

IGRA 02: Morphology V

Harmonic Grammar

Gereon Müller (Universität Leipzig), February 8, 2016

1. Background: Syncretism by Leading Forms, without Underspecification

1.1. Basic Assumptions and Data

The Approach to Syncretism in Müller (2011)

1. There is *no underspecification* of exponents.
2. Not all members of a paradigm (exponents) are present in the input; only *leadings forms* are (see Wurzel (1984), Blevins (2004), Finkel & Stump (2007; 2009), Albright (2008), and Baerman (2009) on somewhat related concepts).
3. A mismatch of paradigm cells and leadings forms gives rise to syncretism: Initial gaps are filled by using “wrong”, i.e., *unfaithful exponents* (Weisser (2007)).
4. Mismatches between the exponent’s specification and the target specification are minimized; this is not accomplished by a single *Minimality* condition (cf. the *Nearest Neighbour Principle* in Weisser (2007, 26), or the *Minimality* principle in Lahne (2007, 11)), but by a set of *ranked faithfulness constraints* for the features involved (as in Grimshaw (2001), Trommer (2001; 2006), Wunderlich (2004), etc.; however, these authors all crucially rely on underspecification – cf. handout Morphology I).
5. *Feature decomposition* yielding natural classes is needed exactly as before.
6. The resulting approach can be viewed as a way to provide a principled, highly restrictive optimality-theoretic concept of a *rule of referral* (Zwicky (1985), Stump (2001), and Baerman, Brown & Corbett (2005)).

(1) *Determiner inflection in German*

<i>dies</i> ‘this’	MASC.SG	NEUTER.SG	FEMININE.SG	PLURAL
NOMINATIVE	<i>r</i>	<i>s</i>	<i>e</i>	<i>e</i>
ACCUSATIVE	<i>n</i>	<i>s</i>	<i>e</i>	<i>e</i>
DATIVE	<i>m</i>	<i>m</i>	<i>r</i>	<i>n</i>
GENITIVE	<i>s</i>	<i>s</i>	<i>r</i>	<i>r</i>

1.2. Analysis

(2) *Nine leading forms:*

- /r/1 ↔ [+masc,–fem,–gov,–obl]
- /n/2 ↔ [+masc,–fem,+gov,–obl]
- /m/3 ↔ [+masc,–fem,+gov,+obl]
- /s/4 ↔ [+masc,–fem,–gov,+obl]
- /s/5 ↔ [+masc,+fem,+gov,–obl]
- /e/6 ↔ [–masc,+fem,–gov,–obl]
- /n/7 ↔ [–masc,–fem,+gov,+obl]
- /r/8 ↔ [–masc,+fem,–gov,+obl]
- /r/9 ↔ [–masc,–fem,–gov,+obl]

Optimality-Theoretic Constraints

- (3) MATCH (undominated, possibly part of GEN):
The morpho-syntactic features of stem and exponent are identical in the output.
- (4) *Faithfulness constraints for features on exponents*
 - a. IDENTMASC:
[±masc] of the input must not be changed in the output on an exponent.
 - b. IDENTOBL:
[±obl] of the input must not be changed in the output on an exponent.
 - c. IDENTFEM:
[±fem] of the input must not be changed in the output on an exponent.
 - d. IDENTGOV:
[±gov] of the input must not be changed in the output on an exponent.
- (5) *Ranking:*
IDENTMASC ≫ IDENTOBL ≫ IDENTFEM ≫ IDENTGOV

Incomplete Paradigms

(6) *Incomplete paradigm with leading forms only*

<i>dies</i> ‘this’	MASC.SG	NEUTER.SG	FEMININE.SG	PLURAL
[–gov,–obl]	/r/1		/e/6	
[+gov,–obl]	/n/2	/s/5		
[+gov,+obl]	/m/3			/n/7
[–gov,+obl]	/s/4		/r/8	/r/9

Note:

In what follows, EXP is an abstract case exponent that stands for the set of possible (fully specified) exponents of the inventory (see RED in McCarthy & Prince (1994)).

