretisms in Russian nouns*

A/N syncretism		A/G syncretism	
appears because	is blocked because	appears because	is blocked because
no affix is available (class 3)	an affix is available (class 2)	only underspecified affixes are available (class 1 and plural)	two specific affixes are available (class 2)
a higher-ranked constraint blocks the existing affix (class 1, class 4)	an even higher-ranked constraint forces the existing affix to appear (class 2)		only one specific genitive affix is available (class 3)

Note:

This analysis can be extended to the plural.

(167) *Selection of optimal forms in an accusative plural context*

a. Inanimate class 2 nouns (a])

	SPEC	COMP	MAX(+hr)/ -pl, a]	*(+hr)/ _V -anim	MAX(+hr)
☞ kart-y					*
kart-ov	*!			*	
kart				*!	

b. Animate class 2 nouns (a])

	SPEC	COMP	MAX(+hr)/ -pl, a]	*(+hr)/ _V -anim	MAX(+hr)
belk-i					*!
belk-ov	*!				
☞ belok					

Chapter 2

Class Features

2.1 Introduction

*Question:*¹:

What is the status of class features in languages with fusional noun inflection (Russian, Greek, German)?

Claims:

(i) Class features are present in morphology:

They are needed to predict marker choice for a given stem in morphology (gender, phonological, semantic features of the stem do not suffice).

(ii) Class features are binary (e.g., [$\pm\alpha$], [$\pm\beta$]), not privative (e.g., I, II):

They combine to yield the classical inflection classes (natural classes of inflection classes can be formed that permit a systematic account of syncretism across inflection classes).

(iii) Class features are uninterpretable in syntax:

They do not project, and syntactic operations do not refer to them.

(iv) Class features are absent in syntax:

Their presence in syntax would violate the Legibility Condition.

(v) Class features act as probes on noun stems that trigger a morphological Agree operation with an inflection marker that acts as a goal before syntax is reached (in the same way that, e.g., LF-uninterpretable Φ -features on T trigger movement in syntax before LF is reached).

(vi) A pre-syntactic approach to class-driven inflectional morphology respects both the Legibility Condition and the Inclusiveness Condition; inner- or post-syntactic approaches violate at least one of these conditions.

2.2 Class Features in Morphology

Observation:

The noun inflection systems of Russian, Greek, and German exhibit massive syncretism (i.e., identity of two forms with a different morpho-syntactic function), both within an inflection class (*intra-paradigmatic syncretism*), and across inflection classes

¹This chapter is joint work with Artemis Alexiadou.

(*trans-paradigmatic syncretism*).

Paradigms:

Paradigms are epiphenomena; they do not exist as genuine entities that, e.g., constraints may refer to (see Harley & Noyer (1999), Bobaljik (2002b), among many others).

(1) *Syncretism Principle* (meta-grammatical):

Identity of form implies identity of function (within a certain domain, and unless there is evidence to the contrary).

(Null hypothesis for child and linguist.)

Assumption:

There is less evidence against systematic syncretism than is sometimes made out (Carstairs (1987), Zwicky (1991), Williams (1994)). However, we will not try to derive syncretism across numbers.

Caveat:

Throughout, we focus on the core systems of noun inflection in Russian, Greek, and German. We disregard minor inflection classes, stem alternations, stress patterns, lexical idiosyncrasies, etc. These issues are ultimately important in comprehensive morphological accounts; but they arguably do not significantly contribute to the issue of class features.

2.2.1 Noun Inflection in Russian

References:

Jakobson (1962a), Jakobson (1962b), Neidle (1988), Corbett & Fraser (1993), Fraser & Corbett (1994), Halle (1994), Franks (1995), Stump (2001).

2.2.1.1 Data

T_1 : *Inflection class I, Sg.: masc*

	<i>zavod_m</i> ('factory')	<i>student_m</i> ('student')	<i>tovarišč_m</i> ('comrade')
nom	∅	∅	∅
acc	∅	a	a
dat	u	u	u
gen	a	a	a
inst	om	om	em
loc	e	e	e

Observation:

(i) Gender features on the stem do not suffice to predict inflection class ($N_{[masc]}$ can be I or II; $N_{[fem]}$ can be II or III).

T_2 : *Inflection class II, Sg.: masc, fem*

	<i>komnat_f</i> ('room')	<i>učitel'nic_f</i> ('female teacher')	<i>nedel'_f</i> ('week')	<i>muščin_m</i> ('man')
nom	a	a	ja	a
acc	u	u	ju	u
dat	e	e	e	e
gen	y	y	i	y
inst	oj(u)	ej(u)	ej(u)	oj(u)
loc	e	e	e	e

T_3 : *Inflection class III, Sg.: fem*

	<i>tetrad'_f</i> ('notebook')	<i>myš'_f</i> ('mouse')	<i>doč'_f</i> ('daughter')
nom	∅	∅	∅
acc	∅	∅	∅
dat	i	i	(er)i
gen	i	i	(er)i
inst	ju	ju	(er)ju
loc	i	i	(er)i

T_4 : *Inflection class IV, Sg.: neut*

	<i>me st_n</i> ('place')	<i>jablok_n</i> ('apple')	<i>syščestv_n</i> ('being')
nom	o	o	o
acc	o	o	o
dat	u	u	u
gen	a	a	a
inst	om	om	em
loc	e	e	e

(ii) Phonological features on the stem do not suffice to predict inflection class (e.g., $N_{[fem]}$ ending in a soft ([-back]) consonant can be II or III); and there are no theme vowels, despite claims to the contrary (Wunderlich (1996), Wunderlich (2002)).

(iii) Semantic features on the stem do not suffice to predict inflection class (e.g., $N_{[anim]}$ can be IV).

Conclusion:

Class features are needed.

2.2.1.2 Analysis

Note:

Intra-paradigmatic syncretism can be accounted for by decomposing privative case features into more primitive, binary case features that are cross-classified (yielding natural classes of cases). These primitive features are semantics-based in Jakobson (1962a), Jakobson (1962b), Neidle (1988), Franks (1995)), and syntax-based in Bierwisch (1967), Wiese (1999), Müller (2002); we adopt the latter view.

T_5 : Syncretism within and across inflection classes in Russian

	I _m	II _{f,m}	III _f	IV _n
nom	∅	a	∅	o
acc	∅/a	u	∅	o
dat	u	e	i	u
gen	a	i	i	a
inst	om	oj	ju	om
loc	e	e	i	e

(2) *Decomposition of cases in Russian*: [\pm subject], [\pm governed], [\pm oblique]

nominative:	[+subj,-gov,-obl]
accusative:	[-subj,+gov,-obl]
dative:	[-subj,+gov,+obl]
genitive:	[+subj,+gov,+obl]
instrumental:	[+subj,-gov,+obl]
locative:	[-subj,-gov,+obl]

Note:

Trans-paradigmatic syncretism can be accounted in the same way by decomposing primitive class features into more primitive, binary class features that are cross-classified (yielding natural classes of inflection classes); see Halle (1992) on Latvian noun inflection ([\pm marginal], [\pm marked] in addition to the “standard” class features A, B); Nesset (1994) on Russian noun inflection ([\pm nom-end] and [a/igen-end]); Oltra Massuet (1999) on verbal inflection in Catalan; Stump (2001) on verbal inflection in Bulgarian; Müller (2005) on Icelandic noun inflection; Trommer (2005) on Amharic verbs. Also see Börjesson (2006) (Slovene noun declension), Opitz (2006) (Albanian noun declension), and Weisser (2006) (Croatian noun declension).

(For natural classes of Russian noun inflection classes without feature decomposition, see McCreight & Chvany (1991), Wiese (2003).)

(3) *Decomposition of inflection classes in Russian*: [$\pm\alpha$], [$\pm\gamma$]

I: [+ α , - γ]	<i>zavod_m</i> (‘factory’)
II: [- α , + γ]	<i>komnat_f</i> (‘room’), <i>muščin_{-m}</i> (‘man’)
III: [- α , - γ]	<i>tetrad_f</i> (‘notebook’)
IV: [+ α , + γ]	<i>mest_n</i> (‘place’)

(4) *Inflection markers (singular)*:

a. /oj/:	{[+N], [- α , + γ], [+subj,-gov,+obl]}
b. /ju/:	{[+N], [- α , - γ], [+subj,-gov,+obl]}
c. /om/:	{[+N], [<u>+α</u>], [+subj,-gov,+obl]}
d. /e/:	{[+N], [- α , + γ], [-subj,+gov,+obl]}
e. /e/:	{[+N], [<u>-(α, -γ)</u>], [-gov,+obl]}
f. /o/:	{[+N], [+ α , + γ], [-obl]}
g. /∅/:	{[+N], [<u>-γ</u>], [-obl]}

h. /i/:	{[+N], [<u>-α</u>], [+obl]}
i. /u/:	{[+N], [-subj,+gov]}
j. /a/:	{[+N]}

Note:

Underspecified class information is underlined in inflection marker specifications.

Assumption:

Noun stems enter morphology with fully specified case, number, gender, and class features. They must combine with an inflection marker. Choice of inflection marker follows the Subset Principle (Kiparsky (1973), Lumsden (1992), Williams (1994), Halle (1997), Noyer (1992), Gunkel (2002)).

(5) *Subset Principle*:

An inflection marker I is merged with a noun stem N iff (i) and (ii) hold:

- (i) The morpho-syntactic features of I are a subset of the morpho-syntactic features of N.
- (ii) I is the most specific marker that satisfies (i).

(6) *Specificity of inflection markers*:

- a. If two inflection markers I_i , I_j differ with respect to the rank of their features, I_i is more specific than I_j if it has a higher-ranked feature.
- b. If two inflection markers I_i , I_j do not differ with respect to the rank of their features, I_i is more specific than I_j if it has more features.

(7) *Hierarchy of features*:

Number \gg Class \gg Case

T_6 : The interaction of inflection markers in the singular in Russian

	I: [+ α , - γ]	II: [- α , + γ]	III: [- α , - γ]	IV: [+ α , + γ]
nom:	/∅/ ^g	/a/ ^j	/∅/ ^g	/o/ ^j
[+subj,-gov,-obl]	(/a/ ^j)		(/a/ ^j)	(/a/ ^j)
acc:	/∅/ ^g	/u/ ⁱ	/∅/ ^g	/o/ ^j
[-subj,+gov,-obl]	((/u/ ⁱ , /a/ ^j))	(/a/ ^j)	((/u/ ⁱ , /a/ ^j))	((/u/ ⁱ , /a/ ^j))
dat:	/u/ ⁱ	/e/ ^a	/i/ ^h	/u/ ⁱ
[-subj,+gov,+obl]	(/a/ ^j)	((/i/ ^h , /u/ ⁱ , /a/ ^j))	((/u/ ⁱ , /a/ ^j))	(/a/ ^j)
gen:	/a/ ^j	/i/ ^h	/i/ ^h	/a/ ^j
[+subj,+gov,+obl]		(/a/ ^j)	(/a/ ^j)	
inst:	/om/ ^c	/oj/ ^a	/ju/ ^b	/om/ ^c
[+subj,-gov,+obl]	((/e/ ^e , /a/ ^j))	((/e/ ^e , /i/ ^h , /a/ ^j))	((/i/ ^h , /a/ ^j))	((/e/ ^e , /a/ ^j))
loc:	/e/ ^e	/e/ ^e	/i/ ^h	/e/ ^e
[-subj,-gov,+obl]	(/a/ ^j)	((/i/ ^h , /a/ ^j))	(/a/ ^j)	(/a/ ^j)

(8) *Inflection markers (plural):*

- a. /ax/: { [+N],[+pl],[-subj,-gov,-+obl] }
 b. /ami/: { [+N],[+pl],[+subj,-gov,+obl] }
 c. /am/: { [+N],[+pl],[-subj,+gov,+obl] }
 d. /ov/: { [+N],[+pl],[-γ],[+subj,+gov,+obl] }
 e. /∅/: { [+N],[+pl],[+γ],[+subj,+gov,+obl] }
 f. /i/: { [+N],[+pl],[-(+α,+γ)],[-obl] }
 g. /a/: { [+N],[+pl],[-obl] }

T_7 : Minimal interaction of inflection markers in the plural in Russian

	I: [+α,-γ]	II: [-α,+γ]	III: [-α,-γ]	IV: [+α,+γ]
nom: [+subj,-gov,-obl]	/i/ʰ (/a/ḡ)	/i/ʰ (/a/ḡ)	/i/ʰ (/a/ḡ)	/a/ḡ
acc: [-subj,+gov,-obl]	/i/ʰ (/a/ḡ)	/i/ʰ (/a/ḡ)	/i/ʰ (/a/ḡ)	/a/ḡ
dat: [-subj,+gov,+obl]	/am/ᶜ	/am/ᶜ	/am/ᶜ	/am/ᶜ
gen: [+subj,+gov,+obl]	/ov/ᵈ	/∅/ᵉ	/ov/ᵈ	/∅/ᵉ
inst: [+subj,-gov,+obl]	/ami/ᵇ	/ami/ᵇ	/ami/ᵇ	/ami/ᵇ
loc: [-subj,-gov,+obl]	/ax/ᵃ	/ax/ᵃ	/ax/ᵃ	/ax/ᵃ

Singular vs. plural markers:

Plural markers do not fit into singular contexts, but singular markers compete in plural contexts. However, since singular markers do not have a number feature, they can never become the most specific markers for a given context.

Note:

The systems relies on two rules of referral (Zwicky (1985), Corbett & Fraser (1993), Stump (2001)) to account for accusative/genitive syncretism with animates.

- (9) a. *A rule of referral for accusative/genitive syncretism in the singular:*
 $I_{\{[+\alpha,-\gamma],[-subj,+gov,-obl]\}} \rightarrow I_{\{[+\alpha,-\gamma],[+subj,+gov,+obl]\}}/[+animate]_{____}$.
 b. *A rule of referral for accusative/genitive syncretism in the plural:*
 $I_{\{[+pl],[-subj,+gov,-obl]\}} \rightarrow I_{\{[+pl],[+subj,+gov,+obl]\}}/[+animate]_{____}$.

2.2.2 Noun Inflection in Greek*References:*

Mackridge (1985), Babinotis (1986), Ruge (1986), Ralli (1994), Ralli (2002), Alexiadou (2004).

2.2.2.1 Data

Assumption (Ralli (1994)):

There are eight inflection classes. (Traditional view: three classes)

T_8 : *Inflection classes I–IV*

	I: masc <i>kip_m</i> ('garden')	I: fem <i>psif_f</i> ('vote')	II: masc <i>maxit(i)_m</i> ('fighter')	III: fem <i>avl(i)_f</i> ('yard')	IV: fem <i>pol(i)(e)_f</i> ('city')
nom/sg	os	os	s	∅	∅
acc/sg	o(n)	o(n)	∅	∅	∅
gen/sg	u	u	∅	s	s
voc/sg	e	e	∅	∅	∅
nom/pl	i	i	es	es	is
acc/pl	us	us	es	es	is
gen/pl	on	on	on	on	on
voc/pl	i	i	es	es	is

T_9 : *Inflection classes V–VIII*

	V: neut <i>vun_n</i> ('mountain')	VI: neut <i>krat_n</i> ('state')	VII: neut <i>spiti_n</i> ('house')	VIII: neut <i>soma(t)_n</i> ('body')
nom/sg	o	os	∅	∅
acc/sg	o	os	∅	∅
gen/sg	u	us	u	os
voc/sg	o	os	∅	∅
nom/pl	a	i	a	a
acc/pl	a	i	a	a
gen/pl	on	on	on	on
voc/pl	a	i	a	a

Observation:

- (i) Gender features on the stem do not suffice to predict inflection class ($N_{[masc]}$ can be I or II; $N_{[fem]}$ can be I, III, or IV; $N_{[neut]}$ can be V–VIII).
 (ii) Phonological features on the stem do not suffice to predict inflection class (thematic vowels are either part of the ending, in which case they cannot encode inflection class by definition; or they are part of the stem, where they fail to unambiguously encode inflection class; see, e.g., *maxit(i)* ('fighter') vs. *papa(δ)* ('priest') vs. *papu(δ)* ('grandfather') in class II).
 (iii) Semantic features on the stem do not suffice to predict inflection class.

2.2.2.2 Analysis

T_{10} : *Syncretism within and across inflection classes in Greek*

	'2.decl.'		'1.decl.'			'3.decl.'			
	$I_{m,f}$		II_m	III_f	IV_f	V_n	VI_n	VII_n	$VIII_n$
nom/sg	os	s	∅	∅	∅	o	os	∅	∅
acc/sg	o(n)	∅	∅	∅	∅	o	os	∅	∅
gen/sg	u	∅	s	s	s	u	us	u	os
voc/sg	e	∅	∅	∅	∅	o	os	∅	∅
nom/pl	i	es	es	is	is	a	i	a	a
acc/pl	us	es	es	is	is	a	i	a	a
gen/pl	on	on	on	on	on	on	on	on	on
voc/pl	i	es	es	is	is	a	i	a	a

(10) *Decomposition of cases in Greek*: $[\pm\text{governed}]$, $[\pm\text{oblique}]$ ($[\pm\text{subject}]$)

nominative: $[-\text{gov}, -\text{obl}]$
 accusative: $[\text{+gov}, -\text{obl}]$
 genitive: $[\text{+gov}, \text{+obl}]$
 (vocative: $[-\text{subj}, -\text{gov}, -\text{obl}]$)

(11) *Decomposition of inflection classes in Greek*: $[\pm\alpha]$, $[\pm\beta]$, $[\pm\gamma]$

I: $[\text{+}\alpha, \text{+}\beta, \text{+}\gamma]$ *kip_m* ('garden'), *psif_f* ('vote')
 V: $[\text{+}\alpha, \text{+}\beta, -\gamma]$ *vun_n* ('mountain')
 VII: $[\text{+}\alpha, -\beta, \text{+}\gamma]$ *spiti_n* ('house')
 VIII: $[\text{+}\alpha, -\beta, -\gamma]$ *soma(t)_n* ('body')
 VI: $[-\alpha, \text{+}\beta, \text{+}\gamma]$ *krat_n* ('state')
 IV: $[-\alpha, -\beta, \text{+}\gamma]$ *pol(i)(e)_f* ('city')
 II: $[-\alpha, \text{+}\beta, -\gamma]$ *marit(i)* ('fighter')
 III: $[-\alpha, -\beta, -\gamma]$ *avl(i)_f* ('yard')

(12) *Inflection markers (singular)*:

a. /o(n)/: $\{[\text{+N}], [\text{+}\alpha, \text{+}\beta, \text{+}\gamma], [\text{+gov}, -\text{obl}]\}$
 b. /os/: $\{[\text{+N}], [\text{+}\alpha, -\beta, -\gamma], [\text{+gov}, \text{+obl}]\}$
 c. /us/: $\{[\text{+N}], [-\alpha, \text{+}\beta, \text{+}\gamma], [\text{+gov}, \text{+obl}]\}$
 d. /o/: $\{[\text{+N}], [\text{+}\alpha, \text{+}\beta, -\gamma], [-\text{obl}]\}$
 e. /os/: $\{[\text{+N}], [\text{+}\beta, \text{+}\gamma], [-\text{obl}]\}$
 f. /s/: $\{[\text{+N}], [-\alpha, \mathfrak{N}\beta], [-\mathfrak{N}\text{gov}, -\mathfrak{N}\text{obl}]\}$
 g. /u/: $\{[\text{+N}], [\text{+}\alpha], [\text{+gov}, \text{+obl}]\}$
 h. /∅/: $\{[\text{+N}]\}$

Note on \mathfrak{N} -notation with /s/:

Assuming that variables ranging over feature values can show up in morpho-syntactic specifications of inflection markers, the two /s/ markers in II and III/IV emerge as one: \mathfrak{N} ranges over \pm . The \mathfrak{N} -notation (originally: α -notation) is introduced in Chomsky (1965), Chomsky & Halle (1968b), and has been used in morphology in Noyer (1992)

(but see Harley (1994), Johnston (1996), and Wiese (2003), Börjesson (2006), Georgi (2006), Lahne (2006), and Opitz (2006). Without this notion, there would have to be two /s/ markers, one specified as $\{[\text{+N}], [-\alpha, \text{+}\beta], [-\text{gov}, -\text{obl}]\}$, and one specified as $\{[\text{+N}], [-\alpha, -\beta], [\text{+gov}, \text{+obl}]\}$. However, the \mathfrak{N} -notation captures the gist of what is traditionally known as the "s-principle" (II uses /s/ where III/IV does not, and vice versa, see Ruge (1986)). (Also note that, other things being equal, markers with variables over features values count as less specific than markers without such variables.)

(13) *Inflection markers (plural)*:

a. /on/: $\{[\text{+N}], [\text{+pl}], [\text{+gov}, \text{+obl}]\}$
 b. /is/: $\{[\text{+N}], [\text{+pl}], [-\alpha, -\beta, \text{+}\gamma], [-\text{obl}]\}$
 c. /us/: $\{[\text{+N}], [\text{+pl}], [\text{+}\alpha, \text{+}\beta, \text{+}\gamma], [\text{+gov}, -\text{obl}]\}$
 d. /es/: $\{[\text{+N}], [\text{+pl}], [-\alpha, -\gamma], [-\text{obl}]\}$
 e. /i/: $\{[\text{+N}], [\text{+pl}], [\text{+}\beta, \text{+}\gamma], [-\text{obl}]\}$
 f. /a/: $\{[\text{+N}], [\text{+pl}], [-\text{obl}]\}$

T_{11} : *The interaction of inflection markers, singular and plural, in Greek*

	I: $[\text{+}\alpha\text{+}\beta\text{+}\gamma]$	II: $[-\alpha\text{+}\beta\text{-}\gamma]$	III: $[-\alpha\text{-}\beta\text{-}\gamma]$	IV: $[-\alpha\text{-}\beta\text{+}\gamma]$	V: $[\text{+}\alpha\text{+}\beta\text{-}\gamma]$	VI: $[-\alpha\text{+}\beta\text{+}\gamma]$	VII: $[\text{+}\alpha\text{-}\beta\text{+}\gamma]$	VIII: $[\text{+}\alpha\text{-}\beta\text{-}\gamma]$
nom/sg: [-gov,-obl], [-pl]	/os/ ^e (/∅/ ^h)	/s/ ^f (/∅/ ^h)	/∅/ ^h	/∅/ ^h	/o/ ^d (/∅/ ^h)	/os/ ^e (/s/ ^f , /∅/ ^h)	/∅/ ^h	/∅/ ^h
acc/sg: [+gov,-obl], [-pl]	/o(n)/ ^a (/os/ ^e , /∅/ ^h)	/∅/ ^h	/∅/ ^h	/∅/ ^h	/o/ ^d (/∅/ ^h)	/os/ ^e (/∅/ ^h)	/∅/ ^h	/∅/ ^h
gen/sg: [+gov,+obl], [-pl]	/u/ ^g (/∅/ ^h)	/∅/ ^h	/s/ ^f (/∅/ ^h)	/s/ ^f (/∅/ ^h)	/u/ ^g (/∅/ ^h)	/us/ ^c (/∅/ ^h)	/u/ ^g (/∅/ ^h)	/os/ ^b (/u/ ^g , /∅/ ^h)
nom/pl: [-gov,-obl], [+pl]	/i/ ^e (/a/ ^f)	/es/ ^d (/a/ ^f)	/es/ ^d (/a/ ^f)	/is/ ^b (/a/ ^f)	/a/ ^f	/i/ ^e (/a/ ^f)	/a/ ^f	/a/ ^f
acc/pl: [+gov,-obl], [+pl]	/us/ ^c (/i/ ^e , /a/ ^f)	/es/ ^d (/a/ ^f)	/es/ ^d (/a/ ^f)	/is/ ^b (/a/ ^f)	/a/ ^f	/i/ ^e (/a/ ^f)	/a/ ^f	/a/ ^f
gen/pl: [+gov,+obl], [+pl]	/on/ ^a	/on/ ^a	/on/ ^a	/on/ ^a	/on/ ^a	/on/ ^a	/on/ ^a	/on/ ^a

2.2.3 Noun Inflection in German

References:

Blevins (2000), Eisenberg (2000), Wiese (2000b), Wiese (2001a), Müller (2002), Sternefeld (2004).

2.2.3.1 Data

T_{12} : Major inflection classes I–IV

	I: masc, neut <i>Tisch_m</i> ('table'), <i>Schaf_n</i> ('sheep')	II: masc <i>Baum_m</i> ('tree')	III: neut <i>Buch_n</i> ('book')	IV: masc <i>Strahl_m</i> ('ray')
nom/sg	∅	∅	∅	∅
acc/sg	∅	∅	∅	∅
dat/sg	∅	∅	∅	∅
gen/sg	(e)s	(e)s	(e)s	(e)s
nom/pl	(e)	”(e)	”er	(e)n
acc/pl	(e)	”(e)	”er	(e)n
dat/pl	(e)n	”(e)n	”ern	(e)n
gen/pl	(e)	”(e)	”er	(e)n

T_{13} : Major inflection classes V–VIII

	V: masc ('weak') <i>Planet_m</i> ('planet')	VI: fem <i>Ziege_f</i> ('goat')	VII: fem <i>Maus_f</i> ('mouse')	VIII: fem <i>Drangsal_f</i> ('distress')
nom/sg	∅	∅	∅	∅
acc/sg	(e)n	∅	∅	∅
dat/sg	(e)n	∅	∅	∅
gen/sg	(e)n	∅	∅	∅
nom/pl	(e)n	(e)n	”(e)	(e)
acc/pl	(e)n	(e)n	”(e)	(e)
dat/pl	(e)n	(e)n	”(e)n	(e)n
gen/pl	(e)n	(e)n	”(e)	(e)

Note:

On this view, /s/-plurals do not belong to the core system of German noun inflection.

Observation:

- (i) Gender features on the stem do not suffice to predict inflection class ($N_{[masc]}$ can be I, II, IV, or V; $N_{[fem]}$ can be VI, VII, or VIII; $N_{[neut]}$ can be I or III).
- (ii) Phonological features on the stem do not suffice to predict inflection class.
- (iii) Semantic features on the stem do not suffice to predict inflection class (e.g., not all members of V (weak masculines) are $N_{[anim]}$, and not all masculine $N_{[anim]}$ stems are in V.)

2.2.3.2 Analysis

(14) *Decomposition of cases in German*: $[\pm\text{subject}]$, $[\pm\text{governed}]$, $[\pm\text{oblique}]$

nominative:	$[+\text{subj}, -\text{gov}, -\text{obl}]$
accusative:	$[-\text{subj}, +\text{gov}, -\text{obl}]$
dative:	$[-\text{subj}, +\text{gov}, +\text{obl}]$
genitive:	$[+\text{subj}, +\text{gov}, +\text{obl}]$

T_{14} : *Syncretism within and across inflection classes in German*

	I _{m,n}	II _m	III _n	IV _{m,n}	V _m	VI _f	VII _f	VIII _f
nom/sg	∅	∅	∅	∅	∅	∅	∅	∅
acc/sg	∅	∅	∅	∅	(e)n	∅	∅	∅
dat/sg	∅	∅	∅	∅	(e)n	∅	∅	∅
gen/sg	(e)s	(e)s	(e)s	(e)s	(e)n	∅	∅	∅
nom/pl	(e)	”(e)	”er	(e)n	(e)n	(e)n	”(e)	(e)
acc/pl	(e)	”(e)	”er	(e)n	(e)n	(e)n	”(e)	(e)
dat/pl	(e)n	”(e)n	”ern	(e)n	(e)n	(e)n	”(e)n	(e)n
gen/pl	(e)	”(e)	”er	(e)n	(e)n	(e)n	”(e)	(e)

(15) *Decomposition of inflection classes in German*: $[\pm\alpha]$, $[\pm\beta]$, $[\pm\gamma]$

I:	$[+\alpha, -\beta, +\gamma]$	<i>Tisch_m</i> ('table'), <i>Schaf_n</i> ('sheep')
II:	$[+\alpha, -\beta, -\gamma]$	<i>Baum_m</i> ('tree'), <i>Nagel_m</i> ('nail')
III:	$[+\alpha, +\beta, +\gamma]$	<i>Buch_n</i> ('book'), <i>Kalb_n</i> ('calf')
IV:	$[+\alpha, +\beta, -\gamma]$	<i>Strahl_m</i> ('ray'), <i>Auge_n</i> ('eye')
V:	$[-\alpha, +\beta, +\gamma]$	<i>Planet_m</i> ('planet'), <i>Bote_m</i> ('messenger')
VI:	$[-\alpha, +\beta, -\gamma]$	<i>Ziege_f</i> ('goat')
VII:	$[-\alpha, -\beta, -\gamma]$	<i>Maus_f</i> ('mouse')
VIII:	$[-\alpha, -\beta, +\gamma]$	<i>Drangsal_f</i> ('distress'), <i>Finsternis_f</i> ('darkness')

(16) *Inflection markers (singular and plural)*:

a.	/”ern/:	$\{[+N], [+pl], [+ \alpha, + \beta, + \gamma], [-\text{subj}, +\text{gov}, +\text{obl}]\}$
b.	/”er/:	$\{[+N], [+pl], [+ \alpha, + \beta, + \gamma]\}$
c.	/ (e)n /:	$\{[+N], [+pl], [-\beta, +\gamma], [-\text{subj}, +\text{gov}, +\text{obl}]\}$
d.	/”(e)n/:	$\{[+N], [+pl], [-\beta, -\gamma], [-\text{subj}, +\text{gov}, +\text{obl}]\}$
e.	/ (e) /:	$\{[+N], [+pl], [-\beta, +\gamma]\}$
f.	/”(e) /:	$\{[+N], [+pl], [-\beta, -\gamma]\}$
g.	/ (e)n /:	$\{[+N], [+pl], [+ \beta]\}$
h.	/ (e)n /:	$\{[+N], [-\alpha, +\beta, +\gamma], [+ \text{gov}]\}$
i.	/ (e)s /:	$\{[+N], [+ \alpha], [+ \text{subj}, +\text{gov}, +\text{obl}]\}$
j.	/∅/:	$\{[+N]\}$

2.3 Class Features in Syntax

2.3.1 Class Marker Phrases

Claim in Bernstein (1993):

Class markers have a syntactic reflex (see Haegeman (1998) for a generalisation of this proposal).

Assumption:

Languages that provide the morphological evidence for class markers, e.g., Spanish (Harris (1991)), have a functional projection in the DP, associated with them in addition to DP and NumP, namely CMP.

