The need for cycles and pieces in German umlaut

Mike Putnam, David Natvig, & Emmeline Wilson

Ablautapalooza, Penn State University | March 20, 2026

1 Introduction

Objective of formal models Theoretical approaches to morphology should strive to capture phenomena such as umlaut *cleanly*, i.e. with minimal stipulative operations and structural assumptions

Empirical focus German umlaut is an ideal test case for investigating the relationships between phonological and (morpho)syntactic representations. It is *non-concatenate* and its distribution is *phonologically unpredictable*, but its outputs are *phonologically regular*

Goal To ensure umlaut is accounted for as phonologically regular, even if it requires more complex theoretical mechanisms in the syntax/morphology to do so

Our talk We evaluate current realizational approaches to morpho(phono)logy in their treatment of German umlaut. We use the criteria presented in §2 in our evaluation.

Spoiler alert! Based on our analysis of approaches to contextual allomorphy considering the criteria laid out in §2, an architecture that embraces morphological complexity and phonological uniformity (such as most versions of DM) are optimal

Data overview – nouns and adjectives

Singular	Plural	Adjective in *-ig*/*-lich*	Glosses
Harz	Harz-e	harz-ig	'resin-resins-resinous'
Tag	Tag-e	**täg-lich**	'day-days-days.long'
Amt	**Ämt-er**	amt-lich	'office-offices-official'
Saft	**Säft-e**	saft-ig	'juice-juices-juicy'
Macht	**Mächt-e**	**mächt-ig**	'power-powers-powerful'

Outline

Evaluation criteria We introduce and review three principle evaluation criteria

- Exceptional rules
- Phonological regularity
- Computation vs. storage

Umlaut in German We present overarching patterns with a set of generalizations concerning the distribution of plural suffixes, that do and do not induce umlaut

- We focus primarily on plural formation in German; however,
- We also make a slight detour into subjunctive verbal morphology

Analysis of approaches to contextual allomorphy We survey how an analysis of German umlaut works in DM, Spanning, and Nanosyntax

Discussion & conclusion Based on our review, we maintain that

1 A 'piece meal', cyclic approach to German umlaut comes with the least amount of baggage, and

2 This approach best captures the 'morphologically mess', yet 'phonologically regular' nature of this phenomenon

2 Evaluation Criteria

2.1 Criterion 1: Exceptional rules

This criterion considers **whether exceptional rules are required** in the morphological derivation of umlauted forms.

Exceptional rules can include:

- post-syntactic (readjustment) rules that affect the form (of the root) prior to phonology
- diacritics or other objects that are applied in the syntax in order to affect the phonology

An example of the latter:
Embick and Shwayder (2018) see umlaut as a unified phenomenon with one vowel-fronting rule $\ddot{R}$ that applies throughout the grammar.

(1) Morphophonological interactions (Embick and Shwayder, 2018, p. 234):

a. Triggering morphemes are set to $\ddot{R}$ (ON): *Hand*∼*Hände* 'hand(s)'

b. Under concatenation, Roots may turn the (ON) setting of certain triggers to (OFF): *Tag*∼*Tage* 'day(s)'

Ideally: (Morpho)syntactic representations will be fairly austere, thereby reducing the number and/or types of exceptional rules it requires, **but** this is a complication we will allow if it is required to model the phonological regularity of umlaut.

2.2 Criterion 2: Phonological regularity

This criterion considers **the extent to which phonological regularity is maintained** in a framework.

Umlaut is **phonologically regular** (see §3), and while it is irregular in its distribution across the grammar, the phonological regularity should be maintained. If possible, umlaut should be treated as a unified phenomenon in a specific domain.

Ideally: a framework will represent phonologically regular phenomena as such rather than idiosyncratic alternations.

2.3 Criterion 3: Computation vs. storage

This criterion considers **how a framework fares with respect to the 'computation vs. storage' debate** of lexical material and phonological forms.