Tableau T₁: *Nom.Neut.Sg. contexts*

Input: dies ↔ [+masc,+fem,-gov,-obl], EXP	MATCH	IDENT MASC	IDENT OBL	IDENT FEM	IDENT GOV
O ₁ : dies-r ₁ ↔ [+masc,-fem,-gov,-obl]				*!	
O ₂ : dies-n ₂ ↔ [+masc,-fem,+gov,-obl]				*!	*
O ₃ : dies-m ₃ ↔ [+masc,-fem,+gov,+obl]			*!	*	*
O ₄ : dies-s ₄ ↔ [+masc,-fem,-gov,+obl]			*!	*	
☞ O ₅ : dies-s ₅ ↔ [+masc,+fem,+gov,-obl]					*
O ₆ : dies-e ₆ ↔ [-masc,+fem,-gov,-obl]		*!			
O ₇ : dies-n ₇ ↔ [-masc,-fem,+gov,+obl]		*!	*	*	*
O ₈ : dies-r ₈ ↔ [-masc,+fem,-gov,+obl]		*!	*		
O ₉ : dies-r ₉ ↔ [-masc,-fem,-gov,+obl]		*!	*	*	
O ₁₀ : dies-r ₁ ↔ [+masc,-fem,-gov,-obl]	*!				

Tableau T₂: *Acc.Pl. contexts*

Input: dies ↔ [-masc,-fem,+gov,-obl], EXP	MATCH	IDENT MASC	IDENT OBL	IDENT FEM	IDENT GOV
O ₁ : dies-r ₁ ↔ [+masc,-fem,-gov,-obl]		*!			*
O ₂ : dies-n ₂ ↔ [+masc,-fem,+gov,-obl]		*!			
O ₃ : dies-m ₃ ↔ [+masc,-fem,+gov,+obl]		*!	*		
O ₄ : dies-s ₄ ↔ [+masc,-fem,-gov,+obl]		*!	*		*
O ₅ : dies-s ₅ ↔ [+masc,+fem,+gov,-obl]		*!		*	
☞ O ₆ : dies-e ₆ ↔ [-masc,+fem,-gov,-obl]				*	*
O ₇ : dies-n ₇ ↔ [-masc,-fem,+gov,+obl]			*!		
O ₈ : dies-r ₈ ↔ [-masc,+fem,-gov,+obl]			*!	*	*
O ₉ : dies-r ₉ ↔ [-masc,-fem,-gov,+obl]			*!		*
O ₁₀ : dies-r ₁ ↔ [+masc,-fem,-gov,+obl]	*!				

Tableau T₃: *Dat.Fem.Sg. contexts*

Input: dies ↔ [-masc,+fem,+gov,+obl], EXP	MATCH	IDENT MASC	IDENT OBL	IDENT FEM	IDENT GOV
O ₁ : dies-r ₁ ↔ [+masc,-fem,-gov,-obl]		*!	*	*	*
O ₂ : dies-n ₂ ↔ [+masc,-fem,+gov,-obl]		*!	*	*	
O ₃ : dies-m ₃ ↔ [+masc,-fem,+gov,+obl]		*!		*	
O ₄ : dies-s ₄ ↔ [+masc,-fem,-gov,+obl]		*!		*	*
O ₅ : dies-s ₅ ↔ [+masc,+fem,+gov,-obl]		*!	*		
O ₆ : dies-e ₆ ↔ [-masc,+fem,-gov,-obl]			*!		*
O ₇ : dies-n ₇ ↔ [-masc,-fem,+gov,+obl]				*!	
☞ O ₈ : dies-r ₈ ↔ [-masc,+fem,-gov,+obl]					*
O ₉ : dies-r ₉ ↔ [-masc,-fem,-gov,+obl]				*!	*
O ₁₀ : dies-r ₁ ↔ [+masc,-fem,-gov,+obl]	*!				

(7) *Complete paradigm with spreading of leading forms*

<i>dies</i> 'this'	MASC.SG [+masc,-fem]	NEUTER.SG [+masc,+fem]	FEMININE.SG [-masc,+fem]	PLURAL [-masc,-fem]
[-gov,-obl]	/r/1	↑	/e/6	→
[+gov,-obl]	/n/2	/s/5	↓	↘
[+gov,+obl]	/m/3	→	↑	/n/7
[-gov,+obl]	/s/4	→	/r/8	/r/9

Note:

To some extent, the decisions on which occurrence of an exponent's distribution is to count as primary (i.e., qualify as the leading form), and which occurrences of the distribution are secondary (involving a violation of faithfulness) have been *arbitrary* from a purely synchronic, grammar-internal point of view.

However:

Evidence for occurrence asymmetries of inflectional exponents comes from other domains (i.e., outside grammatical theory) which can be addressed by research in areas like *diachronic linguistics*, *corpus linguistics*, and *psycholinguistics*.

1.3. *Restrictiveness of the Approach: No Elsewhere*

As it stands, the approach does not derive *elsewhere distributions*.