T₁₅: The interaction of inflection markers, singular and plural, in German

	I: [+α-β+γ]	II: [+α-β-γ]	III: [+α+β+γ]	IV: [+α+β-γ]	V: [-α+β+γ]	VI: [-α+β-γ]	VII: [-α-β-γ]	VIII: [-α-β+γ]
nom/sg	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³
acc/sg	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³	/ (e)n/ ^h (/∅/ ³)	/∅/ ³	/∅/ ³	/∅/ ³
dat/sg	/∅/ ³	/∅/ ³	/∅/ ³	/∅/ ³	/ (e)n/ ^h (/∅/ ³)	/∅/ ³	/∅/ ³	/∅/ ³
gen/sg	/ (e)s/ ⁴ (/∅/ ³)	/ (e)s/ ⁴ (/∅/ ³)	/ (e)s/ ⁴ (/∅/ ³)	/ (e)s/ ⁴ (/∅/ ³)	/ (e)n/ ^h (/∅/ ³)	/∅/ ³	/∅/ ³	/∅/ ³
nom/pl	/ (e)/ ^e	/ (e)/ ^f	/ *er/ ^b (/ (e)n/ ^g)	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)/ ^f	/ (e)/ ^e
acc/pl	/ (e)/ ^e	/ (e)/ ^f	/ *er/ ^b (/ (e)n/ ^g)	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)/ ^f	/ (e)/ ^e
dat/pl	/ (e)n/ ^c (/e/ ^e)	/ (e)n/ ^d (/e/ ^e)	/ *ern/ ^a (/er/ ^b , / (e)n/ ^g)	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)n/ ^d (/e/ ^e)	/ (e)n/ ^c (/e/ ^e)
gen/pl	/ (e)/ ^e	/ (e)/ ^f	/ *er/ ^b (/ (e)n/ ^g)	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)n/ ^g	/ (e)/ ^f	/ (e)/ ^e

T₁₆: Inflection markers in Spanish (from Aronoff (1994, 64)):

Marker	Class	Gender	Example	Gloss
/o/	I	masc	<i>muchacho</i>	'boy'
/o/	I	fem	<i>mano</i>	'hand'
/a/	II	masc	<i>dia</i>	'day'
/a/	II	fem	<i>muchacha</i>	'girl'
/∅/	III	masc	<i>cid</i>	'cid'
/∅/	III	fem	<i>sed</i>	'thirst'
/∅/ (e inserted)	III	masc	<i>padre</i>	'father'
/∅/ (e inserted)	III	fem	<i>madre</i>	'mother'

(17) [DP [NumbP [CMP [NP]]]]

Note:

According to Bernstein, these languages

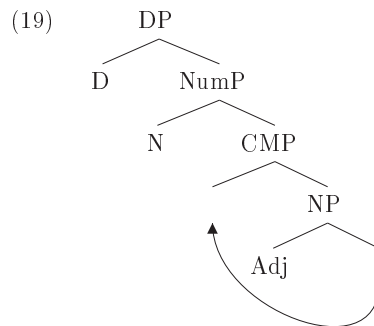
- (a) are characterized by the presence of headmovement within the DP and
- (b) exhibit indefinite noun ellipsis.

(18) Evidence:

- a. la muchacha americana
the girl american
- b. uno pequeño
a small (one)
- c. a red ball/*a ball red

d. *a small

Assuming that both in English and Spanish adjectives are located in the specifier of NP (Cinque (1993)), in the Spanish example (18-a) the head noun moves from its base position to a higher head in the functional domain, while it remains in its base position in English:



Note:

Bernstein attributes this difference to the presence of class markers in Spanish, as opposed to their absence in English.

2.3.2 Problems for Bernstein's Correlation

Class features are not syntactically active (Alexiadou et al. (2001)).

First problem:

There are languages that exhibit N-movement and indefinite noun ellipsis in the absence of distinct class markers.

Observation 1:

French is similar to Spanish, although its noun morphology differs from that of Spanish considerably, i.e., it has no obvious class markers.

(20) N-movement and N-ellipsis in French:

Un cube rouge est sur le coin gauche de cette table. Un bleu
 a cube red is on the left corner of this table, a blue (one)
 est sur le coin droit
 is on the right corner

Observation 2:

Italian is similar to Spanish, although it is not immediately transparent whether the language has class markers (see Bernstein (1993)):

(21) N-movement and N-ellipsis in Italian:

a. uno libro grande
 a book big

- b. uno grande
a big one

Second problem:

There are languages that lack N-movement in the presence of inflectional class distinctions (but have no system of nominal class markers comparable to that of Spanish).

Observation 1:

Greek has class-driven noun inflection (see previous section). However, no noun movement seems to take place, given that the head noun always follows adjectives. (N-ellipsis is possible.)

(22) *No N-movement in Greek:*

- a. *to spiti meghalo/paljo/oreo
the house big/old/nice
b. to meghalo/paljo/oreo spiti
c. i amerikanid-a ginek-a
the_{fem.sg.nom} American_{fem.sg.nom} woman_{fem.sg.nom}

(23) *N-ellipsis in Greek:*

I Maria tha agorasi ena prasino vivlioki ego ena kokino
Mary_{nom} fur buy-3sg a green book and I a red (one)

‘Mary will buy a green book and I a red one

Observation 2: Russian permits indefinite N-ellipsis. N A order is also possible, as shown by the examples in (24). However, there is good reason to doubt that this phenomenon involves head movement. The reason is that N may end up in front of numerals (Franks (1995)), determiners, and even outside the DP. For this reason, the phenomena in (24) are probably better analyzed as instances of (potentially remnant) NP scrambling,

(24) *N-movement and N-ellipsis in Russian:*

- a. Èto [NP₁ vopros] složnyj t₁
this is question_{nom} complicated_{nom}
b. My tam žili [NP₁ goda] dva t₁
we there lived year_{gen} two
c. [DP₂ [NP₁ Razgovor] ètot t₁] ja načal t₂ naročno
conversation this I began intentionally
d. [NP₁ t₂ Čelovek] on [DP neploxo] t₁
person he is not bad

(25) U menja bol’saja mašina a u nego [DP malen’kaja] [N -]
with me big car and with him small (one)

Observation 3:

German has N-ellipsis, but no N-movement.

(26) *No N-movement in German:*

Er hat [DP ein neues Buch₁] / *[DP ein Buch₁ neues t₁] gekauft
he has a new book a book new bought

(27) *N-ellipsis in German:*

Er hat [DP ein neues [N -]] gekauft
he has a new (one) bought

Third problem:

There are languages that lack inflectional class distinctions but show evidence for head-movement, and indefinite noun ellipsis. Hebrew is a case in point (Aronoff (1994, 75-79) – Danon (1996), Ritter (1991)).

(28) *N-movement in Hebrew (Ritter (1991)):*

[DP ha smalot₁ ha yapot t₁]
the dresses the nice

(29) *Ellipsis in Hebrew:*

ra?ti šloša praxim ?adumim ve [DP ?arba?a sgulim [N -]]
(I) saw three flowers red and four purple

T₁₇: Distribution of class features, ellipsis, and NA order:

Language	Indefinite ellipsis	N movement	Inflection classes
Spanish	+	+	+
French	+	+	(-)
Italian	+	+	(-)
Hebrew	+	+	-
Greek	+	-	+
Russian	+	(-)	+
German	+	-	+

2.3.3 General Considerations

Observation:

Verbs do not impose inflection class restrictions on their arguments.

Note:

There is no verb-subject agreement with respect to inflection class. In fact there is even no noun-adjective agreement with respect to inflection class.

- (30) a. la chica inteligente
the girl intelligent
b. el chico inteligente
the boy intelligent

Conclusion:

Syntax cannot interpret class features. Class features are necessary in morphology but uninterpretable in syntax.

(31) *Legibility Condition* (Chomsky (2000), Chomsky (2001)):

Morpho-syntactic features can be present in some component of grammar only if they are interpretable in this component.

Further conclusion, given the Legibility Condition:

Class features are absent in syntax.

2.4 Proposal*Note:*

Features that are uninterpretable at LF must be deleted in syntax, and they can be deleted by participating in an Agree operation. Agree applies under matching of a probe and a goal if both involve uninterpretable features (and may be accompanied by Merge (movement)).

Proposal:

Class features act as probes in morphology.

Assumption:

- (i) Agree operates in syntax to remove LF-uninterpretable features before LF is reached.
- (ii) Agree operates in morphology to remove syntactically uninterpretable features before syntax is reached.

(32) *Components of Grammar:*

Lexicon → Morphology → Syntax → PF, LF

- a. Lexicon: list of exceptions
- b. Morphology: includes probe-driven Agree (=fusional inflection), pure (selection-driven) Merge (perhaps incl. derivational morphology)
- c. Syntax: probe-driven Agree (incl. movement), pure (selection-driven) Merge (perhaps incl. derivational morphology, see Borer (2002), Alexiadou (2001))

(33) *Fusional noun inflection:*

- a. Noun stem is taken from the lexicon with its inherent features (incl. class, gender features).
- b. Non-inherent features (incl. fully specified case and number features) are added in morphology.
- c. A class feature on the noun stem acts as a probe and requires an Agree operation resulting in Merge with an inflection marker (the goal).
- d. All of an inflection marker's features (including often underspecified – class and Case features) are inherent.
- e. The inflection marker determined by the Subset Principle is selected from the

lexicon and merged with the noun stem, resulting in Agree.

- f. The class feature of the noun stem, and all morpho-syntactic features of the inflection marker, all deleted in morphology.
- g. The inflected noun enters syntax, bearing only fully specified and syntactically interpretable morpho-syntactic features.

Note:

Underspecified inflection markers give rise to a well-known problem: Syntax needs fully specified Case information, not the underspecified Case information provided by inflection markers. This problem does not arise if the morpho-syntactic features of an inflection marker are automatically deleted by inflection operations.

Side remark:

In the terminology of Stump (2001), the present approach qualifies as “realizational”: despite being a lexical item with morpho-syntactic features, an inflection marker does not actually contribute any morpho-syntactic information to the noun that it combines with.

Observation 1:

By assimilating inflection and syntactic operations, the Subset Principle can in fact be dispensed with in favour of Chomsky's (2001) principle *Maximize Matching Effects*.

(34) *Specificity as Maximize Matching Effects:*

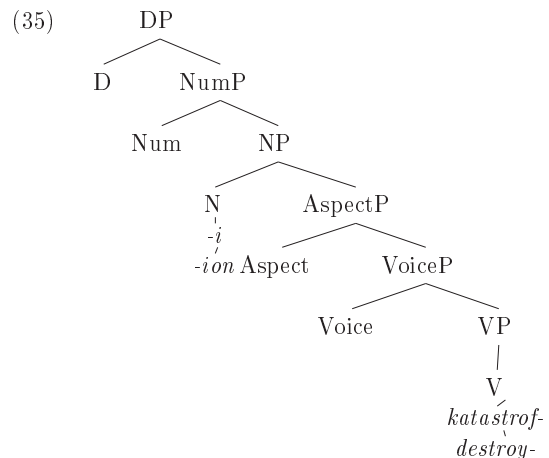
- | | | |
|----|--|---------------------|
| a. | /tetrad'/ | – /i/ |
| | [+N, –bel, –pl, {–α, –γ}, {–subj, +gov, +obl}] | [+N, {–α}, {+obl}] |
| b. | /tetrad'/ | – /u/ |
| | [+N, –bel, –pl, {–α, –γ}, {–subj, +gov, +obl}] | [+N, {–subj, +gov}] |
| c. | /tetrad'/ | – /a/ |
| | [+N, –bel, –pl, {–α, –γ}, {–subj, +gov, +obl}] | [+N] |

Observation 2:

The approach also offers a straightforward account of indeclinable noun stems in Greek and Russian for which separate inflection classes have often been stipulated; see, e.g., *reporter_m* ('reporter'), *plaz_f* ('beach') in Greek, *buržuam* ('bourgeois'), *kofe_m* ('coffee') in Russian. These noun stems simply lack a class feature – hence, a probe that might trigger inflection.

2.5 Further Issues

2.5.1 The Status of Derivational Morphology



2.5.2 The Timing of Inflection

Note:

Class features are needed in morphology to account for noun inflection markers Russian, Greek, and German. A priori, there are three possibilities concerning the timing of inflection:

- (36)
- Noun inflection applies pre-syntactically.
 - Noun inflection applies in the syntax.
 - Noun inflection applies post-syntactically.

Given that there is reason to assume that class features are absent in syntax, we have suggested a pre-syntactic approach to noun inflection where class features are deleted before the noun enters syntax. What about the alternatives?

Intra-Syntactic Approaches

1. *Intra-syntactic approaches:*

Class features trigger inflection in the syntax; however, a class feature that shows up in the syntax is incompatible with the Legibility Condition.

Post-Syntactic Approaches

2. *Post-syntactic approaches* (as in Distributed Morphology; see Halle & Marantz (1993), Harley & Noyer (1999)):

There are two possibilities:

- Class features trigger inflection post-syntactically; but they are present in syntax already. Then, the same problem as with 1. arises: At the point where a late insertion

approach needs a class feature, the Legibility Condition has long forced its deletion.

(ii) Class features trigger inflection post-syntactically; they are not present in syntax, but enter the derivation after syntax (Embick (2000)), perhaps by a dissociation operation (Embick (1998)). They might then act as probes in a post-syntactic morphology and undergo deletion before PF is reached. Such an approach may at first sight seem to be able to accommodate the gist of our proposal. However, it invariably violates the *Inclusiveness Condition*.

(37) *Inclusiveness Condition* (Chomsky (1995, 2000, 2001)):

Nothing can be added in the course of the derivation.

Conclusion:

A pre-syntactic approach is compatible with both the Legibility Condition and the Inclusiveness Condition; inner- and post-syntactic approaches are not.

Consequence:

The present approach would seem to support a syntactic analysis of Agree operations in terms of *checking* rather than *valuation* (or *assignment*). If morpho-syntactic features are not valued before syntax, morphological realization cannot take place before syntax.

Chapter 3

Fission and Impoverishment

3.1 Syncretism and Iconicity in Icelandic Noun Declensions

3.1.1 Icelandic Noun Declensions

Table 1: Weak inflection classes

	Mw <i>penn</i> (‘feather’)	Nw <i>aug</i> (‘eye’)	Fw <i>húf</i> (‘cap’)
nom sg	penn-i	aug-a	húf-a
acc sg	penn-a	aug-a	húf-u
dat sg	penn-a	aug-a	húf-u
gen sg	penn-a	aug-a	húf-u
nom pl	penn-ar	aug-u	húf-ur
acc pl	penn-a	aug-u	húf-ur
dat pl	penn-um	aug-um	húf-um
gen pl	penn-a	aug-n-a	húf-a

Table 2: Strong feminine inflection classes

	Fa <i>vél</i> (‘ma- (chine’)	Fa’ <i>drottning</i> (‘queen’)	Fi <i>mynd</i> (‘picture’)	Fc1 <i>geit</i> (‘goat’)	Fc2 <i>vík</i> (‘bay’)
nom sg	vél-Ø	drottning-Ø	mynd-Ø	geit-Ø	vík-Ø
acc sg	vél-Ø	drottning-u	mynd-Ø	geit-Ø	vík-Ø
dat sg	vél-Ø	drottning-u	mynd-Ø	geit-Ø	vík-Ø
gen sg	vél-ar	drottning-ar	mynd-ar	geit-ar	vík-ur
nom pl	vél-ar	drottning-ar	mynd-ir	geit-ur	vík-ur
acc pl	vél-ar	drottning-ar	mynd-ir	geit-ur	vík-ur
dat pl	vél-um	drottning-um	mynd-um	geit-um	vík-um
gen pl	vél-a	drottning-a	mynd-a	geit-a	vík-a

Table 3: Strong masculine inflection classes

	Ma <i>hest</i> (‘horse’)	Mi <i>stað</i> (‘place’)	Mu <i>fjörð</i> (‘fjord’)	Mc <i>fót</i> (‘foot’)
nom sg	hest-ur	stað-ur	fjörð-ur	fót-ur
acc sg	hest-Ø	stað-Ø	fjörð-Ø	fót-Ø
dat sg	hest-i	stað-Ø	fjörð-i	fót-i
gen sg	hest-s	stað-ar	fjarð-ar	fót-ar
nom pl	hest-ar	stað-ir	fjörð-ir	fæt-ur
acc pl	hest-a	stað-i	fjörð-i	fæt-ur
dat pl	hest-um	stað-um	fjörð-um	fót-um
gen pl	hest-a	stað-a	fjarð-a	fót-a

Table 4: Strong neuter inflection class

	Na <i>borð</i> (‘table’)
nom sg	borð-Ø
acc sg	borð-Ø
dat sg	borð-i
gen sg	borð-s
nom pl	borð-Ø
acc pl	borð-Ø
dat pl	borð-um
gen pl	borð-a

3.1.2 Properties of the Inflection System

3.1.2.1 General Properties: Syncretism and Iconicity

- (1) *Syncretism Principle*:
Identity of form implies identity of function (within a certain domain, and unless there is evidence to the contrary).
- (2) *Iconicity Principle*:
Similarity of form implies similarity of function (within a certain domain, and unless there is evidence to the contrary).

3.1.2.2 Language-Specific Properties

Table 5: Icelandic noun inflection classes

	1 Ma	2 Na	3 Fa(‘)	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2	10 Mw	11 Nw	12 Fw
nom sg	ur	Ø	Ø	ur	Ø	ur	ur	Ø	Ø	i	a	a
acc sg	Ø	Ø	Ø (u)	Ø	Ø	Ø	Ø	Ø	Ø	a	a	u
dat sg	i	i	Ø (u)	Ø	Ø	i	i	Ø	Ø	a	a	u
gen sg	s	s	ar	ar	ar	ar	ar	ar	ur	a	a	u
nom pl	ar	Ø	ar	ir	ir	ir	ur	ur	ur	ar	u	ur
acc pl	a	Ø	ar	i	ir	i	ur	ur	ur	a	u	ur
dat pl	um	um	um	um	um	um	um	um	um	um	um	um
gen pl	a	a	a	a	a	a	a	a	a	(n)a	(n)a	

- (3) *Language-specific properties* (Pétursson (1992, 70-71), Thráinsson (1994, 154)):
 - a. Strong declensions (except for Fa’) do not have an overt marker in accusative singular contexts.
 - b. Strong feminine declensions (except for Fa’) do not have an overt marker in non-genitive singular contexts.
 - c. Neuter declensions have identical markers for nominative and accusative in both singular and plural contexts; these markers never end in /r/.
 - d. Weak declensions never use /r/ in the singular.
 - e. Feminine declensions have identical markers in nominative and accusative plural contexts; these markers begin with a vowel and end in /r/.
 - f. Masculine declensions (except for Mc) have a marker beginning with a vowel and ending with an /r/ in nominative plural contexts; the accusative plural marker equals the nominative plural marker without the /r/.
 - g. All declensions have the same markers for dative plural and genitive plural contexts.

3.1.3 Analysis

3.1.3.1 Background Assumptions

- (4) [N-cn]
- (5) *Subset Principle*:
A vocabulary item V is inserted into a functional morpheme F iff (i) and (ii) hold:
 - (i) The insertion context of V is a subset of the set of the morpho-syntactic features of F .
 - (ii) V is the most specific vocabulary item that satisfies (i).
- (6) *Specificity of vocabulary items*:
A vocabulary item V_i is more specific than a vocabulary item V_j iff there is a feature class \mathfrak{S} such that (i) and (ii) hold.
 - (i) The insertion context of V_i has more features in \mathfrak{S} than the insertion context

3.1.3.4 Vocabulary Insertion

(14) Vocabulary items:

I	/r/	$\leftrightarrow \{[-obl]\}$
II	/a/	$\leftrightarrow \{[-pl], [-weak], [+n]\}$
	/u/	$\leftrightarrow \{[-pl], [-weak, -fem], [-v]\}$
	/i/	$\leftrightarrow \{[-pl], [-weak, -fem, -i\text{-type}], [+obl]\}$
	/s/	$\leftrightarrow \{[-pl], [-weak, -fem, +a\text{-type}], [+n, -obl]\}$
	/u/2	$\leftrightarrow \{[-pl], [-weak, +fem, +c'\text{-type}], [+n]\}$
	/u/3	$\leftrightarrow \{[-pl], [-weak, +fem, +a'\text{-type}], [-n, +v]\}$
III	/a/	$\leftrightarrow \{[-pl], [+weak]\}$
	/u/	$\leftrightarrow \{[-pl], [+weak, +fem], [+v]\}$
	/i/	$\leftrightarrow \{[-pl], [+weak, +masc], [-n, -v]\}$
IV	/a/	$\leftrightarrow \{[+pl], [-n]\}$
	/u/	$\leftrightarrow \{[+pl], [-a\text{-type}]\}$
	/i/	$\leftrightarrow \{[+pl], [-a\text{-type}, -c\text{-type}]\}$
	/um/	$\leftrightarrow \{[+pl], [-n, +v, +obl]\}$
	/a/2	$\leftrightarrow \{[+pl], [+n, +v, -obl]\}$

Syncretism and Iconicity in the Singular of Strong Declensions

Table 7: Vocabulary insertion in the singular of strong declensions

	1 Ma	2 Na	3 Fa(')	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2
nom sg	$[-n-v-o]$ u-r	\emptyset	$[-n-v]$ \emptyset	$[-n-v-o]$ u-r	$[-n-v]$ \emptyset	$[-n-v-o]$ u-r	$[-n-v-o]$ u-r	$[-n-v]$ \emptyset	$[-n-v]$ \emptyset
acc sg	$[-n+v]$ \emptyset	\emptyset	$[-n+v]$ \emptyset (u)	$[-n+v]$ \emptyset	$[-n+v]$ \emptyset	$[-n+v]$ \emptyset	$[-n+v]$ \emptyset	$[-n+v]$ \emptyset	$[-n+v]$ \emptyset
dat sg	$[-n+v+o]$ i	$[-n+v+o]$ i	$[-n+v]$ \emptyset (u)	$[-n+v+o]$ \emptyset	$[-n+v]$ \emptyset	$[-n+v+o]$ i	$[-n+v+o]$ i	$[-n+v]$ \emptyset	$[-n+v]$ \emptyset
gen sg	$[-n+v]$ -o] s	$[-n+v]$ -o] s	$[-n+v]$ -o] a-r	$[-n+v]$ -o] a-r	$[-n+v]$ -o] a-r	$[-n+v]$ -o] a-r	$[-n+v]$ -o] a-r	$[-n+v]$ -o] a-r	$[-n+v]$ -o] u-r

Syncretism and Iconicity in the Singular of Weak Declensions

Table 8: Vocabulary insertion in the singular of weak declensions

	10 Mw	11 Nw	12 Fw
nom sg	$[-n-v]$ i	a	$[-n-v]$ a
acc sg	$[-n+v]$ a	a	$[-n+v]$ u
dat sg	$[-n+v]$ a	$[-n+v]$ a	$[-n+v]$ u
gen sg	$[-n+v]$ a	$[-n+v]$ a	$[-n+v]$ u

Syncretism and Iconicity in the Plural

Table 9: Vocabulary insertion in the plural

	1 Ma	2 Na	3 Fa(')	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2	10 Mw	11 Nw	12 Fw
nom pl	$[-n-v]$ -o] a-r	\emptyset	$[-n-v]$ -o] a-r	$[-n-v]$ -o] i-r	$[-n-v]$ -o] i-r	$[-n-v]$ -o] i-r	$[-n-v]$ -o] u-r	$[-n-v]$ -o] u-r	$[-n-v]$ -o] u-r	$[-n-v]$ -o] a-r	u	$[-n-v]$ -o] u-r
acc pl	$[-n+v]$ a	\emptyset	$[-n+v]$ -o] a-r	$[-n+v]$ i	$[-n+v]$ -o] i	$[-n+v]$ -o] i	$[-n+v]$ -o] u-r	$[-n+v]$ -o] u-r	$[-n+v]$ -o] u-r	$[-n+v]$ -o] a	u	$[-n+v]$ -o] u-r
dat pl	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um	$[-n+v]$ +o] um
gen pl	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] a	$[-n+v]$ -o] (n)a	$[-n+v]$ -o] (n)a

3.1.4 Eine Variante ohne Verarmung?

Annahme 1:

Statt des Konzepts von Spaltung bei Noyer (1992), Frampton (2002) werden von vornherein zwei Morpheme angenommen, bzw. zwei unterschiedliche Regelblöcke im System von Anderson (1992), Stump (2001). (Ob das Konzept der Spaltung bei Halle & Marantz (1993) zugrundegelegt werden kann, ist nicht ganz klar; vermutlich nicht, denn in beiden Morphemen müssen ungefähr dieselben Merkmale zugänglich sein.)

(15) *Spaltung_a* (*fission_a*; Halle & Marantz (1993)):

- a. Spaltung gliedert aus einem Morphem M mit den Merkmalen α ein Merkmalsbündel β aus, so dass zwei terminale Knoten M_1 und M_2 entstehen.
- b. (i) M_1 hat die Merkmale β .
- (ii) M_2 hat die Merkmale $\alpha-\beta$.

Annahme 2:

Kasusdekomposition erfolgt wie oben.

Annahme 3:

Genusdekomposition erfolgt anders.

(16) *Genusdekomposition:*

- a. Mask = [-neut,-fem]
- b. Fem = [-neut,+fem]
- c. Neut = [+neuter]

Annahme 4:

Flexionsklassen werden ebenfalls dekomponiert; die Dekomposition erfolgt ähnlich, aber nicht identisch wie oben.

(17) *Dekomposition der Flexionsklassen:*

[4 [A 5 6 [B 7 8 9 [C [D 1 2 3(')] [E 10 [F 11 12]]]]]]

Annahme 5:

Es gibt keine Verarmungsregeln.

(18) *Vokabularelemente:*a. *Morphem 1:*

- /ur/ ↔ {[-pl],[-neut,-fem],[-n,-v]}
- /u/ ↔ {[-pl],[-n,+v],[+3']}
- /i/ ↔ {[-pl],[-fem],[+obl],[+A,-E]}
- /ar/ ↔ {[-pl],[+n],[-E]}
- /s/ ↔ {[-pl],[-fem],[+n],[+D]}
- /ur/ ↔ {[-pl],[+n],[+9]}
- /i/ ↔ {[-pl],[-neut,-fem],[-n,-v],[+10]}
- /a/ ↔ {[-pl],[+E]}
- /u/ ↔ {[-pl],[+v],[+12]}
- /a/ ↔ {[+pl],[-neut],[-n,-obl],[+C,-F]}
- /i/ ↔ {[+pl],[-n,-obl],[-B]}
- /u/ ↔ {[+pl],[-n,-obl],[-2]}
- /um/ ↔ {[+pl],[+obl]}

b. *Morphem 2:*

- /r/ ↔ {[+pl],[-neut],[-n,-obl]}
- /Ø/ ↔ {[+pl],[-neut,-fem],[-n,+v,-obl],[-7]}
- /a/ ↔ {[+pl],[+n]}

Konsequenzen:

- (i) Das System macht empirisch die richtigen Vorhersagen.
- (ii) Durch den Verzicht auf Verarmungsregeln können die System-definierenden Eigenschaften der isländischen Nominalflexion nicht abgeleitet werden.
- (iii) Es gibt allerdings eine Ausnahme: Der Subtraktionseffekt in (3-f) (wiederholt als (19)) folgt.

- (19) Maskuline Deklinationen (außer Mc) haben im Nominativ Plural einen Marker, der mit einem Vokal anfängt und mit einem /r/ aufhört; der jeweilige Marker für den Akkusativ Plural ergibt sich, wenn man vom Nominativmarker das /r/ wegstreicht.

Beobachtung:

Dieser Effekt folgt systematisch, weil es für Morphem 2 einen hochspezifischen Nullmarker gibt, der die Einsetzung eines konkurrierenden, weniger spezifischen /r/ blockiert.

Bemerkung:

Dies entspricht exakt der Theorie der Verarmung per Vokabulareinsetzung, die in Trommer (1999a, 2003a) entwickelt wird.

Beispiel:

Trommer (1999a) über ein Verbparadigma des klassischen Arabisch (eine Reanalyse von Halle (1997); 2fem, 3fem sind ausgeblendet).

(20)

	Singular	Dual	Plural
1	?aktub	n-aktub	n-aktub
2mask	t-aktub	t-aktub-aa	t-aktub-uu
3mask	y-aktub	y-aktub-aa	y-aktub-uu

Annahmen:

- (i) Verarmung tilgt in der 1. Person den Unterschied zwischen Plural und Dual, nämlich das Merkmal [+dl].
- (ii) Person und Numerus werden in zwei separate X⁰s gespalten.

(21) *Vokabularelemente:*

- a. /?-/ ↔ [+1,-3,-pl]
- b. /n-/ ↔ [+1,-3,+pl]
- c. /t-/ ↔ [-1,-3]
- d. /y-/ ↔ [+3]
- e. /-aa/ ↔ [+pl,+dl]
- f. /-uu/ ↔ [+pl]

(22)

	1. Dual	2. Dual	3. Dual
Syntax	[+1,-3,+pl,+dl]	[-1,-3,+pl,+dl]	[-1,+3,+pl,+dl]
Verarmung	[+1,-3,+pl]	[-1,-3,+pl,+dl]	[-1,+3,+pl,+dl]
Vokabulareinsetzung	n-X	t-X-aa	y-X-aa

Konsequenz:

Es kann nicht der Fall eintreten, dass in der 1. Person Dual und Plural unterschieden sind.

Trommers Idee:

Verarmung muss nicht durch eine gesonderte Regel bewirkt werden; Verarmung kann schlicht aufgefasst werden als Ergebnis der Einsetzung von Nullmarkern. (“Impoverishment is simply the effect of zero-VIs that consume features.”)

(23) *Struktur von Vokabularelementen bei Trommer:*

- a. abstrakt:
(Phon Context Target Deletes)
- b. konkret:
((pref ?) ({}{})) {(1+)(3-)(pl-)} {(1+)(3-)(pl-)}}

Bemerkung:

“Target encodes the necessary features of the target Feature Structure where insertion can take place and Deletes enumerates the features which are deleted when the VI is inserted.”