Nature of the debate

Storage is generally understood as the storage of whole, irregular, normally undecomposable, lexical units in a place often termed the 'lexicon.' Storage can/should also be considered for items smaller than a word, and potentially for rules and other parts of a grammar that must be 'learned'

Computation is the process by which forms are built from pieces; it includes both rules that combine elements and rules that insert elements (Embick, Creemers, and Goodwin Davies, 2022)

Ideally: Computation should be maximized over storage of (i) lists & (ii) Vocabulary Items in order to reduce redundancy.

2.4 Targets & Triggers

Dependent on how different models solve the problem of phonological regularity and morphological irregularity.

We label each approach according to the typology in (2) that specifies the grammatical domain of the targets and triggers of form alternations.

(2) Typology of interactions (Embick and Shwayder, 2018, p. 197):

	P-Targets	**M-Targets**
P-Triggers	Phonological	Morphophonological
M-Triggers	Morphophonological	Suppletion

3 German umlaut (and ablaut)

Umlaut in German is a vowel alternation characterized by the fronting and raising of the stem vowel.

↪ /aː/ and /a/ raise respectively to [eː] and [ɛ] when umlauted; the other back vowels retain their vertical positions.

Historically, *j* and unstressed *i* in various suffixes induced anticipatory raising and fronting of *a* fronting later spread to all back vowels.

We focus here on synchronic number morphology in (Standard) German, but umlaut has a much wider grammatical function across the language.

(3) Non-exhaustive list of the morphosyntactic environments of German umlaut (Embick and Halle, 2005, p. 44):
   a. Verb forms: *fahr-en* 'drive' Inf, *fähr-t* 3SG.PRES.
   b. Noun plurals: *Huhn*∼*Hühn-er* 'hen(s)'
   c. Diminutives: *Vater*∼*Väter-chen* 'father(-DIM)'
   d. Adjective formation: *Europa*∼*europä-isch* 'Europe(an)'
   e. Comparatives: *lang*∼*läng-er* 'long(er)'

Underspecified vowels can't be the (whole) story (Embick and Shwayder, 2018, p. 218)

Singular	Plural	Adjective in *-ig*/*-lich*	Glosses
Harz	Harz-e	harz-ig	'resin-resins-resinous'
Tag	Tag-e	**täg-lich**	'day-days-days.long'
Amt	**Ämt-er**	amt-lich	'office-offices-official'
Saft	**Säft-e**	saft-ig	'juice-juices-juicy'
Macht	**Mächt-e**	**mächt-ig**	'power-powers-powerful'

Why these data are relevant

Locality/Adjacency Locality play *some* role here

Listedness Some degree of listedness appears to be necessary

3.1 Intermezzo: Subjunctive II in German

Aside: While we focus on German umlaut, and specifically, number morphology, we also acknowledge the pattern(s) of ablaut and point out that umlaut processes may also need to interact with ablaut sometimes. Note the 1SG.PST.SBJV-forms that are umlauted forms of an ablauted form of the verb stem.

What's at stake here:

1. The 1SG.PST.SBJV-forms (3rd column) are often the combination of (i) ablaut + (ii) umlaut
2. This casts significant doubt that (all) instances of ablaut and umlaut can be subsumed under the same analysis

1SG.PRS	1SG.PST	1SG.PST.SBJV	PTCP II	Gloss (INF)
h**ö**re	h**ö**rte	h**ö**rte	geh**ö**rt	'to hear'
b**a**de	b**a**dete	b**a**dete	geb**a**det	'to bathe'
w**a**sche	w**u**sch	w**ü**sche	gew**a**schen	'to wash'
k**o**mme	k**a**m	k**ä**me	gek**o**mmen	'to come'
bl**ei**be	bl**ie**b	bl**ie**be	gebl**ie**ben	'to stay'
g**e**he	g**i**ng	g**i**nge	geg**a**ngen	'to go'
s**i**nge	s**a**ng	s**ä**nge	ges**u**ngen	'to sing'
h**e**lfe	h**a**lf	h**ü**lfe/h**ä**lfe	geh**o**lfen	'to help'

3. These data are convincing evidence in favor of a complex (multi-stem) mapping between morphosyntax and phonology
4. They also imply a need for multiple **cycles**, or stages of a sort, to achieve an 'umlauted ablauted' stem vowel.