(8) a. *Leading forms* b. *Intended spreading*

x	
	y

x	→
↓	y

Tableau T₄: A wrong prediction for Gen.Pl. contexts if /r/9 is not present

Input: dies ↔ [-masc,-fem,-gov,+obl], EXP	MATCH	IDENT	IDENT	IDENT	IDENT
		MASC	OBL	FEM	GOV
☛ O ₇ : dies-n ₇ ↔ [-masc,-fem,+gov,+obl]					*
O ₈ : dies-r ₈ ↔ [-masc,+fem,-gov,+obl]				*!	

Tableau T₅: A wrong prediction for Dat.Fem.Sg. contexts under reranking

Input: dies ↔ [-masc,+fem,+gov,+obl], EXP	MATCH	IDENT	IDENT	IDENT	IDENT
		MASC	OBL	GOV	FEM
☛ O ₇ : dies-n ₇ ↔ [-masc,-fem,+gov,+obl]					*
O ₈ : dies-r ₈ ↔ [-masc,+fem,-gov,+obl]				*!	

Tableau T₆: Correct prediction for Gen.Pl. contexts without /r/9: contextual faithfulness

Input: dies ↔ [-masc,-fem,-gov,+obl], EXP	MATCH	IDENT	IDENT	IDENT	IDENT	IDENT
		MASC	OBL	GOV([-FEM])	FEM	GOV
O ₇ : dies-n ₇ ↔ [-masc,-fem,+gov,+obl]				*!		*
☞ O ₈ : dies-r ₈ ↔ [-masc,+fem,-gov,+obl]					*	

Bidirectional spreading:

It seems that in order to derive something like (8-b), *contextual faithfulness* (cf. Beckmann (1998) on positional faithfulness in phonology and Woolford (2007) for syntax) is needed in the absence of *radically underspecified elsewhere markers*.

(9) *Incomplete paradigm of German determiner inflection: a wrong prediction*

<i>dies</i>	FEMININE.SG	PLURAL
'this'	[-masc,+fem]	[-masc,-fem]
[+gov,+obl]		/n/7
[-gov,+obl]	/r/8	

Note:

A *learning algorithm* for elsewhere distributions of syncretism is necessarily much more complex than a learning algorithm for systems where all instances of syncretism can be derived by reference to natural classes, without reference to elsewhere or default exponents (see Pertsova (2007) on the “No-Homonymy Learner” and the “Elsewhere Learner”).

(10) An Obvious Challenge: Verb Inflection in English

	Singular	Plural
1	am	are
2	are	are
3	is	are

(11) Underspecification approach (Subset Principle; standard):

a. /am/ ↔ [-2,-pl]

b. /is/ ↔ [-1,-2,-pl]

c. /are/ ↔ []

(12) Overspecification approach (Superset Principle; Starke (2006), Caha (2007; 2008)):

a. /am/ ↔ [pres,part]

b. /is/ ↔ [pres]

c. /are/ ↔ [pres,part,addr,group]

Even more interesting: /s/ vs. Ø with regular verbs.

Solution for “to be” via contextual faithfulness:

Add a constraint IDENTPERS([-PL]); /are/ ↔ [-1,+2,+pl].

2. Czech Verb Inflection by Leading Forms, without Underspecification

Lit.: Englisch (2015)

(13) *Present tense of the Czech verb prosit ‘ask/beg’*

	SG	PL
1	pros-ím	pros-íme
2	pros-íš	pros-íte
3	pros-í	pros-í

(14) First person: [+1 -2] Singular: [-pl] Past tense: [+pst]

Second person: [-1 +2] Plural: [+pl] Non-past: [-pst]

Third Person: [-1 -2]

(15) a. -ím ↔ [+1 -2 -pl]

b. -íme ↔ [+1 -2 +pl]

c. -íš ↔ [-1 +2 -pl]

d. -íte ↔ [-1 +2 +pl]

e. -í ↔ [-1 -2 -pl]

(16) MATCH

The morpho-syntactic features of stem and exponent are identical in the output.

(17) *Faithfulness constraints*

a. ID1

[±1] of the input must not be changed in the output of an exponent.

b. ID2

[±2] of the input must not be changed in the output of an exponent.

c. IDPL

[±pl] of the input must not be changed in the output of an exponent.

(18) MATCH ≫ { ID1, ID2 } ≫ IDPL

Table 7: OT tableau for *pros-ím* ‘beg-1SG’

I:	pros	↔ [+1 -2 -pl]	MATCH	ID1	ID2	IDPL
a.	☞ pros-ím	↔ [+1 -2 -pl]				
b.	pros-íme	↔ [+1 -2 -pl]				*!
c.	pros-íš	↔ [+1 -2 -pl]		*(!)	*(!)	
d.	pros-íte	↔ [+1 -2 -pl]		*(!)	*(!)	*
e.	pros-í	↔ [+1 -2 -pl]		*(!)		
f.	pros-í	↔ [-1 -2 -pl]	*!			

