Pre-Syntactic Impoverishment

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1. Introduction

Based on the premise that inflectional morphology is an autonomous component of grammar that should not be viewed as a proper part of syntax,[1] two main options suggest themselves on the basis of a Y-model of grammar (cf. Chomsky (1981)): Inflectional morphology can be pre-syntactic, or it can be post-syntactic. While there are arguments for either view, it seems fair to conclude that one of the potentially strongest pieces of evidence in support of a post-syntactic approach is based on *impoverishment* operations, i.e., post-syntactic deletion operations applying to morpho-syntactic features (see Halle & Marantz (1993) and Noyer (1997), among many others; and Keine & Müller (2020) for a recent overview): If it can be shown that there are morpho-syntactic features that must be present in the syntax and absent in the morphology, this can be captured straightforwardly by deletion operations taking place after syntax and before morphological realization; in contrast, it is a priori unclear how to model such a state of affairs if inflectional morphology precedes syntax.

Against this background, the goal of the present contribution is a modest one: I will show that a pre-syntactic approach to impoverishment becomes possible if the *complete well-formed sets of morpho-syntactic features* associated with stems which are realized by morphological exponents (see Stump (2001), Inkelas (2016)) are not yet present at the start of the derivation but arise *incrementally*, by successively adding *non-inherent features* to the stem. On this view, whereas post-syntactic impoverishment of a feature [F_i] *bleeds* morphological realization by exponents bearing [F_i] ([F_i] is deleted early, i.e., before exponence), pre-syntactic impoverishment of [F_i] *counter-feeds* morphological realization by exponents bearing [F_i] ([F_i] is added late, i.e., after exponence). Interestingly, while the two conceptions of impoverishment would by and large seem to be mirror images of one another, there are also different empirical predictions: Pre-syntactic impoverishment predicts that *inherent features* of stems can never be impoverished (features that are not added cannot be added late); post-syntactic impoverishment has no such restriction (both inherent and non-inherent features can be deleted).

I will proceed as follows. Section 2 illustrates the concept of post-syntactic impoverishment, based on systematic patterns of syncretism in German verb inflection. Section 3 argues that the issue of pre- vs. post-syntactic inflectional morphology should at this point not be viewed as fully settled. Given that the concept of impoverishment has received substantial empirical and conceptual confirmation, this then implies that it makes sense to pursue the question of what a pre-syntactic concept of impoverishment might look like. Section 4

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[1] Many arguments to this effect can be found in the literature; let me here just mention two: First, inflectional morphology partly relies on truly morphomic items like inflection class features that have no place in syntax (e.g., there is no agreement or selection rule involving inflection class; see Aronoff (1994)). Second, inflectional morphology makes use of the concept of competition of underspecified morphological exponents, and of competition resolution via principles demanding compatibility and specificity (see, e.g., Lumsden (1992) and Halle (1997)), none of which seems to play a role in syntax.

suggests that an incremental generation of complete well-formed sets of morpho-syntactic features for realization by (underspecified) exponents in a pre-syntactic approach opens up the possibility of viewing impoverishment as premature exponence made possible by late feature addition. Section 5 then highlights the different predictions of the two approaches for inherent features (gender features and inflection class features), and also discusses some further consequences (related to feature-changing impoverishment and impoverishment that deletes entire morphological slots, rather than merely features). The final section is an appendix in which the general, fairly theory-neutral format of pre-syntactic impoverishment operations laid out in section 4 is implemented in an actual pre-syntactic approach to inflectional morphology, viz., Harmonic Serialism (as developed in Müller (2020)).

2. Post-Syntactic Impoverishment

Standardly, impoverishment is conceived of as a post-syntactic operation that deletes morpho-syntactic features in syntactic representations before morphological exponence (i.e., vocabulary insertion in the post-syntactic theory of Distributed Morphology) takes place. Morphological realization then finds an impoverished environment, and this brings about a "retreat to the general case" (Halle & Marantz (1993)): Morphological exponence obeys *compatibility* and *specificity* requirements (i.e., the most specific exponent is chosen among those that are compatible with the complete well-formed set of morpho-syntactic features in need of realization; see Halle (1997) and Stump (2001), among many others). Hence, impoverishment may lead to a scenario where the most specific exponent that would be compatible with the syntactic context fails to be compatible with the post-syntactic context, and a less specific exponent must be chosen. This way, impoverishment makes it possible to systematically account for system-defining instances of syncretism that seem to hold independently of the accidental presence or absence of individual morphological exponents – i.e., *syncretism patterns* (cf. Bobaljik (2002b) and Harley (2008), among others).

As an arbitrarily chosen example, consider the distribution of syncretism in the three inflection classes of the German conjugation system in (1).

(1) a. *Weak inflection*
glauben ('believe')

	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

b. *Strong inflection*
rufen ('call')

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

c. *Suppletive inflection*
sein ('be')

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

(1) shows that first and third person must show identical exponence in singular past environments, independently of the individual inflection class that a verb belongs to; and the same overarching syncretism pattern can be found in plural environments more generally. In

view of this, it is proposed in Frampton (2002) and Müller (2006) that these system-defining patterns are due to two impoverishment operations (cf. (2)) that delete the feature [±1] in the respective environments, thereby leading to a neutralization effect: In singular past and plural environments, no exponent can distinguish between first and third person.

(2) a. [±1] → Ø/[–2,–pl,+past]__
    b. [±1] → Ø/[–2,+pl]__

Frampton (2002) assumes that vocabulary insertion into functional heads discharges matched features and can apply iteratively as long as there are undischarged features available in the head (cf. Noyer (1997), Trommer (1999)); as noted in Müller (2006), this makes it possible to postulate the inventory of exponents in (3), according to which not just full-form syncretisms, but also partial syncretisms can be derived.

(3) a. /te/ ↔ [+past,–strong] b. /s/ ↔ [+2,–pl]
    c. /n/ ↔ [–2,+pl] d. /t/ ↔ [–1]
    e. /(ə)/ ↔ [ ] (requiring minimal indication af deviation from present tense stem)

The consequences of (2) and (3) for weak and strong verb inflection in singular and plural contests in German are illustrated in (4), which presupposes that verb endings are iteratively inserted into T heads, according to a concept of specificity that is sensitive to feature hierarchies (cf. Lumsden (1992), Noyer (1997)): tense > number > person. Note in particular that the analysis can postulate a single underspecified non-first person exponent /t/ ([–1]) that shows up in third person singular present tense contexts, in second person plural contexts, and (following complementary, more specific /s/ ↔ [+2,–pl]) in second person singular contexts; crucially, though, the impoverishment rule in (2-b), whose primary justification is to capture a recurring, inflection class-spanning pattern (viz., first and third person forms must be identical in the plural), successfully keeps /t/ from appearing in third person plural contexts, where it would otherwise be expected to show up, given its maximally general [–1] specification. (In fact, this /t/ does occur in third person plural present tense contexts in Middle High German, where the impoverishment rule (2-b) was confined to past environments.)

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

a.

T	[–past] [–strong]	[–past] [+strong]
[+1,–2,–pl]	/ə/	/ə/
[–1,+2,–pl]	/s/-/t/	/s/-/t/
[–1,–2,–pl]	/t/	/t/
[~~±1,~~–2,+pl]	/n/	/n/
[–1,+2,+pl]	/t/	/t/
[~~–1,~~–2,+pl]	/n/-□	/n/-□

b.

T	[+past] [–strong]	[+past] [+strong]
[~~±1,~~–2,–pl]	/te/	/Ø/
[–1,+2,–pl]	/te/-/s/-/t/	/s/-/t/
[~~–1,~~–2,–pl]	/te/-□	/Ø/-□
[~~±1,~~–2,+pl]	/te/-/n/	/n/
[–1,+2,+pl]	/te/-/t/	/t/
[~~–1,~~–2,+pl]	/te/-/n/-□	/n/-□

This may suffice as an illustration of the general working of impoverishment, and of the dual role that it often has in morphological analyses: On the one hand, impoverishment captures systematic syncretism patterns; and on the other hand, by doing so it can also automatically preclude exponents that would otherwise be compatible (and sufficiently specific) in a given environment from actually occuring, thereby permitting a simpler exponent inventory where more instances of syncretcism are accounted for systematically.

Clearly, impoverishment operations cannot be assumed to generally take place in the syntax already: Unlike morphological exponence, syntactic operations like Agree typically only have access to fully specified morpho-syntactic feature matrices. Therefore, impoverishment must take place *after* syntax, but *before* morphological exponence.[2] Consequently, impoverishment prima facie provides a strong argument for a post-syntactic approach to inflectional morphology: Post-syntactic impoverishment of a morpho-syntactic feature [F_i] *bleeds* morphological realization by exponents bearing [F_i] (and *feeds* morphological realization by exponents not bearing [F_i]). In contrast, post-syntactic impoverishment of [F_i] *counter-bleeds* syntactic operations requiring [F_i] (and *counter-feeds* syntactic operations requiring the absence of [F_i]); i.e., there is an opaque interaction of operations (in the sense of Kiparsky (1973)).

3. Pre- vs. Post-Syntactic Morphology

The challenge of modelling impoverishment in a pre-syntactic approach to inflectional morphology can only qualify as interesting as long as there is reason to assume that the question of pre- vs. post-syntactic morphology has not been unanimously resolved in favour of a post-syntactic approach. It is emphatically not the goal of the present contribution to argue for either option; the sole purpose of the following remarks is to justify the view that there is evidence for both a pre-syntactic and a post-syntactic approach, and that this question should therefore not be considered to be unequivocally settled at this point.

3.1. Morphological Richness

A first consideration that might support a pre-syntactic approach to morphology concerns the concept of *morphological richness*. As noted by Bobaljik (2002a), properties of the morphological inventory cannot be held responsible for the legitimacy or illegitimacy of syntactic operations if inflectional morphology is post-syntactic. Thus, e.g., it cannot be assumed that V-to-T movement in the syntax takes place if a language has a sufficiently rich paradigm of verb inflection (cf. Roberts (1993), Vikner (1997), Holmberg & Platzack (1995), and Rohrbacher (1999), among others) – if inflectional morphology follows syntax, the relevant information can only arise at a point of the derivation (e.g., after vocabulary insertion) where the decision about the legitimacy of V-to-T movement has long been taken. Similarly, it cannot be assumed that argumental *pro* is licensed in pro-drop contexts if a

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[2] See, however, Keine (2010), Bárány (2017), and Bárány & Sheehan (2021) for some cases where it looks as though syntactic Agree operations may have to work with impoverished feature matrices, which can then be taken to support the option of having impoverishment in the syntax in these cases. This does not affect the central conclusion vis-à-vis impoverishment in cases like the one at hand.

language has a sufficiently rich paradigm of verb inflection (see, e.g., Chomsky (1982), Rizzi (1986), Jaeggli & Safir (1989)). Of course, these consequences do not provide a conclusive argument since alternative approaches to these phenomena are available in principle (see, e.g., Bobaljik (2002a) and Holmberg (2005), respectively), but the fact remains that a large class of well-established syntactic analyses are excluded under post-syntactic morphology.

3.2. Properties of Rules of Exponence

A second observation that might initially argue for pre-syntactic morphology pertains to the *properties of rules of exponence*. In a post-syntactic approach, exponence is standardly achieved by designated substitution or insertion transformations applying to terminal nodes (vocabulary insertion; Halle & Marantz (1993)).[3] On the one hand, such operations necessarily violate the *Strict Cycle Condition* (Chomsky (1973; 1995; 2019)) because by definition they exclusively affect proper subparts of complex linguistic expressions formed earlier (incidentally, the same goes for most other post-syntactic morphological operations that have been postulated, like dissociation, fission, etc.); also cf. Marantz (2010) on the related issue of "recycling" (and Kalin & Weisser (2021) on a possible justification of the counter-cyclic nature of vocabulary insertion). On the other hand, these substitution/insertion transformations are at variance with the tenet that all grammatical operations obey the meta-requirements of *generality* and *domain-independence*; on this view, there should be no formal operations in morphology that lack a counterpart elsewhere in the grammar. Both these issues are resolved in a pre-syntactic approach that exclusively relies on Merge operations for bringing about morphological exponence (see, e.g., Alexiadou & Müller (2008), Bruening (2017), and the appendix below).[4]

3.3. Derived Inflection Environments

Then again, there are also various considerations that might favour a post-syntactic approach. For instance, as noted by Kalin & Weisser (2021), a post-syntactic approach can easily accomodate phenomena where it looks as though some grammatical category Γ participates in inflection in a word of category α that is plausibly associated with some functional morpheme that can be reached by a syntactic or post-syntactic word-formation process (such as head movement, merger, or lowering) but that does not naturally lend itself to a classification as a category that α can be inflected for – i.e., instances of *derived inflection environments*. To give a concrete example: In Kazakh, the restrictions on vowel harmony in inflected words in questions (cf. Bowman & Lokshin (2014)) suggest that there can be a stage in the derivation where a clause-final Q exponent (*bA*) forms a phonological word with a preceding noun stem (like *nan*, 'bread') that excludes an instrumental case marker (*men*, 'with') that would otherwise be expected to block vowel harmony, even though the Q item is word-final in the

[3] The following remarks mutatis mutandis also apply if these transformations target entire subtrees (Ackema & Neeleman (2004), Caha (2013)) or spans (Merchant (2015), Svenonius (2016)).