3.2 Number morphology in German

(Standard) German has five concatenative suffix options for plural: *-e*, *-er*,*-(e)n*, ∅, and *-s*, as well as *umlaut*.

- *-(e)n* and *-s* never combines with umlaut
- *-er* always combines with umlaut
- *-e* and ∅ can occur with and without umlaut

This pattern is not fully phonologically predictable (see Trommer, 2021; Müller, 2025)

No umlaut				Umlaut			
Singular	Suffix	Plural	Gloss	Singular	Suffix	Plural	Gloss
Tag	*-e*	*Tage*	'days'	*Hand*	*-e*	*Hände*	'hands'
Gabel	*-(e)n*	*Gabeln*	'forks'	*Buch*	*-er*	*Bücher*	'books'
Anker	∅	*Anker*	'anchors'	*Vogel*	∅	*Vögel*	'birds'

Generalizations about (Standard) German plurals:

1. All plurals are (at least) disyllabic, most commonly trochaic (Wiese, 1996)
2. The *¨-e* suffix is most common with feminine nouns, and a subset of masculine nouns; it can *never* occur with neuter nouns
3. The *¨-er* suffix is most common for neuter nouns; occurs with a few masculine nouns, but feminine nouns *cannot* take it

4. The *-e* suffix typically combines with masculine nouns, and *some* neuter nouns; it does *not* occur with feminine nouns
5. Masculine and neuter nouns can have null (∅) plurals; masculine and feminine nouns can have plurals with just umlaut
6. The *-(e)n* suffix is the plural exponent for a class of weak nouns, comprised of all genders
7. The *-s* suffix[1] applies to nouns that end with a vowel other than /ə/, loan words, and abbreviations or acronyms – a group comprised of all genders.

	Gender			
Suffix	Masculine	Feminine	Neuter	Example
-e	✓	✗	✓	*Tage, Schiffe*
∅	✓	✗	✓	*Anker, Steuer*
¨*er*	✓	✗	✓	*Männer, Bücher*
¨*e*	✓	✓	✗	*Gäste, Hände*
¨	✓	✓	✗	*Vögel, Mütter*
-(e)n	✓	✓	✓	*Boten, Gabeln, Herzen*
-s	✓	✓	✓	*LKWs, Partys, Autos*

4 Approaches to contextual allomorphy

Late-insertion approaches differ crucially from one another in certain respects (Baal et al., 2025):

- **Direct interface:** No additional operations alter syntactic outputs prior to identifying exponency
- **Indirect interface:** Syntactic structures can be manipulated prior to identifying exponency
- **Syntactic targets:** Spell-Out targets (i) terminal nodes, (ii) non-terminal nodes, or (iii) both
- **Subset vs Superset:** Metric used for determining the Vocabulary Item/Exponency of a terminal/tree/span[2]

We assess these approaches to contextual allomorphy in the empirical domain of German plurals according to the criteria laid out in §2.

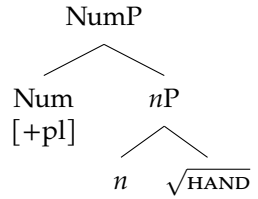
[1] For reasons of time, we do not address the *-s* suffix in the remainder of this work. It will, as in other analyses, result in an additional exponent in the inventory or exception in the grammar.

[2] It's also not clear if current musing in Nanosyntax maintain the Superset Principle as a metric to determine span size (De Clerq et al., 2025).

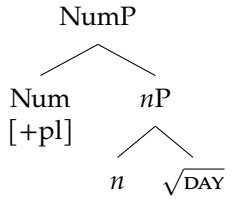
4.1 Distributed Morphology

- For an overview of DM see Embick and Noyer (2007)

(4)



(5)



4.1.1 Root suppletion (MM Process)

(6) Vocabulary Items
   a. *Händ* ⇔ $\sqrt{\text{HAND}}$ / ___ [+pl]
   b. *Tag* ⇔ $\sqrt{\text{DAY}}$
   c. *e* ⇔ [+pl] / ___ {$\sqrt{\text{DAY}}$, $\sqrt{\text{HAND}}$}

Does this approach satisfy our criteria?

