

Structural Cumulativity in German Umlaut

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Umlaut in Diminutives

Wald 'forrest'

Wäld-chen 'small forrest'

Schloss 'palace'

Schlöss-chen 'small palace'

Turm 'tower'

Türm-chen 'small tower'

Maus 'mouse'

Mäus-chen 'small mouse'

Umlaut with diminutives

/a/ → /ɛ/

/u/ → /y/

/o/ → /ø/

/au/ → /oy/

[+back] → [-back]

Classical Autosegmental Approaches

- ▶ **Wiese (1996):** Affix carries a floating [–back] which triggers fronting on stems

- ▶ **Lieber (1992):** Stem carries a floating [–back] which triggers fronting under affixation

Lieber (1992): Affix carries floating [-back]

A m t ch ə n
 |
 +b -b ⇒

Ä m t ch ə n
 |
 +b -b

Wiese (1996): Root carries floating [-back]

A m t ch ə n
 |
 +b -b ⇒

Ä m t ch ə n
 †
 | -
 +b -b

Umlaut: Morphosyntactic Environments

- a. **Diminutives:** Vater 'father'; Väter-chen 'father-DIM'
- b. **Verb agreement:** fahr-en 'drive' Inf, fährt 3s Pres.
- c. **Noun Plurals:** Huhn 'hen', Hühn-er 'hens'
- d. **Adjective Formation:** Europa 'Europe', europä-isch 'European'
- e. **Comparatives:** lang 'long', länger 'longer'
- f. **Subjunctive:** kam-st 'you came', käm-st 'you would come'

Affix- **and** Stem-Dependence of Umlaut

Base	-chen	-lich	-artig	Gloss
Arzt	Ärzt-chen	ärzt-lich	arzt-artig	'doctor'
Stunde	Stünd-chen	stünd-lich	stunden-artig	'hour'
Dorf	Dörf-chen	dörf-lich	dorf-artig	'village'
Amt	Ämt-chen	amt-lich	amt-artig	'office'
Hand	Händ-chen	hand-lich	hand-artig	'hand'
Pflanze	Pflänz-chen	pflanz-lich	pflanzen-artig	'plant'

Systematicity of Stem Behavior in Derivation

Base	-lich	-in	-isch	-er	Gloss
Arzt	ärzt-lich	Ärzt-in	–	–	'doctor'
Herzog	herzog-lich	Herzog-in	–	–	'duke'
Narr	–	Närr-in	närr-isch	–	'fool'
Sklave	–	Sklav-in	sklav-isch	–	'slave'
Sturm	–	–	stürr-isch	Stürr-er	'storm'
Staufen	–	–	stauff-isch	Stauff-er	(name)
Tat	tät-lich	–	–	Tät-er	'act'
Botschaft	botschaft-lich	–	–	Botschaft-er	'embassy'

Wurzel's (1970) Generalization

- ▶ Umlaut-enforcing affixes trigger umlaut on all stems with umlautable vowel
- ▶ Umlaut-triggering affixes trigger umlaut only on umlaut-prone stems

	U-enforcing Affix	U-triggering Affix
U-prone Stem	Ärzt-chen	ärztlich
U-reluctant Stem	Ämt-chen	amt-lich

Central Goal of this Talk

Combine Lieber's **and** Wiese's approach

by reinterpreting Wurzel's Generalization

as a cumulative effect of additive floating features

Analysis: Root + Affix [-back] Triggers Umlaut

a r z t l i ch
 | | | |
 +b -b -b -b

⇒

ä r z t l i ch
 † | | | |
 +b -b -b -b

Overview of the Talk

Introduction

Basic Analysis: Umlaut as a Cumulative Effect

Generalizing the Results

Open Questions

Other Theoretical Approaches to Umlaut

Basic Analysis: Umlaut as a Cumulative Effect

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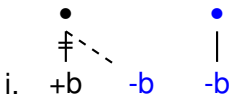
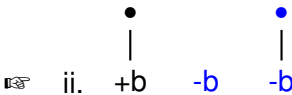
- ▶ Umlaut-**enforcing** affixes have 2 floating [-back] features, umlaut-**triggering** affixes only 1
- ▶ Umlaut-**prone** stems have one floating [-back] feature, umlaut-**reluctant** stems none
- ▶ [+back] stems resist fronting by one floating [-back] but front to realize two floating [-back]s
- ▶ Implementation by cumulation in Harmonic Grammar (Pater 2009, Potts et al. 2010)

Basic Analysis: Constraints

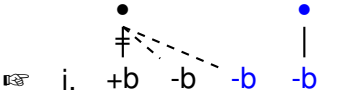
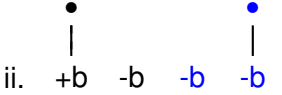
IDENT	[back]	Assign -1 to every segment which is associated to different values of [back] in input and output
ASSOCIATE	[back]	Assign -1 to every instance of [back] not associated to a segmental root node

