

Umlaut as combined suffixation

WOMP 2024 @ Princeton

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March 22, 2024

Road map of our presentation

- What is umlaut (diachronically & synchronically)?
- **Empirical focus:** Plural allomorphy in Standard Modern German nouns (OHG, MHG paradigms for historical context)
- **Theoretical claim:** Modern reflexes of plural suffixes encode more of the older class distinctions than may be apparent on the surface
 - Umlaut consists of the phonological representation of a single exponent
 - Allomorphy partially constrained by syntactic spans
- Conclusions and larger questions

Key question: What is ümläüt?

More specific questions:

- Diachrony: How do we go from one phonological trigger in multiple morphological domains → a single ‘morphological’ process?
- Representations: What *is* this ‘morphological’ process, and what roles do syntax and phonology play?
- Typology: How is this similar to, or different from, other types of non-concatenative morphology?

Our solution to all these!

Combined suffixation: Umlaut is a complex suffix, displaying a combinatorial nature (partially conditioned by syntactic structure)

- Historical process: Fronting of root vowels /u, o, a/ before unstressed /i/ or /j/
 - ‘Primary’ umlaut: OHG *gast* → *gesti* ‘guest’ (nom. sg./pl.)
 - ‘Secondary’ umlaut: MHG *fuoz* → *füeze* ‘foot’ (nom. sg./pl.) cf. Mod German *Fuß* → *Füße*; OHG *fuoz* → *fuozi*
- Synchronic pattern: Fronting of root vowels /u, o, a/ in certain morphological contexts
 - *Huhn* → *Hühn-er* ‘chicken(s)’ ; *Mutter* → *Mütter* ‘mother(s)’
 - *Sohn* → *Söhn-e* ‘son(s)’; *Loch* → *Löch-er* ‘hole(s)’
 - *Vater* → *Väter* ‘father(s)’; *Hand* → *Hände* ‘hand(s)’

Some OHG noun classes & declensions

	a-stem (m)	a-stem (n)	n-stem	i-stem	iz/az-stem	r-stem
Nom. sg.	tag	wort	zungē	gast	lamb	muoter
Acc. sg.	tag	wort	zungūn	gast	lamb	muoter
Dat. sg.	tage	worte	zungūn	gaste	lambe	muoter
Gen. sg.	tages	wortes	zungūn	gastes	lambes	muoter
Nom. pl.	tagā	wort	zungūn	gesti	lambir	muoter
Acc. pl.	tagā	wort	zungūn	gesti	lambir	muoter
Dat. pl.	tagum	wortum	zungōm	gestim	lambirum	muoterum
Gen. pl.	tago	worto	zungōno	gestio	lambiro	muotero
Gloss	‘day’	‘word’	‘tongue’	‘guest’	‘lamb’	‘mother’

Some MHG noun classes & declensions

	a-stem (m)	a-stem (n)	n-stem	i-stem	iz/az-stem	r-stem
Nom. sg.	tac	wort	zunge	gast	lamp	muoter
Acc. sg.	tac	wort	zungen	gast	lamp	muoter
Dat. sg.	tage	worte	zungen	gaste	lambe	muoter
Gen. sg.	tages	wortes	zungen	gastes	lambes	muoter
Nom. pl.	tage	wort	zungen	geste	lember	müeter
Acc. pl.	tage	wort	zungen	geste	lember	müeter
Dat. pl.	tagen	worten	zungen	gesten	lembern	müetern
Gen. pl.	tage	worte	zungen	geste	lember	müeter
Gloss	‘day’	‘word’	‘tongue’	‘guest’	‘lamb’	‘mother’

Some modern German nouns classes & declensions

	a-stem (m)	a-stem (n)	n-stem	i-stem	iz/az-stem	r-stem
Singular	Tag	Wort	Zunge	Gast	Lamm	Mutter
Plural	Tage	Wörter (Worte)	Zungen	Gäste	Lämmer	Mütter
Gloss	'day'	'word'	'tongue'	'guest'	'lamb'	'mother'

The early view of umlaut

Umlaut is a purely phonological process, the “trigger” in this is whether or not the [-back] (or [front]) feature is present

- A floating [-back] feature is attributed to some affixes.
- For most affixes, two versions exist to account for umlauting and non-umlauting surface representations (e.g., *vertraglich* / *verträglich*).
- (Lieber, 1987; Lodge, 1989; Wiese, 1996; etc.)