✓ **No exceptional rules** – No optional morphophonological rules apply

✗ **Phonological regularity** – Root suppletion loses generalization that there is a predictable *front∼back* relationship between umlauted and unumlauted forms

✗ **Computation over storage** – Every root alternation has to be memorized and stored

4.1.2 Plural allomorph competition with readjustment rules (MP Process)

(7) Vocabulary Items (based on Embick and Halle 2005)
   a. *Hand* ⇔ $\sqrt{\text{HAND}}$
   b. *Tag* ⇔ $\sqrt{\text{DAY}}$
   c. *e* ⇔ [+pl] / ___ {$\sqrt{\text{DAY}}$, $\sqrt{\text{HAND}}$}

(8) Readjustment Rule
   a. Front the stem vowel, triggered by [+pl] and the root

Does this approach satisfy our criteria?

✗ **No exceptional rules** – Readjustment rules are triggered based on environment

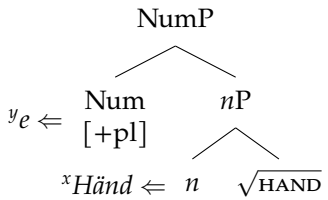
✓ **Phonological regularity** – The lack of root supplection means the *front∼back* alternation of umlauted forms is preserved

✓ **Computation over storage** – Storage of forms is minimized as readjustment rules introduce additional computational mechanisms

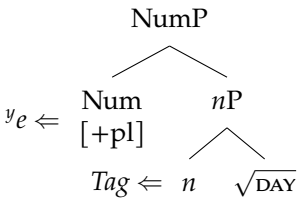
4.1.3 Extended exponency (MP Process)

The feature(s) responsible for triggering umlaut (x) are also responsible for selecting the extended exponency (y), e.g., $x \oplus y$ (Shwayder, 2015).

(9) a.



b.



Does this approach satisfy our criteria?

✗ **No exceptional rules** – Roots are marked, via diacritic, for their ability to turn rules OFF; is this too powerful? Does this violate strict modularity?

✓ **Phonological regularity** – When the $x \oplus y$ rule applies, it captures the *front∼back* alternation, however, it does miss generalizations (e.g., *-er* always induces umlaut, but both *-e* and ∅ vary in doing so)

✓ **Computation over storage** – Minimizes storage of forms, especially compared to suppletion analysis

Additional questions about this approach

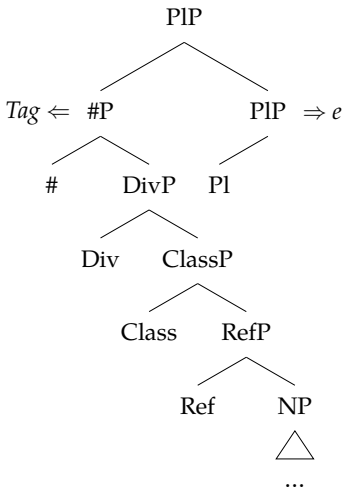
Same output = same process Based on assumption that vowel fronting is a single phenomenon via rule rather than from input representations; comes at the expense of the grammar turning rules on and off

4.2 Nanosyntax

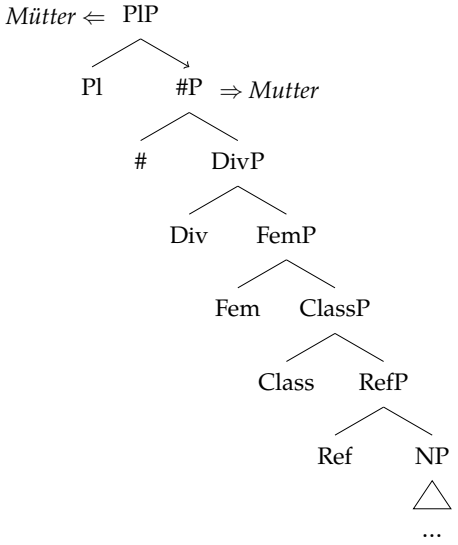
- Varies from DM by way of non-terminal node insertion[3]

4.2.1 Suppletion (MM Process)

(10) a. *Tag* ∼ *Tage*



b. *Mutter* ∼ *Mütter* 'mother(s)'



[3] For an overview of Nanosyntax see Caha (to appear).