Trommers Vorschlag:

Die Verarmung des Dualmerkmals bei der 1. Person ergibt sich aus einem entsprechenden Null-Vokabularelement:

(24) *Verarmung des Duals bei der 1. Person:*

- ((∅) ({}{})) {(1+)(3-)(pl+)(dl+)} {(dl+)}}

Potentielles Problem:

“The empirical question remains if the VIs which have to be stipulated under this analysis conform to the specificity hierarchy assumed for VIs.”

Bemerkung:

Um ein zuverlässiges Funktionieren der Verarmungs-Null-Vokabularelemente zu gewährleisten, werden diese z.T. hochspezifisch sein müssen. Dies ist. u.U. (aus der Perspektive der Ikonizität) problematisch.

Ein weiteres Beispiel (Trommer (2003a)):

Verarmung bei Verbkongruenz im Georgischen bei Halle & Marantz (1993). Annahme dort: Eine Verarmungsregel tilgt einen terminalen Plural-Knoten, wenn dieser irgendeinem T/Agr-Knoten mit den Merkmalen [+3],[+pl] folgt. (Der Plural-Knoten kommt hinter die T/Agr-Position durch Spaltung.)

(25) *Vokabularelemente für Klitikposition(en):*

- a. /gv-/ ↔ [+1],[DAT],[+pl]
- b. /m-/ ↔ [+1],[DAT]
- c. /g-/ ↔ [+2],[DAT]
- d. /v-/ ↔ [+1]
- e. ∅ ↔ [+2]

(5) *Vokabularelemente für Plural:*

- f. /-t/ ↔ [+pl]

(26) *Vokabularelemente für T/Agr:*

- a. ∅ ↔ [+1] oder [+2]
- b. /-s/ ↔ [+3],[+pl]
- c. /-en/ ↔ [+3],[+pl]

(27) *Syntaktische Struktur für die Vokabulareinsetzung:*

- 1 2 3 4
[Cl {Pers.,KAS,NUM} {Pers.,KAS,NUM}] [Stamm] [T/Agr] [+pl]

Bemerkung:

Verarmung ist hier wichtig, weil sonst /en/ und /t/ gleichermaßen in der 3. Pers. Plural auftreten können sollten. Dies ist aber nicht der Fall:

Abgeleitetes Paradigma für xatav im Georgischen:

Subj→ Obj↓	1.Sg.	1.Pl.	2.Sg.	2.Pl.	3.Sg.	3.Pl.
1.Sg.	-	-	m-xatav-∅	m-xatav-t	m-xatav-s	m-xatav-en
1.Pl.	-	-	gv-xatav-∅	gv-xatav-t	gv-xatav-s	gv-xatav-en
2.Sg.	g-xatav-∅	g-xatav-t	-	-	g-xatav-s	g-xatav-en
2.Pl.	g-xatav-t	g-xatav-t	-	-	g-xatav-(s-)t	g-xatav-en
3.Sg.	v-xatav-∅	v-xatav-t	∅-xatav-∅	∅-xatav-t	∅-xatav-s	∅-xatav-en
3.Pl.	v-xatav-∅	v-xatav-t	∅-xatav-∅	∅-xatav-t	∅-xatav-s	∅-xatav-en

Trommers Beobachtung:

Eine bei Halle und Marantz vorausgesetzte Verarmungsregel wie (28-a) ist reformulierbar als Eintrag für ein phonologisch leeres Vokabularelement wie in (28-b).

- (28) a. [+pl] → ∅ / [+Nom,+3,+pl]
b. ∅ ↔ [+pl] / [+Nom,+3,+pl]

Problem:

Lässt sich diese Analyse auf alle vorgeschlagenen Fälle von Verarmung generalisieren? Schwierigkeiten können dort entstehen, wo der Verarmungs-Nullmarker wegen des Teilmengenprinzips (mit der Spezifizitätsbedingung darin) so spezifisch sein müsste, dass er erwünschte Vokabulareinsetzung auch zu verhindern droht.

3.2 Global Impoverishment in Sierra Popoluca**3.2.1 Introduction***Goal:*

An analysis of verbal argument encoding morphology in Sierra Popoluca on the basis of Distributed Morphology that is maximally economical and accounts for all instances of syncretism (marker homonymy).

Main claims:

1. Morphological underspecification is needed.
2. Person features and case features must be decomposed into smaller units ($[\pm 1, \pm 2]$; $[\pm \text{gov}]$).
3. Impoverishment is needed.
4. Impoverishment is brought about by deletion rules (Halle & Marantz (1993, 1994)), not by the interaction of feature co-occurrence restrictions and feature hierarchies (Noyer (1992)).
5. The local domain of impoverishment can be larger than the functional morpheme (Q-morpheme).
6. Post-syntactic vocabulary insertion can be replaced by pre-syntactic probe-driven Agree (Alexiadou & Müller (2005), based on Chomsky (2000, 2001)); post-syntactic impoverishment can be reformulated as a pre-syntactic operation.

3.2.2 The Syntax of Argument Encoding in Sierra Popoluca

Sierra Popoluca:

A Mixe-Zoque language spoken in Mexico (Isthmus of Tehuantepec, Veracruz, Soteapan: ‘Soteapan Zoque’); speakers < 30,000.

Lit.: Elson (1960a,b), Elson & Pickett (1964), Lind (1964), Marlett (1986).

Note:

Sierra Popoluca is a head-marking, ergative language.

Head-marking:

The encoding of primary arguments in Sierra Popoluca does not proceed by dependent-marking (case-markers on DPs); it proceeds by head-marking (Nichols (1986)): The prefixal agreement morphology on the verb is sensitive to the distinction between external and internal arguments; i.e., there is case marking on the verb, in addition to person marking (Elson (1960a, 29-30), Elson (1960b, 207-208)). Overtly realized argument DPs are optional throughout.

Assumptions:

- (i) The argument encoding prefixes of Sierra Popoluca are morphological realizations of person and case feature bundles on the functional categories T and v (Chomsky (1995, ch. 10)) that agree with DP arguments merged in vP/VP; they are not incorporated pronouns (Jelinek (1984)).
- (ii) The DP arguments that the person and case feature bundles on T and v agree with may be phonologically empty pronouns throughout, or (where possible) overtly realized DPs (see Baker (1996), Phillips (1993), Bruening (2001) for some of the options that arise).

Ergative marking pattern:

The encoding of primary arguments in Sierra Popoluca does not follow an accusative marking pattern; it follows an ergative marking pattern: The external argument of a

transitive verb is singled out and marked with special verbal markers (ergative); all other verbal arguments are encoded by other verbal markers (absolutive).

Table 10: Accusative vs. ergative pattern of argument encoding (Plank (1995))

accusative pattern		ergative pattern	
DP _{ext} -V _i	DP _{int} -V _i	DP _{ext} -V _i	DP _{int} -V _i
DP _{ext} -V _t	DP _{int} -V _t	DP _{ext} -V _t	DP _{int} -V _t
nom	acc	erg	abs

Historical note:

- (i) Elson (1960b) calls the two kinds of markers ASSOCIATE and PARTICIPANT.
- (ii) Marlett (1986) explicitly identifies the underlying encoding pattern as an ergative-absolutive pattern; he calls the two kinds of markers A and B.
- (iii) Following much recent work on Mesoamerican languages (see, e.g., Bickel & Nichols (2001) and references cited there), I use the labels ERGATIVE and ABSOLUTE.

Assumptions:

- (i) Ergative case and absolutive case are features on functional heads (v, T) that value (or match with) corresponding features on argument DPs under Agree.
- (ii) Ergative case is located on v; absolutive case is located on T. Hence, ergative is the inner, governed case (on a par with accusative in nominative-accusative patterns), and absolutive is the outer, default-like case (on a par with nominative in accusative-nominative patterns). Thus, in an ergative-absolutive pattern, the inner case shows up on the external argument DP, and the outer case shows up on the internal argument DP in transitive contexts. In intransitive contexts, v does not bear a case feature, and all arguments (external or internal) bear absolutive case regulated by T. See Murasugi (1992), Müller (2004).
- (See Chomsky (1993), Bobaljik (1993), Laka (1993), Rezac (2003), Bittner & Hale (1996) for other options within the minimalist program; Kiparsky (1999), Woolford (2001), Stiebels (2002) for other options in optimality theory.)
- (iii) Head movement of V to v, and of v+V to T yields a complex word T+v+V.

(29) *Absolutive markers in intransitive contexts:*

- a. A-nik-pa
1.ABS-go-INC
'I am going.' (Marlett (1986, 364))
- b. A-pi:šĩñ
1.ABS-man
'I am a man.'
- c. Ta-hoy-pa
1.INCL.ABS-take.a.walk-INC
'You and I take a walk.'

- d. Ø-Wiʔk-pa
3.ABS-eat-INC
'He eats.'
- e. Ø-Nik-pa šiwan
3.ABS-go-INC John
'John is going.'
- f. Ø-Koʔc-tar-p šiwan
3.ABS-hit-PASS-INC John
'John is being hit.'

(Elson (1960b, 208))

(30) *Absolutive and ergative markers in transitive contexts:*

- a. A-Ø-koʔc-pa
1.ABS-3.ERG-hit-INC
'He hits me.'
- b. Ø-Aŋ-koʔc-pa
3.ABS-1.ERG-hit-INC
'I hit him.'
- c. M-aŋ-koʔc-pa
2.ABS-1.ERG-hit-INC
'I hit you.'
- d. Ø-I-koʔc-pa
3.ABS-3.ERG-hit-INC
'He hits him.'
- e. Ø-I-koʔc-yah-pa
3.ABS-3.ERG-hit-3.PL-INC
'They hit him./'He hits them./'They hit them.'

(Elson (1960b, 208))

(Elson (1960b, 209))

Note:

The ergative markers also show up in two other contexts:

- (i) Ergative markers act as possessive markers in DPs (see Benveniste (1974), Anderson (1992)).
- (ii) Ergative markers appear with the distribution of a nominative marker in a nominative-accusative system in certain types of embedded clauses: in those temporal adjunct clauses that do not have a Spanish adverb, and to some extent in clauses embedded under intransitive verbs.

(31) *Ergative markers as possessive markers:*

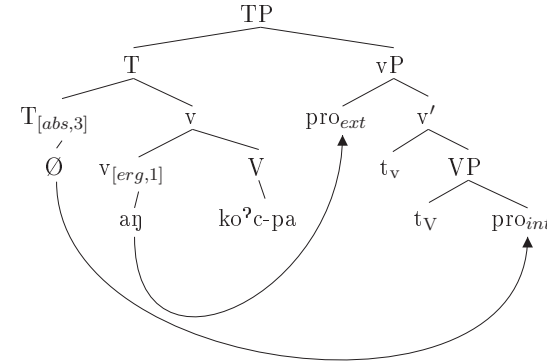
- a. an-tik
1.ERG-house
'my house'
- b. M-an-ha:tuŋ
2.ABS-1.ERG-father
'You are my father.'

(Elson (1960b, 208))

(32) *Ergative markers in adjunct clauses:*

mu an-nik
als 1.ERG-go
'when I went'

(Elson (1960b, 208), Marlett (1986, 364))

(33) *Syntactic structure of ergative/absolutive marking (for (30-b)), simplified):*(34) *Order of verbal affixes in Sierra Popoluca:*

PERS.ABS – PERS.ERG – V – NUM – PASS – ASP

Note:

Number, passive, and aspect markers are ignored here.

- (i) Number marking is of secondary importance in Sierra Popoluca (on nouns as well as on verbs; see Elson (1960b, 209, 219), Noyer (1992, 211-215)), and does not contribute to argument encoding.
- (ii) Passive and aspect markers may either show up on V (under Agree with relevant features in v and T, respectively), or may be suffixal realizations of the relevant features in v and T (which might then argue for autonomous morphological structure).

3.2.3 The Morphology of Argument Encoding in Sierra PopolucaTable 11: *Fusional case/person markers in Sierra Popoluca*

	ABS	ERG
1.	a	an
1. _{incl}	ta	tan
2.	mi	iñ
3.	Ø	i

	ABS ← ERG
1 → 2	man
2 → 1	an

Two difficulties for head-marking languages:

- (i) There is no reliable encoding of arguments in 3./3. contexts. Some languages solve this problem by employing strategies like gender (class) agreement or obligatory passivization (Nichols (1986, 112-113), Aissen (2002)); other languages don't. Sierra Popoluca belongs in this latter class.

(ii) There is less space in a word than there is in a clause. Consequently, in transitive contexts where a priori two markers would be expected to co-occur, it often happens that portmanteau markers are created (which merge the expected markers into a single marker), or that one of the two markers simply fails to show up: *participant reduction*. This is also known as a *neutralization* effect (Noyer (1992)). Both situations can be found in Sierra Popoluca.

(35) *Marker clash in Sierra Popoluca:*

- a. If local person (1./2.) and 3. person co-occur, only the marker for local person shows up, irrespective of its status as ABS or ERG.
- b. If 1. and 2. person co-occur, complex markers arise via /i/ deletion; the order is ABS-ERG:
 - (i) 2.ABS ← 1.ERG = mi-an > man
 - (ii) 1.ABS ← 2.ERG = a-iñ > an

Note:

- (i) Reflexivity is marked by a suffix on the verb.
- (ii) Nothing special happens when two 3. persons co-occur (non-reflexively).

Observation:

Participant reductions like the one at hand can be accounted for straightforwardly by invoking optimality theory (Prince & Smolensky (2004)). See Trommer (2003b) on the ban on simultaneous realization of 1-SUBJ and 2.OBJ in Ainu.

(36) *An optimality-theoretic analysis:*

PARSE-1./2. ≫ ALIGN(PERS)-LEFT ≫ PARSE-3, PARSE-CASE

Problem:

Such an approach takes the markers in table 11 as given and ignores the fact that they consist of very few recurring building blocks: the segments /n/, /a/, /i/, /m/, and /t/.

Consequence:

A maximally simple approach that accounts for all instances of syncretism within the inventory of case/person markers in Sierra Popoluca must involve *subanalysis* of the markers in table 11.

Claim:

A subanalysis of the markers in table 11 automatically accounts for the participant reduction effects.

Problem (Elson & Pickett (1964, 51-52), also cf. Elson (1960b, fn. 7)):

“Morpheme cutting may sometimes be extended beyond the point of diminishing returns, when further analysis makes the results more complicated than they might be otherwise. Analysis beyond this point is called subanalysis. Sierra Popoluca has nine prefixes marking person of subject and object which occur with transitive verbs

[...] Clearly, there are some further morpheme cuts that can be made [in table 11]: t- adds the second person to the first; a- always involves the first person; man- (I-you) can be dissolved into mi- + an-, and an- ‘you-me’ into a- + [iñ]; but further cuts become more difficult. The best solution seems to be to leave the nine forms as a set for describing the grammar of Sierra Popoluca, and perhaps mention in a footnote that some subanalysis is possible.”

Solution:

These objections disappear if underspecification of markers and impoverishment (underspecification of syntactic contexts) are available.

(Also see the appendix on Pike’s analysis of German verb inflection.)

3.2.4 A Distributed Morphology Approach

3.2.4.1 Background Assumptions

(37) *Late vocabulary insertion:*

- a. Functional morphemes like v and T contain fully specified bundles of morpho-syntactic features in syntax; however, they do not yet contain phonological material.
- b. Inflection markers are vocabulary items that pair phonological and (often underspecified) morpho-syntactic features; they are inserted post-syntactically in accordance with the Subset Principle.

(38) *Subset Principle* (Halle (1997)):

A vocabulary item V is inserted into a functional morpheme M iff (i) and (ii) hold:

- (i) The morpho-syntactic features of V are a subset of the morpho-syntactic features of M .
- (ii) V is the most specific vocabulary item that satisfies (i).

(39) *Specificity of vocabulary items* (Lumsden (1992), Noyer (1992), Wiese (1999)):

A vocabulary item V_i is more specific than a vocabulary item V_j iff there is a class of features \mathbb{F} such that (i) and (ii) hold.

- (i) V_i bears more features belonging to \mathbb{F} than V_j does.
- (ii) There is no higher-ranked class of features \mathbb{F}' such that V_i and V_j have a different number of features in \mathbb{F}' .

(40) *Impoverishment* (Bonet (1991), Halle & Marantz (1993, 1994), Bobaljik (2002b), Frampton (2002)):

Morpho-syntactic features can be deleted post-syntactically before vocabulary insertion takes place; this effects a “retreat to the general case”.

(41) *Fission* (Noyer (1992), Frampton (2002), *not* Halle & Marantz (1993)):

If insertion of a vocabulary item V with the morpho-syntactic features β takes place into a fissioned morpheme M with the morpho-syntactic features α , then α

is split up into β and $\alpha-\beta$, such that (a) and (b) hold:

- a. $\alpha-\beta$ is available for further vocabulary insertion.
- b. β is not available for further vocabulary insertion.

Assumption:

T and v in Sierra Popoluca are fissioned morphemes.

3.2.4.2 Case and Person Features

Assumption:

Cases and persons are decomposed into combinations or more primitive binary features. Underspecification with respect to these features encodes natural classes (of cases and persons) that vocabulary items and impoverishment operations can refer to.

(42) *Case* (Bierwisch (1967)):

- a. ERG = [+gov]
- b. ABS = [-gov]

(43) *Person* (Noyer (1992), Wiese (1994), Frampton (2002)):

- a. 1 = [+1,-2]
- b. 1_{incl} = [+1,+2]
- c. 2 = [-1,+2]
- d. 3 = [-1,-2]

(44) *Natural classes of persons in Icelandic verbal inflection:*

[A] *Weak conjugation, class 1:*

krefja ('demand')

	present	past
1.Sg.	kref	krafði
2.Sg.	krefur	krafðir
3.Sg.	krefur	krafði
1.Pl.	krefjum	kröfðum
2. Pl.	krefjið	kröfðuð
3. Pl.	krefja	kröfðu

[B] *Strong conjugation, class 3:*

sleppa ('slip')

	present	past
1.Sg.	slepp	slapp
2.Sg.	sleppur	slappst
3.Sg.	sleppur	slapp
1.Pl.	sleppum	slappum
2.Pl.	sleppið	slappuð
3.Pl.	sleppa	slappu

Analysis:

Two impoverishment rules ensure that the system-defining nature of two kinds of syncretism can be derived:

- (i) In past singular contexts, $[\pm 1]$ is deleted, and 1. and 3. person become indistinguishable: [-2] (Frampton (2002), also see Wiese (1994)).
- (ii) In present singular contexts, $[\pm 2]$ is deleted, and 2. and 3. person become indistinguishable: [-1].

(45) *Feature hierarchy* (for determining specificity):

$[\pm \text{gov}] \gg [\pm 1] \gg [\pm 2]$

3.2.4.3 Subanalysis of Sierra Popoluca Argument Encoding Morphology

(46) *Vocabulary items:*

- a. /n/ \leftrightarrow [+gov]
- b. /a/ \leftrightarrow [+1]
- c. /i/ \leftrightarrow [-1]
- d. /m/ \leftrightarrow [+2] ([-gov])
- e. /t/ \leftrightarrow [+2] ([+1])

Note:

The insertion contexts for /m/ and /t/ include features in brackets; this captures the difference between primary exponence and secondary exponence (Noyer (1992, ch. 1)). Features in brackets may have been targeted by earlier insertion operations.

(47) *Impoverishment rule [A]* (local):

$$[\alpha \text{gov}] \rightarrow \emptyset / [-\alpha 1, -\alpha 2] \underline{\quad} \Rightarrow$$

- (i) [+gov] $\rightarrow \emptyset / [-1, -2] \underline{\quad}$
- (ii) [-gov] $\rightarrow \emptyset / [+1, +2] \underline{\quad}$

Note:

α is a variable over \pm ; see Chomsky & Halle (1968b), Halle (1992), Noyer (1992), Harley (1994), Johnston (1996), Alexiadou & Müller (2005). (47) unifies two separate impoverishment rules:

- (i) Ergative is deleted in 3. person contexts.
- (ii) Absolutive is deleted in 1. person inclusive contexts.

(48) *Impoverishment rule [B]* (global):

$[-1, -2] \rightarrow \emptyset / [-\text{gov}] \underline{\quad}$

Crucial assumptions:

- (i) Rule [A] applies *locally*, in the minimal functional morpheme (T or v).
- (ii) Rule [B] applies *globally*, in the maximal functional morpheme (T including v). (Alternatively, the local domain is the phase; Chomsky (2001, 2005).)
- (iii) The rules do not apply iteratively; they apply either once or not at all in their respective domain. (This is to avoid unwanted massive deletion by the global rule [B].)

Note:

The co-existence of rules [A] and [B] is incompatible with Noyer's (1992) tenet that impoverishment is produced by feature co-occurrence restrictions plus feature hierarchies, and not by rules. The reason is that [A] and [B] together closely resemble the scenario in (49). Noyer's approach rules out such a scenario because impoverishment here must be triggered by a filter $*[\alpha, \beta]$ in interaction with a universal hierarchy of features which must rank one of the features higher than the other one (which is then deleted).

(49) *Noyer's impossible scenario:*

- a. $\alpha \rightarrow \emptyset/\beta$
- b. $\beta \rightarrow \emptyset/\alpha$

(50) *Results of cyclic vocabulary insertion (from the inside out):*

- a. ABS:
 - (i) $[+1,-2,-gov] \rightarrow /a/$
 - (ii) $[+1,+2,-gov] \rightarrow /t-a/$
 - (iii) $[-1,+2,-gov] \rightarrow /m-i/$
 - (iv) $[-1,-2,-gov] \rightarrow / \emptyset /$
- b. ERG:
 - (i) $[+1,-2,+gov] \rightarrow /a-n/$
 - (ii) $[+1,+2,+gov] \rightarrow /t-a-n/$
 - (iii) $[-1,+2,+gov] \rightarrow /i-n/$
 - (iv) $[-1,-2,+gov] \rightarrow /i/$
- c. ABS-ERG
 - (i) $[+1,-2,-gov] [-1,+2,+gov] (2 \rightarrow 1) /a-n/$
 - (ii) $[-1,+2,-gov] [+1,-2,+gov] (1 \rightarrow 2) /m-a-n/$
 - (iii) $[-1,-2,-gov] [-1,-2,+gov] (3 \rightarrow 3) /i/$
 - (iv) $[-1,-2,-gov] [+1,-2,+gov] (1 \rightarrow 3) /a-n/$
 - (v) $[-1,-2,-gov] [-1,+2,+gov] (2 \rightarrow 3) /i-n/$
 - (vi) $[+1,-2,-gov] [-1,-2,+gov] (3 \rightarrow 1) /a/$
 - (vii) $[-1,+2,-gov] [-1,-2,+gov] (3 \rightarrow 2) /m-i/$

Effects of rule [A]:

- (i) Occurrence of /t/ instead of /m/ in the context 1_{incl}.ABS.
- (ii) Absence of /n/ in the context 3.ERG.

Effects of rule [B]:

- (i) Absence of a marker in a simple context 3.ABS.
- (ii) Absence of a marker for 3. person if the other argument is also 3. person.
- (iii) Absence of a marker for 3. person if the other argument is 1. or 2. person.
- (iv) Absence of /i/ in the transitive contexts 1 \rightarrow 2, 2 \rightarrow 1.

Conclusion:

The system of argument encoding morphology in Sierra Popoluca can be given a maximally simple analysis that accounts for all instances of syncretism in a systematic way and derives both the inventory of inflection markers and the participant reduction effects in transitive contexts. The following concepts proved necessary:

- (i) Underspecification of case/number markers.
- (ii) Fission.
- (iii) Impoverishment, including *global* impoverishment.

Question:

Can global impoverishment be avoided by assuming *fusion* of v and T (Halle & Marantz (1993)), which would create a complex v-T morpheme without internal structure?

Answer:

No. Vocabulary insertion must be restricted to the simple v and T morphemes throughout, and cannot combine features from v and T to provide a single insertion context.

3.3 A Pre-Syntactic Alternative

Observation:

Given optimal design considerations (Chomsky (2001, 2005)), splitting up inflection markers into two separate units (f-morpheme and vocabulary item) looks like an imperfection. The null hypothesis would be that the elementary operations of syntax (Merge, Agree, Move) also active in morphology, and specific morphological operations like vocabulary insertion can be dispensed with.

Claim:

This presupposes a pre-syntactic morphology that nevertheless employs underspecification (like the system in Wunderlich (1996)). Such a system, based on minimalist assumptions, is developed in Alexiadou & Müller (2005) (see chapter 2).

(51) *Components of Grammar:*

Lexicon \rightarrow Morphology \rightarrow Syntax \rightarrow PF, LF

(52) *Sketch of verbal inflection:*

- a. A verb stem is taken from the lexicon with its inherent features (e.g., class features).
- b. Non-inherent features (incl. fully specified case and person features) are added in morphology; these features provide the context for underspecified inflection markers.
- c. All of an inflection marker's features (including underspecified case and person features) are inherent.
- d. The inflection marker determined by (an appropriately revised version of) the Subset Principle is selected from the lexicon and merged with the verb stem, resulting in Agree.
- e. Syntactically uninterpretable features of the verb stem, and all morpho-syntactic features of the inflection marker, are deleted in morphology.
- f. The inflected verb enters syntax, bearing only fully specified and syntactically interpretable morpho-syntactic features.

Side remark:

In the terminology of Stump (2001), this approach qualifies as "lexical-realizational", just like standard Distributed Morphology: Despite being a lexical item with morpho-syntactic features, an inflection marker does not actually contribute any

morpho-syntactic information to the stem that it combines with.

Question:

Can a pre-syntactic approach to inflection handle fission and impoverishment?

Impoverishment:

Impoverishment can be viewed as a pre-syntactic operation, provided that the features that are affected are invisible for morphology, but not for subsequent syntactic operations. On this view, impoverishment of T applies in the morphological component after its features have been added, but before the Agree operation with (matching features of) an inflection marker is carried out. Impoverishment *marks* features as morphologically inaccessible, but it does not *delete* them (cf. Chomsky's (1995) difference between deletion and erasure).

Fission:

Suppose that the defining property of fission is that a class feature probe that has triggered an Agree operation (Alexiadou & Müller (2005)) does not delete immediately, but may trigger further Agree operations, and only deletes when no further Agree operation is possible anymore. I.e., a “fissioned morpheme” emerges as a certain kind of class feature probe (in a morpheme).

Note:

This may be straightforward for Icelandic noun declension, but Sierra Popoluca does not have different inflection classes for verbs. The inflection class feature triggering inflection in Sierra Popoluca must therefore be trivial. See Aronoff' (1994) definition of inflection classes:

(53) *Inflectional Class:*

An inflectional class is a set of lexemes whose members each select the same set of inflectional realizations.

Aronoff (1994, 182): “Strictly speaking, a language whose major lexical categories each have only one inflectional class will still have inflectional classes.”

Note:

A similar approach suggests itself for multiple *wh*-movement in Bulgarian (assuming that such multiple movement is a homogenous phenomenon, but cf. Bošković (2002)): The *wh*-probe feature on C does not delete after checking the first *wh*-phrase; it deletes when there is no further *wh*-phrase left.

(54) *Multiple wh-movement in Bulgarian:*

[_{CP} Koj₁ kogo₂ kakvo₃ C [_{TP} t₁ e pital t₂ t₃]] ?
 who whom what asked

(55) *An Example* ((30-b) again):

- a. Select $ko^2c-pa[+\alpha]$ ('hit') from the lexicon. ($[+\alpha]$ is the trivial inflection class feature.)
- b. Add fully specified case and person features (plus, irrelevantly, others):
 $ko^2c-pa[+\alpha]:\{-1,-2,-gov\},\{+1,-2,+gov\}$ ('I hit him')
- c. Apply impoverishment rule [A] (once per feature bundle, vacuously).
- d. Apply impoverishment rule [B] (once per feature set):
 $ko^2c-pa:\{-1,-2,-gov\},\{+1,-2,+gov\}$
- e. Merge /n/ according to Subset Principle:
 $ko^2c-pa[+\alpha]:\{-1,-2,-gov\},\{+1,-2,+gov\} + /n/:\{[+gov]\} \rightarrow$
 $n-ko^2c-pa[+\alpha]:\{-1,-2,-gov\},\{+1,-2,+gov\}$
- f. Merge /a/ according to Subset Principle:
 $n-ko^2c-pa[+\alpha]:\{-1,-2,-gov\},\{+1,-2,+gov\} + /a/:\{[+1]\} \rightarrow$
 $a-n-ko^2c-pa[+\alpha]:\{-1,-2,-gov\},\{+1,-2,+gov\}$
- g. The (trivial) inflection class feature that has triggered all inflection operations is finally deleted.
 $a-n-ko^2c-pa[+\alpha]:\{-1,-2,-gov\},\{+1,-2,+gov\} \rightarrow$
 $a-n-ko^2c-pa:\{-1,-2,-gov\},\{+1,-2,+gov\}$
- h. The inflected verb form enters syntax, with all morpho-syntactic features (whether affected by impoverishment, affected by Agree, or not affected at all) accessible to syntactic operations.

3.4 Appendix: Pike on German Verbs

3.4.1 The Idea

Observation:

There is evidence that the individual word forms are composed of smaller units: *partial syncretism*.

Partial Syncretism in the Suppletive Paradigm: Subanalysis

(56) *Pike's (1965) subanalysis of verb inflection with sein ('be') in German:*

1.sg	b	i	n	
2.sg	b	i	s	t
3.sg		i	s	t
1.pl	z	i	n	t
2.pl	z	a	i	t
3.pl	z	i	n	t
inf	z	a	i	n

Claim (Baerman et al. (2005)):

“Whatever the merits of such an analysis, it is not one which is compatible with most morphological models”.

Side remark: Pike's (1965) article contains two further analyses of inflectional phenomena in German: a subanalysis of definite article inflection (*der, die, das*, etc), and a subanalysis of personal pronouns, including suppletion phenomena (*ich, mich, mir, meiner*, etc.).

Observation: Pike-style analyses have independently been developed for these phenomena in current morphological theories:

- Wunderlich (1997a), Wiese (1999) on the inflection of definite articles
- Wiese (2001b), Fischer (2006) on the inflection of personal pronouns

Subanalysis in Current Morphological Theories

Question:

Do we have to assume that the verb forms in (56) are *morphological constructions* (i.e., not decomposable)?