[4] Adopting Merge instead of vocabulary insertion as the mechanism underlying exponence in a post-syntactic approach would make it possible to comply with the latter meta-requirements but would still leave (strict) cyclicity issues unresolved.

surface representation (*nan-men-ba*, with *ba* opaquely participating in vowel harmony). In a post-syntactic approach, this can be derived by an adequate combination of displacement operations; however, in a pre-syntactic approach, it would in addition seem to necessitate the somewhat unnatural assumption that nouns can be inflected for interrogativity (and that the resulting word forms are confined to clause-final positions in interrogative clauses); cf. Gleim et al. (2021b)).[5]

3.4. Feature Valuation

Another argument for a post-syntactic approach goes back to Preminger (2021). Assuming that a case can be made for syntactic Agree operations involving *valuation* rather than *checking* (cf. Preminger (2014)), it is clear that this initially supports a post-syntactic approach: If some morpho-syntactic feature specifications (viz., those that come into existence as a consequence of Agree) are not yet present at early stages of syntactic derivations, then it is a priori hard to see where the morphological exponents should come from in inflected words in the syntax that are realizations of these feature specifications. Thus, assuming a valuation conception of Agree, a pre-syntactic approach would seem to minimally require some non-trivial extensions.[6]

Needless to say, in addition to these considerations based on morphological richness, properties of rules of exponence, derived inflection environments, and valuation, there are many more potential arguments in favour of either approach. For present purposes, it may suffice to conclude that the issue is not yet definitively resolved. Consequently, given the strong empirical support for impoverishment in post-syntactic morphology, there is every

[5] There is arguably also a flipside to this, though: Given the capacity of post-syntactic approaches to model wordhood dynamically, there seems to be nothing that would systematically exclude scenarios where long-distance movement feeds morphological realization of inflected words via contextual allomorphy. For instance, assuming that portmanteau exponents result from contextual allomorphy (cf. Fenger (2018)), it is not clear why cases of "long-distance portmanteaux" resulting from movement of a constituent containing the functional head realized by the portmanteau to a matrix clause do not seem to exist in the world's languages. (One might think that this issue could be taken care of by cyclic spell-out applying to the moved item before it reaches the matrix clause; but given Chomsky's (2001) Phase Impenetrability Condition, the items that reach the phase edge so as to undergo further movement are exactly the ones that are exempt from phase-based cyclic spell-out.)

[6] It should be noted, though, that from a purely mechanical point of view, reconciling valuation with presyntatic morphology is well within reach. Suppose, e.g., that not just individual word forms but whole paradigms are generated pre-syntactically by rules of exponence. Information from this paradigm then accompanies the lexical item that shows up in syntactic derivations. On this view, valuation under Agree in the syntax does not imply providing a value for features of the lexical item; rather, it amounts to getting rid of the non-matching forms, such that eventually only one exponent remains. The question arises as to how much information of the original, full paradigm is needed for this. Importantly, not all morpho-syntactic features of lexical items are subject to valuation. First, some features are inherent (e.g., inflection class in general, or gender on N, in at least some languages). Second, some features are non-inherent but selected prior to the syntactic derivation (e.g., this holds for number specificitions on N, which are also typically not viewed as the result of valuation). This will then reduce the initial set of forms from which syntactic valuation chooses, leaving sub-paradigms to be associated with lexical items that ultimately just include forms with those features

reason to investigate the option of modelling impoverishment in pre-syntactic morphology.[7]

4. Pre-Syntactic Impoverishment

The first thing to note is that, like the post-syntactic approaches in which impoverishment has been adopted, a pre-syntactic approach that incorporates impoverishment should arguably qualify as realizational, rather than incremental, in Stump's (2001) terminology: Morphological exponents realize morpho-syntactic features that exist independently; they do not contribute features to the inflected word that would otherwise not be present. This ensures that underspecified exponents find a feature matrix against which they can be checked, and it also ensures that there is a feature set independently of the exponents that can be impoverished.[8]

Thus, a basic assumption required for all that follows is that in a pre-syntactic approach to morphological exponence incorporating impoverishment, there are *complete well-formed sets of morpho-syntactic features* (Stump (2001; 2006), Inkelas (2016)) which are associated with stems, and which are realized by morphological exponents (according to compatibility and specificity requirements); and most of the features in these sets are not inherent to the stem. These complete well-formed sets of morpho-syntactic features essentially encode instantiations of all the grammatical categories that a stem of a given part of speech can be inflected for.

Going back to the above example of German verb inflection in (1) & (4), a finite V stem in this language will be associated with a complete set of non-inherent morpho-syntactic features comprising specifications for the grammatical categories person ([±1], [±2]), number ([±pl]), mood ([±sub(junctive),[±imp(erative)], with [–sub], [–imp] tacitly assumed in (4)), and tense ([±past]); in addition, there is inflection class information inherent to the stem ([±strong], abstracting away from minor inflection classes like the suppletive verb *sein*

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that are neither inherent nor equipped with a value independently of Agree. In some cases, this sub-paradigm will still contain a number of forms – e.g., all of the forms in (4) would on this view initially be associated with a lexical item V in German – but deletion of all non-matching forms under valuation in the syntax as such will be entirely unproblematic.

[7] Here is a brute force way of implementing pre-syntactic impoverishment that has been suggested in the literature in one form or the other (cf. Müller (2006) and Stump (2006)), but that has all the hallmarks of a purely technical workaround, given the Y-model of grammar: On this view, pre-syntactic morphology starts out with a fully specified well-formed set of morpho-syntactic features which is then subject to impoverishment before morphological realization takes place, exactly as in the post-syntactic variant. Crucially, however, impoverishment *marks* features as morphologically inaccessible, but it does not actually *delete* them, and they remain accessible in syntax. This is parallel to Chomsky's (1995) distinction between deletion and erasure of features in the syntax; however, just like this latter approach, such a reasoning is conceptually hardly acceptable if one takes seriously the meta-principles of minimalist grammar (Chomsky (2001; 2019)). Similar considerations apply in the case of optimality-theoretic approaches where impoverishment effects do not involve actual feature deletion but can be traced back to a ban on using certain features as a result of constraint interaction (cf. Trommer (2003), Don & Blom (2006), and Wunderlich (2004), among others).

[8] In contrast, incremental approaches in which it is the exponents themselves that contribute the morpho-syntactic features that characterize a word, as in Steele (1995) or Wunderlich (1997), face the challenge of producing such a feature set to match underspecified exponents against.

('be') in (1), and of the small class of deponent verbs in German, i.e., preterite-present verbs like *können* ('can') or *wissen* ('know'); also see below).[9] For instance, a (finite) V stem like *glaub* ('believe') can be associated with a complete well-formed set of morpho-syntactic features {[–strong], [–sub], [–imp], [–1], [+2], [–pl], [+past]}, and the maximally specific exponents realizing this feature matrix (among those that are compatible) will then be first /te/, next /s/, and then /t/, yielding *glaub-te-s-t*. Approaches to inflectional morphology that either explicitly implement such a pre-syntactic procedure, or can be viewed as being fully compatible with it, include Anderson (1992), Grimshaw (2001), Kiparsky (2005), Stump (2001; 2006), Alexiadou & Müller (2008), Brown & Hippisley (2012), Crysmann & Bonami (2016), Inkelas (2016), Bruening (2017), and Müller (2020), among many others.[10]

At this point, a general question arises: Where do the complete well-formed sets of morpho-syntactic features come from that are associated with stems, and that are realized by morphological exponents? I would like to contend that there are two principled answers, a *declarative* and a *generative* one.

According to the declarative approach, a complete well-formed set of morpho-syntactic features comes into being for a stem simply by fiat (i.e., by definition); all non-inherent and inherent features are simultaneously present. This approach has been formalized in Stump (2001) (also cf. Inkelas (2016) on 'target meanings'); it would seem to be assumed (explicitly or implicitly) in virtually all existing work addressing the question of how complete well-formed sets of morpho-syntactic features arise. However, there is in principle an alternative, viz., a generative approach. On this view, a complete well-formed set of morpho-syntactic features is generated incrementally, by adding, in a stepwise fashion, non-inherent features to the stem with its inherent features. Thus, given the generative approach, a German (finite) V stem like *glaub* ('believe') is not in fact associated with a complete well-formed set of morpho-syntactic features like {[–strong], [–sub], [–imp], [–1], [+2], [–pl], [+past]} from the beginning. Rather, initially there are only inherent features in the set ({[–strong]}, in the case at hand), and the other features are added successively, one by one, subject to wellformedness restrictions (implying, e.g., that no contradictory feature-value pairs and no incompatible features can be chosen; cf. Stump (2001)), until the set is finally complete.

Crucially, unlike the declarative approach to complete well-formed sets of morpho-syntactic features, the generative approach offers a new view on impoverishment in pre-syntactic morphology: Impoverishment effects will automatically arise when morphological exponence takes place before the set of morpho-syntactic features in need of realization is complete. Consequently, the post-syntactic impoverishment operation for German verb inflection in (5-a) (cf. (2-b) above), which ensures that differences between first and third

[9] In contrast, non-finite V stems in German are inflected for grammatical categories like verbal status, or verbal case (I: bare infinitive, II: *zu*-infinitive, or III: participle) and verbal level (distinguishing, e.g., different kinds of participles); see Bech (1955/1957), Fabb (1984).

[10] A question that is orthogonal to the present concerns is where exactly the pre-syntactic morphological component is located; obvious candidates are (i) the lexicon (if it is not conceived of as a bare list of exceptions, as in Di Sciullo & Williams (1987)), (ii) the numeration (cf. Chomsky (2001)), and (iii) a designated separate morphological level.

person environments are neutralized in the plural, can be juxtaposed with the pre-syntactic impoverishment operation in (5-b), which has the same effect: Morphological exponents cannot refer to a distinction between [+1] and [–1] in [–2,+pl] environments in a pre-syntactic morphological component because the feature [±1] cannot yet be present here at the point where morphological realization takes place.

(5) a. *Post-syntactic impoverishment*:
Delete [±1] in the environment [–2,+pl] *before* morphological exponence.
b. *Pre-syntactic impoverishment*:
Add [±1] in the environment [–2,+pl] *after* morphological exponence.

(5-b) ensures that morphological exponence in German verb inflection in, say, third person plural present tense indicative contexts with a weak stem like *glaub* ('believe') realizes the feature set in (6-a) but *not* the feature set in (6-b), which only arises by adding [–1] to (6-a) after morphological exponence. Consequently, the inflected verb will be *glaub-n* here (with /n/ realizing [–2,+pl]), not **glaub-n-t* (see (4)), for exactly the same reason as with post-syntactic impoverishment: [–1] would trigger realization by /t/ (given (3)) but is not available when morphological realization takes place, given (5-b).

(6) a. {[–strong], [–sub], [–imp], [+2], [+pl], [–past]}
b. {[–strong], [–sub], [–imp], [–1], [+2], [+pl], [–past]}

Of course, this shift in perspective might ultimately also suggest a shift in terminology: Strictly speaking, pre-syntactic impoverishment does not actually impoverish structures, so one might call the operation *late addition* (of morpho-syntactic features to stems), or perhaps *premature exponence* (i.e., selection of morphological exponents based on information which is not yet complete). Still, in what follows I will stick to the label *pre-syntactic impoverishment*, so as to emphasize the formal mirror-image nature and the functional equivalence of the two concepts.

From the point of view of rule interaction, it can be noted that pre-syntactic impoverishment (now conceived of as late addition, i.e., addition after exponence) of some feature has the same inhibitory effect as post-syntactic impoverishment (early deletion, i.e., deletion before exponence); however, now the effect is not due to transparent bleeding but to opaque counter-feeding. More specifically, pre-syntactic impoverishment of [F_i] *counter-feeds* morphological realization by exponents bearing [F_i], and *counter-bleeds* morphological realization by exponents not bearing [F_i]. In contrast, pre-syntactic impoverishment of [F_i] *feeds* syntactic operations requiring [F_i] (because the feature is added after morphological exponence but before the syntactic derivation starts), and accordingly *bleeds* syntactic operations requiring the absence of [F_i].

Before turning to a different prediction made by the two approaches to impoverishment, one general issue is in need of clarification. The incremental growth of well-formed sets for morphological realization results from successive addition of morpho-syntactic features, but so far nothing has been mentioned concerning potential restrictions on this process. There are two possible strategies. The first one is that there is a fixed hierarchy of features (or feature classes) that must be adhered to during feature set generation. This predicts that if a feature α can be impoverished in the presence of a feature β, β cannot be impoverished in the presence of α. With respect to the case at hand (i.e., (5-b)), this would imply that number features like [±pl] are added to sets of morpho-syntactic features before person features (and perhaps the person feature [±2] before the person feature [±1]). Furthermore, the prediction would be that there can be no impoverishment operation that ensures inaccessibility of, say, [±pl] in the presence of some person feature specification, say, [–1,–2]. As a matter of fact, an approach along these lines has been proposed for post-syntactic impoverishment in Noyer (1997).

The second possible strategy is to assume that there are in fact no restrictions on adding features to the set of morpho-syntactic features for morphological realization. In such an approach, generation starts with the minimal set containing just inherent features of a stem, and adds the other features in an arbitrary order, subject to general wellformedness constraints (see above) and impoverishment rules like (5-b). At least at first sight, this alternative might look preferable in view of the fact that a comparison of pertinent analyses in the literature reveals that it is not clear that cross-linguistically valid hierarchies can be justified; thus, Noyer (1997) on the one hand, and Halle & Marantz (1994), Müller (2006), and Baier (2018) on the other hand, envisage incompatible hierarchies for gender, number, and person. A possible way out here might be to postulate language-specific, or context-specific, hierarchies; but that invariably leads to a loss of predictiveness, and ultimately also raises questions for acquisition. Another possible way out would be to maintain one kind of hierarchy and try to reanalyze the conflicting evidence for the other; this may well eventually emerge as the best strategy (and note incidentaly that the analysis predicting the *order* of inflectional exponents in (4) also depends on there being a general hierarchy of feature classes). Still, to ensure maximal generality of the main claim of the present study, the conclusion suggests itself that any actual implementation of something like (5-b) in an analysis should be compatible with free, unrestricted addition of morpho-syntactic features to feature sets associated with stems in pre-syntactic morphology.

5. Predictions

While the pre-syntactic and the post-syntactic variants of impoverishment are formally complete mirror images of one another, there is one context where they make radically different predictions. In the post-syntactic approach, all morpho-syntactic features that are part of the local domain that is postulated for morphological operations (e.g., the morphological phase; see Marvin (2002), Embick (2010), Bermúdez-Otero (2011)) can in principle be subject to impoverishment. In contrast, by its very nature, the pre-syntactic approach is more restrictive since it predicts that there is a class of features that can never be subject to impoverishment; this holds for all features that are inherent to a stem, i.e., that show up on a stem as an invariable lexical property of that stem. Inherent features are not added in the course of generating complete well-formed sets of morpho-syntactic features since they are already present in the set when such a generation procedure starts; and clearly, features that are not added cannot be added late (i.e., after morphological exponence). Thus, according to the pre-syntactic approach to impoverishment, only non-inherent features (i.e., features that are added to the complete well-formed set of morpho-syntactic features associated with a stem) can in principle be subject to impoverishment. In what follows, I will pursue the question whether this prediction is viable, based on considerations of gender features and inflection class features. After that, I address further consequences of the present approach.