Does this approach satisfy our criteria?

✓ **No exceptional rules** – There are no optional morphophonological rules

✗ **Phonological regularity** – Root suppletion loses generalization that there is a predictable *front∼back* relationship between umlauted and unumlauted forms

✗ **Computation over storage** – All suppletive forms must be stored in some manner

Additional architecture concerns:

1. One feature - One head architecture results in a non-austere syntax
2. Q: What is the motivation for (all) these syntactic heads?
3. There is also an additional apparent lack of restrictiveness in determining spell out domains when compared with an algorithm (like one finds in DM) that exclusively targets terminal nodes (Paparounas, 2024)
4. Nanosyntactic approaches to umlaut/stem allomorphy that do not rely exclusively on suppletion postulate features distant/non-local from the base/root (Natvig, Putnam, and Wilson, 2025)

4.2.2 Declension classes (PP Process)

(11) a. *Tag* ∼ *Tage*
Tag ⇔ [#P[DivP[ClassP[RefP[NP]]]]]
e ⇔ [PlP]

b. *Mutter* ∼ *Mütter* 'mother(s)'
Mutter ⇔ [Fem[ClassP[RefP[NP]]]][#P[DivP]]
[front] ⇔ [PlP[#P[DivP]]]

Does this approach satisfy our criteria?

✓ **No exceptional rules** – There are no optional morphophonological rules

✓ **Phonological regularity** – Using declension classes for umlauting vs. nonumlauting affixes captures phonological alternations

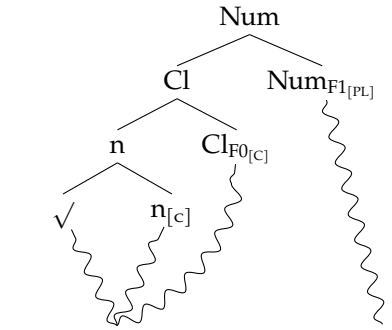
? **Computation over storage** – Fares better than suppletion, but increases storage of exponents

4.3 Spanning

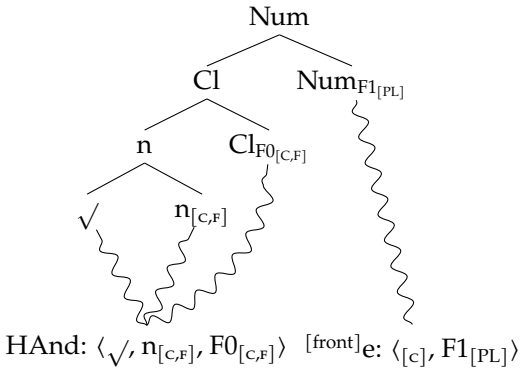
- Distinguished from Nanosyntax by use of Subset Principle over superset and maintaining roots

(12) Sample analysis as **PP process** based on Svenonius (to appear); see also Pomino and Remberger (2025) for a similar perspective

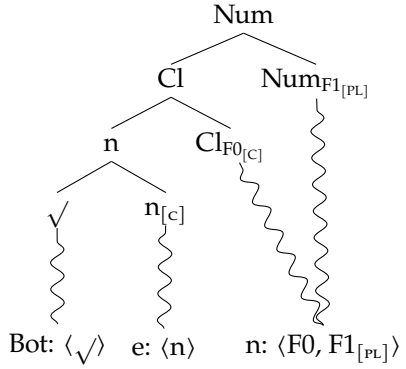
a. *Tag* ∼ *Tage*



b. *Hand* ∼ *Hände*



c. Weak nouns: *Bote* ∼ *Boten* 'messenger(s)'



Does this approach satisfy our criteria?

