

The grammar and typology of plural noun inflection in varieties of German

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Abstract This paper discusses varieties of German with respect to noun pluralisation, with a focus on the status of final plural schwa as in *Fisch-e* ‘fish, pl.’. By analysing the much-discussed plural morphology of Standard German by means of both prosodic as well as morphological principles, it is argued that final schwa in plural nouns of Standard German is not, as generally assumed, an inflectional suffix. As an alternative, an optimality-theoretic constraint-based analysis of final schwa in plurals leads to the proposal that this segment in noun plurals of Standard German arises as an inserted vowel, which is in turn the result of a specific constraint interaction. In the second part of this paper, related noun plurals are studied in a sample of diverse non-standard dialects of German. Morphological and prosodic constraints, through the well-known mechanism of differences in constraint-ranking in Optimality Theory, derive the (non-)appearance of word-final plural schwas in these dialects which are minimally different from Standard German and from each other. The constraints will include those which refer to properties of whole paradigms of word forms, not just to phonological properties of individual words. As an overall descriptive result, a micro-typology of plural formation in varieties of German emerges, and the prosodic phonology of German is demonstrated to play a crucial role in the formation of word forms.

Keywords Dialects · German language · Inflection · Inflectional typology · Optimality theory · Variation

1 Introduction

Why is the status of final schwa in German noun plurals an issue of contention at all? The following introduction will argue that there is strong evidence against

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the unanimous view in the grammatical descriptions of German, namely that final schwa is a suffix, one of several such suffixes to be found in Standard German. Consider first the noun classes, the assumed plural suffixes, and some example words in (1). German has three genders for nouns, but masculine and neuter gender behave largely the same with respect to plural formation. Therefore, the binary distinction expressed by $[\pm \text{feminine}]$ is more insightful for present purposes. These two gender classes are given in table (1) as subdivisions for each suffix with the feminine nouns put in the first row. As plural nouns may or may not be found with the vowel alternation called umlaut, there is a column for both the alternating and the non-alternating class. Non-umlauting nouns either have front vowels (and thus could not be subject to umlaut), or do not umlaut even with the right type of vowel.¹

(1) Classes of plural formation in German, superficially

<i>Suffix</i>	<i>Umlaut</i>	<i>No umlaut</i>
-e	Küh-e, Bänk-e 'cow, pl.', 'bench, pl.'	--
	Türm-e, Gäng-e 'tower, pl.', 'corridor, pl.'	Schaf-e, Schuh-e 'sheep, pl.', 'shoe, pl.'
0	Mütter, Töchter 'mother, pl.', 'daughter, pl.'	--
	Väter, Gärten 'father, pl.', 'garden, pl.'	Knoten, Artikel 'knots', 'articles'
-(e)n	--	Frau-en, Schwester-n 'woman, pl.', 'sister, pl.'
	--	Staat-en, Diplomat-en 'state, pl.', 'diplomat, pl.'
-er	--	--
	Wäld-er, Räd-er 'forest, pl.', 'wheel, pl.'	Kind-er, Kleid-er 'child, pl.', 'dress, pl.'
-s	--	Villa-s, Bar-s 'villa, pl.', 'bar, pl.'
	--	Auto-s, Clown-s 'car, pl.', 'clown, pl.'

On the basis of these examples, German seems to have five “endings” and a total of nine inflectional classes for plurals if the vowel change known as umlaut is taken

¹ Umlaut is very rare for some of the cases given in (1), and also behaves differently for the two non-feminine cases, masculine and neuter. It is more important, however, that umlaut is never productive in plural formation (new nouns never show umlaut in their plural form). A comprehensive discussion of umlaut is beyond the scope of the present article. However, the role of umlaut in plural formation will be discussed in relation to some of the dialectal systems in Section 5.

into account.² This classification disregards finer distinctions of gender between masculine and neuter, the (huge) differences in the frequency distributions, and also the alternation between *-en* and *-n*, which is clearly predictable on the basis of the prosody of the preceding syllable; see Wiese (1996a: ch. 5.3.2) and discussion below. Closer examination reveals, however, that there are more instances of complementary distribution: for the two classes headed in (1) by *-e* (the written equivalent of final schwa) and 0, the suffix *-e* occurs after a stressed syllable, while ‘0’ is only found after a stressless syllable, a so-called “reduced” or “schwa syllable”, i.e., one which ends in either an unstressed vowel or a syllabic (sonorant) consonant, an alternation briefly discussed below. On the basis of this evidence, the first two classes in (1) can be collapsed into one. Exceptions to the generalization are discussed below.

There is further evidence that this is the right view from the relation between the two noun classes: first, the two sub-classes under consideration show the same distribution with respect to umlaut (namely, very few umlauted forms for feminines and lexically variable umlaut for non-feminines), in contrast to all other classes for which umlaut is either impossible (*-(e)n*, *-s*) or the normal case (*-er*), see also Fakhry (2005). Second, the respective nouns often diachronically derive from one class as shown by Pavlov (1995). Third, nouns from these two classes have the same distribution with respect to the gender of nouns (both schwa-final and zero-marked nouns occur productively with masculine and neuter gender only, i.e., with nativised loan words as well as with nouns from the Germanic stock) and the case-marking suffixes (see (11) below for illustration). Finally, and looking ahead towards the discussion of German dialects in Section 5, we note that it is the *-e*-plural class of nouns which shows zero plurals or even subtractive plurals in many dialects; see Golston and Wiese (1996), Holsinger and Houseman (1999) and Knaus (2003) for discussion of subtractive plural in German dialects.

A possible alternative analysis to the present one, taking into account the complementary distribution between final schwa and a zero ending as well, would be to propose an underlying final schwa in the zero-class, and then to delete this vowel for all of the zero-class cases. That is, the plural of *Segel* ‘sail’ and similar words would be derived by first attaching schwa (rather, its underlier), and then deleting this segment. Such an analysis was actually proposed by Wurzel (1970: 26ff.), Wegener (1995) and others. The problems with this proposal are empirical as well as theoretical: first, there is no empirical evidence that this invisible schwa has any role to play other than to express the relation to the class of monosyllabic nouns suffixed with plural schwa. Second, this type of derivation is suspicious for theoretical reasons, in that a segment (as the exponent of a morph) is first inserted and subsequently removed again without leaving a trace. For these reasons, a solution relying on a general schwa-suffix, to be deleted in the case of trochaic nouns, is less attractive.

² To be sure, there are some exceptions. Starting with Bech (1963) and Wurzel (1970), some authors (see, e. g., Golston and Wiese 1996 or Neef 1998) argue, basically on the basis of the first type of evidence presented here, that final schwa in plurals is not a suffix, and stress the complementary distribution with respect to zero plurals.

If this complementary distribution between the *-e*-class and the zero-class is recognised at all in the relevant literature, it is usually described in the way that there is a suffix *-e* which is either not attached or deleted (see discussion above) if the noun stem ends in a reduced syllable. In the following, I will argue that an adequate analysis needs to go one step further: just as “0” is not a suffix, neither is “*-e*”, more precisely, final [ə]. In other words, the German plural system makes use of only the three consonantal suffixes presented in (1), phonologically (though not always phonetically) /r/, /n/, and /s/. These suffixes differ considerably in their frequency distributions, but this is not the topic of the present paper; see, *inter alia*, Köpcke (1988), Clahsen et al. (1992), Wegener (1992), Marcus et al. (1995). What remains to be accounted for, namely the phonetic shape of these suffixes and the (non-) appearance of final schwa, is almost exclusively a matter of word prosody.

The rest of this paper will first establish the case against a schwa-suffix in Standard German plural inflection, provide a constraint-based analysis as an alternative, and then argue for the superiority of this analysis by presenting analyses of the plural noun inflection for other varieties of German by re-ranking of the relevant constraints. In other words, the constraint-based analysis makes the prediction that there is a specific typological space for plural formation in German, and I will argue that this prediction is fulfilled.

2 Final schwa—a morpheme?

The preceding section argued that one class of plural nouns either bears a final schwa or no ending at all and proposed that this final schwa is not a suffix. The first problem with the alternative assumption—that there is such a suffix whose only phonological (and, in fact, phonetic) exponent is a schwa vowel—is that there is good reason to assume that schwa is not a phoneme of German. The reasoning for this view, which goes back to the analysis by Moulton (1962), derives largely from the predictability of schwa. The significance of this claim for the analysis of the plural system is obvious: If schwa is not part of the underlying phonological structure, there is nothing to represent the suffix. In other words, this suffix has no phonological content, following the standard view that the phonological content of morphemes consists of phonemes, or at least a set of distinctive features. This suffix, then, is a “zero suffix”—precisely what its zero-alternant (see 0 in (1)) is already.

The question whether schwa represents a phoneme of German, in the sense of an underlying segment or similar phonological structure, is to be kept apart from the question what the precise representation of this phoneme should be. A range of answers to this latter question have been given in different studies: /ɛ/ (proposed by Wurzel 1980) and /e/ (proposed by Wurzel 1970 and Kloeke 1982), both to be reduced to [ə], are the most obvious candidates from the inventory of vowel phonemes. Using the mechanisms available in theories of underspecification, Wiese (1986) and Hall (1992), among others, instead propose radically underspecified underliers for all surface schwas, such as skeletal positions X or V. These abstract positions are either underlying abstract segments or inserted by a rule of schwa-insertion. These positions are assigned their surface feature values by default rules. In whatever way the proposed underliers for schwa are conceptualised, all such

proposals presuppose that there is *some* such phonemic representation (fully specified or radically underspecified up to an empty position), in contrast to the view that schwa is not an underlying unit at all because of its predictability. Arguably, all (near-)minimal pairs noted in the literature on German phonology are problematic in one way or other: they either abstract away from the difference in stress or at least stressability (see pairs such as *Polo* ['po:lɔ] 'polo' - *Pole* ['po:lə] 'pole', Meinhold and Stock 1980: 91), or they disregard the fact that schwa itself often alternates with the syllabicity of the following sonorant consonant, an alternation which is not found for any other vowel with which schwa is supposed to stand in contrast (see *Freundin* [frɔ̃ndɪn] 'friend, fem. sg.' - *Freunden* [frɔ̃ndən]/[frɔ̃ndŋ] 'friend, dat. pl.').³

The second problem, one that has not yet been discussed to my knowledge, is the optionality of final schwa in contrast to all other suffixes. As shown in (2), it is possible to drop final schwa in plural nouns, whereas all other plural endings can never be omitted. (2a) gives examples for plural nouns which normally have final schwa, (2b) shows that no other plural suffix in German is optional in the same sense. In Standard German orthography, such omitted schwas are regularly marked by apostrophe.