Answer:

Probably not:

Subanalysis is pursued in many current morphological theories:

- *Distributed Morphology:* noun inflection in Latvian and Russian (Halle (1992, 1994)), Afro-Asiatic prefix conjugation (Noyer (1992)), argument encoding markers on verbs in Georgian and Potawatomi (Halle & Marantz (1993)), Spanish object clitics (Halle & Marantz (1994)), verb inflection in Kiowa (Harbour (2003)), noun inflection in Icelandic (Müller (2005)), verb inflection in Menominee (Trommer (2006b), Nevins (2007)), various other phenomena (papers collected in Müller & Trommer (2006))
- *Paradigm Function Morphology* (and other stem-and-paradigm approaches): Bulgarian verb inflection (Stump (2001)), argument encoding markers on verbs in Georgian and Potawatomi (Anderson (1992))
- *Minimalist Morphology* (Wunderlich (1996, 1997b))

3.4.2 Appendix 1: Pike's (1965) Subanalysis of German Verb Inflection in Paradigm Function Morphology

(57) $RR_{n,\tau,C}(\langle X,\sigma \rangle) =_{def} \langle Y,\sigma \rangle$

(58) *Pike's (1965) subanalysis of verb inflection with sein ('be') in German:*

	A	B	C	D	E
1.sg	b		i	n	
2.sg	b		i	s	t
3.sg			i	s	t
1.pl	z		i	n	t
2.pl	z	a	i		t
3.pl	z		i	n	t
inf	z	a	i	n	

(59) *Realization rules in Paradigm Function Morphology*

a. **Block A:**

A1 $RR_{A,\{AGR:\{PER:3,NUM:sg\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle Y,\sigma \rangle$, where Y is X's First Stem.

A2 $RR_{A,\{AGR:\{NUM:sg\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle Y,\sigma \rangle$, where Y is X's Second Stem.

A3 $RR_{A,\{\},sein}(\langle X,\sigma \rangle) =_{def} \langle Y,\sigma \rangle$, where Y is X's Third Stem.

b. **Block B:**

B1 $RR_{B,\{AGR:\{PER:2,NUM:pl\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle Xa,\sigma \rangle$.

c. **Block C:**

C1 $RR_{C,\{\},sein}(\langle X,\sigma \rangle) =_{def} \langle Xi,\sigma \rangle$.

d. **Block D:**

D1 $RR_{D,\{AGR:\{PER:2,NUM:pl\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle X,\sigma \rangle$.

D2 $RR_{D,\{AGR:\{NUM:sg\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle Xs,\sigma \rangle$.

D3 $RR_{D,\{\},sein}(\langle X,\sigma \rangle) =_{def} \langle Xn,\sigma \rangle$.

D4 $RR_{D,\{AGR:\{PER:1,NUM:sg\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle Y,\sigma \rangle$, where $Nar_D(\langle X,\sigma / \{AGR:\{Num:pl\}\} \rangle) = \langle Y,\sigma / \{AGR:\{Num:pl\}\} \rangle$

e. **Block E:**

E1 $RR_{E,\{AGR:\{PER:1,NUM:sg\}\},sein}(\langle X,\sigma \rangle) =_{def} \langle X,\sigma \rangle$.

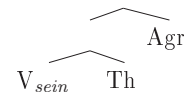
E2 $RR_{E,\{\},sein}(\langle X,\sigma \rangle) =_{def} \langle Xt,\sigma \rangle$.

(60) *Identity Function Default:*

$RR_{n,\{\},U}(\langle X,\sigma \rangle) =_{def} \langle X,\sigma \rangle$

3.4.3 Appendix 2: Pike's (1965) Subanalysis of German Verb Inflection in Distributed Morphology

(61)



(62) *Vocabulary insertion rules in Distributed Morphology*

- a. (i) /b/ $\leftrightarrow V_{sein} / __ [-3,-pl]$
(ii) /z/ $\leftrightarrow V_{sein} / __ [+pl]$

- b. (i) /a/ ↔ [+β] / V_{sein}, [-1,+2,+pl]
 (ii) /ɪ/ ↔ [+α] / V_{sein}
- c. (i) /∅/ ↔ [-1,+2] / V_{sein}, [+pl]
 (ii) /s/ ↔ [-1,±2] / V_{sein}, [-pl]
 (iii) /n/ ↔ [-2] / V_{sein}
 (iv) /∅/ ↔ [-pl] / V_{sein}, [+1]
 (v) /t/ ↔ V_{sein}, [±pl]

Chapter 4

Morphological Richness

4.1 Introduction

Main claims:

(i) An approach to German verb inflection in terms of Distributed Morphology (Halle & Marantz (1993, 1994)) that relies on fission and impoverishment can derive all instances of syncretism in a simple and maximally general way; this provides further evidence for these two operations as means to capture systematic mismatches of morphology and syntax.

(ii) The present analysis can be transferred from a post-syntactic approach to inflectional morphology based on late insertion, to a pre-syntactic approach based on Agree-driven Merge (as assumed for syntax in Chomsky (2001, 2005)).

(iii) In a pre-syntactic approach, inflection can be shown to behave like other (syntactic) structure-building operations (conceptual argument).

(iv) A pre-syntactic approach to inflection can offer a new way of measuring morphological richness, as it plays a role in pro-drop (empirical argument).

Plot:

1. Section 2: I develop a Distributed Morphology approach to German verb inflection. The approach makes crucial use of standard techniques like (i) decomposition of person features and (ii) underspecification of inflection markers. In addition, it employs two mechanisms that only exist in Distributed Morphology: (iii) fission; and (iv) impoverishment. Fission permits a *subanalysis* of markers; impoverishment derives *system-wide patterns of syncretism*.
2. Section 3: I argue that given minimalist assumptions, post-syntactic vocabulary insertion should be replaced by pre-syntactic probe-driven Merge; post-syntactic fission and impoverishment then should be reformulated as pre-syntactic fission and impoverishment.
3. Section 4: I show that post-syntactic inflection is incompatible with an approach to *pro*-licensing that is (i) syntactic, and (ii) relies on the richness of morphological inventories, and I sketch a pre-syntactic alternative according to which a certain type of impoverishment blocks licensing of *pro*.

4.2 A Distributed Morphology Approach to German Verb Inflection

4.2.1 Background Assumptions

- (1) *Late vocabulary insertion*:
- Functional morphemes like *v* and *T* contain fully specified bundles of morpho-syntactic features in syntax; however, they do not yet contain phonological material.
 - Inflection markers are vocabulary items that pair phonological and (often underspecified) morpho-syntactic features; they are inserted post-syntactically in accordance with the Subset Principle.
- (2) *Vocabulary insertion into functional morphemes*:
 $[_{TP} \dots [_{T} [_{v} V v] T] [_{VP} \dots t_v [_{VP} \dots t_V \dots]]]$
- (3) *Subset Principle* (Halle (1997)):
 A vocabulary item *V* is inserted into a functional morpheme *M* iff (i) and (ii) hold:
 (i) The morpho-syntactic features of *V* are a subset of the morpho-syntactic features of *M*.
 (ii) *V* is the most specific vocabulary item that satisfies (i).
- (4) *Specificity of vocabulary items* (Lumsden (1992), Noyer (1992), Wiese (1999)):
 A vocabulary item *V_i* is more specific than a vocabulary item *V_j* iff there is a class of features \mathbb{F} such that (i) and (ii) hold.
 (i) *V_i* bears more features belonging to \mathbb{F} than *V_j* does.
 (ii) There is no higher-ranked class of features \mathbb{F}' such that *V_i* and *V_j* have a different number of features in \mathbb{F}' .
- (5) *Feature hierarchy* (for determining specificity):
 Tense > Number > Person
- (6) *Impoverishment* (Bonet (1991), Halle & Marantz (1993, 1994), Bobaljik (2002b), Frampton (2002)):
 Morpho-syntactic features can be deleted post-syntactically before vocabulary insertion takes place; this effects a “retreat to the general case”.
- (7) *Fission* (Noyer (1992), Frampton (2002), Müller (2005)), *not* Halle & Marantz (1993)):
 If insertion of a vocabulary item *V* with the morpho-syntactic features β takes place into a fissioned morpheme *M* with the morpho-syntactic features α , then α is split up into β and $\alpha-\beta$, such that (a) and (b) hold:
 a. $\alpha-\beta$ is available for further vocabulary insertion.
 b. β is not available for further vocabulary insertion.

Assumption:

T in German is subject to fission.

4.2.2 German Verb Inflection

- (8) a. *Weak conjugation*
glauben (‘believe’) b. *Strong conjugation*
rufen (‘call’) c. *Suppletive conjugation*
sein (‘be’)

	Präsens	Präteritum
1.SG	glaub-e	glaub-te
2.SG	glaub-st	glaub-te-st
3.SG	glaub-t	glaub-te
1.PL	glaub-en	glaub-te-n
2.PL	glaub-t	glaub-te-t
3.PL	glaub-en	glaub-te-n

	Präsens	Präteritum
1.SG	ruf-e	rief
2.SG	ruf-st	rief-st
3.SG	ruf-t	rief
1.PL	ruf-en	rief-en
2.PL	ruf-t	rief-t
3.PL	ruf-en	rief-en

	Präsens	Präteritum
1.SG	bin	war
2.SG	bi-st	war-st
3.SG	is-t	war
1.PL	sind	war-en
2.PL	seid	war-t
3.PL	sind	war-en

Generalization:

There are four instances of syncretism that I take to be non-accidental:

- 1.Pers.Sg.Past = 3.Pers.Sg.Past in all paradigms.
 - 1.Pers.Pl = 3.Pers.Pl in all tenses and paradigms.
 - 3.Pers.Sg.Pres (*t*) = 2.Pers.Pl.Pres (*t*) in (8-ab).
 - 2.Pers.Sg (*st*) = 3.Pers.Sg.Pres (*t*), except for the initial *s*.
- (9) *An observation supporting the systematicity of syncretism (iii)* (Fanselow & Frisch (2005)):
- Er oder ihr wohnt in Frankfurt
 he or you.PL live-3.SG.PRES/2.PL.PRES in Frankfurt
 - Wir oder sie wohnen in Frankfurt
 we or they live-1.PL.PRES/3.PL.PRES in Frankfurt
 - *Ich oder du wohne/wohnst in Frankfurt
 I or you.SG live-1.SG.PRES/live.2.SG.PRES in Frankfurt

State of the art

(Wiese (1994), Wunderlich (1996), Eisenberg (2000), Frampton (2002)):

- Syncretisms (i) and (ii) can be derived (but only Frampton derives them as the general, system-wide properties that they are, via impoverishment).
- Syncretisms (iii) and (iv) cannot be derived (see, however, Bierwisch (1961, 62-66) for an early attempt to derive syncretism (iii).)

Strategy for an analysis that derives all instances of syncretism:

- Feature decomposition creates natural classes of persons.

- (ii) Underspecification of vocabulary items captures such natural classes of persons.
 (iii) Fission ensures that *st* can emerge as the combination of two vocabulary items /s/ and /t/.
 (iv) Impoverishment also refers to natural classes of persons and can thus derive system-wide syncretism patterns.

(10) *Person* (Noyer (1992), Wiese (1994), Wunderlich (1996), Frampton (2002)):

- a. 1 = [+1,-2]
 b. 1_{incl} = [+1,+2]
 c. 2 = [-1,+2]
 d. 3 = [-1,-2]

(11) *Two Φ-feature impoverishment rules that apply to T in German:*

- a. [±1] → Ø/[−2,-pl,+past]___
 b. [±1] → Ø/[−2,+pl]___

(12) *Vocabulary items:*

- a. /te/ ↔ [+past,-strong]
 b. /s/ ↔ [+2,-pl]
 c. /n/ ↔ [-2,+pl]
 d. /t/ ↔ [-1]
 e. /(e)/ ↔ []

(13) *Vocabulary insertion into impoverished Ts in German*

T	[-past]		T	[+past]	
	[-strong]	[+strong]		[-strong]	[+strong]
[+1,-2,-pl]	/e/	/e/	[+1,-2,-pl]	/te/	/Ø/
[-1,+2,-pl]	/s/-/t/	/s/-/t/	[-1,+2,-pl]	/te/-/s/-/t/	/s/-/t/
[-1,-2,-pl]	/t/	/t/	[-1,-2,-pl]	/te/	/Ø/
[+1,-2,+pl]	/n/	/n/	[+1,-2,+pl]	/te/-/n/	/n/
[-1,+2,+pl]	/t/	/t/	[-1,+2,+pl]	/te/-/t/	/t/
[-1,-2,+pl]	/n/	/n/	[-1,-2,+pl]	/te/-/n/	/n/

Assumptions about /(e)/:

- (i) Radically underspecified default markers are inserted iff there is no other marker in the functional morpheme (this also precludes unwanted iteration of /(e)/-insertion; cf. Wunderlich's (1996) Monotonicity Principle).
 (ii) The vocabulary item /(e)/ is somewhat more abstract than the other markers in (12) in the sense that it requires a minimal indication of deviation from the present tense stem. Hence, /(e)/ → Ø whenever there is stem alternation in past tense contexts (strong verbs), or a specific past suffix (weak verbs); and /(e)/ → *e* in present tense contexts when there is no other marker.

Observation:

- (i) 1.Pers.Pl.Past = 3.Pers.Pl.Past in Middle High German.

- (ii) 1.Pers.Pl.Pres ≠ 3.Pers.Pl.Pres in Middle High German.
 (Analysis: Person impoverishment was confined to past contexts.)

Diachronic evidence:

The marker for 3.Pers.Pl.Pres was /n/-/t/, as predicted under the present analysis: If there is no impoverishment rule deleting [-1] in 3.PL contexts, /t/ is predicted to show up. Cf. *helfen*, 1.Pers.Pl.Pres. vs. *helfent*, 3.Pers.Pl.Pres.

4.3 Pre-Syntactic Morphology

4.3.1 General Assumptions

Observation:

Given optimal design considerations (Chomsky (2001, 2005)), splitting up inflection markers into two separate units (f-morpheme and vocabulary item) looks like an imperfection. The null hypothesis would be that the elementary operations of syntax (Merge, Agree, Move) are also active in morphology, and specific morphological operations like vocabulary insertion can be dispensed with.

Claim:

This presupposes a pre-syntactic morphology that nevertheless employs underspecification. Such a system, based on minimalist assumptions, is developed in Alexiadou & Müller (2005) (we should all know that by now).

(14) *Components of Grammar:*

Lexicon → Morphology → Syntax → PF, LF

Assumption (slightly more radical than it has been so far):

Inflectional morphology (of the type under consideration here) takes place in the *numeration* (cf. Chomsky (2000)), more precisely, in that part of the numeration that corresponds to V's extended projection (see Grimshaw (2000)) – crucially, *not* the lexical subarray, because V and T must be in the same local domain for this purpose (unless the lexical subarray of v includes T; see Richards (2004, 2007)).

(15) *Sketch of verbal inflection:*

- a. V is taken from the lexicon with its inherent features (including – possibly trivial but fully specified – class features that act as probes).
 b. T and v are taken from the lexicon and enriched by features, including fully specified Φ- (person, number, gender) features; these features provide the context for underspecified inflection markers (which realize subject or object agreement).
 (Note that this assumption is slightly different from the one made in the preceding chapters, concerning the question which item provides the fully specified syntactic context.)
 c. The inflection marker determined by the Subset Principle is merged with the

verb stem, under Agree, driven by *V*'s class feature, with the fully specified context provided by *T* and *v*, which themselves do not participate in Merge (yet). All of an inflection marker's features (including underspecified case and Φ -features) are inherent.

- d. Syntactically uninterpretable features of the verb stem (class), and all morpho-syntactic features of the inflection marker, are deleted in morphology; *T* and *v* remain unaffected.
- e. The items of the numeration (inflected *V*, *v*, *T*, ...) enter syntax, bearing only fully specified and syntactically interpretable morpho-syntactic features.

Note 1, (15-b):

The effects of the Subset Principle follow if we make the (standard) assumption that Agree requires feature matching, and the more specific assumption that Agree also requires a maximization of matching effects (see Chomsky (2001, 15)). The latter condition then is to be understood in such a way that as many high-ranked features are affected by an Agree operation as possible, where quality outranks quantity.

Note 2, (15-b):

There is a technical issue with (15-c) that must be clarified: Where does the inflection marker that is merged with the verb stem come from?

Two possible answers:

- (i) An inflection marker is taken out of the lexicon when the need arises. This implies that operations in the numeration can still have access to the lexicon (and carry out search in the lexicon, selecting the most specific compatible item).
- (ii) The complete inventory of inflection markers of a given type (e.g., realization for *V-T* in German) may enter the numeration as a single set, and the inflection operation (Merge) picks out one item of this set. This implies that not all material that enters a numeration will have to be used in the syntactic derivation.

4.3.2 Fission and Impoverishment

Question:

This pre-syntactic approach to inflection relies on decomposition and underspecification. Can it handle fission and impoverishment? (Yes, we have seen in the last chapter that it can. Still:)

Impoverishment:

Impoverishment can be viewed as a pre-syntactic operation, provided that the features that are affected are invisible for morphology, but not for subsequent syntactic operations. On this view, impoverishment of *T* applies in the morphological component after its features have been added, but before the Agree operation with (matching features of) an inflection marker is carried out. Impoverishment *marks* features as morphologically unaccessible, but it does not *delete* them (cf. Chomsky's (1995)

difference between deletion and erasure).

Fission:

Suppose that the defining property of fission is that a class feature probe that has triggered an Agree operation does not delete immediately, but may trigger further Agree operations, and only deletes when no further Agree operation is possible anymore. I.e., a "fissioned morpheme" emerges as a certain kind of class feature probe (in a morpheme).

Remark:

A similar approach suggests itself for multiple *wh*-movement in Bulgarian (assuming that such multiple movement is a homogenous phenomenon, but cf. Bošković (2002)): The *wh*-probe feature on *C* does not delete after checking the first *wh*-phrase; it deletes when there is no further *wh*-phrase left.

(16) *Multiple wh-movement in Bulgarian:*

[_{CP} Ko_{j1} kogo₂ kakvo₃ C [_{TP} t₁ e pital t₂ t₃]] ?
 who whom what asked

(17) *An illustration of pre-syntactic inflection:*

- a. Selection of *glaub*:{*V*, [-strong]} from the lexicon.
- b. Selection of *T* from the lexicon; addition of fully specified ϕ - and tense features:
 $T: \{[-1, -2, +pl, +past]\}$
- c. Application of impoverishment rule (11-b) to *T*:
 $T: \{[-1, -2, +pl, +past]\} \rightarrow T: \{[-\bar{1}, -2, +pl, +past]\}$
- d. Agree-driven Merge of (matching, most specific) /te/ with *V*:
 $glaub: \{V, [-strong]\}, T: \{[-\bar{1}, -2, +pl, +past]\} + /te/ : \{[+past, -strong]\} \rightarrow$
 $glaub-te: \{V, [-strong]\}, T: \{[-\bar{1}, -2, +pl, +past]\}$
- e. Agree-driven Merge of (matching, next specific) /n/ with *V*:
 $glaub-te: \{V, [-strong]\}, T: \{[-\bar{1}, -2, +pl, +past]\} + /n/ : \{[-2, +pl]\} \rightarrow$
 $glaub-te-n: \{V\}, T: \{[-\bar{1}, -2, +pl, +past]\}$
- f. *T* and the inflected *V* enter syntax, with all remaining morpho-syntactic features (whether affected by impoverishment, affected by Agree, or not affected at all) accessible to syntactic operations.

Conclusion:

A pre-syntactic approach in terms of Agree-driven Merge can rely on fission and impoverishment, but additional assumptions are necessary.

4.4 Pro-Drop

4.4.1 Morphological Richness

Observation (Bobaljik (2002a)):

If inflectional morphology is post-syntactic, properties of the morphological inventory cannot be held responsible for *V-to-T* movement in syntax: The Rich Agreement

Hypothesis according to which V-to-T movement takes place if a language has a sufficiently rich morphological system of verbal inflection (Roberts (1993), Vikner (1997), Holmberg & Platzack (1995), Rohrbacher (1999)) must therefore be given up in a Distributed Morphology approach. If there is any synchronically relevant correlation at all (see Alexiadou & Fanselow (2000)), it must go in the other direction: Rich verbal morphology can be a *reflex* of movement, but not the *reason* for it.

Note:

The same reasoning applies to licensing of *pro*: Assuming post-syntactic morphology, *pro*-licensing cannot be determined by morphological properties ('richness') because these properties are not yet visible at the point of the derivation where they would be needed; therefore, either (18-a) or (18-b) must hold.

(18) *Consequences of post-syntactic morphology for pro-drop:*

- a. Licensing of *pro* is a syntactic phenomenon but independent of the richness of morphological inventories (Grimshaw & Samek-Lodovici (1998), optimality-theoretic syntax in general).
- b. Licensing of *pro* is a post-syntactic (PF) phenomenon that may or may not rely on a notion of morphological richness (Perlmutter (1971), Holmberg (2004), Adger (2003)).

Observation:

This consequence does not arise if inflectional morphology is pre-syntactic.

(19) *Conceptual and empirical problems with the notion of "richness":*

- a. It has proven difficult to properly define morphological richness.
- b. Morphological richness is usually determined on the basis of standard, fully specified *paradigms* which are arguably pure epiphenomena (i.e., descriptive generalizations) but not objects that grammatical principles can refer to.
- c. Richness is a global property that cannot be checked locally for any given T node – the 'local' richness of inflection marking in T is irrelevant (cf., e.g., fully distinctive null markers).

Illustration:

There is no *pro-drop* in German despite seemingly rich verb inflection.

(20) *Absence of pro-drop in German:*

*Ich denke, dass [TP [vP *pro* gesungen habe]]
 I think that sung have-1.SG

Side remark:

I assume that constructions involving meteorological predicates, impersonal passives, subject inversion, and the like, never involve an expletive or 'quasi-argumental' empty category *pro*, in contrast to what is argued by Rizzi (1986) for Italian, Platzack (1987)

for Icelandic, and Grewendorf (1989) for German. For evidence against such a view, see, e.g., Haider (1988), Rohrbacher (1999).

State of the art:

The absence of *pro-drop* in German is unexpected under most approaches that rely on morphological richness.

(i) Jaeggli & Safir (1989): *Pro-drop* is possible in languages with morphologically uniform inflectional paradigms, where an inflectional paradigm counts as uniform iff it "has either only underived inflectional forms or only derived inflectional forms". This excludes non-*pro drop* languages like English and French, which have bare-stem inflectional forms in their verbal paradigms; however, it also wrongly predicts that German is a *pro-drop* language.

(ii) Rohrbacher (1999): A language can have *pro-drop* if "in at least one number of one tense, the person features [1] and [2] are distinctively marked". Again, German is wrongly expected to be a *pro-drop* language.

General problem:

These approaches presuppose a concept of inflectional paradigm that corresponds to the traditional notion adopted in reference grammars, but that is incompatible with recent developments in theoretical morphology, where paradigms are either epiphenomena (Halle & Marantz (1993, 1994), Bobaljik (2002b)), or abstract grammatical objects that bear little resemblance to the traditional reference grammar notion (Williams (1994), Wunderlich (1996), Wiese (1999)).

Assumptions:

(i) *Pro-drop* involves a syntactic empty category *pro* (Chomsky (1982), Rizzi (1986), Grewendorf (1989)).

(ii) Some notion of morphological richness is relevant for the licensing of (argumental) *pro* (Rizzi (1986), Jaeggli & Safir (1989)). The task then is to show that a *local* determination of richness can be provided in a pre-syntactic approach to inflectional morphology.

4.4.2 A New Proposal: Impoverishment Blocks Pro-Drop

Suggestion:

The crucial property that determines whether argumental *pro* is licensed by T whether or not T is affected by a certain type of impoverishment in the numeration (this can be checked locally).

(21) *Pro Generalization:*

An argumental *pro* DP cannot undergo Agree with T if T has been subjected (perhaps vacuously) to Φ -feature neutralizing impoverishment in the numeration.

Terminology:

Neutralization of a feature implies that a distinction between two categorizations (e.g.,

4.4.5 Russian

(27) *Verbal Inflection in Russian, present tense:*

'read'	present
[1,-pl]	číta-ju
[2,-pl]	číta-eš'
[3,-pl]	číta-et
[1,+pl]	číta-em
[2,+pl]	číta-ete
[3,+pl]	číta-jut

Observation:

There is no syncretism, hence, no impoverishment rule. Consequently, external argument pro-drop is predicted to occur.

(28) *Pro-drop phenomena in Russian:*

pro ponimaju [CP čto [TP *pro* imeeš' v vidu idti v
understand-1.SG.PRES that have-2.SG.PRES in mind go to
koncert]]
concert

Note:

There is disagreement as to whether Russian has pro-drop (alternatively, subject pronoun omission is treated as an instance of contextually licensed ellipsis).

(i) Russian has pro-drop:

Růžička (1986), Müller (1988), Demjjanow & Strigin (2000, 98-99), Perlmutter & Moore (2002, 632)

(ii) Russian does not have pro-drop:

Franks (1995, ch. 7), Avrutin & Rohrbacher (1997)

Perlmutter & Moore (2002):

“Like many other languages, Russian has what has come to be known as pro-drop: subject pronouns can be silent. [...] Pro-drop in Russian is subject to discourse conditions that make it much less common than pro-drop in Italian or Spanish.”

Růžička (1986):

There is an asymmetry between 1./2. and 3. person pro-drop.

Müller (1988): Russian differs from some other pro-drop languages in that overt subject pronouns can be unmarked in non-emphatic contexts. However, in some cases, using *pro* is in fact the only possibility to achieve a certain reading.

(29) *Generic interpretation of subject pronoun as 'one' (Müller (1988, 99)):*

- a. Ob etom *pro* mnogo govorjat
about this – much talk-3.PL
- b. *Pro* prosjat [PRO ne kurit']
– ask-3.PL not to smoke

- c. Ètu knigu *pro* pročityvaeš' za dva časa
this book – read-2.SG. in two hours

Potential problem:

Things are slightly more difficult because Russian has radical person impoverishment in the past tense. Shouldn't this imply that there is no pro-drop at all in this language?

(30) *Verbal Inflection in Russian, past tense:*

'read'	past.masc	past.fem	past.neut
[1,-pl]	číta-l	číta-l-a	číta-l-o
[2,-pl]	číta-l	číta-l-a	číta-l-o
[3,-pl]	číta-l	číta-l-a	číta-l-o
[1,+pl]	číta-l-i	číta-l-i	číta-l-i
[2,+pl]	číta-l-i	číta-l-i	číta-l-i
[3,+pl]	číta-l-i	číta-l-i	číta-l-i

Observation:

Pro-drop can also take place in these contexts (Müller & Rohrbacher (1989, 19), Růžička (1986)).

(31) *Pro-drop in Russian past tense contexts:*

Anna postupila verno [CP čto *pro* rešila [CP stat' vračom]]
Anna acted correctly that she decided to become doctor

Towards a solution:

A diachronic perspective: The inflected past tense forms in (31) are historically *l*-participles (with the originally accompanying auxiliaries dropped in modern Russian); as such, *they never had any person features in the first place* (those features had been located on the auxiliaries). Hence, the most plausible analysis of these forms is not that an impoverishment rule deletes all person features in past tense contexts, but rather that the inflection markers for past tense are not specified for person features for essentially historical reasons: The markers did not bear person features to begin with; they have been re-analyzed as finite markers in parallel with the disappearance of associated auxiliaries, and they simply have not acquired person features in their new function. This explains why subject pro-drop is possible in Russian, and in all tenses. A similar analysis can be given for pro-drop languages like Japanese, Korean, and Chinese: The generalization in (21) can be met because if there are no ϕ -features in the first place, there is no motivation for invoking a designated impoverishment rule that deletes ϕ -features – and it is only the presence of such impoverishment rules that may block *pro* licensing under present assumptions.

4.5 Pro-Drop in the Presence of Syncretism

Cysouw (2001) offers a comprehensive discussion of possible person syncretisms from a typological perspective, and he also provides information about pro-drop options in the

relevant languages. Based on his work, I go through six relevant cases in this section.

1. two languages involving syncretism that affects 2. and 3. person (Wambon and Kenuzi-Dongola)
2. two languages involving syncretism that affects 1. and 3. person (Spanish and Koiari)
3. two languages involving syncretism that affects 1. and 2. person (English and Hunzib).

By and large, the conclusion will be that the impoverishment-based approach to morphological richness and pro-drop is corroborated by the empirical evidence.

Claim:

Among the languages that exhibit syncretism in their verbal paradigms, those that do not permit pro-drop do suggest morphological analyses incorporating impoverishment, and those that do permit pro-drop do not lend themselves to morphological analyses that rely on impoverishment. This way, we can make sense of the observation that pro-drop may freely occur in languages despite the presence of syncretisms in verbal paradigms, and despite the possibility that these syncretisms may be amenable to an account in terms of natural classes of persons. As a result, a standard counter-argument against correlating morphological richness and pro-drop (see, e.g., Cysouw (2001, 51) and Zifonun (2001, 57)) can be rebutted.

4.5.1 Wambon

Wambon is a Trans-New Guinea language (spoken in the Indonesian part) that exhibits syncretism of 2. and 3. person forms in its verbal paradigm (data from Vries (1989), cited after Cysouw (2001)); see (32).

(32) *Verb inflection in Wambon*

- a. andet-*ep*-mbo
eat-1.SG-PAST
'I ate.'
- b. andet- \emptyset -mbo
eat-2./3.SG-PAST
'You/he/she/it ate.'

Unlike languages like Icelandic and Dutch, which show the same pattern of syncretism in verb inflection, Wambon has free subject pro-drop. Consider now possible morphological analysis of the 2./3. person syncretism in Wambon, as in (33).