5.1. Gender Features

A straightforward prediction of the pre-syntactic approach based on premature exponence is that gender features cannot be impoverished if they are an inherent property of stems, as is the case for nouns in many languages – but not, say, for verbs or adjectives that agree with nominal categories. In line with this, it is interesting to note that many plausible proposals for impoverishment of non-inherent gender features on categories that agree with nominal categories can be found in the literature, whereas it seems fair to conclude that impoverishment of inherent gender on nouns has rarely (if ever) been pursued: This scenario is exactly what is predicted by the present approach in terms of pre-syntactic impoverishment, but it must be viewed as coincidental under a post-syntactic approach.

5.1.1. Gender in the Arabic Prefix Conjugation

To begin with, consider Noyer's (1997) analysis of gender impoverishment in first person environments in the Arabic prefix conjugation. As shown in (7), there are no gender distinctions in the first person (also see Frampton (2002) for Kabyle Berber).

(7) *V exponents in Arabic, imperfect* ('write')

	SG	PL
1masc	ʔ-aktub-u	n-aktub-u
1fem	ʔ-aktub-u	n-aktub-u
2masc	t-aktub-u	t-aktub-na
2fem	t-aktub-iina	t-aktub-na
3masc	y-aktub-u	y-aktub-uuna
3fem	t-aktub-u	y-aktub-uuna

(8) $[\pm\text{fem}] \rightarrow \emptyset/[+1,-2]\_\_$

Noyer (1997) proposes to account for this systematic neutralization effect by postulating an impoverishment operation that renders gender information unavailable in first person environments, as in (8) (where [+fem] stands for feminine, [–fem] stands for masculine, and person features are interpreted as above).[11]

[11] This is actually a gross simplification since impoverishment is not triggered by individual rules in Noyer's approach; rather, it is the result of a feature-cooccurrence restriction (see Gazdar et al. (1985)) taking the form **[1 feminine]*, where the question of which of the two features is deleted is determined by a universal hierarchy of features (see above) that will prefer deletion of the lower-ranked gender feature [feminine] to deletion of the higher-ranked person feature [1]. However, this difference is not relevant for the issue currently under consideration.

Transferring (8) to a pre-syntactic approach does not pose any problems. It can be assumed that [±fem] is added to the complete well-formed set of morpho-syntactic features associated with the V stem only after morphological exponence has taken place; the reason is that the gender feature [±fem] is not an inherent feature on a V stem.

5.1.2. *Gender in the Amharic Prefix Conjugation*

In the same way, Trommer (2008b) suggests impoverishment of gender on verbs in another Afro-Asiatic language, Amharic, which exhibits a similar pattern to (7); cf. (9). In contrast to Noyer, Trommer is concerned with the gender neutralization effect in the plural, not so much with the gender neutralization effect in first person environments. Consequently, an impoverishment rule is postulated that deletes [±fem] in the presence of [+pl], as in (10).

(9) *V exponents in Amharic, imperfect* ('break')

	SG	PL
1masc	ə-säbər	ənnə-säbər
1fem	ə-säbər	ənnə-säbər
2fem	tə-säbr-i	tə-säbr-u
2masc	tə-säbər	tə-säbr-u
3fem	tə-säbər	yə-säbr-u
3masc	yə-säbər	yə-säbr-u

(10) [±fem] → Ø/[+pl]__

As in the case of gender on V in Arabic, gender on V in Amharic is not inherent, so transferring this analysis to a pre-syntactic approach is straightforward.

5.1.3. *Gender in Norwegian Adjective Inflection*

The same conclusion holds for Sauerland's (1996) proposal that there is impoverishment of gender on adjectives in Norwegian. As illustrated in (11), in weak DP-internal environments, a prenominal adjective cannot realize the gender feature [±neut(er)] that gives rise to different exponents in the singular in strong DP-internal environments. Given the exponent specifications in (12) and the impoverishment rule in (13) deleting the gender feature [±neut] in the presence of the feature [+weak], this is accounted for.

(11) *A exponents in Norwegian*

STRONG	[–neut]	[+neut]
[–pl]	/Ø/	/t/
[+pl]	/e/	/e/

WEAK	[–neut]	[+neut]
[–pl]	/e/	/e/
[+pl]	/e/	/e/

(12) *Morphological exponents*

a. /t/ ↔ [–pl,+neut]
b. /Ø/ ↔ [–pl,–neut]
c. /e/ ↔ [ ]

(13) [±neut] → Ø/[+weak]__

Again, transferring this analysis to a pre-syntactic account is unproblematic: [±neut] is not inherent on adjectives in Norwegian; so [±neut] is added late (i.e., after morphological realization) if [+weak] is instantiated on a category A in Norwegian.

5.1.4. *Gender in Late Sanskrit Adjective Inflection*

Similarly, Stump (2006) suggests an operation that basically amounts to impoverishment (viz., neutralization via paradigm linkage) for adjectives in Late Sanskrit. The relevant observation is that an adjective like *vīra* ('brave') can have different masculine and neuter forms in the nominative but not in oblique cases like the genitive; see (14). This can be derived by an impoverishment operation as in (15), where the gender feature [±masc] distinguishing masculine and neuter is impoverished in genitive – or, more generally, oblique – singular contexts.[12] Gender on A is not inherent, so a transfer to pre-syntactic impoverishment is unproblematic.

(14) *A exponents in Late Sanskrit*

	MASC	NEUT
nom.sg	vīras	vīram
gen.sg	vīrasya	vīrasya

(15) $[\pm\text{masc}] \rightarrow \text{Ø}/[+\text{obl}]\_\_$

5.1.5. *Gender in Russian and German Pronoun Inflection*

Next, Bobaljik (2002b) proposes impoverishment of gender in the plural of Russian pronouns (here analyzed as belonging to category D); cf. the partial paradigm in (16) and the impoverishment rule in (17). However, the whole point of the analysis is that the pronominal stem *on* itself is *not* inherently marked for gender; this accounts for the stem syncretism across different genders. Gender information ([±masc,±fem]) is added to the nominative stem, which then leads to different inflectional exponents.

(16) *D exponents in Russian, nominative*

	SG	PL
MASC	on-Ø	on-i
FEM	on-a	on-i
NEUT	on-o	on-i

(17) $[\pm\text{masc},\pm\text{fem}] \rightarrow \text{Ø}/[+\text{pl}]\_\_$

In the same way, Fischer's (2006) fine-grained analysis of personal pronouns in German (which accounts for virtually all partial syncretisms, down to the level of segments) envisages a number of impoverishment rules affecting gender features. But again, the basic premise here is that gender is not inherent on these D items but added to the invariant basic stem (which, in contrast to its Russian counterpart, is viewed as fully abstract in this analysis).

5.1.6. *Inherent Gender on Nouns*

The decisive case involves gender features on N (at least, in languages where gender is an inherent feature of nouns). Here the pre-syntactic approach predicts that this grammatical category cannot undergo impoverishment; so the question arises of whether there is good

[12] The implementation via the explicit impoverishment rule in (15) faithfully reproduces the analysis in Stump (2006, 287) in terms of paradigm linkage; like the original, it presupposes that feminine adjectives are outside of this system, in that they are declined according to the feminine *a*-declension. This is an inflection class, but it is not subject to impoverishment (see below on inflection class impoverishment).

evidence for such an operation. As a matter of fact, some languages would seem to potentially provide prima facie evidence for impoverishment. For instance, it is standardly held that gender can never be marked in the plural in German nouns, where the different number (and, to some extent, case) exponents are often assumed to solely realize inflection class in addition to number/case (in contrast to the singular); and it does not seem to be possible to claim that gender information is *in general* (i.e., outside of morphological realization) unavailable with nouns in the plural.[13] That said, there seems to be little evidence for postulating gender impoverishment in the plural (and I am not in fact aware of any such proposal); it simply seems that inflection class rather than gender is the main determinant for exponent choice here. Furthermore, it has often been noted that there are correlations between exponent choice in the plural and gender with nouns in German (see, e.g., Eisenberg (2000)), and several analyses have been advanced that directly use gender information for determining plural exponents (see, e.g., Wunderlich (1999) and Wiese (2000)).

A similar picture arises in Russian. Whereas Corbett & Fraser (1993) have shown that it is impossible to account for the system of Russian noun inflection without abstract inflection class features, this does not imply that gender features are irrelevant for morphological realization, and closer inspection reveals that they can be, and often are, regularly employed in comprehensive analyses in addition to bare inflection class features, for both singular and plural contexts (see, e.g., Halle (1994), Wiese (2004), and Privizentseva (2021), but in fact also already Corbett & Fraser (1993)). Again, there does not seem to be good evidence for impoverishment of gender features.

5.2. *Inflection Class Features*

Inflection class features are intrinsic properties of stems; they qualify as purely morphomic features which differ from morpho-syntactically active features like gender in that they can never be accessed by syntactic operations. Given the present approach to pre-syntactic impoverishment in terms of late addition of morpho-syntactic features to stems, it is therefore predicted that inflection class features, like gender features, can never be subject to impoverishment. In line with this, it turns out that there are very few analyses employing inflection class impoverishment – as a matter of fact, I am only aware of two such proposals (viz., Trommer's (2008b) analysis of Amharic verbs, and Fenger & Harðarson's (2020) analysis of linking morphemes in Dutch and German), to which I will turn below.

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[13] Note, e.g., that in case agreement constructions like (i-ab), a singular head *ein-* of the appositive phrase *ein-nach d- ander-* ('one after the other') must derive its gender (and accusative case) feature from the head noun of the object that it agrees with, even though the latter is in the plural (masculine in (i-a), feminine in (i-b)); cf. Fanselow (1991):

(i) a. Kirke hat die Gefährten [$_{\text{XP}}$ einen [$_{\text{PP}}$ nach dem anderen]] in Schweine verwandelt
Circe has the $\text{fellows}_{\text{masc.acc}}$ $\text{one}_{\text{masc.acc}}$ after $\text{the}_{\text{masc.dat}}$ $\text{other}_{\text{masc.dat}}$ into pigs turned

b. Odysseus hat die Sirenen [$_{\text{XP}}$ eine [$_{\text{PP}}$ nach der anderen]] angehört
Ulysses has the $\text{sirens}_{\text{fem.acc}}$ $\text{one}_{\text{fem.acc}}$ after $\text{the}_{\text{fem.dat}}$ $\text{other}_{\text{fem.dat}}$ listened to

5.2.1. *Inflection Class Features in Russian Noun Declension*

First, however, it is worth noting that there is empirical evidence that does not make impoverishment of inflection class features look like an idea that would be a priori futile or misguided. As a case in point, consider in more detail the distribution of exponents in Russian noun inflection in the plural; see (18).

(18) *N exponents in Russian, plural*:

	I $zavod_m$ ('factory')	II $komnat_f$ ('room')	III $tetrad'_f$ ('notebook')	IV $mest_n$ ('place')
nom.pl	zavod-y	komnat-y	tetrad-i	mest-a
acc.pl	zavod-y	komnat-y	tetrad-i	mest-a
dat.pl	zavod-am	komnat-am	tetrad-j-am	mest-am
gen.pl	zavod-ov	komnat-Ø	tetrad-ej	mest-Ø
inst.pl	zavod-ami	komnat-ami	tetrad-j-ami	mest-ami
loc.pl	zavod-ax	komnat-ax	tetrad-j-ax	mest-ax

It is clear that the distribution of exponents in (18) (and in the full paradigm that also includes singular environments) cannot (solely) be accounted for by invoking gender features (among other things, feminine noun stems in genitive plural contexts can be inflected either with /Ø/ – if they belong to inflection class II – or with */ej/* – if they belong to inflection class III). Furthermore, (18) provides evidence for decomposing inflection class features like "I", "II" etc. into cross-classifications of more primitive binary inflection class features such as [$\pm\alpha$], [$\pm\beta$], such that the instances of syncretism holding across inflection classes in the genitive plural can be captured; cf. Müller (2004), where classes II and IV share the primitive feature [+β] (whereas they differ with respect to [$\pm\alpha$]) that in turn characterizes the genitive plural exponent /Ø/, and classes I and III share the feature [–β] (and also differ with respect to [$\pm\alpha$]), which is realized by the genitive plural exponent */ov/* (as argued by Halle (1994), */ov/* as an underlying exponent can also be realized as *ej* under certain conditions); also cf. Privizentseva (2021). Against this background, an intriguing property of the system in (18) is that inflection class becomes entirely irrelevant in dative plural, instrumental plural, and locative plural environments in Russian noun inflection, where */am/*, */ami/*, and */ax/* occur as the sole available exponents, respectively. In principle, these selective breakdowns of inflection class relevance could be modelled via inflection class feature impoverishment in dative plural, instrumental plural, and locative plural (perhaps, more generally, oblique plural) contexts, as in (19).[14]

(19) [$\pm\alpha$], [$\pm\beta$] $\rightarrow$ Ø/[+obl]__

However, to the best of my knowledge, impoverishment of inflection class features as in (19)

[14] Here, for concreteness, [$\pm\alpha$], [$\pm\beta$] are two binary inflection class features yielding the four main declension patterns in Russian, and [+obl] is assumed to capture the three cases in question. The exact nature of these features is irrelevant in the present context.

has not been proposed for these cases, even though there are several approaches to Russian noun inflection that do embrace impoverishment (or a closely related concept) for other domains (i.e., other features) of the system (see Halle (1994), Corbett & Fraser (1993), Stump (2001), Müller (2004), Wunderlich (2004), Halle & Matushansky (2006), and Privizentseva (2021), among others). And there is a good reason for this: As noted at the outset, a major motivation for postulating impoverishment is to capture systematic patterns of syncretism; however, if there is only one item to begin with (as with /am/, /ami/, /ax/ in the relevant contexts), this does not constitute a pattern, and there is no reason whatsoever to add an impoverishment rule to the analysis. The same conclusion can be drawn when we consider the second motivation for impoverishment mentioned above, viz., that of blocking otherwise optimal exponents and thereby permitting simpler analyses of inflectional paradigms: In the cases at hand, there is no alternative dative (instrumental, locative) exponent to begin with that might need blocking. In sum, inflection class impoverishment as in (19) would be conceptually as well as empirically vacuous; and it may make sense to postulate more generally that such vacuous impoverishment is never available for the language learner.