(2) Optionality in plural morphology

a. final schwa

die Bäum' 'the tree, pl.'

die Pferd' 'the horse, pl.'

die Händ' 'the hand, pl.'

die Bräut' 'the bride, pl.'

b. other suffixes

*die Auto' (Autos) 'the car, pl.'

*die Frau' (Frauen) 'the woman, pl.'

*die Wäld' (Wälder) 'the forest, pl.'

*die Staat' (Staaten) 'the state, pl.'

To be sure, dropping of final schwa is found under specific circumstances only (as under the rhythmic constraints of poetry and other conditions of style and register), but the point is that such schwa-dropping is always well-formed in principle, whereas it is never well-formed for any other plural suffix. The basic fact to be explained is why, of all plural suffixes, only final schwa can ever be omitted. The present proposal is that final schwa simply is not a suffix and is therefore not subject to the conditions valid for inflectional suffixes. Instead, all the evidence considered so far indicates that final plural schwa is tied directly to the prosodic and other phonological structure of its respective word. If demanded by, for example, rhythmic constraints, this final schwa may be omitted. Well-founded alternative explanations do not seem to be available: relying on the status of final schwa as a weak, unstressed vowel would have to explain why final [ɐ], the normal exponent of the suffix *-er*, cannot be omitted, although it is equally reduced and unstressed.

Further consideration of the optionality of final schwa reveals that it can be omitted in many of its instances within the morphology of German (as in verb

³ As a solution to this paradox, it is often proposed that schwa is a phoneme, but is a part of a separate vowel subsystem distinct from the system of full vowels; see Meinhold and Stock (1980: 95). This just underlines that this vowel is fundamentally different from all others.

inflection, nominal case inflection (dative sg. in particular), and others), and again in contrast to all suffixes, inflectional and derivational, for which omission is never possible. Consequences of this observation are not explored here.⁴ Instead, the plural system of Standard German will be reconsidered under the assumption that final schwa is not a suffix, that is, a morphological entity to be put into place by a morphological rule, template, or other mechanism available in morphological theory. The present work axiomatically assumes that morphology in grammar is built upon morphological regularities which may be either very general or rather narrow, down to the existence of individual lexical exceptions to other regularities. This view will be made more concrete in the section to follow, which argues for a stratified view of the morphological system of German.

3 Final schwa and the noun plural system

In the plural system of German nouns, there are clearly distinct groups differing in productivity from other groups. Building on earlier work within the Dual-Mechanism model (see Pinker and Prince 1988, Marcus et al. 1995, or Clahsen 1999), Wiese (1999) argues that the plural inflection system of Standard German is composed of a three-tiered system, as sketched in (3). One subsystem can be characterised as irregular (because of its non-productive behaviour), and one as the default system (because of its productivity and application to non-canonical roots from various groups such as proper names, non-integrated loan words, and a large group of other unusual forms).⁵

(3) The layers in the plural system of Standard German

<i>plural type</i>	<i>suffixes</i>	<i>examples</i>
irregular	-er, -(e)n _{masc./n.} , -e _{fem.} , “Ø” _{fem.}	Kind-er, Fürst-en, Küh-e, Mütter ‘child, prince, cow, mother, pl.’
sub-regular	-(e)n _{fem.} , -e _{masc./n.} , “Ø” _{masc./n.}	Bahn-en, Bäum-e, Vögel ‘track, tree, bird, pl.’
default	-s	Clown-s, Auto-s, Papa-s ‘clown, car, daddy, pl.’

The prosodic conditions to be discussed below do not hold for the nouns in the default group. Whether this is due to a division of grammar according to Lexical Phonology (for German, see Wiese 1988 and subsequent work, in which s-plurals are assigned to a separate level of the lexicon) or some other factor is not the issue of

⁴ As one reviewer points out correctly, this optionality of final schwa varies across morphological categories and across varieties of German: while schwa-less verb forms of the 1st ps. sg. are highly acceptable (as in *(ich) lauf* ‘I run’ instead of *(ich) laufe*), schwa is hardly optional in adjectival inflection: **das groß’ Haus* ‘the big house’. In adjectival inflection, however, schwa is predictable in a different way: all adjectival inflections of German contain schwa, see Wiese (1988). Different morphological contexts seem to place different restrictions on the (non-)occurrence of final schwa. Within a morphological category however, the contrast between optionality of schwa and other inflectional suffixes is always present; compare dat. sg. schwa as in *Hund(e)* ‘dog, dat. sg.’ to *Hunden* ‘dog, dat. pl.’ for which final /n/ is obligatory.

⁵ Well-integrated nouns taking the -s-plural (*Schal-s* ‘shawl, pl.’) are also probably part of the irregular layer.

the present paper. For the present paper, the set of forms in the second subsystem is of central interest. In the study by Bartke et al. (2005), it has been called “sub-regular” because it can be subject to exceptions (namely, the irregular forms) and is sensitive to particular morphological features such as gender, but displays a high degree of productivity at the same time, as has been demonstrated by frequency counts in the CELEX database (Marcus et al. 1995, Bartke et al. 2005).

The otherwise diverse analyses by Neef (1998: 259), Eisenberg (1998: 158) and Wunderlich (1999) all recognize the different status of the *-s*-plural and also acknowledge the large degree of regularity of the plural forms listed in the middle layer of (3)). As this part of plural inflection covers most of the native and nativised common nouns of German, this sub-regular class can be regarded as the core system of German plural inflection. As stated in (3), it looks as if there is a list of forms and conditions for this sub-regular noun plural system. In fact, however, there is a much simpler re-analysis under the assumption that prosody regulates much of its behaviour. This analysis is displayed in (4). It recognises the gender distinction [$\pm$ feminine] as one determinant of plural formation, and the distinction between full and reduced final syllables as introduced in Section 2 as a second determinant valid for both gender classes.

(4) Morphology and prosody in the core plural system of Standard German

<i>stem prosody</i>	<i>gender</i>	
	+ feminine	- feminine
full stem-final syllable	-en	-e
reduced stem-final syllable	-n	0

According to this analysis, there is one suffix, namely /n/, for nouns marked as [+feminine]. Furthermore, there is a prosodic requirement (to be taken up below) which dictates *all* plural nouns to end in one reduced syllable as the right daughter within a binary foot. If the noun-stem already has such a syllable, nothing happens (except for the *-n*-suffix for feminines). If the noun-stem ends in a full-vowel syllable (also bearing some amount of stress), the prosodic requirement leads to the insertion of a schwa-like vowel, indicated by the letter *e* in table (4) and above. Under these assumptions, there are two orthogonal “rules” yielding four types of plurals, and the final schwa falls out just as naturally as the complementary case of “zero” affixation. One is a morphological rule requiring a suffix /n/ for plurals of feminine nouns, the other is a prosodic requirement for nouns to end in a reduced syllable. Under the alternative assumption of a suffix surfacing as /ə/, the resulting trochaic structure for the non-feminine class would be completely unrelated to the same requirement for the feminine class. In fact, the prosodic requirement (“plural nouns end in a binary foot”) has a wider domain of application: it extends to the plural forms identified as irregular in (3) as well. The class of words taking *-s* as the plural marker (whether interpreted as the default plural case or not) is systematically different from all others, as has been noted in much of the relevant literature.

To summarise, nouns in German may carry an inflectional plural suffix, specified either by rule or by lexical specification. In the analyses to follow, these suffixes (/n/, /r/, /s/ only!) will be presupposed with no specific assumption with respect to the mechanism of their origin. On the other hand, final schwa in noun plurals exists in order to fulfill a prosodic condition, namely to create a final sequence of a stressed and a reduced syllable. It is the same requirement which leads to the *-n/-en*-alternation, and is also observed by the suffix *-er*, which attaches to a lexicalised class of monosyllabic nouns only. In other words, the prosodic requirement is not gender-specific, and cross-categorises the mostly gender-specific suffixes *-r* and *-n*. There is no need to assume an additional suffix *-e*; prosody does the job. The fact that the trochaic structure is created at the right edge of words only (but not word-internally) will be accounted for by relying on constraints keeping the stem-form intact (in the discussion of paradigm-related constraints, see (15) in particular). The hypothesis that final schwa in German noun plurals is the reflex of a prosodic requirement will receive some support from dialectal patterns discussed below, in particular final schwa for nouns in prepositional phrases in the Alsatian dialect (see (23)).

The class of noun stems showing two full syllables and a final consonant provides a complication which cannot be fully resolved at present; as shown by the following examples, their plural form can still display either final schwa or the suffix *-en*: cf. *Monat-e*, ‘month, pl.’, *Kürbis-se* ‘pumpkin, pl.’, *Arbeit-en* ‘work, pl.’, *Predigt-en* ‘sermon, pl.’, and others. For these words, the foot structure for the disyllabic singular form is not clear at all. One solution would be to follow Hayes (1995) and others in assuming that each full-voweled syllable constitutes a foot. That is, *Monat* is parsed into two monosyllabic feet as such: (mo:)(na:t). Adding schwa in the plural then would make the final foot disyllabic. Another solution would start from the observation that many, if not most, of the counterexamples noted to the foot-based generalisation actually seem to be words bearing feminine gender (see examples presented by Neef 1998: 246). As a general rule for feminine nouns requires the addition of *-n*, phonotactic requirements will usually lead to forms such as *Arbeit-en* ‘work, fem., pl.’. A third line of attack would rely on the fact that the words of this class are mostly closed by a final obstruent, most often /t/. There is evidence that final obstruents are dispreferred for derived German words (as suggested by Golston and Wiese 1996 and Neef 1998: 251, see also (18) below). The addition of schwa or /n/ (for feminines) avoids the dispreferred structure.