- (33) a. (i) $-ep \leftrightarrow [+1,-2]$
(ii) $-\emptyset \leftrightarrow []$
b. (i) $-ep \leftrightarrow [+1,-2]$
(ii) $\emptyset \leftrightarrow [-1]$
c. (i) $-ep \leftrightarrow [+1,-2]$

- (ii) $-\alpha \leftrightarrow [-1,+2]$
(iii) $-\beta \leftrightarrow [-1,-2]$
(iv) $-\emptyset \leftrightarrow []$
(v) $[\pm 2] \rightarrow \emptyset / [-1] \underline{\hspace{1cm}}$ (impoverishment)
- d. (i) $-ep \leftrightarrow [+1,-2]$.
(ii) $-\alpha \leftrightarrow [-1,+2]$
(iii) $-\emptyset \leftrightarrow [-1]$
(iv) $[+2] \rightarrow \emptyset / [-1] \underline{\hspace{1cm}}$ (impoverishment)
- e. (i) $-ep \leftrightarrow [+1,-2]$
(ii) $-\emptyset \leftrightarrow []$
(iii) $[\pm 2] \rightarrow \emptyset / [-1] \underline{\hspace{1cm}}$ (impoverishment)

(33-a) involves radical underspecification of $-\emptyset$, and (33-b) regular (minimal) underspecification; neither approach involves impoverishment. In contrast, (33-cde) rely on impoverishment. These latter approaches ensure that even if there were alternative markers like $-\alpha$ and $-\beta$, these markers could never be used in Wambon verb inflection because the syntactic contexts for morphological realization are impoverishment in such a way that the feature specifications of $-\alpha$ and $-\beta$ are never a subset of a target specification on a functional head. However, there is evidence arguing against impoverishment analyses of Wambon verb inflection. First, no system-wide pattern of syncretism can be detected in Wambon verb inflection. Second, the analyses in (33-ab) are obviously simpler than the analyses in (33-cde) since they require fewer marker entries (and fewer pre-morphological operations). Third, it is not clear how markers like $-\alpha$ or $-\beta$, which might motivate impoverishment analyses, could be acquired in the first place, given that they are always suppressed by impoverishment; this leaves only option (33-e) among the impoverishment analyses, where impoverishment applies vacuously. Fourth and finally, there is a strong cross-linguistic tendency for null marking (\emptyset) to correlate with radical underspecification; this is an instance of a meta-grammatical *Iconicity Principle* (see Wiese (1999); also see the pertinent remarks on null markers in Halle & Marantz (1993)). Iconicity considerations then argue against the analyses in (33-b) and (33-d), where the null marker is not radically underspecified. We may thus conclude that, from a purely morphological point of view, (33-a) is the best analysis of the Wambon person markers in (32). This analysis does not rely on impoverishment, and the availability of pro-drop is thus respected under present assumptions.

4.5.2 Kenuzi-Dongola

Consider next verb inflection in Kenuzi-Dongola, a Nubian Nilo-Saharan language (data from Reinisch (1879), discussed in Cysouw (2001, 43)). Again, there is a syncretism of 2. and 3. person (*-im*), with another marker (*-ri*) reserved for 1. person contexts.

(34) *Verb inflection in Kenuzi-Dongola*

- a. ai tóg-*ri*
1.SG.PRON beat-1.SG
'I beat.'

- b. er tóg-*im*
2.SG.PRON beat-2./3.SG
'You beat.'
- c. ter tóg-*im*
3.SG.PRON beat-2./3.SG
'He/she/it beats.'

Some of the morphological analyses that are a priori possible are given in (35).

- (35) a. (i) $-ri \leftrightarrow [+1, -2]$
(ii) $-im \leftrightarrow []$
- b. (i) $-ri \leftrightarrow [+1, -2]$
(ii) $-im \leftrightarrow [-1]$
- c. (i) $-ri \leftrightarrow [+1, -2]$
(ii) $-\alpha \leftrightarrow [-1, +2]$
(iii) $-\beta \leftrightarrow [-1, -2]$
(iv) $-im \leftrightarrow [-1]$
(v) $[\pm 2] \rightarrow \emptyset / [-1] \underline{\quad}$ (impoverishment)
- d. (i) $-ri \leftrightarrow [+1, -2]$
(ii) $-im \leftrightarrow [-1]$
(iii) $[+2] \rightarrow \emptyset / [-1] \underline{\quad}$ (impoverishment)

The interesting fact about Kenuzi-Dongola is that pro-drop seems to be prohibited, with personal pronouns showing up in unmarked environments. This would then suggest impoverishment at work. The question then is whether there is any evidence for a system-wide pattern of syncretism in this language; and indeed there is: The personal pronouns for 2. and 3. person (*er* and *t-er*) are extremely similar in their segmental make-up, and they differ a lot from the personal pronoun for 1. person (*ai*). Given subanalysis, this may then plausibly be taken to indicate that a uniform system-wide impoverishment rule of the type in (35-d) is active in Kenuzi-Dongola.¹ A look into Reinisch's (1879) original grammatical descriptions provides an even stronger argument for impoverishment in Kenuzi-Dongola verb inflection. The inflection markers for present tense and aorist are listed in (36).

(36) *Kenuzi-Dongola conjugation, present tense and aorist*

	Present	Aorist		Present	Past
1.SG	-ri	-si	1.PL	-ru	-su
2.SG	-im	-sum	2.PL	-ru	-su
3.SG	-im	-sum	3.PL	-ran	-san

¹Still, further research is required to substantiate this point, and to account for the initial *t* with 2. person pronouns. Furthermore, it is not yet clear whether *-im* in (35) should be radically underspecified ([]), or specified as [-1], assumed in (35-d); but considerations related to iconicity might favour non-radical underspecification.

(36) clearly shows that the syncretism affecting 2. and 3. person in (34) is part of a system-wide pattern because it shows up both in present tense contexts and in aorist contexts, with different forms. Thus, an impoverishment analysis is strongly supported.²

The data presented so far are from the Dongola dialect of Kenuzi-Dongola; interestingly, the Kunuz variety described in Abdel-Hafiz (1988) has slightly different markers but instantiates essentially the same pattern.

4.5.3 Spanish

Cysouw (2001, 43) notes that Spanish exhibits a 1./3. person syncretism (as it shows up systematically in the Germanic languages in singular past tense contexts; see above), but only in some paradigms. Still, pro-drop is possible throughout. The syncretism of 1. and 3. person forms that shows up in the *pretérito imperfecto* is shown in (37).

(37) *Spanish pretérito imperfecto:*

- a. habla-*ba*
speak-1./3.SG.PAST
'I/he/she/it spoke.'
- b. habla-*bas*
speak-2.SG.PAST
'You spoke.'

Again, there is no evidence for an impoverishment approach: The syncretism is not part of a system-defining pattern (in other paradigms, 1. and 3. person are formally distinguished). The most straightforward analysis presumably views *-(b)a* as a separate tense/aspect marker (via subanalysis; compare *comía* vs. *comías*). The ending *-s* is specified as [-1,+2], and $-\emptyset$ emerges as a default marker, with a [] specification.

4.5.4 Koiari

Like Wambon, Koiari is a Trans-New Guinea language (spoken in Papua New Guinea). Like Spanish, it exhibits syncretism in 1. and 3. person contexts in its verb inflection system; see (38) (the data are from Dutton (1996), cited here after Cysouw (2001, 44)).

(38) *Verb inflection in Koiari:*

- a. da ereva-*nu*
1.PRON see-1./3.SG.PAST
'I saw it.'
- b. a ereva-*nua*
2.PRON see-2.SG.PAST
'You saw it.'

²Incidentally, the same conclusion can be drawn on the basis of the plural markers for 1. and 2. person.

- c. ahu ereva-*nu*
 3.PRON see-1./3.PAST
 ‘He/she/it saw it.’

Koiari does not exhibit pro-drop; Cysouw states that “these pronouns [...] are obligatorily used”. Under the general approach adopted here, we are therefore led to expect that impoverishment is involved: [-1,+2] contexts and [-1,-2] contexts are neutralized to [-1] contexts for morphological realization. For the time being, I will leave it at that; to decide this question, a more careful morphological analysis of the whole system of argument encoding is called for.

4.5.5 English

If one confines attention to the pattern in (39), it seems that English exhibits a syncretism of 1. and 2. person.

(39) *Verb inflection in English present tense singular contexts*

- a. I walk- \emptyset
 b. You walk- \emptyset
 c. She walk-*s*

The first thing to note here is that English, as a Germanic language, has inherited a system-defining syncretism for 1. and 3. person singular in past tense environments. Given that this Germanic syncretism is systematically derived by impoverishment, the fact that English does not have pro-drop is accounted for, independently of whether the syncretism in (39) can be traced back to impoverishment or not. Indeed, closer inspection reveals that the 1./2. person syncretism in (39) does in fact not instantiate a system-wide syncretism pattern (see Williams (1994)): With verbs like *be*, 1. and 2. person are distinct: *I am* vs. *You are*. Moreover, the syncretism in (39) is part of a more general regularity: The syncretic form also shows up in all plural contexts (*We walk*, *You walk*, *They walk*), and in the infinitive (*to walk*). Clearly, the null form - \emptyset is simply the radically underspecified default form that fits everywhere (see Halle & Marantz (1993) and Williams (1994), among others).

4.5.6 Hunzib

Finally, let me turn to an instance of syncretism that affects 1. and 2. person in Hunzib, a Nakh-Daghestanian language. Relevant data are given in (40) (from Berg (1995), cited after Cysouw (2001, 46)).

(40) *Verb inflection in Hunzib:*

- a. də hīyaa- \check{c} ācu
 1.PRON open-1./2.PRES door
 ‘I (shall) open the door.’
 b. mə bok’o.l- \check{c} o heʒe
 2.PRON gather-1./2.PRES walnut

- ‘You will gather nuts.’
 c. oʎul hīyaa- \emptyset ācu
 DEM open-3.PRES door

In contrast to what we have seen in English, this time there is really a syncretism affecting 1. and 2. person. The inflection marker - $\check{c}(o)$ is used for 1. and 2. person in present tense contexts, and a null marker - \emptyset is used for 3. person. This suggests that 1. and 2. person form a natural class in Hunzib. Given that [+3] also belongs to the inventory of primitive person features that is in principle available for languages (Trommer (2006a,b), Nevins (2007)), we can assume that 1. and 2. person in Hunzib form a natural class characterized by the feature [-3] (either [+1] or [+2] is then also needed to distinguish 1. and 2. person in Hunzib). The crucial question is whether the syncretism in (40) is due to pure underspecification of an inflection marker, or to a systematic impoverishment rule. Again, the available evidence does not quite suffice to settle this issue. However, there is one fact that would seem to support an impoverishment approach: As noted by Cysouw (2001), the same syncretism pattern shows up with different markers in Lak, which is a related Nakh-Daghestanian language; this situation is reminiscent of the situation in 1. and 3. person singular past tense contexts in the Germanic languages.³

If the preceding reasoning is on the right track, the prediction is there should be no pro-drop in Hunzib, and this seems to be the case.

4.6 Conclusion

To sum up, by looking at a variety of typologically different languages, I have tried to substantiate that only system-defining patterns of syncretism are relevant for determining morphological richness; other kinds of syncretisms are not. This difference is captured by the interaction of impoverishment and underspecification of inflection markers in a version of Distributed Morphology that must be pre-syntactic so as to allow morphology to have an influence on syntactic operations. In line with this, I have argued that the abstract notion of impoverishment may offer a better means of measuring morphological richness (as relevant for pro-drop) than is available in more traditional conceptions of morphology.

4.7 Outlook

Note:

A pre-syntactic approach to inflection does not imply that other morphological

³Note that in general, an alternative to postulating the three primitive features [+1], [+2], and [+3] as part of the universally accessible inventory of person features would be to assume only two primitive person features, and derive the remaining natural class by introducing variables over feature values; i.e., by adopting the system of α notation proposed in Chomsky (1965) and Chomsky & Halle (1968a). However, this would not be compatible with an impoverishment approach.

operations cannot take place within syntax, or post-syntactically. In fact, many of the post-syntactic displacement analyses in Embick & Noyer (2001) could be maintained in the present approach.

Open question:

To what extent could other core concepts of Distributed Morphology also be employed in a pre-syntactic approach?

(41) *Core concepts of Distributed Morphology:*

- a. Merger (Halle & Marantz (1993, 1994))
- b. Local dislocation (Embick & Noyer (2001))
- c. Dissociated morphemes (Embick (2000))
- d. Fusion (Halle & Marantz (1993))

(42) *Fusion* (based on Halle & Marantz (1993, 116)):

- a. Fusion takes two terminal nodes (morphemes) M_1 and M_2 that are sisters and combines them into a single terminal node M_α .
- b. M_α contains the features of both M_1 and M_2 .
- c. M_α behaves like a single primitive morpheme: Only one vocabulary item can be inserted, in accordance with the Subset Principle (modulo fission).

Problem:

It is difficult to formulate fusion in a pre-syntactic approach: Two separate functional heads would need to merge their feature sets while staying structurally distinct in the numeration.

However:

Many (though not all) of the cases of fusion discussed in Halle & Marantz (1993) involve fusion of case and number, or fusion of tense and agreement. In current syntactic theory (cf. Chomsky (1995, ch. 4)), it is often assumed that T and Agr are a single node (T) in the syntax. Similar conclusion may apply in the case of case and number (i.e., there is only one relevant head in the syntax that bears both types of features).

Chapter 5

Enrichment

5.1 Introduction

Background (Matthews (1972, 82), Matthews (1974, 149)):

Extended (multiple) exponence in Greek verb inflection, English verb inflection, etc.

Extended exponence:

Cases of morphological realization where a single morpho-syntactic property seems to be expressed by more than one exponent (i.e., inflection marker, in the cases to be considered here).

Claim:

Extended exponence can be accounted for in Distributed Morphology by assuming *enrichment* rules, which are complementary to well-established *impoverishment* rules, and without resort to a notion like *secondary exponence* (Noyer (1992), Wunderlich (1996), Bobaljik (2000), Frampton (2002)).

Empirical domain:

Interaction of argument encoding and number/person marking in:

- German (case-marking on nouns, number marking)
- Archi (case-marking on nouns, number marking)
- Timucua (agreement morphology on verbs, person marking)
- Sierra Popoluca (agreement morphology on verbs, person marking)

Also addressed:

- Tamazight Berber (verb inflection)
- Swahili (verb inflection)

5.2 Extended Exponence in Argument Encoding Systems

5.2.1 German

Observation:

Plural can be marked twice on nouns in dative (DAT) contexts in German (Eisenberg

(2000), Wiese (2000a)). Note: *n* must be a DAT plural marker rather than a simple DAT marker because it does not show up in the singular.

(1) *Extended exponence in German nouns:*

- | | | |
|-----------------|-----------------|----------|
| a. Kind-er-n | b. *Kind-n | (German) |
| child-PL-DAT.PL | child.SG-DAT.PL | |
| c. Tisch-e-n | d. *Tisch-n | |
| table-PL-DAT.PL | table.SG-DAT.PL | |

5.2.2 Archi

Observation:

The same phenomenon exists in the Daghestanian language Archi (Kibrik (1991, 2003), Mel'čuk (1999), Plank (1999)). Archi exhibits an ergative-absolutive (ERG-ABS) pattern of argument encoding. For a stem like *gel* ('cup'), the ERG plural is created by adding the plural marker *um* and the ERG plural marker *čaj* (in that order); for a stem like *qlin* ('bridge'), the ERG plural is derived by adding the plural marker *or* and, again, the ERG plural marker *čaj*; see (2-ac). As before, it is clear that *čaj* must be a marker of both case (ERG) and number (plural): This marker cannot be used in the singular, where the case markers *li*, *i* are used for marking ERG instead.

(2) *Extended exponence in Archi nouns:*

- | | | |
|------------------|---------------|---------|
| a. gel-um-čaj | b. gel-li | (Archi) |
| cup-PL-ERG.PL | cup.SG-ERG | |
| c. qlinn-or-čaj | d. qlonn-i | |
| bridge-PL-ERG.PL | bridge.SG-ERG | |

5.2.3 Timucua

Observation:

A similar phenomenon can be found in the domain of verb inflection in Timucua, an extinct language isolate from Florida (Mithun (1999, 520); the discussion here is based on Granberry (1990)). Arguments are encoded by head-marking, i.e., case-sensitive agreement morphology on the verb; the pattern is a nominative-accusative one (NOM-ACC). (Assumption: case-assignment depends on Agree operations involving matching features (in the sense of Chomsky (2001)), so structural case (like NOM) is present both on the case-marked DP and the case-marking head; see, e.g., Bobaljik & Wurmbrand (2003)).

(3) *Prefix markers:*

- The internal argument of a transitive verb is encoded by an "object", i.e., ACC prefix.
- Other primary arguments, including the external argument of a transitive verb, are encoded by a "subject", i.e., NOM prefix.

- A NOM prefix precedes a ACC prefix in transitive contexts; the two markers occupy positions no. 1 and 2 in the template identified by Granberry.
- These prefixes encode person (but not number) in addition to case:
 - two 1.NOM markers *ho-* and *ni-* (which "occur with approximately equal frequency"; Granberry (1990, 86))
 - a 2.NOM marker *ci-*
 - a zero 3.NOM marker \emptyset .

(4) *Suffix markers:*

- Many more types of affixes show up on the inflected Timucua verb, but they are all suffixes.
- Among these: number markers indicating plural (in 7th position in Granberry's template):
- Crucially, these plural markers also involve case (NOM) and person (local vs. 3) information and thus qualify as combined PERS.NUMBER.NOM markers (not too unlike typical subject agreement markers in Indo-European languages like German or Icelandic).
- The markers are *-bo* (for 1./2.PL.NOM arguments) and *-ma* (for 3.PL.NOM arguments).

(5) *Extended exponence in Timucua verbs:*

- | | | |
|-------------------------------------|--|-----------|
| a. <u>ho</u> -ini-ta-la | b. <u>ni</u> -huba-so-si- <u>bo</u> -te-la | (Timucua) |
| 1.NOM-be-ASP-LOC | 1.NOM-love-TR-REC-1/2.NOM.PL-ASP-LOC | |
| 'I am.' | 'We love each other.' | |
| c. <u>ci</u> -huba-so-te-le | d. <u>ci</u> -huba-so- <u>bo</u> -te-le | |
| 2.NOM-love-TR-ASP-LOC | 2.NOM-love-TR-1/2.NOM.PL-ASP-LOC | |
| 'You _{sg} love (someone).' | 'You _{pl} love (someone).' | |
| e. ano \emptyset -hewa-na-no | f. \emptyset -ini- <u>ma</u> -bi-la | |
| man 3.NOM-speak-ASP-LOC | 3.NOM-be-3.NOM.PL-ASP-LOC | |
| 'The man is speaking.' | 'They are just now.' | |

Note:

- (5-ace) involve singular subjects (1., 2., 3. person), with a prefix encoding person and case.
- (5-bdf) are corresponding examples with plural subjects (1., 2., 3. person) that exhibit extended exponence of case and person marking in Timucua.

(Other markers, irrelevant here: ASP (aspect, here: durative or bounded action), LOC (or TENSE: proximate vs. distant time), TR (transitivity), and REC (reciprocity); also note that *te/ta*, *le/la* are variants.)

5.2.4 Sierra Popoluca

Observation:

Sierra Popoluca (Mixe-Zoque, Mexico) employs a head-marking system of argument

encoding that follows an ergative-absolutive pattern (ERG-ABS) (Elson (1960a, 29-30), Elson (1960b, 207-208)). As in Timucua, person can be marked twice on the verb.

- (6) *Extended exponence in Sierra Popoluca verbs, intransitive contexts:*
- a. A-nik-pa (Sierra Popoluca)
1.ABS-go-INC
'I am going.' (Marlett (1986, 364))
 - b. A-pi:siñ
1.ABS-man
'I am a man.'
 - c. Ta-ho:y-pa
1.INCL.ABS-take.a.walk-INC
'You and I take a walk.' (Elson (1960b, 208))

- (7) *Extended exponence in Sierra Popoluca verbs, transitive contexts:*
- a. A-Ø-ko²c-pa (Sierra Popoluca)
1.ABS-3.ERG-hit-INC
'He hits me.'
 - b. Ø-Aŋ-ko²c-pa
3.ABS-1.ERG-hit-INC
'I hit him.'
 - c. Ø-Taŋ-ko²c-pa
3.ABS-1.INCL.ERG-hit-INC
'You and I hit him.' (Elson (1960b, 208))

- (8) *Order of verbal affixes in Sierra Popoluca:*
PERS.ABS – PERS.ERG – V – NUM – PASS – ASP

Note:

Number, passive, and aspect markers are ignored here.

- (9) *Apparent fusional case/person markers in Sierra Popoluca:*

	ABS	ERG
1.	a	an
1.INCL	ta	tan
2.	mi	iñ
3.	Ø	i

	ABS ← ERG
1 → 2	man
2 → 1	an

Note:

This time, the evidence is not quite as direct, but it is there under an analysis that provides internal structure for the markers in (9), via subanalysis based on a decomposition of person features as in (10). The simplest analysis (that accounts for all instances of syncretism) will have to postulate that *a* is [+1], and that *t* is then marked [+1,+2] (Müller (2006)). If so, there is extended exponence of [+1] in Sierra Popoluca.

- (10) *Decomposition of person features* (Frampton (2002)):

- a. [+1,-2] = 1. pers.
- b. [-1,+2] = 2. pers.
- c. [-1,-2] = 3. pers.
- d. [+1,+2] = 1. pers. incl.

Conclusion so far:

Extended exponence exists in the argument encoding systems of German, Archi, Timucua, and Sierra Popoluca.

Note:

That said, there are several cases where extended exponence has been argued to show up that may not be fully convincing upon closer inspection. For instance, Matthews (1974) argues for extended exponence on the basis of German plural formation per se, based on the fact that plural may be realized by a combination of segmental plural marker (like *er*) and Umlaut of the stem vowel, as in *Buch* ('book') vs. *Büch-er* ('books'). However, this evidence for extended exponence loses its force if we assume that Umlaut is encoded on plural markers as an abstract ('floating') feature; cf., e.g., Wiese (1996). Similar conclusions may be drawn in the case of deverbal noun formation in Kujamaat Jóola discussed in Aronoff & Fudeman (2005, 154), where a class marker change is accompanied by vowel tensing.

Question:

For which kinds of approach does extended exponence pose a problem?

- (i) *Lexical-incremental approaches* (e.g., Wunderlich (1996)):

Extended exponence is prima facie unexpected.

- (ii) *Inferential-realizational approaches* (e.g., Matthews (1972), Anderson (1992), Aronoff (1994), Stump (2001)):

Extended exponence is expected.

- (iii) *Lexical-realizational approaches:*

Distributed morphology → next section.

5.3 Distributed Morphology

- (11) *Late vocabulary insertion:*

- a. Functional morphemes (F) contain fully specified bundles of morpho-syntactic features in syntax; however, they do not yet contain phonological material.
- b. Inflection markers are vocabulary items that pair phonological and (often underspecified) morpho-syntactic features; they are inserted post-syntactically in accordance with the Subset Principle.

- (12) *Vocabulary insertion into functional (F) morphemes:*

- a. [F V F]

b. $[_F N F]$

(13) *Subset Principle* (Halle (1997)):

A vocabulary item V is inserted into a functional morpheme M iff (i) and (ii) hold:

- (i) The morpho-syntactic features of V are a subset of the morpho-syntactic features of M .
- (ii) V is the most specific vocabulary item that satisfies (i).

(14) *Specificity of vocabulary items* (Lumsden (1992), Noyer (1992), Wiese (1999)):

A vocabulary item V_i is more specific than a vocabulary item V_j iff there is a class of features \mathbb{F} such that (i) and (ii) hold.

- (i) V_i bears more features belonging to \mathbb{F} than V_j does.
- (ii) There is no higher-ranked class of features \mathbb{F}' such that V_i and V_j have a different number of features in \mathbb{F}' .

(15) *Feature hierarchies*:

- a. Verbal domain: Tense > Person > Number > Gender
- b. Nominal domain: Number > Class > Case

(16) *Impoverishment* (Bonet (1991), Halle & Marantz (1993, 1994), Trommer (1999a), Bobaljik (2002b), Frampton (2002), Nevins (2003), Müller (2005)):

Morpho-syntactic features can be deleted post-syntactically before vocabulary insertion takes place; this effects a “retreat to the general case”.

Note:

As it stands, the Subset Principle ensures that only one vocabulary item can be inserted into a given functional morpheme. This is not the case when a further post-syntactic operation has applied, viz., fission.

(17) *Fission* (Noyer (1992), Frampton (2002), *not* Halle & Marantz (1993)):

If insertion of a vocabulary item V with the morpho-syntactic features β takes place into a fissioned morpheme M with the morpho-syntactic features α , then α is split up into β and $\alpha-\beta$, such that (a) and (b) hold:

- a. $\alpha-\beta$ is available for further vocabulary insertion.
- b. β is not available for further vocabulary insertion.

Assumption:

The functional morphemes in this talk are subject to fission. (Background: Assuming that there are no semantically empty functional categories (Chomsky (2001)), fissioned morphemes will be far from exceptional.)

Consequence:

Vocabulary insertion into fissioned morphemes *discharges* morpho-syntactic features. This property makes it difficult to account for extended exponence.

5.4 Noyer’s Analysis of Verb Inflection in Tamazight Berber

(18) *Prefix Conjugation in Tamazight Berber* (Noyer (1992, 145-149)):

<i>dawa</i> (‘cure’)	SG	PL
1	dawa- γ	n-dawa
2 MASC	\underline{t} -dawa- \underline{d}	\underline{t} -dawa- \underline{m}
2 FEM	\underline{t} -dawa- \underline{d}	t-dawa-n-t
3 MASC	i-dawa	dawa-n
3 FEM	t-dawa	dawa-n-t

Observation:

2. person can be expressed twice in a single verb form.

Assumption:

To reconcile extended exponence with the feature discharge in fissioned morphemes, Noyer introduces the concept of *secondary exponence* of morpho-syntactic features: A vocabulary item may presuppose that some feature (like [2]) has already been discharged prior to its insertion. This is formally encoded by adding the secondary feature(s) in brackets (also see Wunderlich (1996), Frampton (2002)).

(19) *Feature hierarchy*: Person > Number > Gender

(20) *An impoverishment rule that applies to (V-)F in Tamazight Berber*:
 $[\pm\text{fem}] \rightarrow \emptyset/[2,-\text{pl}]$

(21) *Vocabulary Items*:

- a. /n-/ \leftrightarrow [1],[+pl]
- b. /- γ / \leftrightarrow [1]
- c. /t-/ \leftrightarrow [2]
- d. /-m/ \leftrightarrow [+pl],[−fem] ([2])
- e. /i-/ \leftrightarrow [−pl],[−fem]
- f. /t-/ \leftrightarrow [−pl],[+fem]
- g. /-d/ \leftrightarrow [−pl] ([2])
- h. /-n/ \leftrightarrow [+pl]
- i. /-t/ \leftrightarrow [+fem]

Properties of the system:

- (i) Discontinuous bleeding (follows from fission)
- (ii) Extended exponence (follows from secondary exponence)

Assumption:

Secondary exponence may be conceptually problematic since it threatens to undermine the notion of discharge. It may also raise problems for determining specificity. (Do secondary features count for the purposes of specificity?)

5.5 Enrichment

Suggestion:

Given that there is *impoverishment*, there is every reason to assume that the complementary operation also exists: *enrichment*.

(22) Enrichment:

Morpho-syntactic features can be added post-syntactically before vocabulary insertion takes place.

Potter's problem:

- Deletion applied to some structure can only affect material that is part of the structure; but with insertion/epenthesis, things are more complicated because it is a priori unclear exactly what kind of material can or must be inserted into a given structure.
- Prof. McGonagall: 'So ... today we are starting *Vanishing Spells*. These are easier than *Conjuring Spells*, which you would not usually attempt until NEWT level, but they are still among the most difficult magic you will be tested on in your OWL.' She was quite right; Harry found the Vanishing Spells horribly difficult." (J.K. Rowling, *Harry Potter and the Order of the Phoenix*. London: Bloomsbury, 2003, p. 232.)

Assumption:

Enrichment can only insert features into a given structure that are already present: enrichment is *doubling*.

Differences to other approaches that involve adding material:

- Enrichment differs from *dissociation* (Embick (1998) and Embick & Noyer (2001)): Dissociation is a post-syntactic operation that introduces *new* features as part of *new*, 'dissociated' morphemes; also see Arregi & Nevins (2006) for the operation of 'obliteration', which differs from impoverishment in roughly the way that dissociation differs from enrichment.
- The impoverishment/enrichment dichotomy parallels the MAX/DEP constraint dichotomy in *optimality theory* (Prince & Smolensky (2004)), used in inflectional morphology by Wunderlich (2004): An optimal violation of some MAX constraint can effect a non-realization of input features (which produces impoverishment effects); and an optimal violation of some DEP constraint can trigger a realization of features in the morphological output that are not present in the input.

Observation:

Both these approaches can introduce *new* material (morphemes, features).

Note:

Here and in what follows, standard person feature decomposition as in (10) is assumed ((20) then has [2] replaced with [-1,+2]).

(23) An enrichment rule that applies to (V-)F in Tamazight Berber:
 $\emptyset \rightarrow [-1,+2]/[-1,+2] \underline{\quad}$

(24) Vocabulary Items:

- | | |
|--|--|
| a. /-m/ \leftrightarrow [-1,+2],[+pl],[-fem] | f. /t-/ \leftrightarrow [-pl],[+fem] |
| b. /n-/ \leftrightarrow [+1,-2],[+pl] | g. /i-/ \leftrightarrow [-pl],[-fem] |
| c. /-d/ \leftrightarrow [-1,+2],[-pl] | h. /-n/ \leftrightarrow [+pl] |
| d. /-y/ \leftrightarrow [+1,-2] | i. /-t/ \leftrightarrow [+fem] |
| e. /t-/ \leftrightarrow [-1,+2] | |

5.6 Verb Inflection in Swahili

Observation (Stump (2001, 162-163)):

Noyer's concept of secondary exponence is empirically problematic since there are cases where one and the same inflection marker must act as a primary exponent of a morpho-syntactic property in one context, and as a secondary exponent of the same morpho-syntactic property in another context.

(25) Past tense and negation in Swahili 1. plural contexts:

- | | |
|------------------------|------------|
| a. tu-li-taka | (positive) |
| 1.PL-PAST-want | |
| 'We wanted' | |
| b. ha-tu-ku-taka | (negative) |
| NEG-1.PL-NEG.PAST-want | |
| 'We did not want' | |

(26) Future tense and negation in Swahili 1. plural contexts:

- | | |
|--------------------|------------|
| a. tu-ta-taka | (positive) |
| 1.PL-FUT-want | |
| 'We will want' | |
| b. ha-tu-ta-taka | (negative) |
| NEG-1.PL-FUT-want | |
| 'We will not want' | |

(27) Vocabulary items (past tense, partial list):

- | |
|---|
| a. /ku/ \leftrightarrow [past,neg] |
| b. /li/ \leftrightarrow [past] |
| c. /tu/ \leftrightarrow [+1,-2],[+pl] |
| d. /ha/ \leftrightarrow [Ø] ([neg]) |

(28) Vocabulary items (future tense, partial list):

- | |
|---|
| a. /ta/ \leftrightarrow [future] |
| b. /tu/ \leftrightarrow [+1,-2],[+pl] |
| c. /ha/ \leftrightarrow [neg] |

Note:

This problem does not show up under an enrichment analysis (assuming for the purposes of the argument that all the inflection markers in Swahili verb inflection are inserted into a single functional morpheme F).