5.2.2. Inflection Class Features and Heteroclisis

Another area where inflection class impoverishment might possibly be invoked concerns heteroclisis, i.e., scenarios where the full inflectional paradigm for a stem involves exponents from two (or more) inflection classes. A relevant case has already briefly been mentioned: Preterite-present verbs in German belong to the [+strong] inflection class in present tense environments, and to the [–strong] inflection class in past tense environments. Furthermore, whereas the exponents of *past tense* environments (cf. (20-a)) are the expected [–strong] *past tense* items (cf. (20-c), repeated from (1-a)), the exponents in the *present tense* (cf., again, (20-a)) are actually those of *past tense* contexts with regular [+strong] verbs (cf. (20-b), repeated from (1-b)), with zero exponence in first and third person singular; the additional use of past forms for present tense environments makes this instance of heteroclisis an instance of (generalized) deponency in addition (cf. the contributions in Baerman et al. (2007), and Müller (2013), Grestenberger (2017) for more recent overviews).

(20) *Preterite-present inflection, German*

a. *Pret.-pres.*: *können* ('can')

	Present	Past
[1,sg]	kann-Ø	konn-te
[2,sg]	kann-st	konn-te-st
[3,sg]	kann-Ø	konn-te
[1,pl]	könn-en	konn-te-n
[2,pl]	könn-t	konn-te-t
[3,pl]	könn-en	konn-te-n

b. *Strong*: *rufen* ('call')

	Past
[1,sg]	rief-Ø
[2,sg]	rief-st
[3,sg]	rief-Ø
[1,pl]	rief-en
[2,pl]	rief-t
[3,pl]	rief-en

c. *Weak*: *glauben* ('believe')

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

However, even though it might initially seem tempting to try to derive one of the two inflectional patterns in the heteroclisis system in (20-a) (presumably the present tense forms) by impoverishment of inflection class features, this will not work: It is not the case that, based on one given set of exponents generated via proper inflection class information, the remaining set set of exponents will result from there being *no* (or even *reduced*) inflection class information; rather, it will result from there being *different* inflection class information. Furthermore, as noted by Stump (2006) in his discussion of the fully parallel case of preterite-present verbs in Old English, such an approach would still leave unresolved the deponency issue that also characterizes preterite-present verbs. Other cases of heteroclisis subjected to scrutiny in Stump (2006) may not give rise to the latter kind of complication, but they all exhibit the former property: Heteroclisis generally seems to imply the change from one inflection class to another one, rather than a change to inflection class-neutral elsewhere exponents, and this fact may plausibly be taken to underlie the absence of impoverishment approaches to heteroclisis in the literature.

5.2.3. Inflection Class Features in Amharic Stem Alternations

Next, let me turn to the first explicit proposal of inflection class impoverishment mentioned above, viz., Trommer's (2008b) analysis of Amharic verbs. As in other Semitic languages, verbs in Amharic are organized according to a *binyan* system, where the initial roots consist only of sequences of consonants (radicals) that are subjected to various systematic modifications, vowel insertions, and affixations, to yield individual binyanim that encode properties like Aktionsart, genus verbi, causativity, reflexivity, reciprocity, etc. For roots with three radicals, there are three basic binyanim in the language; these can be referred to as type A, type B, and type C. As illustrated in (21), there are systematic consonant gemination effects for the medial consonant with the three verb classes (given here without inflectional exponents): With type A verbs, there is gemination in the perfect but not in the imperfect or the participle; with type B, there is gemination in all these three environments; and with type C, gemination affects the perfect and the imperfect but not the participle.

(21) *Basic verb classes for triradicals, Amharic*:

	Type A	Type B	Type C
Perfect	sä bb är ('break')	fä ll äg ('seek')	ma rr äk ('take prisoner')
Imperfect	sä b ər	fä ll əg	ma rr ək
Participle	sä b ar	fä ll ag	ma r ak

The occurrence or lack of gemination in a given environment with one of these verb classes (i.e., whether the underlying C-C-C pattern is changed to a C-CC-C pattern or not) can be viewed as an abstract form of syncretism that is inflection-class specific. To account for the distribution of these kinds of syncretisms in (21), Trommer (2008b) proposes to decompose inflection class features for the verb classes, and to organize the decomposed features •, **all**, and **1** in a feature geometry, as in (22).[15]

(22) a. Type C: •

b. Type B: • → **all**

[15] As with other inflection class (more generally, morphomic) features, whether decomposed or not, the labelling of the features is arbitrary, here guided primarily by mnemonic considerations.

c. Type A: $\bullet \rightarrow \mathbf{all} \rightarrow \mathbf{1}$

Due to the feature-geometric organization, $\bullet$ is assumed to dominate **all** and **1**, and **all** dominates **1**. The relevant empirical observation now is that if the three basic binyanim are subjected to prefixation by *as*, causative binyanim result that maintain the gemination patterns in (21) for type B and type C. However, with type A, gemination of the second consonant now occurs throughout, as with type B; see (23) (cf. Leslau (1995, 485)).

(23) *Causative binyanim for triradicals, Amharic*:

	Type A	Type B	Type C
Perfect	as-näggär ('tell')	as-fälläg ('seek')	as-marräk ('take prisoner')
Imperfect	as-näggər	as-fälləg	as-marrək
Participle	as-näggar	as-fällag	as-marak

To account for this apparent neutralization effect, an impoverishment rule is postulated that deletes $\rightarrow \mathbf{1}$ in all environments where causative *as* is prefixed. Since type A verbs are the only ones that bear this inflection class subfeature, the effect of this instance of inflection class impoverishment is that type A and type B verbs cannot be distinguished anymore in this context; and given that the inflection class information $\bullet \rightarrow \mathbf{all}$ leads to gemination in the Perfect, the Imperfect, and the Participle, whereas bare $\bullet$ does not effect gemination in the Participle, the data in (23) are accounted for.

Clearly, such inflection class feature impoverishment is not available in the pre-syntactic approach outlined above. From this perspective, two questions arise: First, is the inflection class impoverishment analysis intrinsically justified? And second, would an alternative be available that does without impoverishment of inflection class features? As a first step towards addressing the former question, let us look at the actual specifications of the inflectional exponents (i.e., vocabulary items) that Trommer (2008b) postulates to account for the occurrence or absence of gemination in (21), focussing on the evidence that these basic exponents may provide for inflection class feature decomposition: After all, as argued in Halle (1992), Oltra Massuet (1999), Müller (2004), Alexiadou & Müller (2008), and elsewhere, such a decomposition is primarily motivated by instances of trans-paradigmatic syncretism suggesting that exponents can be characterized by underspecified inflection class information, thus referring to natural classes of inflection classes rather than only to single inflection classes (as with fully specified inflection class information), or to no inflection class at all (if such features are fully absent in exponent specifications). The (abstract) exponents that are assumed to bring about gemination or no gemination of the second radical are given in (24).

(24)
a. $C \leftrightarrow [\rightarrow \mathbf{all} \rightarrow \mathbf{1}]$ /__Imperfect
b. $CC \leftrightarrow [\rightarrow \mathbf{all}]$
c. $CC \leftrightarrow [\ \ ]$__Perfect$\vee$Imperfect
d. $C \leftrightarrow [\ \ ]$

(25) $[\rightarrow \mathbf{all} \rightarrow \mathbf{1}] \rightarrow \varnothing$/__$[\neg$Imperfect$]$

By assumption, morphological exponence obeys compatibility and specificity requirements. For type B verbs (with the inflection class information $\bullet \rightarrow$ **all**), (24-a) is not compatible (because of the [$\rightarrow$ **1**] subfeature). (24-b) and (24-d) are both compatible in all three environments (Perfect, Imperfect, Participle), and (24-c) is compatible in two environments (Perfect and Imperfect), but (24-b) is most specific and thus inserted everywhere, producing gemination throughout the paradigm; cf. (21). Next, for type C verbs (with radically underspecified inflection class information), (24-a) and (24-b) are always blocked due to incompatibility. Therefore, (24-c) is selected in Perfect and Imperfect environments (because it counts as more specific than (24-d)), whereas radically underspecified (24-d) is chosen in Participle contexts, where (24-c) violates compatibility; this correctly derives the type C pattern in (21). Finally, for type A verbs (with the most specific inflection class information $\bullet \rightarrow$ **all** $\rightarrow$ **1**), (24-a) is compatible in Imperfect environments, and it is selected here because it qualifies as more specific than (24-b) (or (24-c), (24-d), for that matter). However, in Participle environments, a problem arises: (24-b) should be compatible, and should thus block less specific (24-d), giving rise to gemination, as with type B verbs. To block this unwanted outcome, an additional impoverishment rule is stipulated; see (25). This rule ensures that inflection class information is deleted with type B verbs in Perfect and Participle environments, thereby triggering a retreat to (24-d) with Participles. Similarly, the CC of (24-c) will now have to be responsible for the gemination in Perfect contexts (rather than the CC of (24-b), which would have been selected if not for the interfering class feature impoverishment rule (25)).[16]

More generally, the conclusion can be drawn that the basic system predicting the forms in (21) suffers from three shortcomings. First, syncretism is not maximally derived as systematic. There are two forms of the medial radical in (21) (with and without gemination), but the analysis requires four distinct vocabulary items plus an impoverishment rule to account for the distribution. The CC radical in type B verbs and the CC radical in type A and type C verbs emerge as different exponents, and the same goes for the C in Participle environments in type A and type C verbs and the C in the Imperfect of type A verbs. Second, the impoverishment operation in (25) as such is not directly motivated by the empirical evidence; essentially it has no other purpose than to repair an analysis that makes a wrong prediction. And third (and most importantly), there is no evidence whatsoever in this analysis for inflection class feature decomposition. This is obvious for the exponents in (24-c) and (24-d), which are not equipped with inflection class information. It also holds for the exponent in (24-a) (and the impoverishment rule in (25); cf. the previous footnote), where

[16] The original version of Trommer's (2008b) impoverishment rule in (25), while no less of an artefact of the theory, is formulated in a slightly simpler way since it dispenses with explicitly stating the non-Imperfect context by deriving it from postulating that impoverishment operations can be interspersed with proper vocabulary insertion operations, with the order determined by specificity. This is a natural conclusion in Trommer's (2008b) approach, where impoverishment is viewed as a special type of zero exponent insertion (which discharges morpho-syntactic features and thereby makes them unavailable for subsequent operations). In the case at hand, (25) (without the contextual information) emerges as less specific than (24-a) and more specific than (24-bcd).

complete inflection class information is provided. The only case where this might not be immediately clear is (24-b). Here, the exponent CC is characterized by the specification [→ **all**], which captures a natural class of inflection classes, viz., A and B to the exclusion of C. However, as we have seen, it is exactly here that the system makes a wrong prediction that must be fixed by the impoverishment rule in (25), and that ensures that, in effect, type A verbs do *not* employ this exponent. Thus, given the remainder of the analysis, the empirical evidence actually suggests that A and B *cannot* be referred to as a natural class via inflection class feature decomposition. From this perspective, then, there is no evidence for either the inflection class feature decomposition or the feature-geometric organization in (22), beyond its role in deriving the pattern in (23) with *as*-prefixation via impoverishment of → **1**. This, in turn, suggests that the case of inflection class impoverishment in Amharic verbs might not be as strong as one might initially have thought, and that there is every reason to pursue an alternative approach that does without class feature impoverishment.[17]

The first thing to note is that the distribution of exponents (or, more properly, exponent types) in (21) is strongly reminiscent of the *ABA pattern established, and derived (by invoking standard compatibility and specificity requirements, and asymmetric feature matrices for different types of syntactic categories), by Bobaljik (2012) for comparative and superlative formation in the world's languages, and, in particular, by Wiese (2008) for Ablaut patterns with roots of strong verbs in German. Wiese shows that in German there are verbs that instantiate an AAC pattern, as in (26-a); verbs with an AAA pattern, as in (26-b); verbs with an ABB pattern, as in (26-c); there are also verbs with an ABC pattern, as in (26-d); but there are no verbs with an ABA pattern. The *ABA generalization follows given that the first form (infinitive) is specified as the unmarked verb ([ ]), the second one (past participle) as a pure past category ([past]), and the third one (finite past) as a [past,fin] category. Thus, a [past,fin] category cannot share the form with a [ ] category if the [past] category has a different form (i.e., the ABA pattern cannot be generated): This latter form will always also be compatible with the [past,fin] category, and will be more specific than the [ ] category, yielding an ABB pattern.

(26) *Ablaut patterns, German*:
- a. AAC: geben ('give') – gegeben ('given') – gab ('gave')
- b. AAA: arbeiten ('work') – gearbeitet ('worked') – arbeitete ('worked')
- c. ABB: schreiben ('write') – geschrieben ('written') – schrieb ('wrote')
- d. ABC: werfen ('throw') – geworfen ('thrown') – warf ('threw')

An analogous account can be given for the forms in (21), based on the assumption that the

[17] It should be noted that while the system just described arguably forms the core part of Trommer's (2008b) analysis of Amharic verb classes, there are also various extensions which I have remained silent about, concerning, i.a., an additional alternation of pre-medial vowels, verb classes with four (instead of three) radicals, and other apparent neutralizations with different binyanim (like, e.g., the passive binyan derived by *tä*-prefixation). These extensions do not call into question the overall conclusions just arrived at.

Participle represents the unmarked verbal form ([ ]), the Imperfect is specified as finite ([fin]), and the Perfect as finite past ([fin,past]). See (27), where α, β and γ are (fully specified, privative) inflection class features for the three verb types, and (27-ab) give rise to an AAC pattern, (27-ac) to an AAA pattern, and (27-ad) to an ABB pattern. Like Trommer's system, (27) does not maximally resolve (abstract) syncretism (i.e., gemination vs. non-gemination), but it does not have to rely on additional assumptions (like impoverishment in (25)), and it predicts that there can be no verb class instantiating an ABA pattern.

(27) a. C $\leftrightarrow$ [ ]
b. CC $\leftrightarrow$ [α,fin,past]
c. CC $\leftrightarrow$ [β]
d. CC $\leftrightarrow$ [γ,fin]

Next, the question arises of how the consequence of *as*-prefixation (see (23)) can be implemented. At this point, it is worth pointing out that binyanim in general have properties of both derivational and inflectional morphology (cf. Aronoff (1994)). In Trommer (2008b), the latter aspect is focussed, with the role of *as* being reduced to providing contextual information for an impoverishment rule. In contrast, it seems to me worthwile to strengthen the derivational perspective, according to which *as* is a proper verbal item that combines with a root to yield a new type of verb, and that can have various effects on the shape of the root (cf. Kastner (2019)). On this view, the effect that the causative prefix *as* has on type A verbs in Amharic is fully analogous to the effect that the secondary imperfective suffix *yv* has on, say, class VI verbs in Russian: Just as *yv* is inherently associated with class I in Russian and turns a class VI verb like *perepisat'* ('transcribe', perfective) into a class I verb like *perepisyvat'* ('transcribe', imperfective) (cf., e.g., Isačenko (1975)), I would like to suggest that *as* is inherently associated with inflection class β in Amharic, and turns a class α verb into a class β verb. Of course, from this point of view, the question arises as to why this effect does not occur with type C verbs; a natural conclusion here might be that in such scenarios, the main question is which of the two possible sources for an inflection class feature is dominant, and it may simply be the case that type C verbs are strong enough to prevail where type A verbs are not. Of course, eventually much more would have to be said about these variations on root patterns in Amharic, but for present purposes the conclusion may legitimately be drawn that a reasonably simple and principled alternative to inflection class impoverishment seems to be well within reach for the Amharic data.