4 Schwa insertion—an OT-account

With these ingredients for a deeper analysis at hand, it is possible to develop a more principled account in terms of Optimality Theory (OT), a theoretical approach to grammar making use of a set of violable constraints and their language-specific ranking.⁶ One relevant constraint has been identified already: a constraint demanding that plural nouns end in a sequence consisting of a full-voweled (strong) syllable followed by a reduced (weak) syllable. This is not an arbitrary sequence, but the

⁶ For general information on Optimality Theory, see Prince and Smolensky (1993), Kager (1999), or McCarthy (2002).

trochee, a prosodic foot with exactly this structure, namely binary and left-headed. This structure is regarded as the unmarked, preferred type of foot, at least in the phonology of Germanic languages. Following a number of proposals in the literature, a constraint to this effect will be stated. It is formulated in (5) as one which demands unmarked prosodic structure.⁷

(5) Constraint for unmarked feet: TROCHEE

A foot is a trochee, a binary syllabic structure with the stress pattern strong–weak.

The trochee, as used here, is more than the descriptive device familiar from the analysis of poetic meter. The constraint TROCHEE as used here may well be a cover constraint which can be decomposed into, first, a constraint demanding binary structure either for the foot or the syllable (FOOTFORM as proposed by Prince and Smolensky 1993) and, second, a constraint requiring the head to be on the left. The position here is, following Hayes (1995) and others, that the trochee is the preferred foot shape in German. Furthermore, there are no feet longer than a trochee (as in trisyllabic dactyls). Weak syllables beyond the disyllabic length are considered extrametrical, that is, remain unfooted, see also Hayes (1995). In previous analyses of German prosodic morphology, reference was often made to a constraint demanding a final reduced syllable, in particular by Wiese (1996a: ch. 5.3.2), Neef (1998) and Wunderlich (1999). The present proposal departs from these by postulating the constraint TROCHEE which demands this type of unmarked prosodic structure.⁸ Reference to a unit “reduced syllable” as an alternative is not possible in a restricted version of OT which does not admit reference to arbitrary phonological units, but only to units considered unmarked.

The constraint defined in (5), if applied to a linguistic item, answers the question why there can be final schwas at all. The addition of schwa after a final full syllable is a way of creating the preferred foot, thus fulfilling the constraint TROCHEE with the minimal effort (assuming that schwa is the default vowel). Of course it does not answer, by itself, a host of other questions, such as why plural nouns, but not singular nouns, need to follow the constraint. To answer these questions, the constraint must be seen in a wider perspective. First, TROCHEE is, as just noted, a markedness constraint. Fulfilling this constraint by the addition of a vowel (final schwa) generates the violation of a so-called faithfulness constraint: there is a vowel in the surface form which is not present in the underlying form. Let us assume that this latter constraint is one of the correspondence-theoretic constraints militating against surface segments without a corresponding segment in underlying representations, as stated in (6).⁹

⁷ In metrical theory, syllabic trochees are distinguished from moraic trochees, see Hayes (1995). I assume without further discussion that the trochee refers to a syllabic structure, not one of moras. Arguably, this is a specific version holding for Germanic languages. The role of this constraint for the building of feet in German was first proposed by Féry (1994). The matter of the moraic trochee will be discussed briefly with respect to Bavarian dialects in Section 5.3.

⁸ A precursor for this view is Eisenberg (1998: 159) in his grammar, who states: “Die Pluralformen der morphologisch einfachen Substantive enden auf einen Trochäus.” [Plural forms of morphologically simple nouns end in a trochee, present author’s translation.]

⁹ The version of OT known as correspondence theory was first presented by McCarthy and Prince (1995). The hypothesis that all OT constraints are either markedness constraints or faithfulness constraints goes back to Prince and Smolensky (1993).

(6) Constraint against segment insertion: DEP-SEG

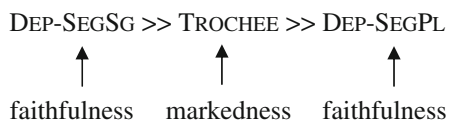
Surface segments depend on underlying segments (i.e., may not be inserted).

Note that each plural form with a final schwa now incurs a violation of this constraint DEP-SEG. This is the price to be paid for an inserted schwa. In addition, a general hypothesis developed in OT by Itô and Mester (1999) and Kurisu (2001) can be drawn upon: faithfulness constraints can be relativised to a specific grammatical category (such as number), while markedness constraints cannot. For the case at hand this means that it is possible to postulate one instance of DEP-SEG as referring to plural nouns (DEP-SEG_{PL}), and a distinct instantiation of this constraint referring to singulars (DEP-SEG_{SG}). A markedness constraint such as TROCHEE cannot be relativised in the same way. This hypothesis is grounded in the observation that faithfulness always means being faithful to something, while markedness is absolute. Faithfulness constraints, in other words, denote a relation, markedness constraints denote a property. Such a parameterisation of faithfulness constraints increases the number of constraints, but allows for the necessary interaction of grammatical domains, in this case the morphological feature of number with the phonological insertion of segments.

Intuitively, this reasoning says that insertion of a segment is worse for singulars than for plurals, capturing the fact that there is schwa insertion in plurals but not in singulars.¹⁰ This observation can be expressed by a constraint ranking which places the ban against insertion for singulars higher than the ban against insertion of plurals. Expressed in optimality-theoretic notation, the ranking is: DEP-SEG_{SG} >> DEP-SEG_{PL}. The number parametrisation of DEP-SEG plus this ranking provides the basic means for disallowing insertion across the board, but ensuring it to apply differentially for singular and plural nouns.

The crucial move now is to place the constraint TROCHEE (5) right into this mini-hierarchy. The resulting constraint ranking is as in (7). A markedness constraint interrupts the hierarchy of two related faithfulness constraints. Obeying TROCHEE can now be accepted even if it leads to a violation of vowel insertion for plurals (DEP-SEG_{PL}), but not at the cost of violating the top-most constraint DEP-SEG_{SG}.

(7) Constraint ranking for final schwa in plurals and constraint types



Applying these constraints under this ranking¹¹ to monosyllabic nouns of German gives the desired result, as shown in (8a) and (8b), for the singular and the plural of

¹⁰ There can be vowel insertion in singular nouns as well, as can be observed in the well-known alternations such as *Segel* vs. *Segl-er* 'sail, n. - sailor'. In these cases, schwas occur for reasons of syllabification of clusters which are not in the focus of this paper.

¹¹ Reversal of the ranking between DEP-SEG_{SG} and DEP-SEG_{PL} is presumably not possible: the derived category (plural) is always subject to markedness constraints more easily than the underived category (singular). Thus, not all six logically possible rankings of the three constraints are expected to be found.

the noun *Tisch* (/tɪʃ/, ‘table’), respectively. An additional assumption made here and in the following is that all features of a word, its grammatical features plus the underlying phonological form of the stem and affixes (if any), constitute the relevant input to be compared with the set of relevant output candidates.¹² As argued in the preceding section, there are plural nouns with suffixes (/n/ for feminines, for example) and others without, such as the present (masculine) noun.

(8) a. Final schwa in monosyllabic nouns, sg.; *Tisch* ‘table’

/tɪʃ/ + sg.	DEP-SEGSg	TROCHEE	DEP-SEGPl
$\varnothing$ [tɪʃ]		*	irrelevant
[tɪʃə]	*!		irrelevant

b. Schwa in monosyllabic nouns, pl.; *Tische* ‘table, pl.’

/tɪʃ/ + pl.	DEP-SEGSg	TROCHEE	DEP-SEGPl
[tɪʃ]	irrelevant	*!	
$\varnothing$ [tɪʃə]	irrelevant		*

As the comparison between the two tables demonstrates, the violation of constraint TROCHEE is fatal for plurals, but not for singulars, whereas the violation of DEP-SEGSg is fatal for singulars, but not for plurals. The low-ranked constraint DEP-SEGPl may be violated in order to fulfill the condition stated in TROCHEE. The insertion of schwa (as opposed to other vowels) constitutes a minimal violation of DEP-SEG in terms of vowel features. Schwa can be regarded as an underspecified vowel of German in terms of vocalic features (Wiese 1996a: ch. 6.1).

Consideration of nouns with a reduced stem-final syllable demonstrates that the constraint DEP-SEGPl cannot be ignored. The tables in (9) present an identical

¹² It is left open here whether this pairing of grammatical and underlying phonological feature sets is itself subject to evaluation by other constraints.

analysis for such nouns, with the assumption that schwa needs to be inserted into the stem in order to fulfill coda conditions on the sequence of final consonants (discussed further below). This schwa adds further violations of DEP-SEG, but DEP-SEG_{PL} is sufficient to provide the reduced syllable required for plurals, without changing the present analysis in any other way.

(9) a. Schwa in trochaic nouns, sg.; *Segel* ‘sail’

/ze:gl/ + sg.	DEP-SEG _{SG}	TROCHEE	DEP-SEG _{PL}
☞ [ze:gəl]	*		irrelevant
[ze:gələ]	**!		irrelevant

b. Schwa in trochaic nouns, pl.; *Segel* ‘sail’

/ze:gl/ + pl.	DEP-SEG _{SG}	TROCHEE	DEP-SEG _{PL}
☞ [ze:gəl]	irrelevant		*
[ze:gələ]	irrelevant		**!

For the plural of *Segel* ‘sail’, it is only the additional violation of low-ranked constraint DEP-SEG_{PL} which rules out the form **Segele*. Therefore, this constraint is necessary. Furthermore, this is again evidence that final schwas are not added gratuitously. The fact that plural and singular forms are completely identical here does not provide enough motivation to have an additional schwa. Addition of final schwa incurs additional, and fatal, violations of DEP-SEG. Recall that trisyllabic feet are not assumed to exist; therefore, TROCHEE is not violated by the trisyllabic forms in (9).