Phonologically unpredictable allophony (after Trommer 2021:603–604)

Singular	Plural	Gloss	Plural form
Kuss	Küss-e	‘kiss(es)’	uml. + <i>-e</i>
Buss	Buss-e	‘bus(es)’	<i>-e</i>
Sohn	Söhn-e	‘son(s)’	uml. + <i>-e</i>
Thron	Thron-e	‘throne(s)’	<i>-e</i>
Vater	Väter	‘father(s)’	uml. + \emptyset
Anker	Anker	‘anchor(s)’	\emptyset
Grund	Gründ-e	‘reason(s)’	uml. + <i>-e</i>
Mund	Münd-er	‘mouth(s)’	uml. + <i>-er</i>
Hund	Hund-e	‘dog(s)’	<i>-e</i>
Pate	Pate-n	‘godfather(s)’	<i>-n</i>
Frau	Frau-en	‘wom(a/e)n’	<i>-(e)n</i>
Suppe	Suppe-n	‘soup(s)’	<i>-en</i>
Band	Bänd-er	‘tie(s)’	uml. + <i>-er</i>
Huhn	Hühn-er	‘chicken(s)’	uml. + <i>-er</i>
Mann	Männ-er	‘m(a/e)n’	uml. + <i>-er</i>

- ① *-e* with and without umlaut
- ② \emptyset with and without umlaut
- ③ *-n* **never** with umlaut
- ④ *-er* **always** with umlaut

We assume the following architecture of the human language faculty:

- Syntax before phonology
- Cyclic spell-out
 - Phonological structures built up piece by piece (Newell 2017, 2021)
 - (Partially) defines domains of phonological activity
 - Phonology-free syntax (Scheer 2010, 2012, et seq.)
- Syntactic structures define contexts for vocabulary insertion/mapping to phonology (Hall 2020: 262)
- Structure as *spans* (Svenonius 2020; Blix 2021; Fisher et al. 2022; Natvig et al. 2023)
 - **Span:** An n-tuple of heads $\langle X_n, \dots, X_1 \rangle$ is a span in a syntactic structure S, iff $X_{n-1}P$ is the complement of X_n in S. (Blix 2021, 7)

Basic architectural assumptions (2)

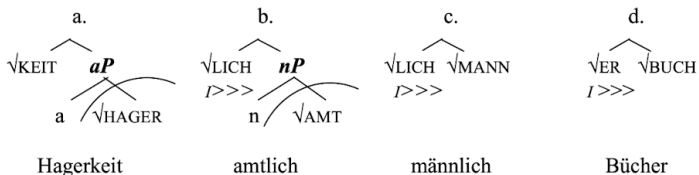
- Precedence formalization: statements about phonological units' (phonemes, features, etc.) relative positions to each other
- Makes explicit the relative order of phonological constituents
- Items can occur contemporaneously as long as their structures are compatible and one does not precede the other
 - (Raimy 2000; Papillon 2020; Idsardi 2022; Natvig et al. 2023; Idsardi & Raimy forthcoming)
- Example: *Gast* 'guest'

→ g → a → s → t → %

In plain words: “# is the start of the form, /g/ is the first segment, which precedes /a/, which precedes /s/, which precedes /t/, which precedes the end of the form (%).”

The syntactic views of umlaut

- Locality and local domains defined by syntax define realization operations (Nevins, 2010; Arregi & Nevins, 2012; Newell, 2008)
- Schwayder (2015): Umlaut is one rule, with two processes that trigger the rule.
 - 1 Morpho-phonological rule with a morphological trigger
 - 2 Morpheme/morpheme readjustment
- Lowenstamm (2017): Affixes select either roots or categorized objects. Some may select both. Those that select roots will umlaut, those that select categorized objects will not.