5.2.4. Inflection Class Features in German Noun Inflection

Linker exponents in German compounds are always homonymous with inflectional exponents of the German noun declension system; see (28-a), where */er/* and */n/* are linker exponents in compounds and plural exponents in nominative environments, and (28-b), where */s/* shows up as a linker exponent in a compound and a genitive exponent in singular environments (in the first example).

(28) a. [Kind-er]-garten ⇔ Kind-er [Sonne-n]-schein ⇔ Sonne-n
child-LNK-garden child-PL.NOM sun-LNK-shine sun-PL.NOM

b. [Zweifel-s]-fall ⇔ Zweifel-s [Bedeutung-s]-lehre ⇔ Bedeutung-Ø
doubt-LNK-case doubt-GEN.SG meaning-LNK-science meaning-GEN.SG

Given this observation, Fenger & Harðarson (2020) (based on an earlier proposal by Mareike de Belder for Dutch) suggest treating this as an instance of syncretism involving a single, unique exponent specification. They propose that there are no plural exponents for nouns in German (note, e.g., that the second compound in (28-a) does not signal the presence of multiple suns); rather, */er/* and */n/* in (28-a) are viewed as pure inflection class exponents, and this is why they occur both as linkers in compounds and inflectional exponents in noun declension environments. More specifically, a feature-geometric approach to inflection class features is adopted that is similar to the one postulated by Trommer (2008b) for Amharic. According to this approach, exponents that are standardly viewed as plural exponents are solely associated with inflection class information, as follows: */er/* is specified as $[\alpha \rightarrow \beta \rightarrow \gamma \rightarrow \delta]$, */ə/* as $[\alpha \rightarrow \beta \rightarrow \gamma]$, */n/* as $[\alpha \rightarrow \beta]$, and */Ø/* as $[\alpha]$. By assumption, these inflection class features are inherently present on N stems, and given that they are copied onto two functional heads *n* and Num that are associated with N via head movement, they govern morphological realization in two inflectional slots of the noun. If nothing else is said, this would wrongly predict that two regular "plural" (i.e., inflection class) exponents show up with every noun, also in singular contexts. It is at this point that inflection class impoverishment enters the picture (in addition to assumptions about morphological haplology): The inflection class features are subject to various impoverishment operations; and given that inflection class features are intrinsically present on N stems, this leads to an incompatibility with the pre-syntactic approach to impoverishment outlined above.[18]

Thus, for an N like *Kind* ('child'), which is associated with the inflection class features $[\alpha \rightarrow \beta \rightarrow \gamma \rightarrow \delta]$, the genitive singular environment in (29-a) (here assumed to be captured by [+sg,+obl,–gov]) does not lead to a post-syntactic realization as in (29-c) but to the realization in (29-d) because of the impoverishment rule in (29-b), which de-links the feature $[\rightarrow \delta]$ from $[\alpha \rightarrow \beta \rightarrow \gamma \rightarrow \delta]$ and thereby effects a retreat to minimally less inflection class-specific */ə/*.

(29) a. $[_{\text{Num}}\ [_{n}\ [_{\text{N}}\ \text{Kind}\ ]\ n_{[\alpha\rightarrow\beta\rightarrow\gamma\rightarrow\delta]}\ ]\ \text{Num}_{[+\text{sg}],[+\text{obl},-\text{gov}],[\alpha\rightarrow\beta\rightarrow\gamma\rightarrow\delta]}\ ]$

b. $[\rightarrow\delta] \rightarrow$ Ø/__[+sg,+obl,–gov]

c. *Kind-(er-)er, *Kind-er-s

d. Kind-ə-s

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[18] As a matter of fact, Fenger & Harðarson (2020) strictly speaking do not postulate that inflection class features are inherent properties of N stems. In their approach, an N root combines with a categorizing morpheme *n*, and it is this latter item that is supposed to bear the class feature(s) (and act as the source for copying to Num). However, since it is clear that it is eventually the root N that determines inflection class, Fenger and Harðarson assume that "the root selects for a *n* of a particular class" – and it goes without saying that to select a certain kind of inflection class means to be equipped with the relevant inflection class information. Hence, there is no denying that inflection class information must ultimately be assumed to be present on the root N in this approach.

This approach is certainly highly innovative and therefore interesting, and it arguably qualifies as the first serious attempt to systematically resolve the homonymies between linker exponents in compounds and plural markers in German as instances of syncretism, by invoking morphomic features that can then be assumed to show up in both contexts. However, there are various problems which, in my view, seriously call into question its viability.

First, some aspects of the concrete implementation of the general idea give rise to unwarranted predictions. For instance, against the background of the feature-geometric organization of the inflection class features, the required impoverishment rules will often select another (less specific) "plural" (i.e., inflection class) marker in singular contexts, rather than no marker at all, as would seem to be suggested by the empirical evidence. It simply does not seem correct to view the ə in *Kind-əs* as a separate morphological exponent: It is often optional in this environment, and blocked where prosodic factors (e.g., a disyllabic or vowel-final stem) exclude it (cf. the genitive singular forms **Vater-əs* vs. *Vater-s* ('father'), **Skiəs* vs. *Ski-s* ('ski') – note that the latter stem also takes /*er*/ in the plural, like *Kind*: *Ski-er*). Similarly, the genitive singular form *Herz-en-s* ('heart') is presented as an argument for a "plural" marker showing up in the *n* slot, but, as noted by Wiese (2000), *Herz* is a unique exception among German nouns, combining adjectival and noun inflection in an idiosyncratic way. Furthermore, it seems clear that a system of inflection class features that predicts four inflection clases for German noun inflection does not suffice, once the interaction with exponents in the singular and the distribution of umlaut are taken into account – e.g., based on Wiese (2000), eight core inflection classes are motivated in Alexiadou & Müller (2008) (ignoring /*s*/ plurals), and derived by a cross-classification of three binary inflection class features. However, all these kinds of problems do not in and of themselves threaten to undermine the general approach: One can straightforwardly think of a version of it that envisages a more appropriate system of inflection classes, that dispenses with a regular *n* slot between the N stem and the ending, and that systematically assumes impoverishment-induced neutralization to zero exponence in the singular.

A second, more pressing problem is conceptual in nature and involves the fundamental role of impoverishment in this approach. Fenger & Harðarson (2020) only list the rule in (29-d) in their analysis of German, but it is clear that many other impoverishment rules will have to be stipulated to derive singular forms of nouns. Even for nouns like *Kind* taking /*er*/ in plural contexts, there will have to be an additional impoverishment rule, next to (29-b), which deletes [$\beta \rightarrow \gamma \rightarrow \delta$] in nominative singular contexts (cf. nominative singular **Kind-ə* vs. *Kind-Ø*). And of course, for each inflection class, singular forms without plural exponents will have to be derived via inflection class feature impoverishment rules of various kinds. In addition, impoverishment is needed to account for variation with linker exponents, so as to accomodate the original evidence for the analysis. All this means that a substantial amount of exponence is not in fact handled by the morphological exponents as such, but by impoverishment rules that regulate their presence. This is at variance with the standard motivations for postulating impoverishment operations (viz., capturing systematic patterns and simplifying morphological analysis).

Third, it is clear why impoverishment rules have to apply in singular environments, to account for the available evidence: If plural exponents are reanalyzed as inflection class exponents, then the absence of plural exponents in the singular requires impoverishment. However, nothing in the analysis has anything insightful to say about why it could not be the other way around. Since inflection class exponents, by assumption, have nothing to do with number, why isn't there inflection class feature impoverishment in the plural rather than in the singular? Why do impoverishment operations not delete some inflection class features in the plural and others in the singular? The simple answer to these questions that suggests itself is that the apparent inflection class exponents are directly related to plural number after all: Plural exponents are confined to plural environments because they are plural exponents, not because a conspiracy of various impoverishment rules accidentally produces this effect for inflection class exponents.

Finally, recall from (28) that linker exponents in German compounds exhibit not one, but two types of systematic homonymies: with plural exponents (cf. (28-a)) and with genitive exponents (cf. (28-b)). The former scenario is addressed by Fenger & Harðarson's (2020) analysis, but the latter scenario is left entirely unaccounted for; and this seems to be so for a deep reason: If plural exponents are reanalyzed as inflection class exponents, this implies that case exponents cannot also be reanalyzed as inflection class exponents at the same time. In line with this limitation, the analysis in Fenger & Harðarson (2020) envisages regular case exponents in German declension, including an */s/* that is specified as genitive singular. Hence, an extension of the morphomic approach to all cases of systematic linker homonymies seems to be out of reach for principled reasons.[19]

To sum up, as with Trommer's proposal, closer scrutiny suggests that the case for inflection class feature impoverishment in Fenger & Harðarson's analysis is not very strong. More generally, then, it may be concluded that the available evidence confirms the prediction of the pre-syntactic approach that there can be no impoverishment of inflection class features. Taking an even wider perspective, showing that inherent gender features and inflection class features are not subject to impoverishment is of course not yet sufficient to firmly establish the stronger generalization that inherent features cannot undergo impoverishment; for this, several other kinds of features (in particular, semantically based features like animacy) will eventually also have to be considered. However, for present purposes, and in the absence of well-established cases instantiating relevant scenarios that would call the general conclusion into question, it may suffice to leave it at that, and turn to a brief discussion of further

[19] Note incidentally that the evidence from genitive linkers would also make it very difficult to maintain that a faithful reduction of the expected feature specification with any given N stem is involved. The reason is that N stems can show up with a genitive */s/* as a linking exponent even when they cannot normally take a genitive singular */s/* in noun inflection. The canonical evidence for this comes from feminine N stems, which belong to inflection classes that have zero exponence in genitive singular environments, like the second example in (28-b) above: *Bedeutung-s-lehre* ('meaning-LNK-science') ⇔ *Bedeutung-Ø/*-s* ('meaning-GEN.SG'); also cf. *Arbeit-s-zeit* ('work-LNK-time') ⇔ *Arbeit-Ø/*-s* ('work-GEN.SG), *funktion-s-los* ('function-LNK-less') ⇔ *Funktion-Ø/*-s* ('function-GEN.SG'), *Liebe-s-brief* ('love-LNK-letter') ⇔ *Liebe-Ø/*-s* ('love-GEN.SG'), and many more. All of this suggests an approach based on the concept of deponency again.

consequences of pre-syntactic impoverishment.

5.3. *Further Consequences*

5.3.1. *Feature-Changing Impoverishment*

There are proposals according to which post-syntactic impoverishment operations do not necessarily *delete* morpho-syntactic features but may also *change* morpho-syntactic features. Among these is Noyer's (1998) analysis of number-dependent verb root variation in Nimboran, where, in a specific environment (the durative), the dual ([–sg,–pl]) of the root is not in fact realized by the expected dual form (which is the elsewhere form), and also not by the singular ([+sg,–pl]) form, but by the plural ([–sg,+pl]) form. To account for this, Noyer suggests that the feature [–pl] of a syntactic dual durative context is not merely deleted, but replaced by the feature [+pl]; this has the effect that dual and plural become featurally identical in this environment. Other analyses employing feature-changing impoverishment include the post-syntactic change of [+sg] to [–sg] in Kiowa object agreement suggested in Harbour (2003), and the post-syntactic change of [–subj,–obl] (i.e., accusative) to [+subj,+obl] (i.e., genitive) with animate nouns in plural and masculine singular environments suggested in Müller (2004).

This kind of feature-changing post-syntactic operation turns out not to straightforwardly lend itself to a reconstruction in a pre-syntactic approach. Here is why: A given feature [αx] can easily be either changed into Ø or into [–αx] in a post-syntactic approach (where α is a variable over feature values; cf. Chomsky (1965)), but if there is no given feature [αx] to begin with, as presupposed under the pre-syntactic approach, the only option is a change from Ø to [αx]. Now, in principle, this problem could be addressed by assuming that a stem for which feature change is to be postulated can inherently be equipped with a prespecified, inherently present feature [–αx] (although [x] as such is not an inherent feature for the stem), which would then later be *overwritten* by a feature [αx] that is instantiated as part of a complete well-formed set of morpho-syntactic features, but only after morphological exponence has taken place. As a matter of fact, this is essentially the approach to instances of deponency that is sketched in Müller (2020, ch. 6); and in line with this, cases where feature-changing impoverishment has been suggested in the literature can plausibly be viewed as instantiating deponency.

Still, there are further issues. The first thing to note is that in this kind of approach, two separate assumptions need to be made to bring about effects of feature-changing impoverishment: First, some feature [–αx] that is normally not inherent is specified as inherently present on a stem; and second, the "proper" (i.e., syntactically relevant) feature [αx] is added late – i.e, after morphological exponence –, as with standard cases of impoverishment in a pre-syntactic approach, given the proposal in section 4. However, this property does not radically distinguish it from feature-changing impoverishment in a post-syntactic approach: Noyer (1998) and Harbour (2003) also decompose the feature-changing operation into two separate parts: a first part that deletes the original feature via regular impoverishment, and a second part that inserts the feature with the opposite feature value. However, there is another issue that is potentially more worrisome: In the pre-syntactic approach to feature-changing impoverishment, it does not suffice to postulate that the "wrong" [$-\alpha$x] feature is always inherently present. Rather, such an initial presence has to be contextually restricted (e.g., to durative environments in Nimboran) – but the problem then is that this contextual information is not yet present, given incremental generation of complete well-formed set of morpho-syntactic features. Thus, the pre-syntactic approach would seem to require an additional means to implement a look-ahead effect.