For feminine nouns, it remains to demonstrate that the alternation between final [n] and [ən] (see examples in (1) and (4)) is covered by the analysis as well. Consider the noun *Frau* ‘woman, fem., sg.’ and its plural form *Frauen* ‘woman, fem., pl.’. On phonotactic grounds alone, the plural form could well be **Fraun*, as

witnessed by words such as *braun* ‘brown’. As shown in (10), the constraints proposed above single out the correct plural form. In particular, TROCHEE prefers *Frauen* over **Fraun*, given that the ban on insertion of schwa for plurals is lower in the constraint hierarchy.

(10) Schwa in feminine nouns, pl.; *Frauen* ‘woman, pl.’

/frau/ + pl. + /n/	DEP-SEGS	TROCHEE	DEP-SEGPL
[frau]	Irrelevant	*!	
☞ [frauən]	Irrelevant		*
[fraun]	Irrelevant	*!	
[frauə]	Irrelevant		*

There is one obvious candidate not considered in (10), namely **Fraune* [frauənə], which would, on the basis of the constraints used so far, fare as well as winning [frauən] ‘woman, pl.’, and thus needs consideration of additional constraints. More generally, the precise position of schwa in the nouns has been unduly neglected. Without justification, candidates in (8) contain schwa only in the absolute final position of the surface form. But alternatively, schwa could be placed within the final syllable. For *Tisch* ‘table’, it is not just *Tische* ‘table, pl.’ which contains the required trochee, but also **Tiesch* with stem-internal schwa. For *Helm* ‘helmet’, the existing plural is *Helme*, but not **Helem*. Conversely, however, for *Segel* ‘sail, sg./pl.’: the potential plural form **Segle* has not been considered in (9). While there is no difference between these forms with respect to TROCHEE, they are significantly different in other respects, especially with respect to well-formed syllable codas in the singular and the placement of schwa and affixes relative to the stem. The latter point becomes apparent if a wider set of word forms as in (11) is considered, namely the complete (case, number) paradigm for one monosyllabic masculine noun, *Helm* ‘helmet’ and one trochaic neuter noun, *Segel* ‘sail’. The significant difference between the two is that the consonant cluster /lm/ can be syllabified in a coda ([hɛlm]), while the cluster /gl/ cannot, see [ze:gəl] or [ze:g̊l].

(11) Noun paradigms for so-called strong nouns

a. monosyllabic *Helm* ‘helmet’

	Singular	Plural
Nominative	Helm	Helme
Genitive	Helm(e)s	Helme
Dative	Helm	Helmen
Accusative	Helm	Helme

b. trochaic *Segel* ‘sail’

	Singular	Plural
Nominative	Segel	Segel
Genitive	Segels	Segel
Dative	Segel	Segeln
Accusative	Segel	Segel

The crucial generalisation is that schwa for well-formed syllabification is found inside stems (see *Segel*), while other schwas are always found outside of stems, either word-finally (as in *Helme*) or between stem and suffix (see *Helmen*). These patterns could result from either of two principles, both of which have been noted before: first, they could follow from the preference for all inflectional markings to be placed at the edge of words, in this case the right edge (cf. *Frau-en* ‘woman, pl.’ to **Frau-ne*, and *Kind-er* ‘child, pl.’ to **Kind-re*). Second, paradigm uniformity, the establishment of identity between forms within a paradigm, could be at work; see Benua (1997) or McCarthy (2005). In OT, several types of paradigm uniformity have been proposed and explored since the work on the role of paradigms; see contributions in Downing et al. (2005). Paradigm uniformity holds for both classes of nouns in (11) and will now be worked into the constraint hierarchy developed above.

For some words, the preference of final schwa over internal schwa could also be derived from requirements on syllable structure. Consider again alternative plurals for *Tisch* ‘table’: comparing *Tische* with **Tiesch* [ti:ə] shows that the former solution gives better syllables. In particular, the well-documented constraint requiring syllables to have onsets is obeyed in the former, but not in the latter form. However, this solution does not appear to have the same amount of generality as the solutions relying on paradigmatic uniformity and alignment. It is not obvious that **Segle* is better than *Segel* in terms of syllable structure.

The restrictions in the placement of schwas to right-edge positions fall out from a combination of alignment (to be explained immediately) and paradigm uniformity. Note first that the reduced-syllable nouns such as *Segel* in (9) and (11b) are those which need some inserted vowel in order to syllabify the final consonant cluster, /gl/ in the case at hand. There is a large and well-studied class of words in German in which schwa breaks up such word-final clusters. The clusters are almost always such that the increase in sonority of the consonants (/g/ is less sonorous than following /l/)

involved do not allow the clusters to occur as such in a syllable coda. The observation that schwa is present here if and only if it serves to make final consonants syllabifiable is due to Wurzel (1970), and later led to a series of attempts to formulate schwa insertion rules referring to syllable structure; see (Giegerich 1985: 459), (Wiese 1988: 144), or (Hall 1989: 810). In all of the rules proposed, schwa (usually in an underspecified version of some sort) is inserted preceding the final consonant of the critical cluster, a derivation going from, e.g., [ze:gl] to [ze:gəl]. The equally likely pronunciation of [ze:g] with a syllabic consonant instead of a schwa vowel is interpreted here as just an instance of the same phenomenon: establishing a syllabic nucleus without the presence of an underlying vowel. While insertion of schwa violates a constraint against insertion (see (6)), a syllabic consonant as in [ze:g] violates a constraint against preferred assignment of consonants and vowels to syllable constituents: consonants should be assigned to the onset or the coda, vowels should be assigned to the nucleus. The interaction between these two constraints (and others, partly related to register variation in German) is not explored further here.

In a theoretical framework without rules such as OT, an insertion rule is not available directly. However, there are well-known constraints which make the placement of schwa in prefinal position less arbitrary than in the rule-based account. One such possible constraint is an alignment constraint dictating the end of the stem to co-terminate with the end of its corresponding phonological word. This constraint is given in (12a). A constraint from the same family is (12b), requiring an affix to occur in the rightmost position of its phonological word.¹³ Alignment constraints require the co-termination of grammatical categories: the left and right edges of a word should correspond to the left and right edges of a syllable, and vice versa, to take just one of many possible examples.¹⁴

(12) Right-alignment of morphemes within words—ALIGNR(stem/affix; phonwd)

- a. The right edge of a stem is aligned with the right edge of its phonological word.
- b. The right edge of an affix is aligned with the right edge of its phonological word.

Constraint ALIGNR(stem; phonwd), as defined in (12a), is sufficient to derive the result that *Segel* is a better singular and/or plural form than alternative **Segle*, as demonstrated in (13). Final schwa as in **Segle* is not part of the stem material, and therefore leads to a violation of this constraint: the stem does not co-terminate with the phonological word.

The stem-alignment constraint introduced in (12a) is added at the bottom of the previous constraint hierarchy for the evaluations presented in (13). As in (9), DEP-

¹³ For “stem”, it would be more correct to say something like “the phonological input structure corresponding to a stem”. The use of “stem” here is an abbreviation for the more precise description.

¹⁴ The theory of alignment was proposed by McCarthy and Prince (1994). For the application of alignment constraints to the description of word stress in German see Féry (1998) and Janßen (2003).

SEGSg needs to be violated for the benefit of higher-ranked, in fact inviolable, constraints on coda structure not included here in order to rule out *[ze:gl] (but see analyses by Féry 1997 and Hall 2002, 2005). As argued in Section 3 above, neither input nor output contain a suffix, for nouns of this class.

(13) a. Schwa in trochaic nouns, sg.; *Segel* ‘sail’

/ze:gl/ + sg.	DEP-SEGSg	TROCHEE	DEP-SEGPl	ALIGNR(stem; phonwd)
☞ [ze:gəl]	*		irrelevant	
[ze:gələ]	**!		irrelevant	*
[ze:glə]	*		irrelevant	*!

b. Schwa in trochaic nouns, pl.; *Segel* ‘sail’

/ze:gl/ + pl.	DEP-SEGSg	TROCHEE	DEP-SEGPl	ALIGNR(stem; phonwd)
☞ [ze:gəl]	irrelevant		*	
[ze:gələ]	irrelevant		**!	*
[ze:glə]	irrelevant		*	*!

ALIGNR(affix; phonwd), introduced in (12b), serves to rank *Frau-en* ‘woman, pl.’ over **Frau-ne*. Obviously, an affixed word cannot obey both (12a) and (12b), since stem and affix compete about the final position in the phonological word; thus, ALIGNR(affix; phonwd) and ALIGNR(stem; phonwd) need to be ranked in this order. Suffixed forms such as *Frauen* violate right-alignment constraint (12a), because realisation of the suffix and its placement at the right edge (as demanded by (12b)) is

ranked higher than the stem-alignment constraint. As shown in (14), the affix-alignment constraint (12b) is sufficient to rule out **Fraune*.

(14) Schwa in feminine nouns; *Frauen* ‘woman, pl.’

/fʁau/ + pl. + /n/	DEP- SEGS	TROCHEE	DEP- SEGPL	ALIGNR(affix; phonwd)	ALIGNR(stem; phonwd)
[fʁau]	irrelevant	*			
⊘ [fʁauən]	irrelevant		*		*
[fʁaʊn]	irrelevant	*!			*
[fʁaʊnə]	irrelevant		*	*!	*

Returning to relevant paradigmatic constraints, the constraint proposed here is given in (15). The type of paradigm uniformity relevant for the present analysis is one in which correspondence between different output forms within a paradigm is valued highly. Therefore, the constraint refers to the output forms, and more particularly, to stems as the bases for affixation. It treats all such bases within a paradigm alike—there is no single element in a paradigm to which all other forms have to be faithful.

(15) Constraint for paradigm uniformity: PARADIGMUNIF

Stems in a paradigm are identical.

Placing PARADIGMUNIF above the alignment constraint ALIGNR(stem; phonwd) allows for the violation of the latter constraint to the benefit of the former. PARADIGMUNIF must also be placed above TROCHEE because plurals are never turned into trochees internally: the plural of *Kartell* ‘trust’ is *Kartelle*, and not **Karetelle*, although the latter form containing two trochees would be the one preferred by TROCHEE. In other words, the present analysis assumes that the restriction to trochees to word-final position is due to PARADIGMUNIF which ensures that stems remain unchanged internally.