N.B. Following Radical Containment Theory (Trommer 2011, 2014a, 2015, Zimmermann and Trommer 2014), deassociation is not deletion, but marking for non-pronunciation, ⇒ underlying deassociated [-back] doesn't violate ASS [back]

Basic Analysis: Umlaut in Harmonic Grammar (I)

amt-lich Input: = ii.	IDENT[b] w=1.5	ASS [b] w=1	\mathcal{H}
 <p>i. +b -b -b</p>	-1		-1.5
 <p>ii. +b -b -b</p>		-1	-1

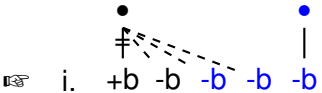
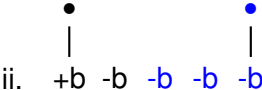
Basic Analysis: Umlaut in Harmonic Grammar (II)

ärzt-lich Input: = ii.	IDENT[b] w=1.5	ASS [b] w=1	\mathcal{H}
 <p>i. +b -b -b -b</p>	-1		-1.5
 <p>ii. +b -b -b -b</p>		-2	-2

German Umlaut in Harmonic Grammar (III)

Ämt-chen Input: = ii.	IDENT[b] w=1.5	ASS [b] w=1	\mathcal{H}
	-1		-1.5
		-2	-2

German Umlaut in Harmonic Grammar (IV)

Ärzt-chen Input: = ii.	IDENT[b] w=1.5	ASS [b] w=1	\mathcal{H}
 <p>i. +b -b -b -b -b</p>	-1		-1.5
 <p>ii. +b -b -b -b -b</p>		-3	-3

Additional High-weighted Constraint

*SPREAD-RIGHT	Assign -1 to every [-back] token which is epenthetically associated to a root-node to its right
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Ärzt-chen Input: = ii.	*Spr-R $w=\infty$	IDENT[b] $w=1.5$	ASS [b] $w=1$	\mathcal{H}
<p>i. +b -b -b -b -b</p>			-1	-1.5
<p>ii. +b -b -b -b -b</p>	-1			∞

Generalizing the Results

More Implications -ig \Rightarrow N \rightarrow V \Rightarrow Plural -e

Base	Plural -e	N \rightarrow V	-ig	Gloss
Harz Kugel	Harz-e Kugel-n	harz-en kugel-n	harz-ig kugel-ig	'resin' 'bullet'
Draht Frucht	Dräht-e Frücht-e	draht-en frucht-en	draht-ig frucht-ig	'wire' 'fruit'
Strom Luft	Ström-e Lüft-e	ström-en lüft-en	strom-ig luft-ig	'stream' 'air'
Wasser Haut	Wässer Häut-e	wässer-n häut-en	wässer-ig häut-ig	'water' 'skin'

(Wurzel 1970:127-128)

More Implications: Derivational Umlaut \Rightarrow Plural-e

Base	Derivation	Plural -e	Gloss
Arzt	ärz-t-lich	Ärzt-e	'doctor'
Hof	höf-lich	Höf-e	'court'
Bruder	brüder-lich	Brüder	'brother'
Tag	täg-lich	Tag-e	'day'
Tod	töd-lich	Tod-e	'death'
Punkt	pü-nt-lich	Punkt-e	'point'

(Wurzel 1970:129)

Generalization of the Analysis

	Number of [-back] features	
-chen, Plural -er	5	—
-lich, -in, -isch, -er	4	Wasser
Plural -e	3	Arzt, Luft
N→V	2	Draht
-ig	1	Tag, Haut
-artig	0	Amt, Harz

Generalization (I)

a. amt-lich Input: = ii.	IDENT[b] w=4.5	ASS [b] w=1	\mathcal{H}
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	-1		-4.5
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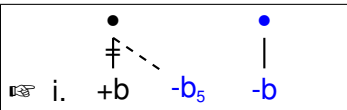
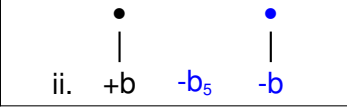
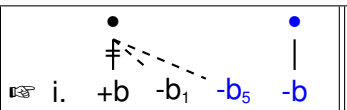
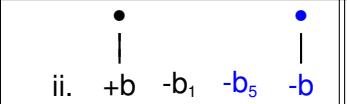
		-4	-4
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b. arzt-lich Input: = ii.	IDENT[b] w=4.5	ASS [b] w=1	\mathcal{H}
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	-1		-4.5
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		-7	-7
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Generalization (II)

c. Ämt-chen Input: = ii.	IDENT[b] w=4.5	ASS [b] w=1	\mathcal{H}
 <p>i. $+b$ $-b_5$ $-b$</p>	-1		-4.5
 <p>ii. $+b$ $-b_5$ $-b$</p>		-5	-5
d. Ärzt-chen Input: = ii.	IDENT[b] w=4.5	ASS [b] w=1	\mathcal{H}
 <p>i. $+b$ $-b_1$ $-b_5$ $-b$</p>	-1		-4.5
 <p>ii. $+b$ $-b_1$ $-b_5$ $-b$</p>		-6	-6