Thus, the conclusion that suggests itself is that the empirical evidence in favour of feature-changing impoverishment should be reconsidered, and reanalyzed in a way that dispenses with feature-changing. This is completely in line with the observation that, other things being equal, systems that employ feature-changing impoverishment are less restrictive than those which make do with standard impoverishment via feature deletion. As noted, by Harley & Noyer (2003, 478), "feature-changing impoverishment [...] has approximately the same power as rules of referral," which basically just stipulate instances of syncretism without attempting to derive them from a shared feature specification of exponents (see Stump (2001)).

5.3.2. *Obliteration, or Impoverishment of the Node*

A phenomenon that is pervasive in inflectional paradigms is the selective non-occurrence of morphological exponents in certain contexts where they would a priori be expected to show up. One case that has received a lot of attention since Anderson (1992) is the absence of Agr exponents after /mʊn/ in Potawatomi verb inflection. Two suffixal Agr exponents are in principle available for transitive verbs like /wap(ʊ)t/ ('see', inanimate object), /wap(ʊ)m/ ('see', animate object); for present purposes, these can be called Agr_2 and Agr_3 (Agr_1 is a prefix slot which is not relevant for the present discussion). E.g., in (30-a), Agr_2 is realized by /nan/↔[+1,+pl,acc], and Agr_3 by /(ə)k/↔[–1,–2,+anim,+pl]. However, if Agr_2 is realized by /mʊn/↔[+1,+pl], as in (30-b), Agr_3 cannot be realized at all. The effect is more general: All Agr_3 exponents are barred in the presence of /mʊn/ as an exponent of 1.PL.NOM.

(30) a. n-wap(ʊ)m-ək(O)-[$_{Agr_2}$ nan]-[$_{Agr_3}$ ək]
1-see-INVERS-1.PL.ACC-3.ANIM.PL 'They see us.'

b. n-wap(ʊ)m-a-[$_{Agr_2}$ mʊn]-(*[$_{Agr_3}$ ək])
1-see-DIRECT-1.PL-3.ANIM.PL 'We see them.'

To account for the unavailability of the Agr_3 position in the presence of 1.PL.NOM /mʊn/, Halle & Marantz (1993) argue for a radical version of an impoverishment rule that deletes not just features, but the whole Agr_3 slot; cf. (31).[20]

(31) $Agr_3 \rightarrow$ Ø/governed by [+1],[+pl],[nom]__

[20] This rule must apply non-locally – hence the qualification "governed by" in (31) – in the presence of [+1,+pl,nom] features in Agr_2.; and it must not be fed by another (standard) impoverishment rule that removes [acc] features in preterit environments, and that is responsible for the occurrence of an initially unexpected /mʊn/ there.

Subsequently, this type of whole-category impoverishment has (independently) been made use of by Arregi & Nevins (2012) in their analysis of varieties of Basque, and by Harbour (2003) in his analysis of Kiowa; the former call the operation *obliteration* to distinguish it from regular feature-oriented *impoverishment*; the latter calls it *impoverishment of the node* (as opposed to standard, feature-deleting *impoverishment at the node*). More recent work employing this operation includes Kouneli (2019) on deletion of number heads in Kipsigis DPs.

At present, I take it to be an open question whether the a priori unexpected complete absence of a morphological slot in certain environments (for which exponents would in principle be available) should be viewed as forming a natural class with standard impoverishment operations, or should perhaps be taken to suggest a qualitatively different mechanism at work. However, for the purposes of the present discussion, suppose that the two phenomena are to be treated as, essentially, a single phenomenon. Then, the question arises whether this can be expressed in the pre-syntactic approach to impoverishment. The answer would seem to be affirmative. Given that morphological slots can be captured by sets of features, there is no qualitative difference between a late addition of one feature, of two features, or of a set of features that correspond to a complete morphological slot (however this concept is eventually encoded in a pre-syntactic approach).

Appendix: Pre-Syntactic Impoverishment in Harmonic Serialism

An Approach to Inflectional Morphology in Harmonic Serialism

Harmonic Serialism is a derivational version of Optimality Theory that has been envisaged as an alternative to Standard Parallel Optimality Theory from the very beginning (Prince & Smolensky (2004)), and has actively been pursued over the last decade both for phonology (cf. McCarthy (2010; 2016), among many others) and for syntax (cf., e.g., Heck & Müller (2013; 2016), Assmann et al. (2015), and Murphy (2017); here the model is sometimes referred to as 'extremely local optimization'). In contrast, there has been less work in morphology so far. Relevant studies include Caballero & Inkelas (2013), Inkelas (2016), Gleim et al. (2021a;b), and Müller (2020); in what follows I will focus on the latter.

In Harmonic Serialism, generation (GEN) and harmony evaluation (H-EVAL) alternate constantly: Given an initial input, a finite set of competing output candidates is generated; crucially, these outputs differ from the input by application of *at most one operation*. The optimal output then forms the input for the next generation procedure, and so on; this way the overall constraint profile is gradually improved. Once improvement is not possible anymore (i.e., input and optimal output are identical), the derivation *converges*, and stops.

In Müller (2020), the outlines of a comprehensive harmonic serialist approach to inflectional morphology are developed. This approach qualifies as (a) *realizational* (like Distributed Morphology); (b) *lexical*, i.e., based on inflectional exponents as items existing outside of the words that they show up in (again, like Distributed Morphology), (c) *Merge-based* (unlike Distributed Morphology, which relies on substitution transformations as the operation that brings about inflectional exponence; cf. subsection 3.2. above), and (d) *pre-syntactic* (also unlike Distributed Morphology) – it is, of course, this latter property that will give rise to the question of whether a pre-syntactic concept of impoverishment can successfully be implemented.

More specifically, this approach to inflectional morphology works as follows. Initially, a stem A is taken from the lexicon with its inherent features (e.g., inflection class, gender, aspectual information). These features are always fully specified. Next, non-inherent features (e.g., person, number, case, tense) are added in the *numeration*. On this view, the numeration is not merely the place where lexical items are assembled prior to their use in subsequent syntactic derivations (see Chomsky (2001)); it is in fact also a generative component, viz., the place where inflectional morphology takes place (cf. footnote 10 above). The non-inherent features are also always fully specified. Together, inherent and non-inherent features on the stem establish a complete well-formed set of morpho-syntactic features and thus provide the context for underspecified inflection markers.

After this, triggered by high-ranked MERGE CONDITIONS (MCs) for structure-building features [$\bullet\alpha\bullet$], [$\bullet\beta\bullet$], ... on a stem, inflectional exponents of type [α], [β], ... are successively merged with the stem, thereby eventually generating whole words (once discharged, structure-building features are removed from representations). The morphological categories [α], [β] involved here may or may not correspond directly to syntactic categories (i.e., they can be morphomic); they are determined by *morphological arrays*, i.e., sets that collect (underspecified) exponents sharing morpho-syntactic features. Each Merge operation is required to add the new exponent at the left or right edge of the current stem, because of the *Strict Cycle Condition*; the ranking of MCs (thus, the order of Merge operations) follows the *functional sequence* of grammatical categories (f-seq).

In addition to MCs, there are IDENT, MAX, and DEP constraints deriving the compatibility and specificity requirements for underspecified morphological exponents (this makes it possible to adopt standard approaches to syncretism in Optimality Theory; see Grimshaw (2001), Trommer (2001), Stiebels (2006), Wolf (2008)); and there are alignment (and other precedence) constraints (like $\alpha \Rightarrow$R(ight), L(eft)$\Leftarrow\beta$, $\alpha\Rightarrow\beta$) determining the order of exponents (Trommer (2001; 2008a), Ryan (2010)). Finally, the fully inflected word composed of stem and inflectional exponents is transferred to the syntax, which cannot see the internal structure generated in the morphology (a version of the *Strong Lexicalist Hypothesis*); but it can access the morpho-syntactic features associated with the stem, and carry out Agree operations (Chomsky (2001), Bruening (2017)).

This pre-syntactic approach recognizes compatibility and specificity conditions for underspecified exponents, which accounts for instances of syncretism. Hence, the existence of systematic patterns of syncretism in paradigms, and the postulate that morphological analyses should be maximally simple and elegant, suggest an implementation of a pre-syntactic notion of impoverishment via late addition of morpho-syntactic features (and, consequently, premature exponence). In what follows, I develop such an implementation of pre-syntactic impoverishment for the general approach to inflectional morphology in Müller (2020).

An Implementation of Pre-Syntactic Impoverishment

Recall from section 4 the central hypothesis that pre-syntactic impoverishment can be conceived of as late addition of morpho-syntactic features that follows premature exponence in a system where complete well-formed sets of morpho-syntactic features in need of morphological realization arise incrementally, by adding one non-inherent feature after the other. For the Harmonic Serialism approach to inflectional morphology just sketched, this means that the morphological derivation starts earlier than assumed in Müller (2020): It begins when a stem is selected with its inherent features (including structure-building features of the [$\bullet\alpha\bullet$] type); at this point, non-inherent features are not yet present. These are then successively added via iterated optimization operations, with the *maximally-one-edit-away-from-the-input* restriction on GEN ensuring that only one new context feature can be added to a stem during any given generation of outputs. In the normal course of events (i.e., when no impoverishment is involved), morphological exponence that is brought about by MERGE CONDITIONS (MCs) can only take place when a complete well-formed set of morpho-syntactic features is present. Thus, there has to be a general constraint that forces the growth of this feature set until it is complete. Suppose that this constraint is FULLSPEC, as in (32). This constraint must outrank the relevant MCs, so as to block premature exponence in nonimpoverished environments.[21]

(32) FULLSPEC:
Each stem has a complete well-formed set of morpho-syntactic features.

The case study that I want to present here is that of impoverishment in German verb inflection (see (4) above), so the relevant MCs are those in (33-ab) (whose ranking is assumed to be determined by f-seq in Müller (2020) and Gleim et al. (2021b), with MC(T) always dominating MC(Agr), and counter-f-seq orders as they may show up in languages like Berber derived by alignment constraint-driven morphological movement).

(33) a. MERGECONDITION(T) (MC(T)):
[•T•] participates in Merge.
b. MERGECONDITION(Agr) (MC(Agr)):
[•Agr•] participates in Merge.

As noted above, compatibility and specificity requirements for merging underspecified exponents can be derived from faithfulness constraints in optimality-theoretic approaches (including the present harmonic serialist one); as in all approaches incorporating these two requirements, the compatibility requirement must be higher-ranked.[22] However, since this is not the main point of the present exercise, for present purposes it may suffice to assume that there is a low-ranked COMPSPEC requirement that ensures compability and specificity with exponents, as a proxy for a system of faithfulness constraints (IDENT, MAX, DEP) for each individual morpho-syntactic feature that can show up in well-formed sets of stems.[23]

(34) COMPSPEC:
The morpho-syntactic features on a stem in the input are realized by maximally specific compatible exponents in the output.

As we have seen (cf. (6)), in order to derive the generalization that first and third person cannot be distinguished in plural environments in German, the feature matrix that is used for morphological exponence in a third-person context should be the impoverished one in (35-a), with [–1] missing, and not the complete one in (35-b) (as before, here and in what follows I abstract away from the features [–sub], [–imp] capturing indicative environments

[21] This would likely seem to be a case where there is no free re-ranking of constraints; but this is nothing unusual in this system: As noted in Müller (2020), it holds for various other constraint types. More generally, the question of which constraints are freely re-rankable in this approach, and which ones are not, is discussed in Müller (2020, ch. 6); also cf. the remarks below on compatibility and specificity.

[22] Cf., e.g., the analogous property of the Subset Principle of Distributed Morphology (cf. Halle (1997), among many others): Specificity only decides the competition between morphological exponents if they are all compatible with (i.e., realize a subset of) the feature matrix in need of realization.

[23] Similarly, I completely ignore alignment constraints here; to ensure that the T and Agr exponents all show up as suffixes, and in this order, it suffices to assume that there are low-ranked constraints Agr⇒R and T⇒R, where the former constraint outranks the latter one (such that no morphological movement of exponents is triggered).

that will also form part of the complete well-formed set of morpho-syntactic features).

(35) a. {[–strong], [–sub], [–imp], [+2], [+pl], [–past]}
b. {[–strong], [–sub], [–imp], [–1], [+2], [+pl], [–past]}

The constraint that brings about impoverishment in these context is given in (36); this is a faithful implementation of the general rule in (5-b) in section 4 in the approach currently under consideration.

(36) IMP([±1]):
If [±1] shows up in the environment [–2,+pl], it terminates the derivation.

The central concept of termination is specified in (37).

(37) *Termination*:
A feature terminates the derivation if it is introduced as the final operation in a word, and there are no structure-building features left.

Based on these assumptions, let us consider how the impoverishment operation in third person plural present tense environments of weak German verbs is implemented in the approach to inflectional morphology based on Harmonic Serialism in Müller (2020). In the first step (cf. (38)), the verb stem is selected from the lexicon as the initial input I_0. At this point, it is only equipped with its inherent features – an inflection class specification [–str(ong)], and structure-building features [•T•] and [•Agr•] for T and Agr exponents, respectively. In addition, there are corresponding morphological arrays including all the T and Agr exponents of the system, from which the most specific ones among the ones that are compatible will ultimately be selected, given COMPSPEC.