The relevant constraints are now applied first to a simple monosyllabic noun such as *Helms* ‘helmet’. Applying constraint PARADIGMUNIF to the plural nouns gives the results presented in (16). In this tableau, pairs of forms are used as candidates,

because the constraint PARADIGMUNIF always compares one possible form with another one from the same paradigm.¹⁵ A ranking between DEP-SEGS and PARADIGMUNIF cannot be established; therefore the two constraints are assumed to be not ranked.

(16) Paradigmatic constraints for *Helme* ‘helmet, pl.’

/hɛlm/ + pl.	DEP-SEGS	PARADIGMUNIF	TROCHEE	DEP-SEGPL	ALIGNR(stem; phonwd)
 [hɛlm] - [hɛlmə]	irrelevant			*	*
[hɛlm] – [hɛlm]	irrelevant		*!		
[hɛlm] - [hɛləm]	irrelevant	*!		*	

The analysis relies on one constraint hierarchy, the one used in (16) to which ALIGNR(affix; phonwd) needs to be added as in (14), which correctly derives the plural forms of a complex class of noun plurals in German. The analysis can be extended rather easily to the other subsystems of noun plural formation, especially those which contain one of the suffixes *-r* and *-n* in exceptional classes. These plurals are like those of the *-e/zero*-class in all relevant respects. They only add the (morphological or lexical) requirement that a specific suffix must be added. The one plural class which behaves differently is the *-s*-class. It is mostly for this reason that it has been assigned to a different layer in (3) above. Looking back at the list of plural alternants given in (1), we note that its five endings’ have been reduced to three, namely the three suffixes consisting of the simple consonants /n/, /s/, and /R/.

It is worth pointing out that none of the constraints used so far is motivated by its use in plural formation alone. Insertion of schwa is generally widespread in German, in that it is found in a large variety of word forms, but still restricted; the trochee is a well-motivated structure in German phonology (e.g., stress patterns) and morphology (e.g., disyllabic hypocoristics as in *Studi* ‘student, hyp.’); the similarity of forms

¹⁵ In other words, paradigmatic constraints are particular versions of faithfulness constraints which do not compare an input to an output, but two (or more) outputs; see Kenstowicz (2005) for discussion.

in a paradigm is found in all domains, and the alignment constraint is responsible for minimal schwa addition in other domains as well.

5 Variations on a theme—dialects of German

Standard German, the language studied in preceding sections, is of course only one of a large number of German varieties. It will be shown in the second part of this paper that other, non-standard, varieties of German differ from Standard German pluralisation in small but significant ways which relate exactly to the alternations and constraints discussed above. In this section, some dialects of German, from different major dialect areas and with plural systems different from each other and from Standard German, will be analysed with respect to their nominal plural inflection. The aim is to demonstrate that an OT-style reranking of the constraints used above derives the various systems found in the dialects to a large extent. Basically, three factors identified as relevant for plural formation will be discussed: the presence/absence of schwa, the presence/absence of the three suffixes identified above, and the requirement that plurals are different from singulars (the last one has not been discussed yet).

In contrast to these factors, the role of paradigm uniformity and of right-edge alignments seems to remain the same across German dialects and is therefore not considered in the following. It should also be noted that the detailed information on morphological classes and their relation to each other in terms of frequency and productivity is usually not available for the dialects to the extent that it has become available for Standard German. For this reason, analyses of dialects, here and elsewhere, are more sketchy than is desirable. This lack of descriptive detail is increased by a tendency in dialect grammars to concentrate on a putative core of lexical information from an inherited (Old High German) stock, disregarding the fact that dialects, like Standard German, are subject to borrowing, change, and related phenomena.

5.1 Dialects without plural trochees

The first group of dialects to be studied downgrades the trochaic requirement which was shown to be prominent in Standard German. The dialect of Kirm an der Nahe belongs to the Franconian dialect area, classified as *Westmitteldeutsch* according to Wiesinger (1983). In a grammar of this dialect, Kirchberg (1906: 43/44) presents the paradigms for strong nouns from the three genders and subclassified according to number as in (17).¹⁶ Kirchberg gives case distinctions

¹⁶ Here and in the following, I follow the transcription conventions of the respective authors. The notation (often pre-IPA) is therefore not strictly phonetic, but contains sufficient information for present purposes. The distinction between strong and weak nouns goes back to the historical grammar of German by Grimm (1828); weak nouns are those which use the stem-forming suffix *-(e)n* including the plural suffix, strong nouns are those with other plural suffixes and the genitive singular suffix *-s*.

for these nouns, formulated as prepositional forms and not as inflectional suffixes. Morphological cases present in Standard German have all disappeared in this dialect, as well as in most others, and are therefore not given, with the exception of the Zorntal dialect, see (23) below.

- (17) a. Plural formation in the dialect of Kirn an der Nahe—strong nouns without umlaut

<i>Masc.</i>	
dáχ ‘day’	hunt ‘dog’
dáχ ‘day, pl.’	hun ‘dog, pl.’

- b. Plural formation in the dialect of Kirn an der Nahe—strong nouns with umlaut

<i>Masc.</i>	<i>Neutr.</i>	<i>Fem.</i>
nál ‘nail’	wôert ‘word’	hant ‘hand’
nêl ‘nail, pl.’	wêærdær ‘word, pl.’	hên ‘hand, pl.’

On the basis of these examples, which Kirchberg considers as representative, the following generalisation for strong nouns can be drawn: strong nouns display zero plural except for those bearing the suffix *-r*. There simply is no schwa-final plural for these nouns in the Kirn dialect. In consequence, the plural nouns do not display the final trochee common for Standard German (cf. *Tage* ‘day, pl.’, *Hunde* ‘dog, pl.’, and *Hände* ‘hand, pl.’ as cognates to the nouns in (17)), unless the trochee appears as the result of affixation; see *wêærdær* in (17).¹⁷ In terms of constraint ranking, this must mean that the ban on insertion is ranked high enough not to allow final schwa for plural nouns.

A further property of strong nouns in this dialect is that they (besides showing vowel umlaut) display the remarkable property of subtraction in plurals, precisely for words which have final schwa in Standard German. Nouns such as *hunt*, *hant* (‘dog’, ‘hand’, sg.) appear as *hun*, *hen* (pl.). Without further discussion, I will assume that the proposal developed by Knaus (2003: 22), modifying a proposal by Golston and Wiese (1996), should be integrated into the analysis here: a constraint $\text{SON}]_{\sigma}$, as defined in (18), requires a syllable to end in a sonorant. Furthermore, this constraint is higher ranked than the ban on deletion which exists exclusively for plurals, but not

¹⁷ The fact that Standard German trochaic *Nagel* ‘nail’ has changed to monosyllabic *nál* in this dialect provides further evidence for the low role of TROCHEE in this dialect.

for singulars. In the version of OT used here, markedness constraints opposing deletion are referred to as MAX(imality) constraints, requiring that all input segments are preserved in the output. The present configuration thus leads to a sub-hierarchy of the form MAX-SEGS >> SON]_σ >> MAX-SEGPL. This subsystem will have to be worked into the overall constraint hierarchy eventually. Note that the ranking is a good example again of a markedness constraint sandwiched in between two class-specific faithfulness constraints, completely analogous to the configuration in (7) with its interaction between DEP-SEG and TROCHEE.

(18) Constraint on syllable codas - SON]_σ

A syllable ends in a sonorant.

Starting with the constraint set developed in (16) for Standard German, let us consider the question of necessary re-rankings to derive the strong noun plurals of the Kim dialect. For exemplification, Kirchberg's case of *dáχ*, 'day, pl.' is used. As shown in (19), the crucial move is the demotion of TROCHEE with respect to DEP-SEGPL. This plural system, in contrast to that of Standard German, does not admit schwa insertion in order to form a final trochee. Whether there are other constraint re-rankings for this dialect is not obvious, but PARADIGMUNIF still needs to out-rank TROCHEE as in Standard German. The precise conditions of truncation plurals is also not the subject of the present paper; they are discussed by Golston and Wiese (1996) and Knaus (2003).

(19) Constraint ranking for *dáχ* 'day, pl.'

/dáy/ + pl.	DEP-SEGS	PARADIGM UNIF	DEP-SEGPL	TROCHEE	ALIGNR(stem; phonwd)
[dáy] - [dáyə]	irrelevant		*!		*
^σ [dáy] - [dáy]	irrelevant			*	
[dáy] - [dáyə]	irrelevant	*	*!		

The difference between the strong nouns of Standard German and those of the Kim dialect resulting from a local re-ordering in the constraint ranking is given in (20). Final schwa in noun plurals has thus no chance to appear in the dialect. Such comparisons of ranking hierarchies will be continued in (33) below.

(20) a. Constraint ranking for the Kim dialect:

DEP-SEGS, PARADIGMUNIF >> DEP-SEGPL >> TROCHEE >> ALIGNR(stem;
phonwd)

b. Constraint ranking for Standard German:

DEP-SEGS, PARADIGMUNIF >> TROCHEE >> DEP-SEGPL >> ALIGNR(stem;
phonwd)

As outlined in the analysis of Standard German above, the present model allows faithfulness constraints regulating the relation between input and output or between output forms to be parameterised to specific grammatical categories, while markedness constraints are seen as global constraints. For the present case, this means that the ban against insertion (DEP) or the demand for identical stems (PARADIGMUNIF) may be relativised to categories such as noun, number, or even lexical class, while constraints such as those demanding specific types of feet or syllables may not.

A specific lexical class may be the second subsystem for plurals noted by Kirchberg, that of weak nouns. It is presented in (21), again as presented by Kirchberg (1906: 44). While the strong noun system (see above) never shows schwa, the weak nouns display final schwa in all genders and cases.