Suffixes and their allomorphy (according to Trommer 2021)

(6) *Representations for German plural affixes*

a. [+pl] ↔ $\begin{array}{c} \bullet \\ \text{VPL} \\ | \\ \text{COR} \end{array}$ (⊙●)

b. [+pl +fem] ↔ NAS (⊙)

c. [+pl -fem-masc] ↔ $\begin{array}{c} \text{CPL} \\ | \\ \text{PHAR} \end{array}$ (⊙)

a. front feature and empty vowel
($\sim V \rightarrow [\emptyset]$)

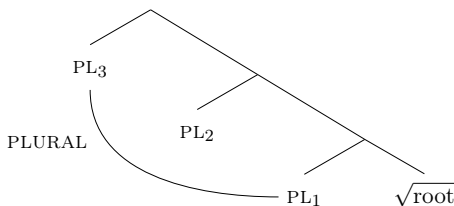
b. nasal (/n/)

c. pharyngeal feature ($\sim /r/$)

- $\emptyset + V = \emptyset$
- front allomorphy: controls where [front] is realized (stem vowel, /n/ suffix)
- underspecified and specified root vowels feed or bleed umlaut

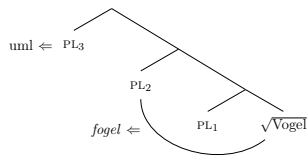
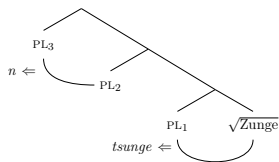
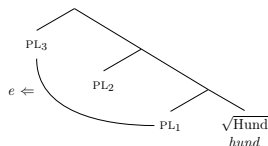
Rules of the allomorphy game:

- 1 Phonologically predictable alternations = phonology
- 2 Phonologically unpredictable alternations = syntax-lexicon interface
 - Traditional synsem features as spans
 - Allomorphy as division of labor between $\sqrt{\text{root}}$ and exponent in lexicalizing spans



Nuts n' bolts (2)

Allomorphy is the division of labor between $\sqrt{\text{roots}}$ and exponents in lexicalizing spans



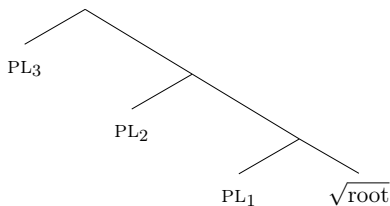
- $\sqrt{\text{root-span size}}$ = how many features at PF of a $\sqrt{\text{root}}$ lexicalizes

We make a crucial distinction between **l(exical)**- and **s(yntactic)**-spans

- **S**-spans are generated in the grammar and must be ‘interpreted’, i.e., *realized*
- **L**-spans represent the ‘parsing preferences’ of a given language/steady state-grammar for a local configuration of features
- The Superset Principle allows for an **S**- to be spelled out as an **L**-tree

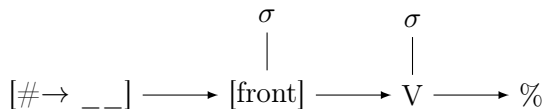
Lexicalization table for German plurals (major classes)

$\sqrt{\text{root}}$	PL ₁	PL ₂	PL ₃	Plural
Tag (M)	e			Tage
Thron (M)	e			Throne
Bote (M)		n		Boten
Zunge (F)		n		Zungen
Herz (N)		n		Herzen
Gabel (F)		n		Gabeln
Sohn (M)			uml	Söhne
Gast (M)			uml	Gäste
Mutter (F)			uml	Mütter
Vogel (M)			uml	Vögel
Buch (N)			uml	Bücher
Mann (M)			uml	Männer
Zobel (M)				Zobel
Anker (M)				Anker



The umlaut exponent

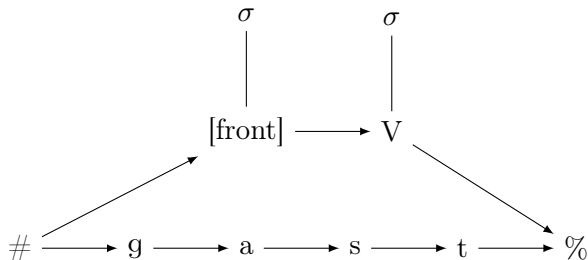
- Umlaut:



- Reads: “a front feature follows the beginning of a form; that feature then precedes an empty vowel slot (in different syllables), which in turn precedes the end of the form.”