Table 8: OT tableau for *pros-í* ‘beg-3PL’

I:	pros	↔ [-1 -2 +pl]	MATCH	ID1	ID2	IDPL
a.	pros-ím	↔ [-1 -2 +pl]		*(!)		*
b.	pros-íme	↔ [-1 -2 +pl]		*(!)		
c.	pros-íš	↔ [-1 -2 +pl]			*(!)	*
d.	pros-íte	↔ [-1 -2 +pl]			*(!)	
e.	☞ pros-í	↔ [-1 -2 +pl]				*
f.	pros-í	↔ [-1 -2 -pl]	*!			

Problem (as before):

This kind of approach does not easily accomodate elsewhere distributions.

3. A Harmonic Grammar Approach to Syncretism

Lit.: English (2015).

3.1. Reconstruction of the Analysis of Czech Verb Inflection

(19) *Harmony* (Pater; 2009: 1006)

$$H = \sum_{k=1}^K s_k w_k$$

(s = satisfaction score, w = weight)

(20) *Illustration of the gang effect in Harmonic Grammar*

I:	[+α +β +γ]	H	IDα	IDβ	IDγ
			3	2	2
a.	☞ [-α +β +γ]	-3	-1	0	0
b.	[+α -β -β]	-4	0	-1	-1

Goal:

Reanalysis of the approach to Czech verb inflection in Harmonic Grammar.

(21) MATCH

For each feature in each marker, add -1 to the satisfaction score iff. the feature value differs from the value of the feature in the corresponding feature structure in the input.

Table 9: HG tableau for *pros-ím* ‘beg-1SG’

I:	[+1 -2 -pl]	H	MATCH	ID1	ID2	IDPL
			6	2	2	1
a.	☞ -ím	↔ [+1 -2 -pl]	0	0	0	0
b.	-íme	↔ [+1 -2 -pl]	-1	0	0	-1
c.	-íš	↔ [+1 -2 -pl]	-4	0	-1	0
d.	-íte	↔ [+1 -2 -pl]	-5	0	-1	-1
e.	-í	↔ [+1 -2 -pl]	-2	0	-1	0
f.	-í	↔ [-1 -2 -pl]	-6	-1	0	0

Table 10: HG tableau for *pros-í* ‘beg-3PL’

I:	[-1 -2 +pl]	H	MATCH	ID1	ID2	IDPL
			6	2	2	1
a.	-ím	↔ [-1 -2 +pl]	-3	0	-1	0
b.	-íme	↔ [-1 -2 +pl]	-2	0	-1	0
c.	-íš	↔ [-1 -2 +pl]	-3	0	0	-1
d.	-íte	↔ [-1 -2 +pl]	-2	0	0	-1
e.	☞ -í	↔ [-1 -2 +pl]	-1	0	0	0
f.	-í	↔ [-1 -2 -pl]	-6	-1	0	0

	SG	PL		SG	PL
[Present tense]	1 am	are	[Past tense]	1 was	were
	2 are	are		2 were	were
	3 is	are		3 was	were

Table 11: Paradigm of the English verb *be*

(22) IDα

For each marker in the output, add -1 to the satisfaction score iff. its value for the feature [±α] differs from the value of [±α] in the corresponding leading form.

(23) *Constraints and their weights for Czech verbal inflection*

constraint	MATCH	ID1	ID2	IDPL
weight	6	2	2	1

3.2. *Elsewhere Effects*

(24) a. am ↔ [+1 -2 -pl -pst] d. was ↔ [+1 -2 -pl +pst]

b. are ↔ [-1 +2 +pl -pst] e. were ↔ [-1 +2 +pl +pst]

c. is ↔ [-1 -2 -pl -pst]

(25) *[-pl]

For each instance of the feature [-pl] in the output, add -1 to the satisfaction score.

(26) *Constraints and their weights for English:*

constraint	IDPST	IDPL	MATCH	*[-pl]	ID1	ID2
weight	19	19	3	2	2	2

(27) *HG tableau for the 1PL form of the English copula be*

I:	[+1 -2 +pl]	H	IDPST	IDPL	MATCH	*[-pl]	ID1	ID2
			19	19	3	2	2	2
a.	am ↔ [+1 -2 -pl]	-5	0	0	-1	-1	0	0
b.	☞ are ↔ [+1 -2 +pl]	-4	0	0	0	0	-1	-1
c.	is ↔ [+1 -2 -pl]	-7	0	0	-1	-1	-1	0