Generalization (III)

	IDENT[b] w=4.5	ASS [b] w=1	\mathcal{H}
 i. +b -b ₄ -b ₂	-1		-4.5
ii. +b -b ₄ -b ₂		-6	-6
 i. +b -b ₄ -b ₁	-1		-4.5
ii. +b -b ₄ -b ₁		-5	-5
 i. +b -b ₃ -b ₂	-1		-4.5
ii. +b -b ₃ -b ₂		-5	-5
i. +b -b ₃ -b ₁	-1		-4.5
 ii. +b -b ₃ -b ₁		-4	-4
i. +b -b ₂ -b ₂	-1		-4.5
 ii. +b -b ₂ -b ₂		-4	-4
i. +b -b ₂ -b ₁	-1		-4.5
 ii. +b -b ₂ -b ₁		-3	-3

a. flücht-en

b. flücht-ig

c. lüften

d. luft-ig

e. duften

f. duft-ig

Open Questions

- ▶ Productive umlaut vs. full listing (Féry 1994)
- ▶ Umlaut involving additional features or narrower restrictions, e.g.:
 - ▶ 2sg/3sg verbs: no umlaut for [u],
but additional raising of [e]
(brechen → br**i**cht, Neef 1996, Trommer 2010)
 - ▶ No umlaut for comparatives with diphthongs or polysyllabic roots
(mager → *m**ä**ger-er, Janda 1983:67)
- ▶ Interaction of Umlaut with other grammatical factors
 - ▶ The strong/weak distinction in subjunctive umlaut (Wiese 1996)
 - ▶ Gender sensitivity in noun plural umlaut (Trommer 2014b)

Other Theoretical Approaches to Umlaut

Umlaut as Readjustment: Embick and Halle (2005)

- ▶ Only one readjustment rule independent of exponence rules
- ▶ triggered by listed root+affix combinations
- ▶ - Cannot account for Wurzel's generalizations

Inconsistent Umlauting of Single Lexemes

Infinitive	Agentive	3sg
back(-en)	B ä ck-er	back-t
fahr(-en)	Fahr-er	f ä hr-t

Bare Noun	Plural	Denominal verb
Maus	M ä us-e	maus-en;
Luft	L ü fte	l ü ft-en

Why Umlaut is Readjustment

“In addition, it is also the case that a Root that undergoes Umlaut in one of these environments may or may not be subject to this process in another environment.

This fact must evidently be listed;”

“a Readjustment Rule like Umlaut may be triggered in a number of distinct syntactico-semantic environments, while at the same time being a single rule of the grammar.

(Embick & Halle, 2005:8-9)

Readjustment Rule for Umlaut

$$V \rightarrow [-\text{back}] / \begin{array}{l} \sqrt{\text{Amt}} + [\text{Dim}] \\ \sqrt{\text{Arzt}} + [\text{Dim}] \\ \sqrt{\text{Arzt}} + [\text{A}] \\ \dots \end{array}$$

Wurzel's (1970) Morphological Diacritic Theory

- ▶ Umlaut-**enforcing** affixes have the Feature [+Umlaut-Enforcing]
- ▶ Umlaut-**prone** stems have the feature [+Derivational-Umlaut]
- ▶ Umlaut-**triggering** affixes have the feature [+Umlaut-Triggering]

Wurzel's (1970) Morphological Diacritic Theory: Rules

(i) [+syllabic] → [-back] / ___ C₀ [+Umlaut-Enforcing]

(ii) [+syllabic] → [-back] / ___ C₀ [+Umlaut-Triggering]

/ [___ +Derivational-Umlaut]

Different Construction-specific Rules (Janda 1983, Anderson 1986)

- ▶ Umlaut is triggered by morphological word-formation rules
- ▶ Different constructions have different umlauting rules
- ▶ + Explains construction-specific umlaut features/restrictions
- ▶ - cannot account for Wurzel's generalizations

Summary of the Analysis

- ▶ **Combines** the classical autosegmental approaches to umlaut (Lieber 1992, Wiese 1996)
- ▶ **Restates + Simplifies** Wurzel's (1970) account of implications between umlaut constructions by diacritic morphological features as cumulative constraint interaction for phonological features
- ▶ **Obviates:** massive lexical listing of stem-affix combinations (Féry 1994, Embick and Halle 2005)
- ▶ Adds to evidence for the phonological status of umlaut (Klein 2000, Hermans and van Oostendorp 2008, Trommer 2014b)

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Overview

Introduction

- German Umlaut

- Stem- and Affix-Dependence in Umlaut

Basic Analysis: Umlaut as a Cumulative Effect

Generalizing the Results

Open Questions

Other Theoretical Approaches to Umlaut

- Distributed Morphology: Embick and Halle (2005)

- Wurzel's (1970) Morphological Diacritic Theory

- Construction-specific Umlaut Rules (Janda 1983, Anderson 1986)