(21) Plural formation in the dialect of Kirn an der Nahe—weak nouns

	<i>Masc.</i>	<i>Neutr.</i>	<i>Fem.</i>
Sg.	mènš ‘human’	hèrts ‘heart’	frá ‘woman’
Pl.	mènšə ‘human’	hèrtsə ‘heart’	fráo ‘woman’

This system of weak nouns is thus remarkably different from the one for strong nouns and allows for a different generalisation: schwa is *always* added to monosyllabic nouns in their plural form. In the weak noun system of the Kirn dialect, the prosodic requirement for plural nouns is ranked high enough to cause final schwa for plural nouns. The prosody is of course identical to that of the strong nouns for Standard German, as presented in Section 4. The constraints and their hierarchy as given in (20b) will derive the weak noun plurals for the Kirn dialect.

This identity is not accidental. The weak nouns here are those which have a plural suffix *-n* in Standard German and in earlier stages of the language, either by a morphological rule, as suggested above for feminines, or by lexical exception for the non-feminines. This suffix was dropped from the Kirn dialect just as from many others as an effect of a wide-spread sound change dropping all final nasals in unstressed syllables independent of morphological function. What remains is the prosodic requirement, leading, via the constraint ranking, to final schwa in (21). The change is purely phonological and results in a suffix loss, while everything else stays the same. Consideration of the Bavarian dialect of Nuremberg in Section 5.3 below will show the opposite pattern: retaining the suffix /n/ and loss of the trochaic requirement.

An alternative view would see the change as a replacement of the suffix *-n* by the suffix *-e*, which is a complex and therefore less likely change. Why should a consonant be replaced by a vowel, especially if both sounds can be syllabified as a nucleus? I regard this as additional evidence for the present view of final schwa which analyses the change for the strong nouns as the demotion of the constraint TROCHEE, and the change for the weak nouns as loss of the suffix /n/. The class of

weak nouns in German is basically defined by the presence of *-en* in the plural (see fn 16). In classifying the nouns in (21) as weak, Kirchberg recognises the fact that these nouns historically have this suffix, although there is no synchronic trace in the present dialect.

Finally, in contrast to the strong nouns, there is no subtractive plural for the weak nouns in this dialect; a consonant is never deleted before final schwa. The analysis making use of the constraint $\text{SON}]_{\sigma}$ as in (18) explains this fact directly: a plural form ending in schwa obeys this constraint; there is no final obstruent to be dropped in order to fulfill the constraint. In terms of constraint ranking, the ban on deletion is placed higher here than the ban on adding schwa: $\text{MAX-SEGPL} \gg \text{DEP-SEGPL}$. Dialects showing subtraction in noun plurals (Hessian, Franconian, Luxemburgian, strong nouns in the Kirn dialect; see Knaus 2003) have the reverse order.

The weak nouns, in summary, behave exactly as in Standard German minus the suffix *-n*; as pointed out above, the constraint ranking identified for Standard German (20b) will deliver the correct result, shown in (22). Whether the members of this noun class need to be assigned to the class (called ‘weak’) in an arbitrary manner, or whether there is some more principled way of assigning nouns to subclasses is left as an open question. Various proposals addressing this issue exist, such as co-phonologies (Inkelas 1998), stratal distinctions (Itô and Mester 1999), and lexical prespecification (Pater 2000), but their exploration is beyond the scope of the present paper.

(22) Constraints for *mènʃə* ‘human being, pl.’

/mənʃ/ + pl.	DEP-SEGSg	PARADIGMUNIF	TROCHEE	DEP-SEGPl	ALIGNR(stem; phonwd)
$\text{[mənʃ]} - \text{[mənʃə]}$	irrelevant			*	*
$\text{[mənʃ]} - \text{[mənʃ]}$	irrelevant		*!		
$\text{[mənʃ]} - \text{[mənə]}$	irrelevant	*!		*	

This system, with slight variations, is found in other dialects as well, which will now be covered briefly. Alsatian, a sub-group of the Low Alemannic dialects of the Alsace, is characterised by the following paradigms for nouns in their singular and plural forms. The examples in (23), again separately for umlauted and non-umlauted nouns as far as this is applicable, come from Lienhart (1891: 42–45) and Bayer

(1963) with slightly diverging phonetic notations, but follow roughly the preliminary classification used for Standard German in (1).¹⁸ As with many other dialects, neither *-s*-plural nor *-n*-plural is attested in Alsatian.

(23) Classes of plural formation in the Alsace dialect

<i>Ending</i>	<i>Umlaut</i>	<i>No umlaut</i>
-e	--	Ochs - Ochse 'ox, sg./pl.', Leffəl - Lefflə 'spoon, sg./pl.'
-0	prùšt - prešt 'breast, sg./pl.', khòrp - kherp 'basket, sg./pl.'	frent - frent 'friend, sg./pl.', khent - kheŋ 'child, sg./pl.'
-0	Gårtə - Gärtə 'garden, sg./pl.', Bodə - Bedə 'ground, sg./pl.'	Kettə - Kettə 'chain, sg./pl.', Birə - Birə 'pear, sg./pl.'
-er	tòrf - tèrfər 'village, sg./pl.', Männ - Männər 'man, sg./pl.'	Fest - Fester 'feast, sg./pl.'

Zero plural is found both for mono-syllabic nouns as well as for nouns with final schwa in their singular form, but often with umlauting of the vowel. Overall, many nouns of the Alsatian dialect (historically the class of strong nouns) may be analysed by ranking the constraint TROCHEE below the constraint DEP-SEGPL, as in (20a) for the Kirm dialect. Beyer (1963) notes that final schwa is used optionally in Alsatian. That is, the nouns in the first row of (23) are often found without final schwa. This feature is consistent with the fact that final schwas are generally optional in German, as noted in the discussion of (2) above.

A remarkable additional aspect in parts of this dialect group consists in the use of final schwa in the oblique case plural forms (as well as for the High Alemannic dialects studied by Gabriel 1963).¹⁹ Both Lienhart and Beyer present so-called dative plural forms as in (24). These nouns are all monosyllabic in their remaining singular and plural forms.

¹⁸ Beyer (1963) covers a larger dialect area than Lienhart and presents variation within this area (the Alsace). Present examples from Beyer's work are restricted to the area covered by Lienhart's local dialect (Zornthal, northern Alsace). There are additional types of plural formation for Alsatian beyond those in (23) which are apparently less common.

¹⁹ Distinctions of morphological case are largely absent from this dialect as well as from many others. While Lienhart distinguishes the four cases of Standard German, it is more adequate to distinguish only between a nominative and an oblique/dative case for nouns.

(24) Prepositional phrases and plural forms

- | | |
|---|--|
| <p>a. Lienhart (1891: 42-45)</p> <p>fòn tə frentə ‘from the friends’</p> <p>en tə frentə ‘in the friends’</p> <p>fòn tə kheŋə ‘from the children’</p> <p>en tə kheŋə ‘in the children’</p> <p>fòn tə khèrwə ‘from the baskets’</p> <p>en tə khèrwə ‘in the baskets’</p> <p>fòn tə preštə ‘from the breasts’</p> <p>en tə preštə ‘in the breasts’</p> <p>fòn tə tèrfərə ‘from the villages’</p> <p>en tə tèrfərə ‘in the villages’</p> | <p>b. Beyer (1963)</p> <p>mit də Rossə ‘with the horses’</p> <p>mit də Hängə ‘with the hands’</p> <p>vun də Littə ‘of the people’</p> <p>bi də Kingə ‘with the children’</p> <p>(in) də Söwə ‘in the sows’</p> <p>uf də Kninə ‘on the knees’</p> <p>in də Schüəjə ‘in the shoes’</p> |
|---|--|

As these examples (constituting the complete list of oblique case plural forms presented by Lienhart and Beyer) show, these plural nouns displaying final schwa are always preceded by a preposition plus article sequence. The result is that not only do the nouns themselves appear as trochaic feet, but the immediately preceding preposition-article sequence has the same prosodic shape. There is a close parallel within each of the prepositional phrases noted in (24): each of them consists of two adjacent trochaic feet. In contrast, especially the data provided by Lienhart (1891: 42–45) are very explicit in combining monosyllabic preposition-article forms with monosyllabic nouns, resulting in singular forms such as *fòm frent* ‘of the friend’. I submit that the reason behind the appearance of final schwa in plural nouns bearing oblique case is this parallelism, a requirement of prosodic identity for the two feet within the prepositional phrase. The relevant dialect descriptions do not give their description in these terms, but clearly allow for this conclusion which calls for further research. Beyer (1963) presents two additional phrases containing adjectives preceding the noun within a prepositional phrase: *in də nächstə Jorə* ‘in the next years’, *in minə altə Tagə* ‘in my old days’ (both *Jor* ‘year’ and *Tag* ‘day’ are monosyllabic in the plural). Here, the same sequence of two trochaic feet is found, supporting the hypothesis that a prosodic requirement is at work, and not a morphosyntactic condition.

Whether final schwa is restricted here to prepositional phrases needs to be explored. A potential problem for the present proposal (pointed out by a reviewer of the present paper) arises from the fact that noun plurals which are trochaic already receive additional schwa in their dative forms; see *tèrfərə* ‘village, dat. pl.’ in the final two examples of (24). A possible solution would be to assume that oblique

forms need to be different from their non-oblique counterparts (obeying an instance of the constraint demanding within-paradigm contrast to be presented below in (26)). Distinguishing dative case from other forms would then be achieved by a minimal addition outside of the stem, that is, a final schwa. Seiler (2003) points out that dative forms of noun phrases in Alemannic are often (though usually not obligatorily) marked by a preposition. This preposition is semantically empty and again serves just the function of signalling a dative/oblique case of the noun phrase to follow.

The question whether all final schwas in German dialects in all morphological environments are subject to a prosodic re-interpretation goes far beyond the focus of the present paper and must therefore remain open. It is true, however, that most German dialects show fewer final schwas than does Standard German, not only in plural inflection; see forms such as *müd* (not *müde*) ‘tired’, obligatory drop of *-e* for dat. sg. of nouns, etc. In other words, the functional role of final schwa is generally low in German dialects. For this reason, a prosodic interpretation of this segment along the lines proposed for plural forms does not seem impossible, at least in an account which can, at the same time, acknowledge the morphological function of final schwas.