(38) *Step 1*: *Feature addition*

I_0: V:[–str], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_1: V:[–str], [•T•], [•Agr•]		****!	*	*	
☞O_2: V:[–str,*–past*], [•T•], [•Agr•]		***	*	*	
O_3: V:[–str]-Ø, [•Agr•]		****!		*	*
O_4: V:[–str]-n, [•T•]		****!	*		*

As shown in (38), the competing outputs differ from I_0 by carrying out at most one operation. More specifically, O_4 merges an underspecified Agr exponent /n/, thereby satisfying MC(Agr); O_3 merges an underspecified T exponent /Ø/, thereby satisfying MC(T); and O_2 adds the feature [–past], as a first step towards generating a complete well-formed set of morpho-syntactic features for morphological realization. Since there are no context features (beyond [–str]) present in either O_3 or O_4, these outputs will violate COMPSPEC. However, there is a problem with these outputs that is even worse: By assumption, FULL-INT outranks MC(T) and MC(Agr), but O_3 and O_4 do nothing to reduce violations of this highest-ranked active constraint. The same goes for O_1, which leaves the input intact. Consequently, by adding [–past] (highlighted here by italics), O_2 emerges as optimal, and is used as the new input I_2 in the next optimization round; cf. (39).[24]

(39) *Step 2*: *More feature addition*

I_2: V:[–str,–past], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{21}: V:[–str,–past], [•T•], [•Agr•]		***!	*	*	
☞O_{22}: V:[–str,–past,+*pl*], [•T•], [•Agr•]		**	*	*	
O_{23}: V:[–str,–past]-Ø, [•Agr•]		***!		*	
O_{24}: V:[–str,–past]-n, [•T•]		***!	*		*

In this second step in (39), a new context feature [+pl] is added in O_{22}. The justification for this is exactly as before: High-ranked FULLSPEC ensures that the derivation wants to establish a complete well-formed set of morpho-syntactic features before morphological exponence takes place, and adding one feature at a time constantly reduces the initial FULLSPEC violations; in contrast, O_{21} (which fails to carry out any operation), O_{23} (which merges a T exponent), and O_{24} (which merges an Agr exponent) do not reduce violations of this highest-ranked constraint that is active in the competition (IMP([±1]) is not yet active).[25] O_{22} is selected as the new input I_{22} in the third step, illustrated in (40), which adds another context feature; this time, the person feature [–2] is chosen.[26]

(40) *Step 3*: *Yet more feature addition*

I_{22}: V:[–str,–past,+pl], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{221}: V:[–str,–past,+pl], [•T•], [•Agr•]		**!	*	*	
☞O_{222}: V:[–str,–past,+pl,*–2*], [•T•], [•Agr•]		*	*	*	
O_{223}: V:[–str,–past,+pl]-Ø, [•Agr•]		**!		*	
O_{224}: V:[–str,–past,+pl]-n, [•T•]		**!	*		*

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[24] What about alternative outputs adding other features than [–past]? I will address this issue below. For now, I will only focus on just one derivation that successfully implements impoverishment.

[25] Note incidentally that whereas O_{23} and O_{24} both fatally violate FULLSPEC here because they prematurely merge T and Agr exponents, respectively, merging the T exponent will not violate COMPSPEC in the same way that merging the Agr exponent will: There is a context feature [–past] for T at this point, but not yet for Agr.

[26] Of course, choice of the specific person feature is entirely free at this point, as is choice of the specific tense feature in step 1, and choice of the specific number feature in step 2 (subject to general wellformedness requirements holding for verb inflection in German; cf. Stump (2001)). Thus, the derivation could have picked, say, [+past], [–pl], and [+2] in the first three steps – but then, there would be no impoverishment effect.

The reason why O_{222} is optimal in (40) is basically the same as in the earlier two competitions. Now there is only one FULLSPEC violation left, which corresponds to the observation that the verb stem is now only one feature short of having a complete well-formed set of morpho-syntactic features: By assumption, full person information is provided by a cross-classification of two primitive binary person features [±1], [±2], and so far, only one of these features is present on the stem. In the normal course of events, this final feature would be added in the next step. However, as shown in (41), the addition of [–1] in O_{2222} gives rise to a fatal violation of the undominated impoverishment constraint IMP([±1]): Now [–1] shows up in the environment [–2,+pl], but it does not terminate the derivation since there are two structure-building features left on V. As a consequence, the decision falls to the lower-ranked MC(T), which selects /Ø/ as the T exponent that best satisfies the COMPSPEC constraints, as an instance of premature exponence, and accordingly assigns optimal status to O_{2223} (O_{2224} is blocked since MC(Agr) is ranked below MC(T), and O_{2221} is excluded because it does not carry out any operation, and thus fails to improve the constraint profile).

(41) *Step 4*: *Premature exponence*

I_{222}: V:[–str,–past,+pl,–2], [●T●], [●Agr●] {[$_{\text{T}}$ /te/ ↔[+past,–str]], [$_{\text{T}}$ /Ø/ ↔[–past]], .. } {[$_{\text{Agr}}$ /n/ ↔ [–2,+pl]], [$_{\text{Agr}}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{2221}: V:[–str,–past,+pl,–2], [●T●], [●Agr●]		*	*!	*	
O_{2222}: V:[–str,–past,+pl,–2,–1], [●T●], [●Agr●]	*!		*	*	
☞O_{2223}: V:[–str,–past,+pl,–2]-Ø, [●Agr●]		*		*	
O_{2224}: V:[–str,–past,+pl,–2]-n, [●T●]		*	*!		

Next, for exactly the same reasons, the following step in (42) is one that employs premature exponence again (cf. O_{22233}), rather than the addition of the [–1] that would turn the well-formed set of morpho-syntactic features associated with the stem into a complete one (cf. O_{22232}). Like O_{22233}, output O_{22234} merges an Agr exponent, as required by MC(Agr) (which thus blocks O_{22231}, which leaves the input unchanged). However, the COMPSPEC constraints favour /n/ ↔ [–2,+pl] over /t/ ↔ [–1]: On the one hand, /n/ is more specific; on the other hand (and this is decisive), /t/ does not even satisfy compatibility here (note that [–1] is not yet present on the stem).

(42) *Step 5*: *More premature exponence*

I_{2223}: V:[–str,–past,+pl,–2]-Ø, [●Agr●] {[$_{\text{T}}$ /te/ ↔[+past,–str]], .. } {[$_{\text{Agr}}$ /n/ ↔ [–2,+pl]], [$_{\text{Agr}}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{22231}: V:[–str,–past,+pl,–2]-Ø, [●Agr●]		*		*!	
O_{22232}: V:[–str,–past,+pl,–2,–1]-Ø, [●Agr●]	*!			*	
☞O_{22233}: V:[–str,–past,+pl,–2]-Ø-*n*		*			
O_{22234}: V:[–str,–past,+pl,–2]-Ø-*t*		*			*!

At this point, there is no structure-building feature left on the new input, I_{22233}; cf. (43). Therefore, finally adding [–1], as in O_{222332}, now has a chance to satisfy IMP([±1]), by terminating the derivation: So far at least, adding [–1] is the last operation in the word.[27] Thus, FULLSPEC can finally be satisfied, which blocks the inert output O_{222331}; adding /t/, as in O_{222333}, is excluded for the same reason (but it would independently also be ruled out by inducing a compatibility violation of COMPSPEC, as opposed to the specificity violation incurred by O_{222332}).

(43) *Step 6*: *Late addition of [–1]*

I_{22233}: V:[–str,–past,+pl,–2]-Ø-n {[$_T$ /te/ ↔[+past,–str]], .. } {[$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{222331}: V:[–str,–past,+pl,–2]-Ø-n		*!			
☞O_{222332}: V:[–str,–past,+pl,–2,*–1*]-Ø-n					*
O_{222333}: V:[–str,–past,+pl,–2]-Ø-n-*t*		*!			*

In the last step of the derivation, convergence is achieved. This is shown in (44), where $O_{2223321}$ leaves the input intact and emerges as optimal. The reason is that $O_{2223322}$, which tries to merge the /t/ exponent for which the compatibility-satisfying feature [–1] would now be present, must violate IMP([±1]): Given that /t/ has been merged, it is clear that adding [–1] cannot have been the last operation in the word; there was no termination.

(44) *Step 7*: *Convergence*

I_{222332}: V:[–str,–past,+pl,–2,–1]-Ø-n {[$_T$ /te/ ↔[+past,–str]], .. } {[$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
☞$O_{2223321}$: V:[–str,–past,+pl,–2,–1]-Ø-n					*
$O_{2223322}$: V:[–str,–past,+pl,–2,–1]-Ø-*n-t*	*!				

Thus, it is ensured that the feature [–1] will have to be added late, after all exponence is finished, with the features [–2,+pl] also present, and the impoverishment effect in this environment is derived. However, the generation of the complete well-formed set of morpho-syntactic features took place in a certain order in this derivation: [–past] → [+pl] → [–2] → [–1]. As noted in section 4, postulating a hierarchy of this type has indeed been argued to determine all instances of impoverishment (cf. Noyer (1997)); to implement this in the present approach, FULLSPEC would have to be made sensitive to such a hierarchy. However, the conclusion at the end of section 4 eventually was that an approach to impoverishment in terms of premature exponence and late feature addition should not necessarily rely on a fixed order in which morpho-syntactic features are added to stems, as it is in fact to be expected if

[27] Note, though, that O_{222332} introduces a new violation of COMPSPEC: There is a feature present in the structure now – viz., [–1] – that is not (and will never be) realized by an exponent.

the only constraint bringing about iterated feature addition is the extremely general statement embodied in FULLSPEC in (32). As it turns out, the present system of constraints can derive the intended impoverishment effect *independently of the order in which morpho-syntactic features are added*.

To see this, let us consider a derivation that differs from the one considered so far in that [–1] is added *before* the features [–2,+pl] that render IMP([±1]) active are both in place. It remains to be shown that [–1] cannot be inadvertantly realized by /t/ in this case. Thus, suppose that the first two steps are exactly as before: [–past] is added first (cf. (45)), and [+pl] is added next (cf. (46)).

(45) *Step 1′: Feature addition*

I_0: V:[–str], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_1: V:[–str], [•T•], [•Agr•]		****!	*	*	
☞O_2: V:[–str,*–past*], [•T•], [•Agr•]		***	*	*	
O_3: V:[–str]-Ø, [•Agr•]		****!		*	*
O_4: V:[–str]-n, [•T•]		****!	*		*

(46) *Step 2′: More feature addition*

I_2: V:[–str,–past], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{21}: V:[–str,–past], [•T•], [•Agr•]		***!	*	*	
☞O_{22}: V:[–str,–past,+*pl*], [•T•], [•Agr•]		**	*	*	
O_{23}: V:[–str,–past]-Ø, [•Agr•]		***!		*	
O_{24}: V:[–str,–past]-n, [•T•]		***!	*		*

However, in the next step 3′, it is not [–2] that is added this time, but [–1]. Note that this does not trigger a violation of IMP([±1]) because [–2] is not yet present; cf. (47).

(47) *Step 3′: Yet more feature addition*

I_{22}: V:[–str,–past,+pl], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{221}: V:[–str,–past,+pl], [•T•], [•Agr•]		**!	*	*	
☞O_{222}: V:[–str,–past,+pl,*–1*], [•T•], [•Agr•]		*	*	*	
O_{223}: V:[–str,–past,+pl]-Ø, [•Agr•]		**!		*	
O_{224}: V:[–str,–past,+pl]-n, [•T•]		**!	*		*

After this, FULLSPEC favours adding [–2], as in O_{2222} in (48), but this will now give rise to a violation of higher-ranked IMP([±1]): At this point, [–1] shows up in the environment

[–2,+pl], but it does not terminate the derivation since there are structure-building features left on the stem. Therefore, O_{2223}, with premature exponence of T, is selected as the optimal output.

(48) *Step 4′: Premature exponence*

I_{222}: V:[–str,–past,+pl,–1], [•T•], [•Agr•] {[$_T$ /te/ ↔[+past,–str]], [$_T$ /Ø/ ↔[–past]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{2221}: V:[–str,–past,+pl,–1], [•T•], [•Agr•]		*	*!	*	
O_{2222}: V:[–str,–past,+pl,–1,–2], [•T•], [•Agr•]	*!		*	*	
☞O_{2223}: V:[–str,–past,+pl,–1]-*Ø*, [•Agr•]		*		*	
O_{2224}: V:[–str,–past,+pl,–1]-n, [•T•]		*	*!		

For the same reason, the next step in (49) again involves premature exponence. This time, it affects an Agr exponent; and interestingly, it is /t/ rather than /n/ that is now merged with the stem in the optimal output O_{22234} since [–1] is part of the feature matrix but [–2] is not.

(49) *Step 5′: More premature exponence: a wrong impoverishment effect*

I_{2223}: V:[–str,–past,+pl,–1]-Ø, [•Agr•] {[$_T$ /te/ ↔[+past,–str]], .. } {[$_{Agr}$ /n/ ↔ [–2,+pl]], [$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
O_{22231}: V:[–str,–past,+pl,–1]-Ø, [•Agr•]		*		*!	*
O_{22232}: V:[–str,–past,+pl,–1,–2]-Ø, [•Agr•]	*!			*	
O_{22233}: V:[–str,–past,+pl,–1]-Ø-n		*			*!
☞O_{22234}: V:[–str,–past,+pl,–1]-Ø-*t*		*			

In the next step, the derivation tries to finally add [–2] so as to yield a complete well-formed set of morpho-syntactic features, as demanded by FULLSPEC. However, as shown in (50), such an addition is still blocked: If [–2] is added, as in O_{222342}, IMP([±1]) becomes active, and will invariably be violated because the addition of [–2] clearly shows that [–1] has not terminated the derivation – since [–1] has already been in place at this point, it is very clearly not introduced as the final operation in the word. Hence, O_{222341}, which leaves input intact, now is the optimal output.

(50) *Step 6′: No late addition of [–2]; convergence*

I_{22235}: V:[–str,–past,+pl,–1]-Ø-t {[$_T$ /te/ ↔[+past,–str]], .. } {[$_{Agr}$ /t/ ↔ [–1]], .. }	IMP –1	FULL SPEC	MC T	MC AGR	COMP SPEC
☞O_{222341}: V:[–str,–past,+pl,–1]-Ø-t		*			
O_{222342}: V:[–str,–past,+pl,–1,–2]-Ø-t	*!				

The mapping from step 5′ to step 6′ means that the derivation has now reached convergence, with a final optimal output that does not have a complete well-formed set of morpho-syntactic features. Consequently, a *no good output* scenario arises (cf. Grimshaw (1994))), which instantiates one of the standard ways in optimality-theoretic morpho-syntax to derive *ineffability* (or *absolute ungrammaticality*; cf. Müller (2015) for an overview of the options): The final optimal candidate has an *underspecified* feature matrix associated with the stem, and can therefore not be used in subsequent syntactic derivations, which require *complete* feature matrices. Thus, the fact that this derivation produces a "wrong" form as the final optimal output for third person plural present tense environments with weak verbs in German is harmless: This output form can never be used in the syntax. More generally, any other modification of the order of feature additions to the stem that integrates [–1] in a non-final step if a [–2,+pl] environment is to be generated will end up with the same problem: [–1] can only be instantiated if it is instantiated at the end.[28]

References

Ackema, Peter & Ad Neeleman (2004): *Beyond Morphology*. Oxford University Press, Oxford.

Alexiadou, Artemis & Gereon Müller (2008): Class Features as Probes. In: A. Bachrach & A. Nevins, eds., *Inflectional Identity*. Oxford University Press, Oxford, pp. 101–155.

Anderson, Stephen (1992): *A-Morphous Morphology*. Cambridge University Press, Cambridge.

Aronoff, Mark (1994): *Morphology by Itself*. MIT Press, Cambridge, Mass.