The uml. exponent in action (1): $Gast \sim G\ddot{a}ste$

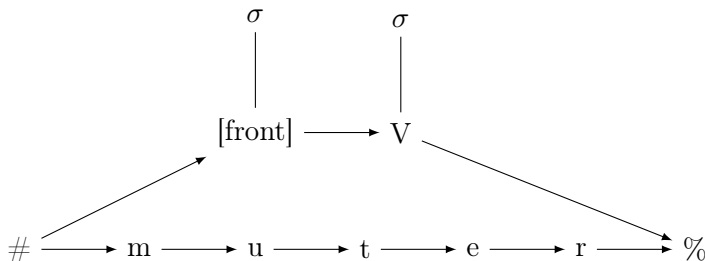
- Stem: $[PL_2[PL_1[\sqrt{Gast}]]] \Rightarrow /gast/$
- Exponent: $[PL_3] \Rightarrow \text{umlaut}$



- *Linearized form*: $g \{a, [front]\} s t \{V\}$
- *Implementation*: $[g\ddot{e}st\text{ə}]$
- **IMPORTANT**: Linking [front] and V to separate σ s ensures that V can come after [gast]

The uml. exponent in action (2): *Mutter* ~ *Mütter*

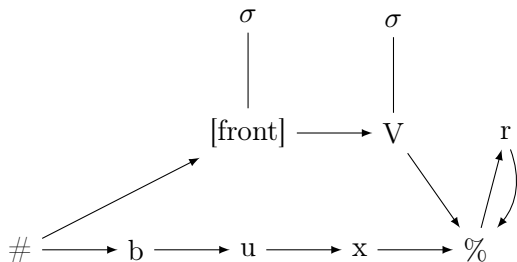
- Stem: $[PL_2[PL_1[\sqrt{\text{Mutter}}]]] \Rightarrow /muter/$
- Exponent: $[PL_3] \Rightarrow \text{umlaut}$



- *Linearized form*: $m \{u, [\text{front}]\} t \{e, V\} r$
- *Implementation*: $[\text{myt}\text{e}]$

The uml. exponent in action (3) *Buch* ~ *Bücher*

- Root: $\sqrt{\text{Buch}} \Rightarrow /bux/$
- Exponent: $[PL_2[PL_1[\dots[N]]]] \Rightarrow [\% \rightarrow _ _] \rightarrow r \rightarrow \%$
- Exponent: $[PL_3] \Rightarrow \text{umlaut}$



- *Linearized form*: $b \{u, [front]\} \{x, [front]\} \{V\} r$
- *Implementation*: $[by:\zeta\epsilon]$

Historical change in exponents

- A-STEMS: $-a \rightarrow -e$
- N-STEMS: ‘theme vowels’ reduced to [ə], some lost (e.g. *Herz* < OHG *herza*)
- IZ/AZ-STEMS: $-r$ exponents gender features (primarily N, but not F) along with part of the plural span
- [front] is detached from old $-i$ and $-iz$ suffixes, but vowel slot remains
 - Umlaut + final schwa via epenthesis for monosyllabic stems
 - Both [front] and V in the “umlaut” suffix can be implemented vacuously (cf. *Kind*~*Kinder* for umlaut; *Mutter*~*Mütter* for V)

Doublets (neuter a-stems)

$\sqrt{\text{root}}$	N	PL ₁	PL ₂	PL ₃	Plural	Gloss	Period
wort					wort	‘word(s)’	OHG
Wort		e			Worte	“ ”	ModG
Wort	r				uuml.	“ ”	ModG
lant					wort	‘land(s)’	OHG
Land		e			Lande	“ ”	ModG
Land	r				uuml.	“ ”	ModG

Questions and (tentative) answers:

- Diachrony: How do we go from one phonological trigger in multiple morphological domains → a single ‘morphological’ process?
 - Phonologization of an umlaut exponent
- Representations: What *is* this ‘morphological’ process, and what roles do syntax and phonology play?
 - Syntax-phonology mapping models noun classes and related allomorphy; phonology governs realization of parallel streams into a linear string
- Typology: How is this similar to, or different from, other types of non-concatenative morphology?
 - More to come, but we believe it’s more similar than different

- A number of noun classes remain, but some with *phonological* changes in exponents
- Membership in the noun classes is represented in terms of $\sqrt{\text{root-span}}$ sizes, rather than as memorized lists or individual alternations; membership can change, but constrained
- Uml. exponent is a disentangling of the distinctive feature [front] from the V-node (in terms of precedence)
- i-stems and iz/az-stems both receive the uml. exponent, but lexicalize the previous span material in different ways
- **Interface story:** Umlaut is concatenative (syntax), but not timed as such (phonology)

Thank you!