(29) *An enrichment rule that applies to F(-V) in Swahili:*

$\emptyset \rightarrow [\text{neg}]/[\text{neg},\text{past}]_$

(30) *Vocabulary items (past tense, partial list; revised):*

- a. /ku/ \leftrightarrow [past,neg]
- b. /li/ \leftrightarrow [past]
- c. /tu/ \leftrightarrow [+1,-2],[+pl]
- d. /ha/ \leftrightarrow [neg]

5.7 Enrichment Rules for German, Archi, Timucua, and Sierra Popoluca

5.7.1 German

(31) *Extended exponence in German nouns:*

- | | | |
|-----------------|-----------------|----------|
| a. Kind-er-n | b. *Kind-n | (German) |
| child-PL-DAT.PL | child.SG-DAT.PL | |
| c. Tisch-e-n | d. *Tisch-n | |
| table-PL-DAT.PL | table.SG-DAT.PL | |

Brute force solution (Alexiadou & Müller (2005)):

The extended exponence problem in DAT plural contexts is denied by treating *ern*, *en* in *Kind-er-n*, *Tisch-e-n* as primitive markers.

Assumption:

A single F (Kase/Number) head accompanies an N stem in the syntax in German.

(32) *An enrichment rule that applies to (N-)F in German:*

$\emptyset \rightarrow [+pl]/[+pl],[\text{dat}]_$

Restrictions on dative plural /n/:

The additional *n* marker that signals extended exponence in DAT plural contexts shows up only in a proper subset of the inflection classes in German declension: It occurs with inflection classes that have /-e/ or /-er/ as the plural marker, but it does not occur with inflection classes that have /-n/ or /-s/ as the plural marker (cf. the DAT plural forms *Mensch-en* vs. **Mensch-en-(e)n*, *Auto-s* vs. **Auto-s-(e)n*).

Possible analyses:

- The inflection classes that give rise to extended exponence form a natural class characterized by a primitive inflection class feature (like [+ δ]); see Alexiadou & Müller (2005). The enrichment rule in (32) would then be confined to [+ δ], so

that the DAT plural marker /n/ could be radically underspecified with respect to inflection class, and still only be inserted in the proper contexts.

- Enrichment applies throughout, with the vocabulary item /-n/ confined to [+ δ] environments.

What remains unaccounted for under these views:

- All inflection classes that have a general plural marker /-e/ or /-er/ permit a DAT plural marker /-n/.
- All inflection classes that have /-n/ or /-s/ as a general plural marker disallow an additional DAT plural marker /-n/ (there is more than one class at least in the cases of /-e/ and /-n/, based on differences in the singular, and with respect to Umlaut).

Conclusion:

Both the enrichment rule in (32) and the feature specification associated with the DAT plural marker /-n/ are not restricted to certain inflection classes; rather, the illegitimate combinations are excluded on phonological or morpho-phonological grounds (Eisenberg (2000, 161)).

(33) *(Simplified) Vocabulary items:*

- a. /-er/ \leftrightarrow [+pl],[+ α ,+ β ,+ γ]
- b. /-e/ \leftrightarrow [+pl],[− β ,+ γ]
- c. /-n/ \leftrightarrow [+pl],[dat]

Note:

Primitive class features (like [$\pm\alpha$], [$\pm\beta$], [$\pm\gamma$]) that encode natural classes of inflection classes (Oltra Massuet (1999), Alexiadou & Müller (2005), Trommer (2005)) outrank case features on the hierarchy of features. Thus, /-er/, /-e/ are inserted into fissioned (N-)F morphemes before /-n/ is.

5.7.2 Archi

(34) *Extended exponence in Archi nouns:*

- | | | |
|------------------|---------------|---------|
| a. gel-um-čaj | b. gel-li | (Archi) |
| cup-PL-ERG.PL | cup.SG-ERG | |
| c. qlinn-or-čaj | d. qlonn-i | |
| bridge-PL-ERG.PL | bridge.SG-ERG | |

(35) *An enrichment rule that applies to (N-)F in Archi:*

$\emptyset \rightarrow [+pl]/[+pl],[\text{erg}]_$

(36) *Vocabulary items:*

- a. /-um/ \leftrightarrow [+pl],[+ α]
- b. /-or/ \leftrightarrow [+pl],[− α]
- c. /-čaj/ \leftrightarrow [+pl],[erg]

Note:

Oblique case forms are generated on the basis of the ergative form: parasitic (Priscianic) formations (Matthews (1972); Mel'čuk (1999, 8)). These forms are unproblematic if case features are also decomposed (see Bierwisch (1967), Franks (1995), Wiese (1999); and Kibrik (2003, 60-61) for an approach along these lines).

(37) *Paradigms of cases for 'gel' ('cup'), 'qIn' ('bridge'):*

	SG	PL
absolute	gel	gel-um
ergative	gel-li	gel-um-čaj
genitive	gel-li-n	gel-um-če-n
dative	gel-li-s	gel-um-če-s
comparative	gel-li-Xur	gel-um-če-Xur
comitative	gel-li-4u	gel-um-če-4u
permutative	gel-li-L'ana	gel-um-če-L'ana

<i>qIn</i> ('Brücke')	sg	pl
absolute	qlin-Ø	qlonn-or
ergative	qlinn-i	qlonn-or-čaj
genitive	qlinn-i-n	qlonn-or-če-n
dative	qlinn-i-s	qlonn-or-če-s

5.7.3 Timucua

(38) *Extended exponence in Timucua verbs:*

- | | | |
|---|--|-----------|
| a. <u>ho</u> -ini-ta-la
1.NOM-be-ASP-LOC
'I am.' | b. <u>ni</u> -huba-so-si- <u>bo</u> -te-la
1.NOM-love-TR-REC-1/2.NOM.PL-ASP-LOC
'We love each other.' | (Timucua) |
| c. <u>ci</u> -huba-so-te-le
2.NOM-love-TR-ASP-LOC
'You _{sg} love (someone).' | d. <u>ci</u> -huba-so- <u>bo</u> -te-le
2.NOM-love-TR-1/2.NOM.PL-ASP-LOC
'You _{pl} love (someone).' | |
| e. ano Ø-hewa-na-no
man 3.NOM-speak-ASP-LOC
'The man is speaking.' | f. Ø- <u>ini</u> - <u>ma</u> -bi-la
3.NOM-be-3.NOM.PL-ASP-LOC
'They are just now.' | |

(39) *An enrichment rule that applies to (V-)F in Timucua:*

$$\emptyset \rightarrow [\mu 1, \nu 2], [\text{nom}] / [\mu 1, \nu 2], [\text{nom}] \underline{\quad}$$

Note 1:

μ, ν are variables over feature values (+, -) (see Chomsky (1965, 175 & 233), Chomsky & Halle (1968b, 83), Halle (1992, 39), Noyer (1992), Alexiadou & Müller (2005), Baerman (2006); and Harley (1994), Johnston (1996) for critical evaluation).

Note 2:

The case, person, and number features in (V-)F can be realized both by prefixation and by suffixation, as argued by Noyer (1992) for Tamazight Berber.

(40) *Vocabulary items:*

- /ho-/ (/ni-/) \leftrightarrow [+1, -2], [nom]
- /ci-/ \leftrightarrow [-1, +2], [nom]
- /Ø-/ \leftrightarrow [-1, -2], [nom]
- /-bo/ \leftrightarrow [nom], [+pl]
- /-ma/ \leftrightarrow [-1, -2], [nom], [pl]

Note:

- /-bo/ is the elsewhere marker for NOM plural; it is blocked in 3. person contexts by the more specific NOM plural marker /-ma/.
- As it stands, the feature hierarchy predicts suffixation to precede prefixation, except with underspecified /-bo/, where the order is reversed. This consequence is empirically unproblematic; but it can be avoided by assigning to /-bo/ the person specification $[\mu 1, -\mu 2]$.

5.7.4 Sierra Popoluca

(41) *Apparent fusional case/person markers in Sierra Popoluca:*

	ABS	ERG
1.	a	an
1.INCL	ta	tan
2.	mi	iñ
3.	Ø	i

	ABS ← ERG
1 → 2	man
2 → 1	an

(42) *Impoverishment rules*

- [aerg] \rightarrow Ø / [-α1, -α2] $\underline{\quad}$
- [-1] \rightarrow Ø / [-2, -erg] $\underline{\quad}$ (global)

(43) *An enrichment rule that applies to F(-V) in Sierra Popoluca:*

$$\emptyset \rightarrow [+1] / [+1, +2] \underline{\quad}$$

On this basis, the analysis of the argument encoding system of Sierra Popoluca in Müller (2006) can dispense with secondary features.

(44) *Vocabulary items:*

- /n/ \leftrightarrow [+erg]
- /t/ \leftrightarrow [+1, +2]
- /a/ \leftrightarrow [+1]
- /i/ \leftrightarrow [-1]
- /m/ \leftrightarrow [+2], [-erg]

Note:

The vocabulary items /t/ and /m/ are now more specific than in the analysis in the earlier approach (assuming that secondary features do not count for specificity), and this may create problems for marker order. Assuming ERG to be ranked high on the verbal hierarchy, and ABS low, and assuming a ranking $[\pm 1] > [\pm 2]$ (as in the earlier approach in Müller (2006)), all of the order facts follow, except for one: /t/ insertion is predicted to precede /a/ insertion. The fact that the order is nevertheless /t/-/a/- (/n/)-V can plausibly be linked to the fact that /t/ and /a/ realize the same feature (and to autonomous morphological structure).

5.8 Conclusion

1. The existence of post-syntactic enrichment in Distributed Morphology is expected for reasons of symmetry alone (given post-syntactic impoverishment); and by assuming enrichment, extended exponence can be accounted for without secondary features.
2. The present analysis differs from one in terms of secondary features in an important respect: Just as system-wide, non-accidental patterns of syncretism can be better accounted for by impoverishment than by accidental feature specifications of individual vocabulary items (Bobaljik (2002b)), only enrichment (and not an approach in terms of secondary features) makes it possible to treat extended exponence as a system-wide property. For instance, the fact that case and person can be realized twice on verbs in Timucua can be expressed as such by an enrichment rule, and is thus more than an accidental by-product of individual marker specifications.
3. An enrichment-based approach does not imply that extended exponence is a completely unmarked phenomenon that comes for free (as in Stump (2001), Anderson (2005)). Rather, it always takes a specific post-syntactic operation to bring it about: In the unmarked case, a single morpho-syntactic feature is not realized by more than one exponent (cf. Wurzel (1984)).

5.9 Pre-Syntactic Morphology

Obvious question:

Can enrichment be implemented in the pre-syntactic approach to inflectional morphology laid out in the previous chapters?

Answer:

Yes. The copy operations apply in the pre-syntactic, morphological component (e.g., the numeration), in the same way that pre-syntactic impoverishment does. Perhaps the additional features should be accompanied by a diacritic that precludes their use in syntax.

Chapter 6

Paradigm Economy

6.1 Introduction

Background:

(i) In Distributed Morphology, paradigms do not exist as genuine objects that, e.g., grammatical constraints can refer to. Rather, paradigms are epiphenomena – essentially, empirical generalizations that need to be derived in some way.

(ii) This view is incompatible with a more traditional view according to which paradigms exist as genuine entities in the grammar.

(1) *Some constraints on paradigms:*

- a. The Paradigm Economy Principle (Carstairs (1987))
- b. The No Blur Principle (Carstairs-McCarthy (1994))
- c. The Basic Instantiated Paradigm Principle (Williams (1994) vs. Bobaljik (2002b))
- d. Optimal Paradigms (McCarthy (2003) vs. Bobaljik (2003))

Observation:

(i) Constraints like the Paradigm Economy Principle and No Blur restrict the number of possible inflection classes that can be generated on the basis of a given set of inflection markers (for a given grammatical category).

(ii) If such constraints cannot be adopted for principled reasons, there is a danger that the theory is not restrictive enough.

(iii) Principled reasons that preclude adopting constraints on the number of possible inflection classes (on the basis of a given marker inventory):

- non-existence of paradigms in morphological theory
- decomposition of inflection class features in order to account for *trans-paradigmatic syncretism* (see Halle (1992), Oltra Massuet (1999), Stump (2001), Alexiadou & Müller (2005), and below).

(Compare Noyer's (2005) Interclass Syncretism Constraint, which is similar in its effects to No Blur, and fundamentally incompatible with a decomposition of inflection class features.)

Two possible strategies:

- (i) argue that the question of how inflection classes can be constrained is irrelevant from a synchronic perspective;
- (ii) argue that restrictions on the number of possible inflection classes (based on a given marker inventory) follow from independently motivated assumptions, without invoking specific constraints that explicitly impose restrictions on possible inflection classes. I adopt the latter strategy.

A *meta-principle* that restricts possible inflectional systems (null hypothesis for both child and linguist) (Alexiadou & Müller (2005)):

(2) *Syncretism Principle*:

Identity of form implies identity of function

(within a certain domain, and unless there is evidence to the contrary).

Claim:

Accompanied by two simple and widely accepted auxiliary assumptions (which I call *Elsewhere* and *Blocking*), the Syncretism Principle significantly restricts the number of possible inflection classes by itself:

(3) *Inflection Class Economy Theorem*:

Given a set of n inflection markers, there can be at most 2^{n-1} inflection classes, independently of the number of grammatical categories that the markers have to distribute over.

6.2 Paradigm Economy

6.2.1 The Paradigm Economy Principle

Background question:

What is the largest number of inflection classes (paradigms) which a given array of inflectional resources can be organized into?

(4) *The Paradigm Economy Principle* (Carstairs (1987, 51)):

When in a given language L more than one inflectional realization is available for some bundle or bundles of non-lexically-determined morphosyntactic properties associated with some part of speech N , the number of macroparadigms for N is no greater than the number of distinct “rival” macroinflections available for that bundle which is most generously endowed with such rival realizations.

Consequence:

The number of (macro-) inflection classes does not exceed the greatest number of allomorphs.

(5) *An impossible paradigm* (Carstairs-McCarthy (1998)):

	Class A	Class B	Class C	Class D
Cell 1	a	a	f	f
Cell 2	b	e	e	e
Cell 3	c	c	h	h
Cell 4	d	d	d	g

- number of inflection classes: 4
- greatest number of allomorphic variation: 2

(6) *Hungarian present indefinite verb inflection*

	Indicative	Subjunctive
Sg 1	ok, ek, ök, om, em, öm	ak, ek am em
2	(a)sz, (e)sz, ol, el, öl	Ø, ál, él
3	Ø, ik	on, en, ön, ék
Pl 1	unk, ünk	unk, ünk
2	(o)tok, (e)tek, (ö)tök	atok, etek
3	(a)nak, (e)nek	anak, enek

Logical possibility:

Given complete independence of distribution of markers over (macro-) inflection classes: 276.480 inflection classes.

Actual (macro-) inflection classes:

very few. How many exactly?

(7) *Some Hungarian verbs*

Indicative					
	olvasni 'read'	ülni 'sit'	enni 'eat'	érteni 'understand'	írni 'write'
Sg 1	olvas-ok	ül-ök	esz-em	ért-ek	ír-ok
2	olvas-ol	ül-sz	esz-el	ért-esz	ír-sz
3	olvas-Ø	ül-Ø	esz-ik	ért-Ø	ír-Ø
Pl 1	olvas-unk	ül-ünk	esz-unk	ért-ünk	ír-unk
2	olvas-tok	ül-tök	esz-tek	ért-etek	ír-tok
3	olvas-nak	ül-nek	esz-nek	ért-enek	ír-nak
Subjunctive					
Sg 1	olvas-ak	ülj-ek	egy-em	értj-ek	írj-ak
2	olvas-Ø/-ál	ülj-Ø/-él	egy-él	értj-Ø/-él	írj-Ø/-ál
3	olvas-on	ülj-en	egy-ek	értj-en	írj-on
Pl 1	olvas-unk	ülj-ünk	egy-ünk	értj-ünk	írj-unk
2	olvas-atok	ülj-etek	egy-etek	értj-etek	írj-atok
3	olvas-anak	ülj-enek	egy-enek	értj-enek	írj-anak

Conclusion:

Abstracting away from differences that are (morpho-) phonologically predictable, there are only two (macro-) inflection classes: the *normal* conjugation and the *ik* conjugation (each with a back-vowel and a front-vowel version).

(8) *Hungarian present indefinite conjugations: analysis*

		Indicative		Subjunctive	
		normal	ik	normal	ik
Sg	1	ok	om	ak	am
	2	ol (after sibilants) asz (elsewhere)	ol	Ø/ál	Ø/ál
	3	Ø	ik	on	ék
Pl	1	unk	unk	unk	unk
	2	(o)tok	(o)tok	(o)tok	(o)tok
	3	(a)nak	(a)nak	(a)nak	(a)nak

Observation:

The Paradigm Economy Principle crucially relies on the notion of macro-paradigm (or macro-inflection class).

(9) *Macro-Paradigm:*

A macro-paradigm consists of:

- any two or more similar paradigms whose inflectional differences either can be accounted for phonologically, or else correlate consistently with differences in semantic or lexically determined syntactic properties (like gender);
or
- any paradigm which cannot be thus combined with other paradigm(s).

(10) *German noun inflection*

	I: masc, neut <i>Hund_m</i> ('dog'), <i>Schaf_n</i> ('sheep')	II: masc <i>Baum_m</i> ('tree') <i>Floß_n</i> ('raft')	III: neut, masc <i>Buch_n</i> ('book'), <i>Mann_m</i> ('man')	IV: masc, neut <i>Strahl_m</i> ('ray') <i>Auge_n</i> ('eye')
nom/sg	Ø	Ø	Ø	Ø
acc/sg	Ø	Ø	Ø	Ø
dat/sg	Ø	Ø	Ø	Ø
gen/sg	(e)s	(e)s	(e)s	(e)s
nom/pl	(e)	”(e)	”er	(e)n
acc/pl	(e)	”(e)	”er	(e)n
dat/pl	(e)n	”(e)n	”ern	(e)n
gen/pl	(e)	”(e)	”er	(e)n

	V: masc ('weak') <i>Planet_m</i> ('planet')	VI: fem <i>Ziege_f</i> ('goat')	VII: fem <i>Maus_f</i> ('mouse')	VIII: fem <i>Drangsal_f</i> (‘distress’)
nom/sg	Ø	Ø	Ø	Ø
acc/sg	Ø	Ø	Ø	Ø
dat/sg	Ø	Ø	Ø	Ø
gen/sg	(e)s	(e)s	(e)s	(e)s
nom/pl	(e)	”(e)	”er	(e)n
acc/pl	(e)	”(e)	”er	(e)n
dat/pl	(e)n	”(e)n	”ern	(e)n
gen/pl	(e)	”(e)	”er	(e)n

nom/sg	Ø	Ø	Ø	Ø
acc/sg	(e)n	Ø	Ø	Ø
dat/sg	(e)n	Ø	Ø	Ø
gen/sg	(e)n	Ø	Ø	Ø
nom/pl	(e)n	(e)n	”(e)	(e)
acc/pl	(e)n	(e)n	”(e)	(e)
dat/pl	(e)n	(e)n	”(e)n	(e)n
gen/pl	(e)n	(e)n	”(e)	(e)

German noun inflection and paradigm economy:

The classification in (10) is that of Alexiadou & Müller (2005), but there is a similar taxonomy of inflection classes in Carstairs (1986, 8). (Carstairs actually has 14 inflection classes, including ones with *s* as a plural marker.)

Observation:

The greatest number of allomorphic variation is 4 (nom/acc/gen plural; 5 if /s/ is included).

Conclusion:

There can at most be 4 (5) macro-inflection classes.

(11) *Macro-inflection classes for German noun declension*

- III (”er-plural)
- V (so-called ‘weak masculines’)
- IV/VI (*en*-plural; gen/sg *s* for masc/neut; gen/sg Ø for fem)
- II/VII (”e-plural; gen/sg *s* for masc/neut; gen/sg Ø for fem)
- I/VIII (*e*-plural; gen/sg *s* for masc/neut; gen/sg Ø for fem)

Problem:

It seems that (11-de) must be combined into a single macroclass, with Umlaut accounted for independently (viz., (morpho-) phonologically). Carstairs (1987, 58): Stem allomorphy does indeed not give rise to different macro-inflection classes (there is “a distinction between affixal and non-affixal inflection”).

(12) *Russian noun inflection*

- Singular

	Ia/Ib _m	IIa/IIb _{f,m}	IIIa/IIIb _f	IVa/IVb _n
nom/sg	Ø	a	Ø	o
acc/sg	Ø/a	u	Ø	o
dat/sg	u	e	i	u
gen/sg	a	i	i	a
inst/sg	om	oj	ju	om
loc/sg	e	e	i	e

b. Plural

	Ia/Ib _m	IIa/IIb _{f,m}	IIIa/IIIb _f	IVa/IVb _n
nom/pl	y	y	i	a
acc/pl	y/ov	y/∅	i/ej	a/∅
dat/pl	am	am	jam	am
gen/pl	ov	∅	ej	∅
inst/pl	ami	ami	jami	ami
loc/pl	ax	ax	jax	ax

Problem:

1. If the [acc ← gen] animacy effect with class I noun stems and all plural noun stems gives rise to different inflection classes in each case, the number of inflection classes would have to be 8.
2. However, the greatest number of allomorphic variation is 4 (accusative singular).

Solution:

- The variation in acc/sg (class 1) and acc/pl (all classes) contexts correlates consistently with differences in semantic properties (*animacy*), and is thus predictable: 8 → 4.
- The differences between class 1 and class 4 are also predictable on the basis of *gender*: 4 → 3.
- Thus, there are only three macro-inflection classes in Russian noun declension.

Conclusion:

Given the concept of macro-paradigm (or macro-inflection class), counter-examples to the Paradigm Economy Principle can be explained away. On this view, if a different inflectional pattern can be described by invoking gender features, semantic features (like animacy), phonological features, or if it involves non-affixal inflection, it is irrelevant for paradigm economy: Only those differences count which are absolutely irreducible.

Problem:

- (i) Without a concept like that of a macro-paradigm, the Paradigm Economy Principle would be much too restrictive; it would exclude many of the attested inflection patterns in languages with inflection classes.
- (ii) However, assuming such a liberal notion of macro-paradigm reduces the Paradigm Economy Principle's predictive power.

6.2.2 No Blur

Background:

The No Blur Principle is proposed in Carstairs-McCarthy (1994) as a successor to his earlier Paradigm Economy Principle.

(13) *The No Blur Principle* (Carstairs-McCarthy (1994, 742)):

Within any set of competing inflectional realizations for the same paradigmatic cell, no more than one can fail to identify inflection class unambiguously.

Underlying idea:

There is typically one *elsewhere marker* that is not specified for inflection class, but no more than that.

Note:

Just like the Paradigm Economy Principle, the No Blur Principle blocks (what looks like) a constant *re-use* of inflectional material in various inflection classes, and thereby restricts the number of possible inflection classes over a given inventory of markers. (Comment: However, this is exactly what seems to happen in inflectional systems of various types, again and again. Moreover, No Blur, at least as a tendency, is in conflict with the existence of *trans-paradigmatic syncretism*).

(14) *Strong feminine inflection classes in Icelandic*

	Fa	Fa'	Fi	Fc1	Fc2
	vél ('ma-chine')	drottning ('queen')	mynd ('picture')	geit ('goat')	vík ('bay')
nom sg	vél-∅	drottning-∅	mynd-∅	geit-∅	vík-∅
acc sg	vél-∅	drottning-u	mynd-∅	geit-∅	vík-∅
dat sg	vél-∅	drottning-u	mynd-∅	geit-∅	vík-∅
gen sg	vél-ar	drottning-ar	mynd-ar	geit-ar	vík-ur
nom pl	vél-ar	drottning-ar	mynd-ir	geit-ur	vík-ur
acc pl	vél-ar	drottning-ar	mynd-ir	geit-ur	vík-ur
dat pl	vél-um	drottning-um	mynd-um	geit-um	vík-um
gen pl	vél-a	drottning-a	mynd-a	geit-a	vík-a

Analysis (Carstairs-McCarthy (1994, 740-742)):

- Genitive singular and nominative plural are the *leading forms* ('Kennformen'; cf. Wurzel (1987)).
- Markers for gen/sg: *ur* ↔ gen/sg, class Fc2; *ar* ↔ gen/sg.
- Markers for nom/pl: *ar* ↔ nom/pl, class Fa; *ir* ↔ nom/pl, class Fi; *ur* ↔ nom/pl

Problem:

The No Blur Principle makes wrong predictions if the complete system of Icelandic noun declension is taken in to account: In both gen/sg and nom/pl contexts, there is more than one marker that fails to unambiguously identify inflection class.

(15) *The complete system of inflection classes in Icelandic noun inflection* (Kress (1982), Müller (2005)):

	1	2	3	4	5	6	7	8	9	10	11	12
	Ma	Na	Fa(')	Mi	Fi	Mu	Mc	Fc1	Fc2	Mw	Nw	Fw
nom sg	ur	∅	∅	ur	∅	ur	ur	∅	∅	i	a	a
acc sg	∅	∅	∅ (u)	∅	∅	∅	∅	∅	∅	a	a	u
dat sg	i	i	∅ (u)	∅	∅	i	i	∅	∅	a	a	u
gen sg	s	s	ar	ar	ar	ar	ar	ar	ur	a	a	u
nom pl	ar	∅	ar	ir	ir	ir	ur	ur	ur	ar	u	ur
acc pl	a	∅	ar	i	ir	i	ur	ur	ur	a	u	ur
dat pl	um	um	um	um	um	um	um	um	um	um	um	um
gen pl	a	a	a	a	a	a	a	a	a	(n)a	(n)a	

Solution:

- No Blur holds only for a set of inflection classes of the same *gender*.
- However, this still does not seem to suffice: In masculine nom/pl contexts, neither *ar* (Ma, Mw) nor *ir* (Mi, Mu) unambiguously identifies inflection class.

Trans-paradigmatic syncretism and No Blur:

This problem is indicative of a more general potential problem that is raised by the No Blur Principle (as well as by Noyer's (2005) related Interclass Syncretism Constraint): Trans-paradigmatic syncretism is a recurring pattern of inflectional systems. This pattern has successfully been addressed by standard techniques (Jakobson (1936), Bierwisch (1967)) involving feature decomposition and underspecification (which permits a reference by inflection marker specifications to natural classes of inflection classes). See Halle (1992), Oltra Massuet (1999), Wiese (1999), Stump (2001), Alexiadou & Müller (2005), Müller (2005), Trommer (2005), Börjesson (2006), Opitz (2006), Weisser (2006). In all these approaches, more than one of the inflection markers competing for a given instantiation of a grammatical category fails to unambiguously identify inflection class, in violation of the No Blur Principle.

Conclusion:

- Paradigm Economy Principle and No Blur Principle (Noyer's Interclass Syncretism Constraint) reduce the set of logically possible inflection classes (based on a given inventory of markers) to a very small set.
- However, these constraints constantly face the danger of being *too* restrictive.
- Furthermore, these constraints are incompatible with the view that paradigms are mere epiphenomena, and with the view that trans-paradigmatic syncretism can be accounted for by invoking class feature decomposition and underspecification.
- This warrants looking for alternative ways of bringing about paradigm economy.

6.3 Paradigm Economy as a Theorem

6.3.1 Claim

(16) *Inflection Class Economy Theorem:*

Given a set of n inflection markers, there can be at most 2^{n-1} inflection classes, independently of the number of instantiations of the grammatical category that the markers have to distribute over.

Note:

The number of 2^{n-1} inflection classes encodes the powerset of the inventory of markers, minus one radically underspecified marker. For instance: Assuming an abstract system with five markers and six instantiations of a grammatical category (e.g., case), the Inflection Class Economy Theorem states that there can at most be sixteen (i.e., $2^{5-1} = 2^4$) inflection classes, out of the 15.625 (i.e., 5^6) that would otherwise be possible.

Claim:

The Inflection Class Economy Theorem follows under any morphological theory that makes the three assumptions in (17), (18), and (19), which I call 'Syncretism', 'Elsewhere', and 'Blocking'.

(I basically presuppose an approach along the lines of Distributed Morphology (Halle & Marantz (1993, 1994), Noyer (1992)), but things are exactly the same under alternative morphological theories, e.g., Minimalist Morphology (Wunderlich (1996, 1997b)), or Paradigm Function Morphology (Stump (2001)).)

(17) *Syncretism* (first assumption):

The Syncretism Principle holds: For each marker, there is a unique specification of morpho-syntactic features.

Note:

The Syncretism Principle underlies much recent (and, based on the Jakobsonian tradition, some not so recent) work in inflectional morphology; it provides simple and elegant analyses, and it has been empirically confirmed for a variety of inflectional systems in the world's languages.

(18) *Elsewhere* (second assumption):

There is always one elsewhere marker that is radically underspecified with respect to inflection class (and more generally). Other markers may be underspecified to an arbitrary degree (including not at all).

Note:

(i) Underspecification as a means to account for syncretism is employed in most recent theories of inflectional morphology, including Distributed Morphology, Minimalist Morphology, and Paradigm Function Morphology.

(ii) The assumption that there is always one radically underspecified elsewhere marker in inflectional systems is quite common (see, e.g., Stump's (2001) Identity Function Default rule).

(ii-a) It is well-motivated empirically because it can account for ‘discontinuous’ occurrences of markers in paradigms (where natural classes captured by non-radical underspecification is unlikely to be involved).

(ii-b) It ensures that there are (usually) no paradigmatic gaps in inflectional systems (which should otherwise be an option, given underspecification).

(19) *Blocking* (third assumption):

Competition of underspecified markers is resolved by choosing the most specific marker: For all (competing) markers α , β , either α is more specific than β , or β is more specific than α .

Note:

A Specificity constraint along these lines is adopted in Distributed Morphology (typically as part of the definition of the Subset Principle, see Halle (1997)), in Minimalist Morphology (see Wunderlich (1996, 1997b, 2004)), and in Paradigm Function Morphology (Stump (2001) calls the relevant constraint Panini’s Principle).

Consequence:

(i) Syncretism is systematic in the sense that only one specification of morpho-syntactic features is associated with any given inflection marker (with the qualifications made in (2)).