(28) *HG tableau for the 2SG form of the English copula be*

I:	[-1 +2 -pl]	H	IDPST	IDPL	MATCH	*[-pl]	ID1	ID2
			19	19	3	2	2	2
a.	am ↔ [-1 +2 -pl]	-6	0	0	0	-1	-1	-1
a.′	am ↔ [+1 -2 -pl]	-8	0	0	-2	-1	0	0
a.″	am ↔ [+1 +2 -pl]	-7	0	0	-1	-1	0	-1
a.″″	am ↔ [-1 -2 -pl]	-7	0	0	-1	-1	-1	0
b.	☞ are ↔ [-1 +2 +pl]	-3	0	0	-1	0	0	0
b.′	are ↔ [-1 +2 -pl]	-21	0	-1	0	-1	0	0
c.	is ↔ [-1 +2 -pl]	-4	0	0	0	-1	0	-1
c.′	is ↔ [-1 -2 -pl]	-5	0	0	-1	-1	0	0

Note:

The resulting system does not derive a full elsewhere pattern. Suppose that /am/ were not present. In that case, /is/ rather than /are/ would be the optimal candidate for first person singular contexts. Englisch (2015) claims that this is a correct result since it exactly corresponds to the distribution of exponents in past tense contexts.

References

- Albright, Adam (2008): Inflectional Paradigms Have Bases Too. Arguments from Yiddish.. In: A. Bachrach & A. Nevins, eds., *The Bases of Inflectional Identity*. Oxford University Press, Oxford.
- Baerman, Matthew (2009): Inflection Classes Through Profligate Syncretism?. Ms., University of Surrey. Talk at Workshop on Polyfunctionality and Underspecification, Leucon.
- Baerman, Matthew, Dunstan Brown & Greville Corbett (2005): *The Syntax-Morphology Interface. A Study of Syncretism*. Cambridge University Press, Cambridge.
- Beckmann, Jill (1998): Positional Faithfulness. PhD thesis, University of Massachusetts, Amherst.
- 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.
- Caha, Pavel (2007): The Shape of Paradigms. Ms., University of Tromsø.
- Caha, Pavel (2008): The Case Hierarchy as Functional Sequence. In: M. Richards & A. Malchukov, eds., *Scales*. Vol. 86 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 247–276.
- Englisch, Johannes (2015): An Underspecification-Free Approach to Syncretism. Master’s thesis, Universität Leipzig.
- Finkel, Raphael & Gregory Stump (2007): Principal Parts and Morphological Typology, *Morphology* 17, 39–75.
- Finkel, Raphael & Gregory Stump (2009): Principal Parts and Degrees of Paradigmatic Transparency. In: J. P. Blevins & J. Blevins, eds., *Analogy in Grammar: Form and Acquisition*. Oxford University Press, Oxford, pp. 13–53.
- Grimshaw, Jane (2001): Optimal Clitic Positions and the Lexicon in Romance Clitic Systems. In: G. Legendre, J. Grimshaw & S. Vikner, eds., *Optimality-Theoretic Syntax*. MIT Press, Cambridge, Mass., pp. 205–240.
- Lahne, Antje (2007): Deriving Polarity Effects in Inflectional Morphology. In: J. Trommer & A. Opitz, eds., *1 2 Many*. Vol. 85 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 1–22.
- McCarthy, John & Alan Prince (1994): The Emergence of the Unmarked: Optimality in Prosodic Morphology, *Proceedings of the North East Linguistic Society* 24, 333–379.
- Müller, Gereon (2011): Syncretism without Underspecification in Optimality Theory: The Role of Leading Forms, *Word Structure* 4(1), 53–103.
- Pater, Joe (2009): Weighted Constraints in Generative Linguistics, *Cognitive Science* 33, 999–1035.
- Pertsova, Katya (2007): Learning Form-Meaning Mappings in Presence of Homonymy: A Linguistically Motivated Model of Learning Inflection. PhD thesis, UCLA, Los Angeles.
- Starke, Michal (2006): Nanosyntax Class Lectures. Ms., University of Tromsø.
- Stump, Gregory (2001): *Inflectional Morphology*. Cambridge University Press, Cambridge.
- Trommer, Jochen (2001): Distributed Optimality. PhD thesis, Universität Potsdam.
- Trommer, Jochen (2006): Person and Number Agreement in Dumi, *Linguistics* 44, 1011–1057.

- Weisser, Philipp (2007): Case Borrowing. In: J. Trommer & A. Opitz, eds., *1 2 Many*. Vol. 85 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 23–41.
- Woolford, Ellen (2007): Aspect Splits as Contextual Faithfulness. Ms., University of Massachusetts, Amherst.
- 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.
- 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.