5.2 Obligatory plural marking

Some dialects from diverse German-speaking regions enforce plural marking for all nouns, but they may do so with or without final schwa. For the dialects of the latter type, two of the plural suffixes, *-r* and *-n*, are common, whereas schwa does not appear. With respect to the (non-)appearance of final schwa and of the suffix *-s*, dialects may vary, as the following data will illustrate.

5.2.1 *Schwa-less dialects*

One dialect of this group is the Hunsrück dialect of Horath as studied by Reuter (1989). The larger part of its plural system is presented by Reuter as in (25) (with present author’s translations). Cells of the table display the stem forms with the rather rich set of possible stem alternations presented in the columns. The stem forms appear before three plural suffixes given in the first column of the table, including a “zero ending” 0, as given in the first row. *-s* and other suffixes exist as well, but only very marginally according to Reuter.²⁰

²⁰ This dialect has two tone accents, signified by “ ’ ” and “ ˇ ” in (25). These tone accents are the subject of an extensive debate in recent prosodic studies; see several contributions in de Vaan (2003).

(25) Plural nouns in the Horath dialect; suffixes and alternating stems (Reuter 1989: 143)

	alternations								
	consonant	vowel	quantity	accent	consonant vowel	vowel accent	consonant vowel accent	vowel quantity accent	consonant vowel quantity accent
before /-0/	—	/ˈpas/→ /ˈpes/ ‘passport, sg./pl.’	—	/ˈve:rt/→ /ˈve:rt/ ‘host, sg./pl.’	—	/ˈfal/→ /ˈfɛl/ ‘fall, sg./pl.’	/ˈkamp/→ /ˈkɛm/ ‘comb, sg./pl.’	/ˈbum/→ /ˈba:m/ ‘tree, sg./pl.’	/ˈʃuh/→ /ˈʃou/ ‘shoe, sg./spl.’
before /-ər/	/ˈkent/→ /ˈkenər/ ‘child, sg./pl.’	/ˈman/→ /ˈmənər/ ‘man, sg./pl.’	/ˈpre:t/→ /ˈpredər/ ‘board, sg./pl.’	—	/ˈlant/→ /ˈlənər/ ‘country, sg./pl.’	—	/ˈvo:rt/→ /ˈve:rər/ ‘word, sg./pl.’	/ˈzɛl/→ /ˈza:lər/ ‘rope, sg./pl.’	—
before /-ən/	/ˈbint/→ /ˈbinən/ ‘binding, sg./pl.’	—	—	—	—	—	—	—	—

One aspect of the plural system displayed in (25) is not immediately obvious, but worth some attention: the zero plural, shown in the first row of table (25), only occurs in conjunction with at least one of the alternations found in the stem. The alternation may be segmental (vowel umlaut, ablaut, deletion), quantitative (vowel lengthening), or prosodic (tone accent)—the crucial observation is that plural forms always differ in some (often unpredictable) way from the singular.²¹ Reuter (1989: 135) emphasises that nouns for which plural forms are non-distinct from the singular are rare in this dialect; she lists stems ending in /ən/ and a “rare” group of masculines as the only two types with zero-marking (/ˈbɛkən/ ‘basin’ illustrates the first group and /ˈfɛl/ ‘fish’ the second). As other dialects (in particular Westphalian, to be discussed immediately below) are subject to the same principle of within-paradigm contrast, this generalisation leads to the analysis of the next type of plural system and to a further constraint. Standard German, as demonstrated above, has systematic and productive groups of nouns which remain formally indistinct from singulars, in particular the non-feminines ending in a schwa syllable; see (1) and (4) above. Other varieties of German show even more extensive zero markings in plural nouns; see the Zortel dialect presented above and the observation by Keller (1961: 56) on Swiss German, another variety of High Alemannic dialects: “This type of plural formation [zero plural, present author] is more frequent in Swiss German than in NewHighGerman.”

²¹ There are additional interactions between the various alternations and suffixes not analysed here. For example, monosyllabic nouns with umlaut and the 0 suffix do not seem to exist in the neuter case.

In other words, dialects such as the Horath dialect follow a ban against number syncretism, and the constraint responsible for this ban is placed higher than it is in Standard German and Alemannic, in which systematic number syncretism exists. The constraint itself is again one referring to within-paradigm relations. It has been discussed in the literature occasionally; see in particular Kenstowicz (2005). The version given in (26) is suitably abstract; it simply requires any specific type of formal contrast between members of a paradigm. Furthermore, it does not take into account the restriction to the category of number, but could easily be parameterised in this respect.

(26) Constraint against syncretism—PARADIGMCONTR

Different members of a paradigm remain distinct in the output.

For the relation between the two paradigm-related constraints (PARADIGMCONTR as in (26) vs. PARADIGMUNIF as in (15)), note that PARADIGMCONTR refers to the word as a whole, whereas PARADIGMUNIF refers to the base of a word, the stem, only. In other words, words can fulfill both constraints simultaneously, but only under affixation or some other modification which leaves the stem intact. Addition of final schwa exemplifies the latter option, as shown above. Umlaut, found in many plural forms throughout the present paper, on the other hand is a change applied to the base (vowel fronting), and therefore helps to make members of a paradigm distinct (i.e., obeying PARADIGMCONTR), but constitutes a violation of PARADIGMUNIF. For this reason, umlaut is enforced by the presence of some underlying feature in the input, such as [front]. This is the view taken in many (otherwise differing) analyses of German vowel umlaut, see Féry (1994) or Wiese (1987, 1996b). This feature is taken as an additional input feature in the following evaluation.

For the Horath dialect as given in (25), the following generalisations hold: first, there is no final schwa, therefore DEP-SEGPL must be ranked higher than TROCHEE. Second, plural forms (nearly) always are distinct from singulars; thus, PARADIGMCONTR must be high-ranked, i.e., also higher than TROCHEE. Applying this reasoning to one of the forms from (25) gives the result illustrated in (27).

(27) Constraint ranking for *pes* ‘passport, pl.’ in Horath dialect

/pas/ + pl. + [+front]	PARADIGMCONTR	DEP-SEGPL	PARADIGMUNIF	TROCHEE	ALIGNR(stem; phonwd)
[pas] - [pas]	*!			*	
[Ⓢ] [pas] - [pes]			*	*	
[pas] - [pesə]		*!	*		*
[pas] - [pasə]		*!			*

Ranking PARADIGMCONTR and DEP-SEGPL above PARADIGMUNIF ensure that [pɛs] surfaces as the winning form. The lack of schwa-final plurals is taken care of by ranking TROCHEE below the ban against insertion DEP-SEGPL, once again as in the ranking stated in (20a) for the Kirn dialect. The fact that the plural form [pɛs] for the case under consideration contains an instance of umlaut is interpreted as a case of lexical specification for this noun. The diversity and (partial) unpredictability of the specific type of alternation for each noun is quite obvious from the examples presented in (25). Rankings between the paradigm-related constraints and other neighbouring constraints cannot be established.

5.2.2 Schwa-final dialects

Westphalian dialects, a major sub-group of the Low German dialects covering northern Germany, are also subject to the principle that singulars and plurals are required to be distinct. These dialects are different from the Middle and Upper German dialects discussed in the previous section by having a large number of plural nouns carrying the *-s*-suffix, and by widely displaying final schwa in plural nouns. In the latter respect, Westphalian differs from other Low German dialects. Westphalian plurals are also crucially different from those of Standard German: apart from the fact that many nouns belong to different classes in the two dialects (although the set of suffixes is identical), the systematic difference consists in the lack of zero plurals in Westphalian. In (28), the major classes of plural formation in Westphalian are illustrated, drawing upon examples from the grammar by Jellinghaus (1877: 72–78).

(28) Types of plural formation in Westphalian

- a. *-e*: küenink-*e* ‘king, pl.’; dail-*e* ‘part, pl.’
- b. *-er*: ding-*er* ‘thing, pl.’; twik-*er* ‘twig, pl.’
- c. *-(e)n*: bieke-*n* ‘brook, pl.’; minsk-*en* ‘human, pl.’
- d. *-s*: süster-*s* ‘sister, pl.’; slüedel-*s* ‘key, pl.’
- e. *-ens*: kiark-*ens* ‘church, pl.’, böss-*ens* ‘brush, pl.’

Westphalian dialects thus make maximum use of all the means of plural formation available in German. The net result is that zero plurals are very rare and are confined to a few words which are apparently lexical exceptions to be found with considerable variation across Westphalian dialects. In his survey of German dialects, Keller (1961: 314) notes for Münsterland Westphalian: “To this type [zero plural, present author] belong: very few masc. nouns, e.g., *Finger* ‘finger’.” It happens that, for this example, a few informants asked by the present author prefer the suffixed form *Finger-s*. Holthausen (1886: 86) again mentions *Finger* as a zero-suffixed plural noun, for the dialect of Soest, from the south-eastern part of Westfalia, and stresses the fact that such nouns are rare. If zero-plurals form a systematic class at all, it is the class of nouns ending in unstressed *-el*, *-er* (Jellinghaus 1877: 71). However, even for these nouns, *-s*-plural is possible, as examples in (28d) and (29) demonstrate. In his grammar of eastern Westphalian, Jellinghaus (1877: 71) connects the use of *-s* to the lack of zero-marked plural nouns as such: “Wo der Plural sich nicht mehr durch Endung oder Umlaut vom Singular unterscheidet, wird in der

Regel die Endung “s” als Zeichen des Plurals verwendet.”²² To emphasise the point, (29) lists some *-s*-suffixed forms which are all zero-suffixed in Standard German. All the forms here are taken from the grammar by Jellinghaus (1877), but receive support from other descriptions, as from those by Holthausen (1886), Lindow et al. (1998), and Born (1978).

(29) Trochaic nouns in Westphalian with *-s*-plural forms

- appel-s ‘apple, pl.’
- iesel-s ‘donkey, pl.’
- hāmer-s ‘hammer, pl.’
- kindken-s ‘child, dim., pl.’
- bessem-s ‘broom, pl.’