(ii) For any given fully specified context, there is always one inflection marker that fits.

(iii) For any given fully specified context, there is never more than one inflection marker that fits.

(Elsewhere and Blocking emerge as two sides of the same coin; see ‘Completeness’ and ‘Uniqueness’ in Wunderlich (1996, 99).)

Two remaining issues:

(i) How does the Inflection Class Economy Theorem constrain inflectional systems?

(ii) How does the Inflection Class Economy Theorem follow as a theorem from Syncretism, Elsewhere, and Blocking?

6.3.2 Illustration

(20) *Two versions of the basic question:*

- a. Given an inventory of markers for a certain domain (e.g., noun inflection), how many inflection classes can there be?
- b. Given an inventory of markers *with associated features encoding a grammatical category* (e.g., case) for a certain domain (e.g., noun inflection), how many inflection classes can there be?

Assumption:

(20-a) is the more interesting question: It does not presuppose that the specification of a marker for a grammatical category (e.g., with respect to case and/or number) is somehow privileged, i.e., more basic than its inflection class features. (Carstairs (1987)

only tries to answer (20-b).)

A system without restrictions:

If, in a given domain (e.g., noun inflection), there are n markers for m instantiations of a grammatical category (e.g., case), the markers can be grouped into n^m distinct inflection classes (i.e., the set of m -tuples over an input set with n members). [Thanks to the comp4ling toolbox, UMass linguistics.]

Abstract example 1: 3 markers, 4 cases: 81 ($= 3^4$) possible inflection classes

a a a a	a b c a	b a b a	b c a a	c a c a	c c b a	
a a a b	a b c b	b a b b	b c a b	c a c b	c c b b	
a a a c	a b c c	b a b c	b c a c	c a c c	c c b c	
a a b a	a c a a	b a c a	b c b a	c b a a	c c c a	
a a b b	a c a b	b a c b	b c b b	c b a b	c c c b	
a a b c	a c a c	b a c c	b c b c	c b a c	c c c c	
a a c a	a c b a	b b a a	b c c a	c b b a		
a a c b	a c b b	b b a b	b c c b	c b b b		
a a c c	a c b c	b b a c	b c c c	c b b c		
a b a a	a c c a	b b b a	c a a a	c b c a		
a b a b	a c c b	b b b b	c a a b	c b c b		
a b a c	a c c c	b b b c	c a a c	c b c c		
a b b a	b a a a	b b c a	c a b a	c c a a		
a b b b	b a a b	b b c b	c a b b	c c a b		
a b b c	b a a c	b b c c	c a b c	c c a c		

Note:

(i) The letters a , b , and c stand for the three markers.

(ii) All four-letter rows (4-tuples separated by either a vertical line or a line break) correspond to one inflection class, with the first marker in a row being used for the first instantiation of case (e.g., nominative), the second one for the second instantiation of case (e.g., accusative), the third one for the third instantiation of case (e.g., dative), and the fourth one for the fourth instantiation of case (e.g., genitive).

(iii) It is unlikely that a language can be found in which eighty-one inflection classes have been generated on the basis of three markers and four instantiations of a grammatical category.

(21) *Predictions for example 1*

- a. Paradigm Economy Principle, worst case scenario:
3 inflection classes: the size of the inventory
- b. No Blur Principle, worst case scenario:
9 inflection classes: $((3-1) \times 4) + 1$
- c. Inflection Class Economy Theorem, worst case scenario:
4 inflection classes: 2^{3-1}

(22) *Explanation of worst case scenarios, Paradigm Economy Principle:*

All three markers can be allomorphs for a single case specification (e.g., a , b , and c can all be accusative markers); still, there can then only be three distinct inflection

classes.

(23) *Explanation of worst case scenarios, No Blur Principle:*

- a. There is one default marker (say, *a*).
- b. One class consists only of default markers (*aaaa*).
- c. All the other inflection classes differ from this class by replacing one of the *a*'s with either *b* or *c* (*baaa, abaa, aaba, aaab, caaa, acaa, aaca, aaac*), so that all classes respect the No Blur Principle.
- d. Adding another class with more than one *b*, or more than one *c*, or a – perhaps minimal – combination of *b*'s and *c*'s (cf. *bbaa*, or *aacc*, or *abca*, etc.) will invariably lead to a violation of the No Blur Principle because either *b* or *c* (or both) will cease to be inflection-class specific.
- e. In general, the No Blur Principle predicts that there can at most be $((n-1) \times m) + 1$ inflection classes, for *n* markers and *m* instantiations of a grammatical category: Every marker except for one – the default marker, hence “-1” – can appear for a given instantiation of a grammatical category only in one inflection class; and “+1” captures a class consisting exclusively of default markers.

Note:

Assuming default markers that are specific with respect to instantiations of a grammatical category (such that, e.g., *a* is the default marker for the first instantiation, *b* for the second, *c* for the third, and perhaps again *a* for the fourth) instead of an extremely general default marker *a*, does not change things: This would be compatible with No Blur, but it could not increase the number of possible inflection classes. In the case at hand, the maximal set of inflection classes would include *abca, bbca, cbca, aaca, acca, abaa, abba, abcb, abcc*.

Abstract example 2: 5 markers, 3 cases: 125 (= 5³) possible inflection classes

a a a	a d a	b b a	b e a	c c a	d a a	d d a	e b a	e e a
a a b	a d b	b b b	b e b	c c b	d a b	d d b	e b b	e e b
a a c	a d c	b b c	b e c	c c c	d a c	d d c	e b c	e e c
a a d	a d d	b b d	b e d	c c d	d a d	d d d	e b d	e e d
a a e	a d e	b b e	b e e	c c e	d a e	d d e	e b e	e e e
a b a	a e a	b c a	c a a	c d a	d b a	d e a	e c a	
a b b	a e b	b c b	c a b	c d b	d b b	d e b	e c b	
a b c	a e c	b c c	c a c	c d c	d b c	d e c	e c c	
a b d	a e d	b c d	c a d	c d d	d b d	d e d	e c d	
a b e	a e e	b c e	c a e	c d e	d b e	d e e	e c e	
a c a	b a a	b d a	c b a	c e a	d c a	e a a	e d a	
a c b	b a b	b d b	c b b	c e b	d c b	e a b	e d b	
a c c	b a c	b d c	c b c	c e c	d c c	e a c	e d c	
a c d	b a d	b d d	c b d	c e d	d c d	e a d	e d d	
a c e	b a e	b d e	c b e	c e e	d c e	e a e	e d e	

(24) *Predictions for example 2*

- a. Paradigm Economy Principle, worst case scenario:

- 5 inflection classes: the size of the inventory
- b. No Blur Principle, worst case scenario:
13 inflection classes: $((5-1) \times 3) + 1$
(E.g., assuming *a* as a default marker, *aaa, baa, aba, aab, caa, aca, aac, daa, ada, aad, eaa, aea, aae*)
- c. Inflection Class Economy Theorem, worst case scenario:
16 inflection classes: 2^{5-1}

(25) *Predictions for example 3*

- a. Paradigm Economy Principle, worst case scenario:
5 inflection classes: the size of the inventory
- b. No Blur Principle, worst case scenario:
17 inflection classes: $((5-1) \times 4) + 1$
(E.g., *aaaa, baaa, abaa, aaba, aaab, caaa, acaa, aaca, aaac, daaa, adaa, aada, aaad, eaaa, aeaa, aaea, aaee*.)
- c. Inflection Class Economy Theorem, worst case scenario:
16 inflection classes: 2^{5-1}

Conclusion so far:

The Inflection Class Economy Theorem restricts possible inflection classes in a way that is roughly comparable to the Paradigm Economy and No Blur Principles.

6.3.3 Deriving the Inflection Class Economy Theorem

Recall:

- (i) Syncretism: Only one morpho-syntactic feature specification is associated with each marker of the inventory for a given morphological domain (exceptions apart).
- (ii) Elsewhere: There is always one marker that in principle fits into every context of fully specified morpho-syntactic features.
- (iii) Blocking: There is always only one marker that can in fact be used for any fully specified context of morpho-syntactic features.

(26) *Argument via marker deactivation combinations:*

- a. Since each inflection marker *M* can only be associated with one specification of morpho-syntactic features (because of **Syncretism**), it follows that for each inflection marker *M* and for each inflection class *I*, it must be the case that *M* is either *compatible* with *I* or *incompatible* with *I*.
- b. A marker is compatible with an inflection class *I* if it bears no inflection class feature, if it bears fully specified inflection class information that completely characterizes *I*, or if it is characterized by a set of underspecified inflection class features that is a subset of the fully specified set of features that characterize the inflection class.
- c. *M* is *activated* for *I* if it is compatible with it; and *deactivated* for *I* if it is

Abstract example 3: 5 markers, 4 cases: 625 (= 5⁴) possible inflection classes

a a a a	a c c a	a e e e	b c b a	b e d a	c c a a	c e c a	d b e a	d e b a	e b d a	e e a a
a a a b	a c c b	a e e b	b c b b	b e d b	c c a b	c e c b	d b e b	d e b b	e b d b	e e a b
a a a c	a c c c	a e e c	b c b c	b e d c	c c a c	c e c c	d b e c	d e b c	e b d c	e e a c
a a a d	a c c d	a e e d	b c b d	b e d d	c c a d	c e c d	d b e d	d e b d	e b d d	e e a d
a a a e	a c c e	a e e e	b c b e	b e d e	c c a e	c e c e	d b e e	d e b e	e b d e	e e a e
a a b a	a c d a	b a a a	b c c a	b e e a	c c b a	c e d a	d c a a	d e c a	e b e a	e e b a
a a b b	a c d b	b a a b	b c c b	b e e b	c c b b	c e d b	d c a b	d e c b	e b e b	e e b b
a a b c	a c d c	b a a c	b c c c	b e e c	c c b c	c e d c	d c a c	d e c c	e b e c	e e b c
a a b d	a c d d	b a a d	b c c d	b e e d	c c b d	c e d d	d c a d	d e c d	e b e d	e e b d
a a b e	a c d e	b a a e	b c c e	b e e e	c c b e	c e d e	d c a e	d e c e	e b e e	e e b e
a a c a	a c e a	b a b a	b c d a	c a a a	c c c a	c e e a	d c b a	d e d a	e c a a	e e c a
a a c b	a c e b	b a b b	b c d b	c a a b	c c c b	c e e b	d c b b	d e d b	e c a b	e e c b
a a c c	a c e c	b a b c	b c d c	c a a c	c c c c	c e e c	d c b c	d e d c	e c a c	e e c c
a a c d	a c e d	b a b d	b c d d	c a a d	c c c d	c e e d	d c b d	d e d d	e c a d	e e c d
a a c e	a c e e	b a b e	b c d e	c a a e	c c c e	c e e e	d c b e	d e d e	e c a e	e e c e
a a d a	a d a a	b a c a	b c e a	c a b a	c c d a	d a a a	d c c a	d e e a	e c b a	e e d a
a a d b	a d a b	b a c b	b c e b	c a b b	c c d b	d a a b	d c c b	d e e b	e c b b	e e d b
a a d c	a d a c	b a c c	b c e c	c a b c	c c d c	d a a c	d c c c	d e e c	e c b c	e e d c
a a d d	a d a d	b a c d	b c e d	c a b d	c c d d	d a a d	d c c d	d e e d	e c b d	e e d d
a a d e	a d a e	b a c e	b c e e	c a b e	c c d e	d a a e	d c c e	d e e e	e c b e	e e d e
a a e a	a d b a	b a d a	b d a a	c a c a	c c e a	d a b a	d c d a	e a a a	e c c a	e e e a
a a e b	a d b b	b a d b	b d a b	c a c b	c c e b	d a b b	d c d b	e a a b	e c c b	e e e b
a a e c	a d b c	b a d c	b d a c	c a c c	c c e c	d a b c	d c d c	e a a c	e c c c	e e e c
a a e d	a d b d	b a d d	b d a d	c a c d	c c e d	d a b d	d c d d	e a a d	e c c d	e e e d
a a e e	a d b e	b a d e	b d a e	c a c e	c c e e	d a b e	d c d e	e a a e	e c c e	e e e e
a b a a	a d c a	b a e a	b d b a	c a d a	c d a a	d a c a	d c e a	e a b a	e c d a	e e d a
a b a b	a d c b	b a e b	b d b b	c a d b	c d a b	d a c b	d c e b	e a b b	e c d b	e e d b
a b a c	a d c c	b a e c	b d b c	c a d c	c d a c	d a c c	d c e c	e a b c	e c d c	e e d c
a b a d	a d c d	b a e d	b d b d	c a d d	c d a d	d a c d	d c e d	e a b d	e c d d	e e d d
a b a e	a d c e	b a e e	b d b e	c a d e	c d a e	d a c e	d c e e	e a b e	e c d e	e e d e
a b b a	a d d a	b b a a	b d d a	c a e a	c d b a	d a d a	d d a a	e a c a	e c e a	e e e a
a b b b	a d d b	b b a b	b d d b	c a e b	c d b b	d a d b	d d a b	e a c b	e c e b	e e e b
a b b c	a d d c	b b a c	b d d c	c a e c	c d b c	d a d c	d d a c	e a c c	e c e c	e e e c
a b b d	a d d d	b b a d	b d d d	c a e d	c d b d	d a d d	d d a d	e a c d	e c e d	e e e d
a b b e	a d d e	b b a e	b d d e	c a e e	c d b e	d a d e	d d a e	e a c e	e c e e	e e e e
a b c a	a d e a	b b b a	b d d a	c b a a	c d c a	d a e a	d d b a	e a d a	e d a a	e e d a
a b c b	a d e b	b b b b	b d d b	c b a b	c d c b	d a e b	d d b b	e a d b	e d a b	e e d b
a b c c	a d e c	b b b c	b d d c	c b a c	c d c c	d a e c	d d b c	e a d c	e d a c	e e d c
a b c d	a d e d	b b b d	b d d d	c b a d	c d c d	d a e d	d d b d	e a d d	e d a d	e e d d
a b c e	a d e e	b b b e	b d d e	c b a e	c d c e	d a e e	d d b e	e a d e	e d a e	e e d e
a b d a	a e a a	b b c a	b d e a	c b b a	c d d a	d b a a	d d c a	e a e a	e d b a	e e d a
a b d b	a e a b	b b c b	b d e b	c b b b	c d d b	d b a b	d d c b	e a e b	e d b b	e e d b
a b d c	a e a c	b b c c	b d e c	c b b c	c d d c	d b a c	d d c c	e a e c	e d b c	e e d c
a b d d	a e a d	b b c d	b d e d	c b b d	c d d d	d b a d	d d c d	e a e d	e d b d	e e d d
a b d e	a e a e	b b c e	b d e e	c b b e	c d d e	d b a e	d d c e	e a e e	e d b e	e e d e
a b e a	a e b a	b b d a	b e a a	c b c a	c d e a	d b b a	d d d a	e b a a	e d c a	e e d a
a b e b	a e b b	b b d b	b e a b	c b c b	c d e b	d b b b	d d d b	e b a b	e d c b	e e d b
a b e c	a e b c	b b d c	b e a c	c b c c	c d e c	d b b c	d d d c	e b a c	e d c c	e e d c
a b e d	a e b d	b b d d	b e a d	c b c d	c d e d	d b b d	d d d d	e b a d	e d c d	e e d d
a b e e	a e b e	b b d e	b e a e	c b c e	c d e e	d b b e	d d d e	e b a e	e d c e	e e d e
a c a a	a e c a	b b e a	b e b a	c b d a	c e a a	d b c a	d d e a	e b b a	e d d a	e e d a
a c a b	a e c b	b b e b	b e b b	c b d b	c e a b	d b c b	d d e b	e b b b	e d d b	e e d b
a c a c	a e c c	b b e c	b e b c	c b d c	c e a c	d b c c	d d e c	e b b c	e d d c	e e d c
a c a d	a e c d	b b e d	b e b d	c b d d	c e a d	d b c d	d d e d	e b b d	e d d d	e e d d
a c a e	a e c e	b b e e	b e b e	c b d e	c e a e	d b c e	d d e e	e b b e	e d d e	e e d e
a c b a	a e d a	b c a a	b e c a	c b e a	c e b a	d b d a	d e a a	e b c a	e d e a	e e d a
a c b b	a e d b	b c a b	b e c b	c b e b	c e b b	d b d b	d e a b	e b c b	e d e b	e e d b
a c b c	a e d c	b c a c	b e c c	c b e c	c e b c	d b d c	d e a c	e b c c	e d e c	e e d c
a c b d	a e d d	b c a d	b e c d	c b e d	c e b d	d b d d	d e a d	e b c d	e d e d	e e d d
a c b e	a e d e	b c a e	b e c e	c b e e	c e b e	d b d e	d e a e	e b c e	e d e e	e e d e

incompatible with it.

(If a marker is activated for an inflection class I, this does not imply that it will actually be used by I – there may well be a more specific marker that blocks it.)

- d. **Blocking** ensures that each inflection class can be defined in terms of the markers that are active in it: For all competing markers α and β , it is fixed once and for all by the markers' feature specifications (and independently of inflection classes) that either β is more specific than α , or α is more specific than β .
- e. Hence, if the same set of markers is activated for two inflection classes I_1 and I_2 , I_1 must be identical to I_2 .
- f. Conversely, since every marker is either activated or deactivated for any given inflection class, it also follows that if the same set of markers is *deactivated* for two inflection classes I_1 and I_2 , I_1 and I_2 must be the same inflection class (because the same set of markers is then activated for I_1 and I_2 , because a marker /x/ can only have one specification $[\xi]$, and because specificity relations among competing markers are fixed).
- g. In order to determine the maximal number of inflection classes on the basis of a given inventory of markers, it now suffices to successively deactivate all possible marker combinations.
- h. Starting with the full inventory of markers, we can proceed by successively deactivating all combinations of markers, which yields class after class.
- i. Thus, all markers of the inventory are compatible with class I_1 ; all except for marker a are compatible with class I_2 ; all except for markers a, b are compatible with class I_3 ; and so forth.
- j. However, by assumption (**Elsewhere**), one marker always is the elsewhere (default) marker: It is compatible with all inflection classes because it is radically underspecified; and therefore it cannot be deactivated by definition.
- k. Consequently, all possible *marker deactivation combinations* are provided by the *powerset* of the set of all the markers of the inventory minus the elsewhere marker: 2^{n-1} , for n markers.
- l. Thus, given a set of n inflection markers, there can be at most 2^{n-1} marker deactivation combinations.
- m. Since marker deactivation combinations fully determine possible inflection classes, it now follows that given a set of n inflection markers, there can be at most 2^{n-1} inflection classes.

Note:

This reasoning is independent of the number of instantiations of the grammatical category (e.g., the number of cases) that a set of markers needs to distribute over. In contrast to what is the case under the No Blur Principle, an increase in instantiations of a grammatical category does not induce an increase in possible inflection classes over a given inventory of markers. Hence:

(27) *Inflection Class Economy Theorem:*

Given a set of n inflection markers, there can be at most 2^{n-1} inflection classes, independently of the number of grammatical categories that the markers have to distribute over.

6.3.4 Examples**6.3.4.1 A First Example**

Note:

In order to illustrate the possible marker deactivation patterns, the case categories are now called 1, 2, 3, and 4. Given an inventory of three markers, there are $2^{3-1} = 4$ deactivation combinations.

(28) *Example 1 revisited:*

- a. 3 markers: {a, b, c}
- b. 4 cases: 1, 2, 3, 4
- c. Deactivation combinations: { {b, c}, {b}, {c}, { } }

Observation:

Of the 81 inflection classes that would logically be possible under, only four remain, given Syncretism, Underspecification, and Blocking (i.e., the Inflection Class Economy Theorem). This result holds under any specificity-induced order of the markers, and under any assignment of case features to markers.

(29) *A possible assignment of case specifications to markers:*

- a. Markers:
 - (i) /a/ ↔ []
 - (ii) /b/ ↔ [12]
 - (iii) /c/ ↔ [234]
- b. Specificity: /b/ > /c/ > /a/
- c. Deactivation combinations and inflection classes:

{b, c}	→	aaaa
{b}	→	acc
{c}	→	bbaa
{ }	→	bbcc

(30) *Another possible assignment of case specifications to markers:*

- a. Markers:
 - (i) /a/ ↔ []
 - (ii) /b/ ↔ [234]
 - (iii) /c/ ↔ [4]
- b. Specificity: /c/ > /b/ > /a/
- c. Deactivation combinations and inflection classes:

- | | | |
|--------|---|------|
| {b, c} | → | aaaa |
| {b} | → | aaac |
| {c} | → | abbb |
| { } | → | abbc |

Note:

The question of how the cases 1, 2, 3, 4 are derived from more primitive decomposed features (e.g., how [234] can be a natural class), and how systems with apparently unnatural classes (under minimal decomposition) are derived, is orthogonal.

6.3.4.2 A second example(31) *Example 3 revisited:*

- a. 5 markers: {a, b, c, d, e}
- b. 4 cases: 1, 2, 3, 4

(32) *A possible choice:*

- a. Markers:
 - (i) /a/ ↔ []
 - (ii) /b/ ↔ [23]
 - (iii) /c/ ↔ [14]
 - (iv) /d/ ↔ [3]
 - (v) /e/ ↔ [34]
- b. Specificity: /d/ > /e/ > /c/ > /b/ > /a/
- c. Deactivation combinations & inflection classes:

{b, c, d, e}	→	aaaa
{b, c, d}	→	aaee
{b, c, e}	→	aada
{b, c}	→	aade
{b, d, e}	→	caac
{b, d}	→	caee
{b, e}	→	cadc
{b}	→	cade
{c, d, e}	→	abba
{c, d}	→	abee
{c, e}	→	abda
{c}	→	abde
{d, e}	→	cbbc
{d}	→	cbee
{e}	→	cbdc
{ }	→	cbde

(33) *Another possible choice:*

- a. Markers:
 - (i) /a/ ↔ []
 - (ii) /b/ ↔ []
 - (iii) /c/ ↔ [1]
 - (iv) /d/ ↔ [2]
 - (v) /e/ ↔ [34]
- b. Specificity: /c/ > /d/ > /e/ > /b/ > /a/
- c. Deactivation combinations & inflection classes:

{b, c, d, e}	→	aaaa
{b, c, d}	→	aaee
{b, c, e}	→	adaa
{b, c}	→	adee
{b, d, e}	→	caaa
{b, d}	→	caee
{b, e}	→	cdaa
{b}	→	cdee
{c, d, e}	→	bbbb
{c, d}	→	bbee
{c, e}	→	bdbb
{c}	→	bdee
{d, e}	→	cbbb
{d}	→	cbee
{e}	→	cdbb
{ }	→	edee

(34) *A third possible choice:*

- a. Markers:
 (i) /a/ ↔ []
 (ii) /b/ ↔ [234]
 (iii) /c/ ↔ [134]
 (iv) /d/ ↔ [123]
 (v) /e/ ↔ [123]
- b. Specificity:
 /d/ > /e/ > /c/ > /b/ > /a/
- c. Deactivation combinations
 & inflection classes:
 {b, c, d, e} → aaaa
 {b, c, d} → eeea
 {b, c, e} → ddda
 {b, c} → ~~ddda~~
 {b, d, e} → cacc
 {b, d} → eeec
 {b, e} → dddc
 {b} → ~~ddde~~
 {c, d, e} → abbb
 {c, d} → eeeb
 {c, e} → dddb
 {c} → ~~dddb~~
 {d, e} → cbcc
 {d} → ~~eecc~~
 {e} → ~~ddde~~
 { } → ~~edde~~

Note:

Again, the issue of what the decomposed case and inflection class features that encode the deactivation patterns in systems like (32)–(35) would actually look like is strictly speaking orthogonal to present concerns. Still, for the case at hand, in the worst case there would have to be four binary inflection class features [$\pm\alpha$], [$\pm\beta$], [$\pm\gamma$] and [$\pm\delta$] whose cross-classification yields the sixteen inflection classes (with individual markers underspecified as, e.g., [$+\alpha$]); two abstract grammatical category features (e.g., case features such as [\pm governed], [\pm oblique], as in Bierwisch (1967)) would suffice for all systems but (34), where either reference to negated specifications would be necessary, or a third primitive feature would have to be invoked.

6.4 Conclusion

Scope of the result:

There may be minor imperfections in inflectional systems that can be traced back to historical factors. In particular, these deviations from optimal design show up in the form of isolated markers that cannot be given unique specifications, resulting in a case

of *non-systematic homophony*. In such a situation, the set of possible inflection classes is mildly increased; it is 2^{n-1+x} , for x additional marker specifications required by unresolved, accidental homophony.

Abstractness of inflection markers:

The notion of “marker” is to be understood in a somewhat more abstract way that ignores allomorphic variation which is phonologically or morpho-phonologically conditioned (and not morphologically, as with variation determined by inflection class membership). For instance, Halle (1994) argues that the marker realizations *ov* and *ej* for genitive plural in Russian are allomorphs whose choice is morpho-phonologically determined; on this view, there is but a single marker /ov/, accompanied a single underspecified set of morpho-syntactic features (perhaps involving underspecified inflection class features, as suggested in Alexiadou & Müller (2005) in order to account for fact that this marker exhibits trans-paradigmatic syncretism).

Note:

The same reasoning applies to

- (i) the use of *disjunction* or *negation* in marker specifications (see, e.g., Bierwisch (1967), Wunderlich (1996)), but only if contradictory feature specifications are involved;
 (ii) the use of variables over feature values in marker specifications (i.e., α notation (see Chomsky (1965), Chomsky & Halle (1968a) for the original concept, Noyer (1992), Harley (1994), Johnston (1996), Alexiadou & Müller (2005), Börjesson (2006), Georgi (2006), Lahne (2006), and Opitz (2006) on its use in morphology).

On the other hand:

The 2^{n-1} formula captures worst case scenarios. Overlapping marker specifications reduce the number of possible inflection classes further. Moreover, for an inflectional system to fully exploit the logical possibilities for developing inflection classes as they arise under the Inflection Class Economy Theorem is extremely unlikely – typically, far from all marker deactivation combinations will be employed.

(36) *Consequences for other morphological operations:*

- a. *Fission* (Distributed Morphology; Halle & Marantz (1993), Noyer (1992)), *rule blocks* (stem-and-paradigm accounts; Anderson (1992), Stump (2001)). Both concepts give rise to instances of subanalysis, in the sense that what may look like a complex marker at first sight turns out to be best analyzed as a sequence of smaller markers, each with its own specifications (Janda & Joseph (1992), Bierkandt (2006)): unproblematic as long as it is understood that no more than one inflection class can determine a sequence of subanalyzed markers in each case.
- b. *Impoverishment* (Distributed Morphology): Given that standard impoverishment (as feature deletion) can be reanalyzed as insertion of a highly specific null marker (Trommer (1999a)), each impoverishment rule also increases the set of n 's (for which the powerset is created) by one.

References

- Abdel-Hafiz, Ahmed Sokarno (1988): A Reference Grammar of Kunuz Nubian. PhD thesis, Cornell University.
- Adger, David (2003): *Core Syntax*. Oxford University Press, Oxford, New York.
- Aissen, Judith (2002): Bidirectional Optimization and the Problem of Recoverability in Head Marking Languages. Ms., University of California, Santa Cruz.
- Alexiadou, Artemis (2004): Inflectional Class, Gender, and DP Internal Structure. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 21–49.
- Alexiadou, Artemis & Gereon Müller (2005): Class Features as Probes. Ms., Universität Stuttgart and Universität Leipzig. To appear in Asaf Bachrach and Andrew Nevins (eds.), *The Bases of Inflectional Identity*. Oxford University Press.
- Alexiadou, Artemis & Gisbert Fanselow (2000): On the Correlation between Morphology and Syntax: The Case of V-to-I. In: W. Abraham & J.-W. Zwart, eds., *Proceedings from the 15th Comparative Germanic Syntax Workshop*. Benjamins, Amsterdam, pp. 219–242.
- Alexiadou, Artemis, Liliane Haegeman & Melitta Stavrou (2001): On Nominal Functional Projections: Noun Morphology, Movement and Ellipsis. In: *Proceedings of the Annual Conference of the Israel Association for Theoretical Linguistics*. Vol. 16, pp. 1–8.
- Anderson, Stephen (1992): *A-Morphous Morphology*. Cambridge University Press, Cambridge.
- Anderson, Stephen (2005): Morphological Universals and Diachrony. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 2004*. Springer, Dordrecht, pp. 1–17.
- Aronoff, Mark (1994): *Morphology by Itself*. MIT Press, Cambridge, Mass.
- Aronoff, Mark & Kirsten Fudeman (2005): *What is Morphology?*. Blackwell, Oxford.
- Arregi, Karlos & Andrew Nevins (2006): Obliteration vs. Impoverishment in the Basque *g-/z-* Constraint. Ms., University of Illinois and Harvard University.
- Avrutin, Sergej & Bernhard Rohrbacher (1997): Null Subjects in Russian Inverted Constructions. In: *Proceedings of the Fourth Annual Workshop on Formal Approaches to Slavic Linguistics*. Michigan Slavic Publications, Ann Arbor, pp. 32–53.
- Babinotis, George (1986): *Brief History of the Greek Language*. Athens University Press, Athens.
- Baerman, Matthew (2006): Tracking the Amphisbaenic Paradigm: Morphological Polarity. Ms., University of Surrey.
- Baerman, Matthew, Dunstan Brown & Greville Corbett (2005): *The Syntax-Morphology Interface. A Study of Syncretism*. Cambridge University Press, Cambridge.
- Baker, Mark (1996): *The Polysynthesis Parameter*. Oxford University Press, New York and Oxford.
- Benveniste, Emile (1974): *Probleme der allgemeinen Sprachwissenschaft*. Paul List Verlag, München.
- Berg, Helma van den (1995): A Grammar of Hunzib. PhD thesis, Universiteit Leiden.
- Bernstein, Judy (1993): Topics in the Syntax of Nominal Structure across Romance.