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This didn't happen all at once!

3 phases of development:

- West Germanic i-Umlaut
- Primärumlaut
- Sekundärumlaut

Warning!

All 3 of these processes were never fully carried out in (all of) the dialects!

Phase 1: West Germanic i-Umlaut (& Height Harmony)

Germ. short *e* > W.Gmc. *i*, when *i/j/u* appear in the following syllable

PIE	W.Gmc
<i>*esti</i>	<i>*isti</i>
<i>*nemesi</i>	<i>*nemiz(i)</i> > <i>nimis</i>

OHG	NHG
<i>helfan: [er] hilfit</i>	<i>helfen: er hilft</i>
<i>neman: [du] nimis</i>	<i>nehmen: du nimmst</i>
<i>stern: gestirni</i>	<i>Stern: Gestirn</i>

Germ. short [a] > OHG short [ɛ], when *i/j* occurred in the following syllable

- started during the OHG-period (750-1050 AD/CE)
- *gast* > *gesti* (cf. *tag* > *taga*, *fogal* > *fogala*)

OHG	NHG
lamb > lembir	Lamm > Lämmer
lang > lengiro	lang > länger
faran > ferit	fahren > (er) fährt

- OHG Primärumlaut was blocked by the following consonant clusters:
 - **ht**: Ex: *nahti* ‘Nächte’
 - **hs**: Ex: *wahsit* ‘wächst’
 - **lC**: Ex: *haltan* - *haltis* ‘to hold, you (2sg) hold’
 - **rC**: Ex. *starch* - *starchiro* ‘strong, stronger’
 - Consonants with *w*
 - Ex: *garwet* ‘(er) bereitet’, vgl. *gerben*

Warning!

This is a **very** simplified story! I’m skipping over all of the regional variation!

Phase 3: Sekundärumlaut

While *i* and *e* already existed in the Germanic period, the unlauded-forms of the following vowels become new phonemes:

ā, o, ō, u, ū

	OHG	MHG
a > æ	<i>tāti</i>	<i>tæte</i>
o > ö, ō > œ	<i>oli</i> (lat. <i>olium</i>), <i>hōren</i> (< * <i>hōr-jan</i>)	<i>öle, hæren</i>
u > ü, ū > ie [y:]	<i>ubir, hūsir</i> (nhd. <i>Häuser</i>)	<i>über, hiuser</i>

Gradually, over the course of centuries, the phenomenon of umlaut became *morphologized*, meaning that (some instances) of plural- and modality-marking were analogously systematized:

- Stab > *Stäbe*
- Wolf > *Wölfe*

How about some MHG examples?

OHG	MHG	Gloss
wânen	wænen	'to fancy'
turi	tür	'door'
lôsen	lœsen	'to loose'
skôni	scæn	'beautiful'
mahti	mähte	'powers'

2nd option for MHG

Secondary umlaut applied systematically.

	OHG	MHG	Gloss
a > æ	tāti	tæte	
o > ö	oli	öle	‘oil’
ō > œ	hōren	hœren	‘to hear’
u > ü	ubir	über	‘over’
ū > ie [y:]	hūsir	hiuser	‘houses’

Umlaut occurred in environments that had been blocked from undergoing primary umlaut.

Environment	ht	hs	rC
OHG	mahti	wahsit	warmen
MHG	mähte	wähset	wärmen
Gloss	‘powers’	‘he grows’	‘to warm’

Typology of parameters (Biberauer & Roberts 2012)

- (1) For a given value v_i of a parametrically variant feature F:
- a. **Macroparameters:** all heads of the relevant type, e.g. all probes, all phase heads, etc., share v_i ;
 - b. **Mesoparameters:** all heads of a given natural class, e.g. [+V] or a core functional category, share v_i ;
 - c. **Microparameters:** a small, lexically definable subclass of functional heads (e.g. modal auxiliaries, subject clitics) shows v_i ;
 - d. **Nanoparameters:** one or more individual lexical items is/are specified for v_i .

Key takeaway

If we assume that $v_i = \text{spans}$ that realize umlaut, this process is (partially) syntactically determined