Arregi, Karlos & Andrew Nevins (2012): *Morphotactics: Basque Auxiliaries and the Structure of Spellout*. Springer, Heidelberg.

Assmann, Anke, Doreen Georgi, Fabian Heck, Gereon Müller & Philipp Weisser (2015): Ergatives Move Too Early. On an Instance of Opacity in Syntax, *Syntax* 18, 343–387.

Baerman, Matthew, Greville Corbett, Dunstan Brown & Andrew Hippisley, eds. (2007): *Deponency and Morphological Mismatches*. Oxford University Press (for The British Academy), Oxford.

Baier, Nicholas (2018): Anti-Agreement. PhD thesis, University of California, Berkeley.

Bárány, András (2017): *Person, Case, and Agreement: The Morphosyntax of Inverse Agreement and Global Case Splits*. Oxford University Press, Oxford.

Bárány, András & Michelle Sheehan (2021): Challenges for Dependent Case. Ms., Universiät Bielefeld and Anglia Ruskin University.

Bech, Gunnar (1955/1957): *Studien über das deutsche Verbum Infinitum*. Niemeyer, Tübingen. Reprint 1983.

Bermúdez-Otero, Ricardo (2011): Cyclicity. In: M. van Oostendorp, C. Ewen, E. Hume & K. Rice, eds., *The Blackwell Companion to Phonology*. Vol. 4, Wiley-Blackwell, Malden,

[28] Closer inspection reveals that a bit more would have to be said if there is more than one impoverishment operation affecting a single word. To cover such a scenario, the concept of termination in (37) needs to be revised, e.g., by postulating that "final operation" is reinterpreted as "final operation, not counting other features addressed by IMP constraints".

MA, pp. 2019–2048.

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 (2012): *Universals in Comparative Morphology. Suppletion, Superlatives, and the Structure of Words*. MIT Press, Cambridge, Mass.

Bowman, Samuel & Benjamin Lokshin (2014): Idiosyncratically Transparent Vowels in Kazakh. In: *Proceedings of the 2013 Annual Meeting on Phonology*. Linguistic Society of America, Washington, DC.

Brown, Dunstan & Andrew Hippisley (2012): *Network Morphology*. Cambridge University Press, Cambridge.

Bruening, Benjamin (2017): Consolidated Morphology. Ms., University of Delaware.

Caballero, Gabriela & Sharon Inkelas (2013): Word Construction: Tracing an Optimal Path Through the Lexicon, *Morphology* 23, 103–143.

Caha, Pavel (2013): Explaining the Structure of Case Paradigms by the Mechanisms of Nanosyntax, *Natural Language and Linguistic Theory* 31, 1015–1066.

Chomsky, Noam (1965): *Aspects of the Theory of Syntax*. MIT Press, Cambridge, MA.

Chomsky, Noam (1973): Conditions on Transformations. In: S. Anderson & P. Kiparsky, eds., *A Festschrift for Morris Halle*. Academic Press, New York, pp. 232–286.

Chomsky, Noam (1981): *Lectures on Government and Binding*. Foris, Dordrecht.

Chomsky, Noam (1982): *Some Concepts and Consequences of the Theory of Government and Binding*. MIT Press, Cambridge, Mass.

Chomsky, Noam (1995): *The Minimalist Program*. MIT Press, Cambridge, Mass.

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 (2019): Lectures. UCLA & MIT.

Corbett, Greville & Norman Fraser (1993): Network Morphology: A DATR Account of Russian Nominal Inflection, *Journal of Linguistics* 29, 113–142.

Crysmann, Berthold & Olivier Bonami (2016): Variable Morphotactics in Information-Based Morphology, *Journal of Linguistics* 52, 311–374.

Di Sciullo, Anna Maria & Edwin Williams (1987): *On the Definition of Word*. MIT Press, Cambridge, Mass.

Don, Jan & Elma Blom (2006): A Constraint-Based Approach to Morphological Neutralization. In: *Linguistics in the Netherlands 2006*. Benjamins, Amsterdam, pp. 78–88.

Eisenberg, Peter (2000): *Grundriß der deutschen Grammatik. Band 1: Das Wort*. Metzler, Stuttgart.

Embick, David (2010): *Localism vs. Globalism in Morphology and Phonology*. MIT Press, Cambridge, Mass.

Fabb, Nigel (1984): Syntactic Affixation. PhD thesis, MIT, Cambridge, Mass.

Fanselow, Gisbert (1991): Minimale Syntax. Habilitation thesis, Universität Passau.

Fenger, Paula (2018): Multiple Agreeing Heads Is Not That Special: Restrictions on Person Portmanteaux, *University of Pennsylvania Working Papers in Linguistics* 24, 9:1–10.

Fenger, Paula & Gísli Rúnar Harðarson (2020): One Classy Number: Linking Morphemes in Dutch and German. In: M. Asatryan, Y. Song & A. Whitmal, eds., *Proceedings of the North East Linguistics Society*. Vol. 2, GSLA, Amherst, Mass., pp. 1–14.

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.

Gazdar, Gerald, Ewan Klein, Geoffrey Pullum & Ivan Sag (1985): *Generalized Phrase Structure Grammar*. Blackwell, Oxford.

Gleim, Daniel, Gereon Müller, Mariia Privizentseva & Sören Tebay (2021a): Non-Local Phonology by Morphological Movement. In: A. Farinella & A. Hill, eds., *Proceedings of NELS 51*. University of Massachusetts, Amherst.

Gleim, Daniel, Gereon Müller, Mariia Privizentseva & Sören Tebay (2021b): Reflexes of Exponent Movement in Inflectional Morphology: A Study in Harmonic Serialism. Ms., Universität Leipzig. To appear in *Natural Language and Linguistic Theory*.

Grestenberger, Laura (2017): Deponency in Morphology. Ms., Universität Wien.

Grimshaw, Jane (1994): Heads and Optimality. Ms., Rutgers University. (Handout of talk, Universität Stuttgart).

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.

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.

Halle, Morris & Ora Matushansky (2006): The Morphophonology of Russian Adjectival Inflection, *Linguistic Inquiry* 37(3), 351–404.

Harbour, Daniel (2003): The Kiowa Case for Feature Insertion, *Natural Language and Linguistic Theory* 21, 543–578.

Harley, Heidi (2008): When is a Syncretism more than a Syncretism? Impoverishment, Metasyncretism, and Underspecification. In: D. Harbour, D. Adger & S. Béjar, eds., *Phi Theory: Phi-Features Across Modules and Interfaces*. Oxford University Press, Oxford, pp. 251–294.

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.

Heck, Fabian & Gereon Müller (2013): Extremely Local Optimization. In: H. Broekhuis & R. Vogel, eds., *Linguistic Derivations and Filtering*. Equinox, Sheffield, pp. 135–166.

Heck, Fabian & Gereon Müller (2016): On Accelerating and Decelarating Movement: From Minimalist Preference Principles to Harmonic Serialism. In: G. Legendre, M. Putnam, H. de Swart & E. Zaroukian, eds., *Optimality-Theoretic Syntax, Semantics, and Pragmatics*. Oxford University Press, Oxford, pp. 78–110.

Holmberg, Anders (2005): Is There a Little Pro? Evidence from Finnish, *Linguistic Inquiry* 36(4), 533–564.

Holmberg, Anders & Christer Platzack (1995): *The Role of Inflection in the Syntax of the Scandinavian Languages*. Oxford University Press, Oxford.

Inkelas, Sharon (2016): Affix Ordering in Optimal Construction Morphology. In: D. Siddiqi & H. Harley, eds., *Morphological Metatheory*. Benjamins, Amsterdam, pp. 479–511.

Isačenko, Alexander (1975): *Die russische Sprache der Gegenwart*. Max Hueber Verlag, München.

Jaeggli, Osvaldo & Ken Safir (1989): The Null Subject Parameter and Parametric Theory. In: O. Jaeggli & K. Safir, eds., *The Null Subject Parameter*. Kluwer, Dordrecht.

Kalin, Laura & Philipp Weisser (2021): Minimalism, Morphology, and the Lexicon: Then and Now. Ms., Princeton University and Universität Leipzig.

Kastner, Itamar (2019): Templatic Morphology as an Emergent Property: Roots and Functional Heads in Hebrew, *Natural Language and Linguistic Theory* 37, 571–619.

Keine, Stefan (2010): *Case and Agreement from Fringe to Core. Impoverishment Effects on Agree*. Linguistische Arbeiten, Mouton de Gruyter, Berlin.

Keine, Stefan & Gereon Müller (2020): Impoverishment. Ms., Universität Leipzig. To appear in Artemis Alexiadou, Ruth Kramer, Alec Marantz & Isabel Oltra-Massuet (eds.), *Distributed Morphology*.

Kiparsky, Paul (1973): Abstractness, Opacity and Global Rules. In: O. Fujimura, ed., *Three Dimensions in Linguistic Theory*. TEC, Tokyo, pp. 57–86.

Kiparsky, Paul (2005): Blocking and Periphrasis in Inflectional Paradigms. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 2004*. Springer, Dordrecht, pp. 113–135.

Kouneli, Maria (2019): The Syntax of Number and Modification: An Investigation of the

Kipsigis DP. PhD thesis, New York University, New York.
Leslau, Wolf (1995): *Reference Grammar of Amharic*. Otto Harrassowitz, Wiesbaden.
Lumsden, John (1992): Underspecification in Grammatical and Natural Gender, *Linguistic Inquiry* 23, 469–486.
Marantz, Alec (2010): Locality Domains for Contextual Allosemy in Words. Ms., NYU. (Handout.).
Marvin, Tatjana (2002): Topics in the Syntax and Stress of Words. PhD thesis, MIT, Cambridge, Mass.
McCarthy, John (2010): An Introduction to Harmonic Serialism, *Language and Linguistics Compass* 4, 1001–1018.
McCarthy, John (2016): The Theory and Practice of Harmonic Serialism. In: J. McCarthy & J. Pater, eds., *Harmonic Grammar & Harmonic Serialism*. Equinox, Sheffield, pp. 47–87.
Merchant, Jason (2015): How Much Context is Enough? Two Cases of Span-Conditioned Allomorphy, *Linguistic Inquiry* 46, 273–303.
Müller, Gereon (2004): A Distributed Morphology Approach to Syncretism in Russian Noun Inflection. In: O. Arnaudova, W. Browne, M. L. Rivero & D. Stojanovic, eds., *Proceedings of FASL 12*. University of Ottawa.
Müller, Gereon (2006): Pro-Drop and Impoverishment. In: P. Brandt & E. Fuß, eds., *Form, Structure, and Grammar. A Festschrift Presented to Günther Grewendorf on Occasion of his 60th Birthday*. Akademie Verlag, Berlin, pp. 93–115.
Müller, Gereon (2013): Approaches to Deponency, *Language and Linguistics Compass* 8(6).
Müller, Gereon (2015): Optimality-Theoretic Syntax. In: T. Kiss & A. Alexiadou, eds., *Syntax. An International Handbook*. Vol. 2, De Gruyter, Berlin, pp. 875–936.
Müller, Gereon (2020): *Inflectional Morphology in Harmonic Serialism*. Advances in Optimality Theory, Equinox, Sheffield. http://home.uni-leipzig.de/muellerg/harm/imhs.pdf.
Murphy, Andrew (2017): Cumulativity in Syntactic Derivations. PhD thesis, Universität Leipzig.
Noyer, Rolf (1997): *Features, Positions and Affixes in Autonomous Morphological Structure*. Garland Publishing, New York.
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.
Oltra Massuet, Isabel (1999): On the Notion of Theme Vowel: A New Approach to Catalan Verbal Morphology. Master of science thesis, MIT, Cambridge, Mass.
Preminger, Omer (2014): *Agreement and Its Failures*. MIT Press, Cambridge, Mass.
Preminger, Omer (2021): The Shortest Argument You've Ever Seen in Favour of Late Insertion. Blog entry, https://web.archive.org/web/20220106145559/https://omer.lingsite.org/blogpost-the-shortest-argument-for-late-insertion.
Prince, Alan & Paul Smolensky (2004): *Optimality Theory. Constraint Interaction in Generative Grammar*. Blackwell, Oxford.
Privizentseva, Mariia (2021): Mixed Agreement in Russian: Gender, Declension, and Mor-

phological Ineffability. Ms., Universität Leipzig.

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.

Ryan, Kevin (2010): Variable Affix Order: Grammar and Learning, *Language* 86, 758–791.

Sauerland, Uli (1996): The Late Insertion of Germanic Inflection. Generals paper, MIT.

Steele, Susan (1995): Towards a Theory of Morphological Information, *Language* 71, 260–309.

Stiebels, Barbara (2006): Agent Focus in Mayan Languages, *Natural Language and Linguistic Theory* 24, 501–570.

Stump, Gregory (2001): *Inflectional Morphology*. Cambridge University Press, Cambridge.

Stump, Gregory (2006): Heteroclisis and Paradigm Linkage, *Language* 82, 279–322.

Svenonius, Peter (2016): Spans and Words. In: H. Harley & D. Siddiqi, eds., *Morphological Metatheory*. Benjamins, Amsterdam, pp. 199–220.

Trommer, Jochen (1999): Morphology Consuming Syntax' Resources. In: *Proceedings of the ESSLI Workshop on Resource Logics and Minimalist Grammars*. University of Nijmegen, pp. 37–55.

Trommer, Jochen (2001): Distributed Optimality. PhD thesis, Universität Potsdam.

Trommer, Jochen (2003): 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 (2008a): Coherence in Affix Order, *Zeitschrift für Sprachwissenschaft* 27, 99–140.

Trommer, Jochen (2008b): A Feature-Geometric Approach to Amharic Verb Classes. In: A. Bachrach & A. Nevins, eds., *Inflectional Identity*. Oxford University Press, Oxford, pp. 206–236.

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.

Wiese, Bernd (2000): 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 (2004): Categories and Paradigms: On Underspecification in Russian Declension. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 321–372.

Wiese, Bernd (2008): Form and Function of Verbal Ablaut in Contemporary Standard German. In: R. Sackmann, ed., *Explorations in Integrational Linguistics*. Benjamins, Amsterdam, pp. 97–151.

Wolf, Matthew (2008): Optimal Interleaving. PhD thesis, University of Massachusetts, Amherst.

Wunderlich, Dieter (1997): 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 (1999): German Noun Plural Reconsidered. Ms., Universität Düsseldorf.

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.