✓ **No exceptional rules** – There are no optional morphophonological rules

✓ **Phonological regularity** – Feature-driven assimilation captures alternation

? **Computation over storage** – Better than suppletion; storage depends on phonological assumptions and the viability of underspecified vowels to capture generalizations (see Svenonius, to appear, for an analysis of Icelandic)

4.4 Extended exponents and morphological colors

- Trommer (2021): Fully concatenative process
- Interaction between three exponents and constraints governing the realization of forms
- Harmonious with a DM approach to morphosyntax; *but*, all of these alternations take place *in the phonology*

Exponents:
[+PL]: Root node and floating COR (i.e., [front])
[+PL +FEM]: Floating NAS
[+PL −MASC −FEM]: Floating PHAR

Additional mechanisms (via constraint interaction):
COR induces umlaut only when vowels are underspecified
COR cannot cross underlying schwa
COR and NAS coalesce for *-n* suffix for FEM
Floating NAS in non-feminine stems with *n*-plurals
PHAR forces association of COR to stem vowel (i.e., umlaut)
Floating PHAR in masculine stems with *¨er*-plurals

Does this approach satisfy our criteria?

? **No exceptional rules** – Umlaut fails to apply in certain phonological environments; some cases are also dependent on the morphological color of the phonological representation

✓ **Phonological regularity** – Fronting from COR feature in exponent

✓ **Computation over storage** – Minimal storage of forms; complexity lies in constraint interactions, capturing a host of phonological generalizations

Additional questions about this approach

Underspecified vowels These are necessary for the analysis but do not transfer to umlaut distributions in other grammatical categories (e.g., *Tage* 'days', but *täglich* 'days.long')

Morphological colors To what extent are these morphological diacritics?

4.5 Interim summary

All three late-insertion frameworks reviewed above (DM, Nanosyntax, and Spanning), as well as a full concatenative analysis (e.g., Trommer, 2021) *can* account for German umlaut (in plurals), *however*, none of them are a perfect fit and fail to address all of these issues at once:

- Minimizing theoretical machinery and assumptions
- Taking into account the phonological regularities of German umlaut in plurals,
- Maximizing computation over storage in order to reduce redundancy

Assessment of computation vs. storage issue leads us to revisit assumptions concerning phonological representations

5 Assessment and discussion

How the interaction classifications fared

MM DM root suppletion (§4.1.1) and Nanosyntax suppletion (§4.2.1) fail to satisfy two of our criteria: (i) phonological regularity, (ii) computation over storage

MP DM with readjustment rules (§4.1.2) and DM-style extended exponency (§4.1.3) fails to satisfy one of our criteria: (i) no exceptional rules

PP Nanosyntax and Spanning with 'declension classes' (§4.2.2, §4.3), and extended exponency with morphological colors (§4.4) may satisfy all of our criteria (with caveats and details involving storage and/or other uncertainties)

By not maintaining umlaut as a phonologically regular phenomenon, we assert that **both suppletion approaches (MM) are suboptimal theoretical approaches**.

Assuming a phonological component – as target and/or trigger (MP or PP) – reduces the storage of suppletive forms and also captures both the regularity of the umlaut process and restricted scope of the alternation. **PP approaches** may check a lot of boxes, but they result is a complex syntax with operations that are PF-driven.

Our verdict

Umlaut is best understood as a morphophonological (MP) phenomenon. While a proper treatment of 'umlaut' still requires morphological rules and at times, some degree of (morphological) listedness, appears to be necessary.

In the end, all late-insertion models have mechanisms for capturing contextual allomorphy and declension class patterns; adjudicating between them means weighing the benefits of:

- Lists vs. tree sizes / non-terminal spellout
- Predictions for subset vs. superset in modeling distributional patterns
- Predictions for defining/determining locality and/or cyclicity

The 'Storage Issue'

- Assuming a phonological component – either as target or target and trigger – reduces storage of suppletive forms
  - Also captures the regularity of the process and restricted scope of the alternation
  - Honest question: How bad is it actually to store exponents?
- Other grammatical domains need to be examined to assess storage of umlauting vs. non-umlauting affixes throughout the grammar

The 'Machinery Issue'