- PhD thesis, CUNY.
- Bickel, Balthasar & Johanna Nichols (2001): Inflectional Morphology. Ms., Universität Leipzig. To appear in T. Shopen (ed.), *Language Typology and Syntactic Description*. Cambridge: Cambridge University Press.
- Bierkandt, Lennart (2006): Kasusmorphologie des Diyari. Ein Ansatz im Rahmen der Distribuierten Morphologie. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 43–62.
- Bierwisch, Manfred (1961): Zur Morphologie des deutschen Verbalsystems. PhD thesis, Universität Leipzig.
- Bierwisch, Manfred (1967): Syntactic Features in Morphology: General Problems of So-Called Pronominal Inflection in German. In: *To Honor Roman Jakobson*. Mouton, The Hague/Paris, pp. 239–270.
- Bittner, Maria & Ken Hale (1996): Ergativity: Toward a Theory of a Heterogeneous Class, *Linguistic Inquiry* pp. 531–604.
- Blevins, James (2000): Markedness and Blocking in German Declensional Paradigms. In: B. Stiebels & D. Wunderlich, eds., *Lexicon in Focus*. Akademie-Verlag, Berlin, pp. 83–103.
- Blevins, James (2004): Inflection Classes and Economy. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 51–95.
- Bobaljik, Jonathan (1993): Ergativity and Ergative Unergatives. In: C. Phillips, ed., *Papers on Case and Agreement II*. Vol. 19 of *MIT Working Papers in Linguistics*, MITWPL, MIT: Cambridge, Mass., pp. 45–88.
- Bobaljik, Jonathan (2000): The Ins and Outs of Contextual Allomorphy. In: K. Grohmann & C. Struijke, eds., *University of Maryland Working Papers in Linguistics*. Vol. 10, University of Maryland, College Park, pp. 35–71.
- Bobaljik, Jonathan (2002a): Realizing Germanic Inflection: Why Morphology Does Not Drive Syntax, *Journal of Comparative Germanic Linguistics* 6, 129–167.
- Bobaljik, Jonathan (2002b): Syncretism without Paradigms: Remarks on Williams 1981, 1994. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 2001*. Kluwer, Dordrecht, pp. 53–85.
- Bobaljik, Jonathan (2003): Paradigms (Optimal and Otherwise): A Case for Skepticism. Ms., University of Connecticut, Storrs.
- Bobaljik, Jonathan & Susi Wurmbrand (2003): Relativized Phases. Ms., University of Connecticut, Storrs.
- Bonet, Eulália (1991): Morphology after Syntax. PhD thesis, MIT, Cambridge, Mass.
- Bonet, Eulalia (1995): Feature Structure of Romance Clitics, *Natural Language and Linguistic Theory* 13, 607–647.
- Börjesson, Kristin (2006): Argument Encoding in Slovene. A Distributed Morphology Analysis of Slovene Noun Declensions. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 115–130.
- Bošković, Željko (2002): On Multiple Wh-Fronting, *Linguistic Inquiry* 33, 351–383.

- Bruening, Benjamin (2001): Syntax at the Edge: Cross-Clausal Phenomena and the Syntax of Passamaquoddy. PhD thesis, MIT, Cambridge, Mass.
- Carstairs, Andrew (1986): Macroclasses and Paradigm Economy in German Nouns, *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung* 39, 3–11.
- Carstairs, Andrew (1987): *Allomorphy in Inflection*. Croom Helm, London.
- Carstairs-McCarthy, Andrew (1994): Inflection Classes, Gender, and the Principle of Contrast, *Language* 70, 737–787.
- Carstairs-McCarthy, Andrew (1998): Paradigm Structure: Inflectional Paradigms and Morphological Classes. In: A. Spencer & A. Zwicky, eds., *Handbook of Morphology*. Blackwell, Oxford, pp. 322–334.
- Chomsky, Noam (1965): *Aspects of the Theory of Syntax*. MIT Press, Cambridge, MA.
- Chomsky, Noam (1982): *Some Concepts and Consequences of the Theory of Government and Binding*. MIT Press, Cambridge, Mass.
- Chomsky, Noam (1993): A Minimalist Program for Syntactic Theory. In: K. Hale & S. J. Keyser, eds., *The View from Building 20*. MIT Press, Cambridge, Mass., pp. 1–52.
- Chomsky, Noam (1995): *The Minimalist Program*. MIT Press, Cambridge, Mass.
- Chomsky, Noam (2000): Minimalist Inquiries: The Framework. In: R. Martin, D. Michaels & J. Uriagereka, eds., *Step by Step*. MIT Press, Cambridge, Mass., pp. 89–155.
- Chomsky, Noam (2001): Derivation by Phase. In: M. Kenstowicz, ed., *Ken Hale. A Life in Language*. MIT Press, Cambridge, Mass., pp. 1–52.
- Chomsky, Noam (2005): On Phases. Ms., MIT, Cambridge, Mass.
- Chomsky, Noam & Morris Halle (1968a): *The Sound Pattern of English*. MIT Press, Cambridge, Mass.
- Chomsky, Noam & Morris Halle (1968b): *The Sound Pattern of English*. MIT Press, Cambridge, Mass.
- Cinque, Guglielmo (1993): On the Evidence for Partial N-Movement in the Romance DP, *University of Venice Working Papers in Linguistics* 3.2, 21–40.
- Corbett, Greville & Norman Fraser (1993): Network Morphology: A DATR Account of Russian Nominal Inflection, *Journal of Linguistics* 29, 113–142.
- Cysouw, Michael (2001): The Paradigmatic Structure of Person Marking. PhD thesis, Katholieke Universiteit Nijmegen. Revised version published 2003: Oxford University Press.
- Danon, Gabi (1996): The Syntax of Determiners in Hebrew. Master's thesis, Tel-Aviv University.
- Demjjanow, Assinja & Anatoli Strigin (2000): Case Assignment to Conceptual Structures: The Russian Instrumental. In: M. Kracht & A. Strigin, eds., *Papers on the Interpretation of Case*. Vol. 10 of *Linguistics in Potsdam*, Universität Potsdam, Institut für Linguistik, Potsdam, pp. 75–107.
- DiSciullo, Anna-Maria & Edwin Williams (1987): *On the Definition of Word*. MIT Press, Cambridge, Mass.
- Dutton, Tom (1996): *Koiari*. Lincom, München.
- Eisenberg, Peter (2000): *Grundriß der deutschen Grammatik. Band 1: Das Wort*. Metzler, Stuttgart.

- Elson, Ben (1960a): *Gramatica Popoluca de la Sierra*. Number 6 in 'Gramáticas de Lenguas Indígenas de México', Biblioteca de la Facultad de Filosofía y Letras, Universidad Veracruzana.
- Elson, Ben (1960b): Sierra Popoluca Morphology, *International Journal of American Linguistics* 20, 206–223.
- Elson, Ben & Velma Pickett (1964): *An Introduction to Morphology and Syntax*. Summer Institute of Linguistics, Santa Ana, California.
- Embick, David (1998): Voice Systems and the Syntax/Morphology Interface. In: H. Harley, ed., *Papers from the UPenn/MIT Roundtable on Argument Structure and Aspect*. Vol. 32, MITWPL, Cambridge, Mass., pp. 41–72.
- Embick, David (2000): Features, Syntax, and Categories in the Latin Perfect, *Linguistic Inquiry* 31, 185–230.
- Embick, David & Rolf Noyer (2001): Movement Operations after Syntax, *Linguistic Inquiry* 32, 555–595.
- Fanselow, Gisbert (1991): Minimale Syntax. Habilitation thesis, Universität Passau.
- Fanselow, Gisbert & Stefan Frisch (2005): Effects of Processing Difficulty on Judgments of Acceptability. Ms., Universität Potsdam.
- Fischer, Silke (2006): Zur Morphologie der deutschen Personalpronomina – eine Spaltungsanalyse. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 77–101.
- Frampton, John (2002): Syncretism, Impoverishment, and the Structure of Person Features. In: M. Andronis, E. Debenport, A. Pycha & K. Yoshimura, eds., *Papers from the Chicago Linguistics Society Meeting*. Vol. 38, Chicago, pp. 207–222.
- Franks, Steven (1995): *Parameters of Slavic Morphosyntax*. Oxford University Press, New York and Oxford.
- Fraser, Norman & Greville Corbett (1994): Gender, Animacy, and Declensional Class Assignment: A Unified Account for Russian. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 1994*. Kluwer, Dordrecht, pp. 123–150.
- Gallmann, Peter (2004): Feature Sharing in DPs. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 121–160.
- Georgi, Doreen (2006): A Distributed Morphology Approach to Argument Encoding in Kambera. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 1–21.
- Granberry, Julian (1990): A Grammatical Sketch of Timucua, *International Journal of American Linguistics* 56, 60–101.
- Grewendorf, Günther (1989): *Ergativity in German*. Foris, Dordrecht.
- Grimshaw, Jane (2000): Extended Projection and Locality. In: P. Coopmans, M. Everaert & J. Grimshaw, eds., *Lexical Specification and Insertion*. Benjamins, Amsterdam, pp. 115–133.
- Grimshaw, Jane & Vieri Samek-Lodovici (1998): Optimal Subjects and Subject Universals. In: P. Barbosa, D. Fox, P. Hagstrom, M. McGinnis & D. Pesetsky, eds., *Is the Best Good Enough?*. MIT Press and MITWPL, Cambridge, Mass., pp. 193–219.

- Gunkel, Lutz (2002): Syncretism and Case Underspecification in Polish Noun Paradigms. Ms., IDS Mannheim. To appear in L. Gunkel, G. Müller and G. Zifonun, eds., *Explorations in Nominal Inflection*. Berlin: Mouton de Gruyter.
- Haegeman, Liliane (1998): Gender and Word Markers in West Flemish. Ms., University of Lille.
- Haider, Hubert (1988): Pro Pro-Drop Drop, *Wiener Linguistische Gazette* 42/43, 57–79.
- Halle, Morris (1992): The Latvian Declension. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 1991*. Kluwer, Dordrecht, pp. 33–47.
- Halle, Morris (1994): The Russian Declension: An Illustration of the Theory of Distributed Morphology. In: J. Cole & C. Kisseberth, eds., *Perspectives in Phonology*. CSLI Publications, Stanford, pp. 29–60.
- Halle, Morris (1997): Distributed Morphology: Impoverishment and Fission. In: B. Bruening, Y. Kang & M. McGinnis, eds., *Papers at the Interface*. Vol. 30, MITWPL, pp. 425–449.
- Halle, Morris & Alec Marantz (1993): Distributed Morphology and the Pieces of Inflection. In: K. Hale & S. J. Keyser, eds., *The View from Building 20*. MIT Press, Cambridge, Mass., pp. 111–176.
- Halle, Morris & Alec Marantz (1994): Some Key Features of Distributed Morphology. In: A. Carnie, H. Harley & T. Bures, eds., *Papers on Phonology and Morphology*. Vol. 21 of *MIT Working Papers in Linguistics*, MITWPL, Cambridge, Mass., pp. 275–288.
- Harbour, Daniel (2003): The Kiowa Case for Feature Insertion, *Natural Language and Linguistic Theory* 21, 543–578.
- Harley, Heidi (1994): Hug a Tree: Deriving the Morphosyntactic Feature Hierarchy. In: A. Carnie & H. Harley, eds., *MITWPL 21: Papers on Phonology and Morphology*. MITWPL, Cambridge, Mass., pp. 275–288.
- Harley, Heidi & Rolf Noyer (1999): Distributed Morphology, *GLOT International* 4/4, 3–9.
- Harley, Heidi & Rolf Noyer (2003): Distributed Morphology. In: L. Cheng & R. Sybesma, eds., *The Second GLOT International State-of-the-Article Book*. Mouton de Gruyter, Berlin, pp. 463–496.
- Harris, James (1991): The Exponence of Gender in Spanish, *Linguistic Inquiry* 22, 27–62.
- Holmberg, Anders (2004): Null Subjects and Uninterpretable Features: Evidence from Finnish. Ms., University of Durham.
- Holmberg, Anders & Christer Platzack (1995): *The Role of Inflection in the Syntax of the Scandinavian Languages*. Oxford University Press, Oxford.
- Jaeggli, Osvaldo & Ken Safir (1989): The Null Subject Parameter and Parametric Theory. In: O. Jaeggli & K. Safir, eds., *The Null Subject Parameter*. Kluwer, Dordrecht.
- Jakobson, Roman (1936): Beitrag zur allgemeinen Kasuslehre: Gesamtbedeutungen der russischen Kasus, *Travaux du Cercle Linguistique de Prague VI* pp. 240–299. Reprinted in E. Hamp, et al. (eds.) (1966), *Readings in Linguistics II*, 51–89.
- Jakobson, Roman (1962a): Beitrag zur allgemeinen Kasuslehre. Gesamtbedeutungen der russischen Kasus. In: *Selected Writings*. Vol. 2, Mouton, The Hague and Paris, pp. 23–71.

- Jakobson, Roman (1962b): Morfologičeskije Nabljudenija. In: *Selected Writings*. Vol. 2, Mouton, The Hague and Paris, pp. 154–181.
- Janda, Richard & Brian Joseph (1992): Pseudo-Agglutinativity in Modern Greek Verb-Inflection and “Elsewhere”. In: *Proceedings from the 28th Regional Meeting of the Chicago Linguistic Society*. Vol. 1, pp. 251–266.
- Jelinek, Eloise (1984): Empty Categories, Case, and Configurationality, *Natural Language and Linguistic Theory* 2, 39–76.
- Johnston, Jason (1996): Systematic Homonymy and the Structure of Morphological Categories. PhD thesis, University of Sydney.
- Kibrik, Aleksandr (1991): Organising Principles for Nominal Paradigms in Daghestan Languages: Comparative and Typological Observations. In: F. Plank, ed., *Paradigms*. Mouton de Gruyter, Berlin, pp. 255–274.
- Kibrik, Aleksandr (2003): Nominal Inflection Galore: Daghestanian, with Side Glances at Europe and the World. In: F. Plank, ed., *Noun Phrase Structure in the Languages of Europe*. Mouton de Gruyter, Berlin, pp. 37–112.
- Kiparsky, Paul (1973): ‘Elsewhere’ in Phonology. In: S. Anderson & P. Kiparsky, eds., *A Festschrift for Morris Halle*. Academic Press, New York, pp. 93–106.
- Kiparsky, Paul (1999): Analogy and OT: Morphological Change as Emergence of the Unmarked. Vortrag auf der 21. Jahrestagung der DGfS, Konstanz. Ms., Stanford University.
- Kress, Bruno (1982): *Isländische Grammatik*. 1 edn, VEB Verlag Enzyklopädie, Leipzig.
- Lahne, Antje (2006): Contextual Allomorphy and Morpho-Phonological Processes in Sanskrit. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 143–160.
- Laka, Itziar (1993): Unergatives that Assign Ergative, Unaccusatives that Assign Accusative. In: J. Bobaljik & C. Phillips, eds., *Papers on Case and Agreement I*. Vol. 18 of *MIT Working Papers in Linguistics*, MITWPL, MIT: Cambridge, Mass., pp. 149–172.
- Lieber, Rochelle (1992): *Deconstructing Morphology*. University of Chicago Press, Chicago.
- Lind, John (1964): Clause and Sentence Level Syntagmemes in Sierra Popoluca, *International Journal of American Linguistics* 30, 341–354.
- Lumsden, John (1992): Underspecification in Grammatical and Natural Gender, *Linguistic Inquiry* 23, 469–486.
- Mackridge, Peter (1985): *Modern Greek*. Clarendon Press, Oxford.
- Marlett, Stephen (1986): Syntactic Levels and Multiattachment in Sierra Popoluca, *International Journal of American Linguistics* 52, 359–387.
- Matthews, Peter (1972): *Inflectional Morphology: A Theoretical Study Based on Aspects of Latin Verb Conjugation*. CUP, Cambridge.
- Matthews, Peter (1974): *Morphology*. Cambridge University Press, Cambridge.
- Matthews, Peter (1991): *Morphology*. Cambridge University Press, Cambridge.
- McCarthy, John (2003): Optimal Paradigms. Ms., University of Massachusetts, Amherst. Available from ROA: <http://roa.rutgers.edu>.

- McCloskey, James & Ken Hale (1984): On the Syntax of Person-Number Inflection in Modern Irish, *Natural Language and Linguistic Theory* 1, 487–533.
- McCreight, Katherine & Catherine Chvany (1991): Geometric Representation of Paradigms in a Modular Theory of Grammar. In: F. Plank, ed., *Paradigms*. Mouton de Gruyter, Berlin, pp. 91–111.
- Mel'čuk, Igor (1999): Zero Sign in Morphology. In: *Proceedings of the 4th Int. Tbilissi Symposium on Language, Logic, and Computation*. Batumi.
- Mithun, Marianne (1999): *The Languages of Native North America*. Cambridge University Press, Cambridge.
- Müller, Gereon (1988): Zur Analyse subjektloser Konstruktionen in der Rektions-Bindungs-Theorie. That-trace-Effekte und pro-Lizensierung im Russischen. Seminararbeit, Universität Frankfurt/Main.
- Müller, Gereon (2002): Remarks on Nominal Inflection in German. In: I. Kaufmann & B. Stiebels, eds., *More than Words: A Festschrift for Dieter Wunderlich*. Akademie Verlag, Berlin, pp. 113–145.
- Müller, Gereon (2004): Argument Encoding and the Order of Elementary Operations. Ms., Universität Leipzig.
- Müller, Gereon (2005): Syncretism and Iconicity in Icelandic Noun Declensions: A Distributed Morphology Approach. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 2004*. Springer, Dordrecht, pp. 229–271.
- Müller, Gereon (2006): Subanalyse verbaler Flexionsmarker. In: E. Breindl, L. Gunkel & B. Strecker, eds., *Grammatische Untersuchungen*. Narr, Tübingen, pp. 183–203.
- Müller, Gereon & Bernhard Rohrbacher (1989): Eine Geschichte ohne Subjekt. Zur Entwicklung der pro-Theorie, *Linguistische Berichte* 119, 3–52.
- Müller, Gereon & Jochen Trommer, eds. (2006): *Subanalysis of Argument Encoding in Distributed Morphology*. Number 84 in 'Linguistische Arbeitsberichte', Institut für Linguistik, Universität Leipzig. Available from: www.uni-leipzig.de/~va/?nav=papiere.
- Murasugi, Kumiko (1992): Crossing and Nested Paths. PhD thesis, MIT, Cambridge, Mass.
- Neidle, Carol (1988): *The Role of Case in Russian Syntax*. Kluwer, Dordrecht.
- Neset, Tore (1994): A Feature-Based Approach to Russian Noun Inflection, *Journal of Slavic Linguistics* 2, 214–237.
- Nevins, Andrew (2003): Do Person/Number Syncretisms Refer to Negative Values?. Ms., Harvard University.
- Nevins, Andrew (2007): The Representation of Third Person and Its Consequences for Person-Case Effects, *Natural Language and Linguistic Theory* 25, 273–313.
- Nichols, Johanna (1986): Head-Marking and Dependent-Marking Grammar, *Language* 62, 56–119.
- Noyer, Rolf (1992): Features, Positions, and Affixes in Autonomous Morphological Structure. PhD thesis, MIT, Cambridge, Mass.
- Noyer, Rolf (1998): Impoverishment Theory and Morphosyntactic Markedness. In: S. Lapointe, D. Brentari & P. Farrell, eds., *Morphology and its Relation to Phonology and Syntax*. CSLI, Palo Alto, pp. 264–285.

- Noyer, Rolf (2005): A Constraint on Interclass Syncretism. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 2004*. Springer, Dordrecht, pp. 273–315.
- Oltra Massuet, Isabel (1999): On the Notion of Theme Vowel: A New Approach to Catalan Verbal Morphology. Master of science thesis, MIT, Cambridge, Mass.
- Opitz, Andreas (2006): A Reanalysis of Definiteness-Markers in Albanian Noun Inflection. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 103–114.
- Perlmutter, David (1971): *Deep and Surface Structure Constraints in Syntax*. Holt, Rinehart and Winston, Inc., New York.
- Perlmutter, David & John Moore (2002): Language-Internal Explanation: The Distribution of Russian Impersonals, *Language* 78, 619–650.
- Pétursson, Magnús (1992): *Lehrbuch der isländischen Sprache*. 3 edn, Helmut Buske Verlag, Hamburg.
- Phillips, Colin (1993): Conditions on Agreement in Yimas. In: J. Bobaljik & C. Phillips, eds., *Papers on Case and Agreement I*. Vol. 18 of *MIT Working Papers in Linguistics*, MITWPL, MIT: Cambridge, Mass., pp. 173–213.
- Pike, Kenneth L. (1965): Non-Linear Order and Anti-Redundancy in German Morphological Matrices, *Zeitschrift für Mundartforschung* 31, 193–221.
- Plank, Frans (1991a): Of Abundance and Scantiness in Inflection: A Typological Prelude. In: F. Plank, ed., *Paradigms*. Mouton de Gruyter, Berlin, pp. 1–39.
- Plank, Frans (1991b): Rasmus Rask's Dilemma. In: F. Plank, ed., *Paradigms*. Mouton de Gruyter, Berlin, pp. 161–196.
- Plank, Frans (1995): Ergativity. In: J. Jacobs, A. von Stechow, W. Sternefeld & T. Vennemann, eds., *Syntax. Ein internationales Handbuch zeitgenössischer Forschung*. Vol. 2, de Gruyter, Berlin, pp. 1184–1199.
- Plank, Frans (1999): Split Morphology: How Agglutination and Flexion Mix, *Linguistic Typology* 3.
- Platzack, Christer (1987): The Scandinavian Languages and the Null Subject Parameter, *Natural Language and Linguistic Theory* 5, 377–402.
- Postma, Gertjan (1998): Agreement, Anti-Agreement, and the Structure of the Verbal Paradigm, *Groninger Arbeiten zur Germanistischen Linguistik* 37, 169–194.
- Prince, Alan & Paul Smolensky (2004): *Optimality Theory. Constraint Interaction in Generative Grammar*. Blackwell, Oxford.
- Ralli, Angela (1994): Feature Representations and Feature-Passing Operations: The Case of Greek Nominal Inflection. In: *Proceedings of the 8th International Symposium on English & Greek*. University of Thessaloniki: School of English Dept. of Theoretical & Applied Linguistics, pp. 19–46.
- Ralli, Angela (2002): The Role of Morphology in Gender Determination: Evidence from Modern Greek, *Linguistics* 40, 519–551.
- Reinisch, Leo (1879): *Die Nuba-Sprache. Erster Teil: Grammatik und Texte*. Wilhelm Braumüller, Wien.
- Rezac, Milan (2003): The Fine Structure of Cyclic Agree, *Syntax* 6, 156–182.
- Richards, Marc (2004): Object Shift and Scrambling in North and West Germanic: A

- Case Study in Symmetrical Syntax. PhD thesis, University of Cambridge, Cambridge, UK.
- Richards, Marc (2007): Deriving the Edge: What's in a Phase?. Ms., Universität Leipzig.
- Ritter, Elizabeth (1991): Two Functional Categories in Noun Phrases: Evidence from Modern Hebrew. In: S. Rothstein, ed., *Syntax and Semantics*. Vol. 26, Academic Press, San Diego, pp. 37–62.
- Rizzi, Luigi (1986): Null Objects in Italian and the Theory of 'pro', *Linguistic Inquiry* 17, 501–557.
- Roberts, Ian (1993): *Verbs and Diachronic Syntax*. Kluwer, Dordrecht.
- Rohrbacher, Bernhard (1999): *Morphology-Driven Syntax: A Theory of V to I Raising and Pro-Drop*. Benjamins, Amsterdam.
- Růžička, Rudolf (1986): Funkcionirovanie i Klassifikacija Pustyx Kategorij v Russkom Literaturnom Jazyke, *Zeitschrift für Slavistik* 31, 388–392.
- Ruge, Hans (1986): *Grammatik des Neugriechischen*. Romiosini, Köln.
- Sauerland, Uli (1996): The Late Insertion of Germanic Inflection. General paper, MIT.
- Sternefeld, Wolfgang (2004): Feature Checking and Case Agreement in German DPs. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 269–299.
- Stiebels, Barbara (2002): *Typologie des Argumentlinkings: Ökonomie und Expressivität*. Akademie Verlag, Berlin.
- Stump, Gregory (2001): *Inflectional Morphology*. Cambridge University Press, Cambridge.
- Thráinsson, Höskuldur (1994): Icelandic. In: E. König & J. van der Auwera, eds., *The Germanic Languages*. Routledge, pp. 142–189.
- Trommer, Jochen (1999a): Morphology Consuming Syntax' Resources. In: *Proceedings of the ESSLI Workshop on Resource Logics and Minimalist Grammars*. University of Nijmegen, pp. 37–55.
- Trommer, Jochen (1999b): Morphology Consuming Syntax' Resources. In: *Proceedings of the ESSLI Workshop on Resource Logics and Minimalist Grammars*. University of Nijmegen. <http://www.ling.uni-osnabrueck.de/trommer/papers.html>.
- Trommer, Jochen (2003a): Feature (Non-)Insertion in a Minimalist Approach to Spell-out. In: *The Main Session. Papers from the 39th Meeting*. Vol. 1, Chicago Linguistic Society, Chicago.
- Trommer, Jochen (2003b): Participant Reduction and Two-Level Markedness. In: J. Spenader, A. Eriksson & Ö. Dahl, eds., *Variation within Optimality Theory. Proceedings of the Stockholm Workshop*. Stockholm University, Department of Linguistics, pp. 102–108.
- Trommer, Jochen (2005): A Feature-Geometric Approach to Amharic Verb Classes. Ms., Universität Leipzig.
- Trommer, Jochen (2006a): Plural Insertion is Constructed Plural. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 197–228.
- Trommer, Jochen (2006b): Third-Person Marking in Menominee. Ms., Universität

- Leipzig.
- Vikner, Sten (1997): V-to-I Movement and Inflection for Person in All Tenses. In: L. Haegeman, ed., *The New Comparative Syntax*. Longman, London, pp. 189–213.
- Vries, Lourens de (1989): Studies in Wambon and Kombai. PhD thesis, Universiteit van Amsterdam.
- Weisser, Philipp (2006): A Distributed Morphology Analysis of Croatian Noun Inflection. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 131–142.
- Wiese, Bernd (1994): Die Personal- und Numerusendungen der deutschen Verbformen. In: K.-M. Köpcke, ed., *Funktionale Untersuchungen zur deutschen Nominal- und Verbalmorphologie*. Niemeyer, Tübingen, pp. 161–191.
- Wiese, Bernd (1999): Unterspezifizierte Paradigmen. Form und Funktion in der pronominalen Deklination, *Linguistik Online* 4. (www.linguistik-online.de/3_99).
- Wiese, Bernd (2000a): Warum Flexionsklassen?. In: R. Thieroff, M. Tamrat, N. Fuhrhop & O. Teuber, eds., *Deutsche Grammatik in Theorie und Praxis*. Niemeyer, Tübingen, pp. 139–153.
- Wiese, Bernd (2000b): Warum Flexionsklassen? Über die deutsche Substantivdeklination. In: R. Thieroff, M. Tamrat, N. Fuhrhop & O. Teuber, eds., *Deutsche Grammatik in Theorie und Praxis*. Niemeyer, Tübingen, pp. 139–153.
- Wiese, Bernd (2001a): Paradigmen aus formbezogener Sicht. Handout, IDS Mannheim.
- Wiese, Bernd (2001b): Pronominale Deklination. Handout, IDS Mannheim.
- Wiese, Bernd (2003): Categories and Paradigms: On Underspecification in Russian Declension. Ms., IDS Mannheim. To appear in L. Gunkel, G. Müller and G. Zifonun, eds., *Explorations in Nominal Inflection*. Berlin: Mouton de Gruyter.
- Wiese, Richard (1996): *The Phonology of German*. Clarendon Press, Oxford.
- Williams, Edwin (1994): Remarks on Lexical Knowledge, *Lingua* 92, 7–34.
- Williams, Edwin (1997): Blocking and Anaphora, *Linguistic Inquiry* 28, 577–628.
- Woolford, Ellen (2001): Case Patterns. In: G. Legendre, J. Grimshaw & S. Vikner, eds., *Optimality-Theoretic Syntax*. MIT Press, Cambridge, Mass., pp. 509–543.
- Wunderlich, Dieter (1996): Minimalist Morphology: The Role of Paradigms. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 1995*. Kluwer, Dordrecht, pp. 93–114.
- Wunderlich, Dieter (1997a): Der unterspezifizierte Artikel. In: C. Dürscheid, K. H. Ramers & M. Schwarz, eds., *Sprache im Fokus*. Niemeyer, Tübingen, pp. 47–55.
- Wunderlich, Dieter (1997b): A Minimalist Model of Inflectional Morphology. In: C. Wilder, H.-M. Gärtner & M. Bierwisch, eds., *The Role of Economy Principles in Linguistic Theory*. Akademie Verlag, Berlin, pp. 267–298.
- Wunderlich, Dieter (2002): Is There Any Need for the Concept of Directional Syncretism?. Ms., Universität Düsseldorf. To appear in L. Gunkel, G. Müller and G. Zifonun, eds., *Explorations in Nominal Inflection*. Berlin: Mouton de Gruyter.
- Wunderlich, Dieter (2004): Is There Any Need for the Concept of Directional Syncretism?. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 373–395.

- Wurzel, Wolfgang Ullrich (1984): *Flexionsmorphologie und Natürlichkeit*. Akademie Verlag, Berlin.
- Wurzel, Wolfgang Ullrich (1987): Paradigmenstrukturbedingungen: Aufbau und Veränderung von Flexionsparadigmen. In: W. U. Wurzel, ed., *Studien zur Morphologie und Phonologie II*. Number 156 in 'Linguistische Studien, Reihe A: Arbeitsberichte', Akademie der Wissenschaften der DDR, Zentralinstitut für Sprachwissenschaft, Berlin, pp. 135–155.
- Wurzel, Wolfgang Ullrich (1998): Drei Ebenen der Struktur von Flexionsparadigmen. In: R. Fabri, A. Ortman & T. Parodi, eds., *Models of Inflection*. Niemeyer, Tübingen.
- Zifonun, Gisela (2001): Grammatik des Deutschen im europäischen Vergleich: Das Pronomen, Teil 1: Überblick und Personalpronomen. Amades working paper 4/01, IDS Mannheim.
- Zwicky, Arnold (1985): How to Describe Inflection. In: M. Niepokuj, M. V. Clay, V. Nikiforidou & D. Feder, eds., *Proceedings of the 11th Annual Meeting of the Berkeley Linguistics Society*. BLS, Berkeley, University of California, pp. 372–386.
- Zwicky, Arnold (1991): Systematic versus Accidental Phonological Identity. In: F. Plank, ed., *Paradigms*. Mouton de Gruyter, pp. 113–132.