- Placing umlaut (in German plurals) as a *phonologically consistent* phenomenon, we avoid the need for morphological operations that turn rules ON/OFF (but we need to be precise about the blocking effects...)
- Non-concatenative patterns are epiphenomenal (Bye and Svenonius, 2012) using the same representations needed for (underspecified) ordering of segments (Raimy, 2000; Papillon, 2020; Idsardi, 2022)
- Work remains to explore closer connections to locality and cyclic domains (Pak, 2008; Embick, 2013; Embick, 2014; Moskal, 2015a; Moskal, 2015b; Lowenstamm, 2015; Lowenstamm, 2017; Creemers, Don, and Fenger, 2018; Fenger and Weisser, 2025)

The 'Competition Issue'

- All late-insertion models have mechanisms for capturing contextual allomorphy and declension class patterns; adjudicating between them will weigh the benefits of:
  - Lists vs. tree sizes
  - Predictions re: spanning vs terminal node-insertion
  - Predictions re: other 'cyclic concerns'

6 Conclusion & remaining challenges

Primary takeaways

- All three late-insertion approaches (e.g., DM, Nanosyntax, and Spanning) make different assumptions about how to license umlaut
  - All of these models license mechanisms that model contextual allomorphy, i.e., competition between different exponents of a given feature (set) (Baal et al., 2025)
- Following Embick and Shwayder (2018), we endorse the view that it's possible that these different 'flavors of umlaut' can have different triggers and/or targets

Remaining challenges

Input-output mismatches: Arriving with similar outputs doesn't (always) mean that the same derivational processes were involved

Underlying differences: Different patterning is also evidence for different underlying representations (e.g., {*e*, ∅} clusters with masculine and neuter whereas {*ë*, *ë*} clusters with masculine and feminine)

Diachrony: Diachronic origins can shed light on exponent storage vs. computation across time (Calabrese and Grestenberger, to appear)

References

Baal, Yvonne van, Terje Lohndal, David Natvig, and Michael T. Putnam (2025). "Realizing features: A case study of the syntax-morphology interface". In: *Syntax in uncharted territories: Essays in honor of Maria Polinsky*. eScholarship: Open Access Publications from the University of California.

Bye, Patrik and Peter Svenonius (2012). "Non-concatenative morphology as epiphenomenon". In: *The Morphology and Phonology of Exponence*. Ed. by Jochen Trommer. Oxford: Oxford University Press, pp. 427–495.

Caha, Pavel (to appear). "Nanosyntax: some key features". In: *The Oxford Handbook of Distributed Morphology*. Ed. by Artemis Alexiadou, Ruth Kramer, Alec Marantz, and Isabel Oltra-Massuet. Oxford: Oxford University Press.

Calabrese, Andrea and Laura Grestenberger (to appear). "Distributed Morphology and historical linguistics". In: *The Oxford Handbook of Distributed Morphology*. Ed. by Artemis Alexiadou, Ruth Kramer, Alec Marantz, and Isabel Oltra-Massuet. Oxford: Oxford University Press.

Creemers, Ava, Jan Don, and Paula Fenger (2018). "Some affixes are roots, others are heads". In: *Natural Language & Linguistic Theory* 36, pp. 45–84.

De Clerq, Karen, Pavel Caha, Michal Starke, and Vanden Wyngaerd (2025). "Nanosyntax: State of the art and recent developments". In: *Nanosyntax and the Lexicalization Algorithm*. Ed. by Pavel Caha, Karen De Clercq, and Guido Vanden Wyngaerd. Oxford: Oxford University Press, pp. 1–46.

Embick, David (2013). "Morphemes and morphophonological loci". In: *Distributed Morphology today: Morphemes for Morris Halle*. Ed. by O. Matushansky and A. Marantz. Cambridge, MA: MIT Press, pp. 151–165.

– (2014). "Phase cycles, ϕ-cycles, and phonological (in)activity". In: *The form of structure, the structure of form: Essays in honor of Jean Lowenstamm*. Ed. by S. Bendjaballah, N. Faust, M. Lahrouchi, and N. Lampitelli. Amsterdam: John Benjamins, pp. 271–286.

Embick, David, Ava Creemers, and Amy J. Goodwin Davies (2022). "Morphology and the mental lexicon: Three questions about *decomposition*". In: *The Oxford Handbook of the Mental Lexicon*. Ed. by Anna Papafragou, John C. Trueswell, and Lila R. Gleitman. Oxford: Oxford University Press, pp. 77–97.

Embick, David and Morris Halle (2005). "On the status of stems in morphological theory". In: *Romance languages and linguistic theory 2003: Selected papers from 'Going Romance' 2003, Nijmegen, 20-22, November*. Ed. by Twan Geerts, Ivo van Ginneken, and Haike Jacobs. Amsterdam: John Benjamins, pp. 37–62.

Embick, David and Ralph Noyer (2007). "Distributed Morphology and the syntax/morphology interface". In: *Oxford handbook of linguistic interfaces*. Ed. by Gillian Ramchand and Charles Reiss. Oxford: Oxford University Press, pp. 289–324.

Embick, David and Kobey Shwayder (2018). "Deriving morphophonological (mis)applications". In: *From Sounds to Structures: Beyond the Veil of Maya*. Ed. by Roberta Petrosino, Pietro Cerrone, and Harry van der Hulst. Berlin: Mouton de Gruyter, pp. 193–248.

Fenger, Paula and Philipp Weisser (2025). "Matching domains: The syntax, morphology, and phonology of the verb in Sinhala". In: *Natural Language & Linguistic Theory*.

Idsardi, William (2022). "Underspecification in time". In: *Canadian Journal of Linguistics/Revue canadienne de linguistique* 67.4, pp. 1–13.

Lowenstamm, Jean (2015). "Derivational affixes as roots: Phasal spell-out meetings English stress shift". In: *The syntax of roots and the roots of syntax*. Ed. by Artemis Alexiadou, Hagit Borer, and Schäfer. Oxford: Oxford University Press, pp. 230–259.

– (2017). "German affixes *-lich*, *-tum*, *-schaft*, and Umlaut ". In: *Festschrift für Martin Prinzhorn*. Ed. by Clemens Mayr and Edwin Williams. Vienna: Wiener Linguistische Gazette, pp. 193–206.

Moskal, Beate (2015a). "Domains on the border: Between morphology and phonology". PhD thesis. University of Connecticut - Storrs.

– (2015b). "Limits on allomorphy: A case study in nominal suppletion". In: *Linguistic Inquiry* 46.2, pp. 363–376.

Müller, Stefanie (2025). "Umlaut and allomorphy as diagnostics in the analysis of suspended affixation: Experimental evidence from acceptability judgments". PhD thesis. Universität Leipzig.

Natvig, David, Michael T. Putnam, and Emmeline Wilson (2025). "Exponency in bilingual grammars: Conflict and compromise". In: *Nanosyntax and the Lexicalization Algorithm*. Ed. by Pavel Caha, Karen De Clercq, and Guido Vanden Wyngaerd. Oxford: Oxford University Press, pp. 466–492.

Pak, Majorie (2008). "The postsyntactic derivation and its phonological reflexes". PhD thesis. University of Pennsylvania.

Paparounas, Lefteris (2024). "Visibility and intervention in allomorphy: Lessons from Modern Greek". In: *Linguistic Inquiry* 55.3, pp. 537–577.
Papillon, Maxime (2020). "Precedence and the lack thereof: Precedence-Relation-Oriented-Phonology". PhD thesis. University of Maryland.
Pomino, Natascha and Eva-Maria Remberger (2025). "Small syntactic terminal nodes, large Vocabulary Items: A spanning approach to irregular Romance verb inflection". In: *Glossa: a journal of general linguistics* 10.1.
Raimy, Eric (2000). *The phonology and morphology of reduplication*. Berlin: Mouton de Gruyter.
Shwayder, Kobey (2015). "Words and subwords: Phonology in a piece-based syntactic morphology". PhD thesis. University of Pennsylvania.
Svenonius, Peter (to appear). "Icelandic nominal declensions". In: *Ms.* University of Tromsø – The Arctic University of Norway.
Trommer, Jochen (2021). "The subsegmental structure of German plural allomorphy". In: *Natural Language & Linguistic Theory* 39.2, pp. 601–656.
Wiese, Richard (1996). "Phonological versus morphological rules: On German umlaut and ablaut". In: *Journal of Linguistics* 32.1, pp. 113–135.