If the main difference between Standard German, as analysed in Section 4, and Westphalian lies in the absence of zero marking in the latter variety, this difference must be derived from the ranking of relevant constraints. For Standard German, the constraint PARADIGMCONTR was not considered, but introduced for the Horath dialect in (26). If it had been considered, it would have to be placed at the bottom of the hierarchy (below TROCHEE), as zero-marking of plurals with its concomitant violation of PARADIGMCONTR has been shown to be possible systematically in Standard German. This constraint is thus more dominant in Westphalian, as in the Horath dialect above. In order to explore the logic of Westphalian plural formation, the following table (30) considers possible plural forms of *iesels* ‘donkey, pl.’, a noun which would be zero-marked in Standard German and most other varieties of German. In this analysis, it is assumed that the suffix *-s* is a default suffix in Westphalian which need not be assigned to a particular class of stratum as it is in Standard German. Matters of the stem-internal presence of schwa and its position are ignored here.

(30) Paradigmatic contrast in Westphalian, *iesels* ‘donkey, pl.’

/iesl/ + pl. + /s/	PARADIGMCONTR	TROCHEE	DEP-SEGPL	PARADIGMUNIF
[iesəl]-[iesəl]	*!		*	
☞ [iesəl]- [iesəls]			*	
[iesəl]-[iesələs]			**!	

²² ‘When the plural is not distinct from the singular any more by either ending or umlaut, in general the ending *-s* is used to signify plural.’ (present author’s translation). An additional example from the Westphalian version of the comic series *Asterix and Obelix* is: “De spinnt, de Rōmers.” ‘They are funny, the Romans’.

The main difference from the ranking proposed for Standard German in (20b) is the prominent position of PARADIGMCONTR with respect to other constraints. The constraint TROCHEE is still prominent in Westphalian—the grammars mentioned above present very few words without a final schwa syllable. Those few seem to be lexical exceptions and are perhaps due to the thorough language contact with Standard German.

5.3 A parsimonious system

So far, plural systems have been presented which either prioritise the trochee requirement (see Standard German), or the paradigm uniformity (see the Kirm dialect), or the intraparadigmatic distinctness (see the Horath dialect and Westphalian). The final type of plural formation, one which does not highlight either the trochee or the presence of a plural marker, is exemplified by Northern Bavarian dialects. Gebhardt (1907) presents a rather comprehensive description of the Nuremberg dialect in which he analyses the noun plural system and points out the differences from Standard German, largely as in (31), in which plural forms are once again compared to Standard German; see also Kalau (1984: 125). As with other dialects, the case distinctions have disappeared almost completely in Bavarian, except for a dative plural marker *-n*. Even this ending is not common anymore (Kalau 1984: 16, 124), and is not mentioned. Vowel umlaut is again found in many cases.

(31) Standard German compared to Northern Bavarian (Nuremberg); (Gebhardt 1907)

Standard German plurals ending in:	-e	-er	-n	-0
Nuremberg Bavarian plurals of some cognates:	tōx ‘day’, bēχ ‘brook’, khem ‘comb’, šif ‘ship’, gends ‘goose’	weldə ‘forest’, khelwə ‘calf’, haisə ‘house’, wəðrmə ‘worm’	saxn ‘thing’, tȳən ‘door’, hætsn ‘heart’, entn ‘duck’	nēgl ‘nail’, fenstə ‘window’, fatə ‘father’

As these examples demonstrate clearly, plurals in this dialect never have final schwa.²³ All nouns with a schwa ending in Standard German and Middle High German are either zero-suffixed in the dialect or have adopted one of the other suffixes. This pattern is productive, because Gebhardt (1907: 260) notes that this pattern also applies to loan words: Standard German *Apparate* ‘gadget, pl.’ corresponds to *āparəðtŋ*, and *Komplimente* ‘compliment, pl.’ to *khùmplamēntŋ*. Thus, only the suffixes *-er* and *-n* are found in Bavarian, though not always with the

²³ The final vowel given as [ə], i.e., an r-coloured schwa, is the particular version of vocalised /r/ in this dialect.

same lexical items as in Standard German.²⁴ On the basis of the analysis of final schwa proposed in this paper, the conclusion from these observations is that, in this group of dialects, the requirement that plurals have to be marked with respect to singulars is ranked below the requirement of having intraparadigmatic uniformity, as some of the examples in the first column of (31) demonstrate as well. The fact that the suffix *-s* is not used either²⁵ provides additional evidence for the proposal that the marking of plural forms is not a high-ranked principle. In contrast to the Kirn and Zortel dialects studied in Section 5.1, Nuremberg Bavarian has kept the *-n*-suffix, although it has given up the trochaic requirement, such that its presence cannot be demonstrated in the plural system.

Such observations lead to the following reranking of the constraints identified above: Both the constraint PARADIGMCONTR and the constraint TROCHEE are ranked below the constraint DEP-SEGPL. This ranking ensures that schwas will not surface in order to fulfill either of these requirements. Furthermore, there is no *-s*-suffix as part of a general rule of plural affixation. Thus, only *-r* (in vocalised surface form) and *-n* appear in (31) as suffixes for lexically specified classes of nouns to realise the plural category. Applying this ranking to a noun such as *tox* ‘day’ from (31) will give the result displayed in (32), which may be compared to that for the Kirn dialect given in (19).

(32) Constraint ranking in Northern Bavarian for *tox* ‘day, pl.’

/tōx/, pl.	DEP-SEGSG	DEP-SEGPL	PARADIGMUNIF	TROCHEE	PARADIGMCONTR
[⌈] tōx - tōx	irrelevant			*	*
tōx - tōxə	irrelevant	*!	*		

As for the role of TROCHEE, it is noteworthy that the plural forms given in the last two columns of (31) often end in a voiceless nasal or liquid, according to Gebhardt’s transcription. It is not altogether clear whether these word forms should be regarded as disyllabic, and thus forming a disyllabic trochee. If not, there is further evidence for the low ranking of this constraint.

In (33), Bavarian and Westphalian, two dialects which are maximally apart with respect to the constraints studied here, are compared with respect to their constraint rankings.

²⁴ Yiddish is another variety, partly based on Old High German, without schwa-final plurals, as in *teg* ‘day, pl.’, *fis* ‘foot, pl.’, or *schich* ‘shoe, pl.’; see Jacobs (2005: ch. 5).

²⁵ However, Kalau (1984: 125) mentions a few plural forms with the *-s*-suffix: *kʰinɔ-s* ‘cinema, pl.’; *uhu-s* ‘eagle owl, pl.’. She notes (p. 129) that there is “widerstrebender Gebrauch” ‘reluctant use’ of this suffix in the dialect. The actual extent of the *-s*-plural in German dialects is hard to ascertain because of the tendency in many dialect studies not to consider words typically subject to the *-s*-plural.

(33) Constraint rankings in Northern Bavarian and Westphalian

a. Bavarian:

DEP-SEGSg >> DEP-SEGPl >> PARADIGMUNIF >> TROCHEE >> PARADIGMCONTR

b. Westphalian:

DEP-SEGSg >> PARADIGMCONTR >> TROCHEE >> DEP-SEGPl >> PARADIGMUNIF

As can be seen, the differences lie both in the relative ranking of the trochaic constraint and the constraint demanding a within-paradigm contrast: Bavarian places both of these demands below the ban against insertion, while Westphalian behaves in the opposite way.

A related noun plural system, that of the Bavarian Palatinate dialect of Eslarn, is described by Bachmann (2000: ch. 2.3.3.). He notes that there is one noun class (with nouns corresponding to the schwa-final nouns of Standard German) which marks plural nouns by lengthening the final obstruent, as in [ti] - [ti:] 'table, sg./pl.'. The potential relevance of this dialect might be that this "geminate" type of plural is more compatible with a segmental treatment of plural formation.

The relevant facts are more complex, however. Bachmann (2000: 35) points out in an earlier part of his grammar that the dialect shows a complementary distribution between the length of a vowel and the length of the following obstruent, see [ɸi:] 'fish, sg.' vs. [ɸi:] 'fish, pl.'. There is no conclusive analysis of these patterns in sight, but given that length/quantity is generally seen as a prosodic phenomenon, and given the complementary distribution of length described by Bachmann, a prosodic analysis at present seems the more obvious one. As for the Nuremberg nouns ending in a voiceless nasal consonant exemplified in (31), the question arises how to analyse such nouns in terms of their prosody. One possible speculation is to rely upon the concept of the mora, and to argue that a voiceless consonant (as a separate segment or as the second part of a geminate) does not add a syllable, but a mora. The prosodic structure in question would then be a moraic trochee. The possible role of moras in the description of such prosodic phenomena in German is very much an open issue.²⁶

Note finally that a lower role of the constraint PARADIGMCONTR is less dramatic than it seems at first sight. For Bavarian as well as for other dialects, the category of plural is often signalled by other means than a particular prosodic shape of a word or a specific suffix. The definite article in particular is generally distinct for singular and plural forms (see also the article forms given for various dialects in (17), (21), and (23) above), helping to reduce the functional load of plural marking within the noun itself. The vowel alternations, umlaut in particular, have also been kept in all the dialects studied here (see examples from (1) to (31) throughout the present paper), and provide further assistance in keeping singular and plural forms apart.

6 Conclusions

Descriptively, this paper has arrived at three results. First, final schwa (in German plurals) is not a suffix, but the consequence of a prosodic requirement. The presence

²⁶ For the Eslarn dialect, Bachmann (2000: ch. 2.3.3.) also lists a schwa-final plural class in his description of noun inflection. But from his phonetic description of this schwa, again in a different part of the grammar, (Bachmann 2000: 22), it appears that he actually refers to [ɐ], which in turn is vocalised /r/. The Eslarn dialect in this respect confirms the description provided for the Nuremberg dialect.

of final schwa can be derived from the application of prosodic constraints and their ranking, and thus need not be stated elsewhere. Secondly, the presence and position of plural marking is regulated through a set of interacting constraints demanding the presence of suffixes (if specified by morphological rule or by lexical item), a prosodic requirement, paradigmatic distinctions and paradigmatic uniformity. Thirdly, the set of plural suffixes is reduced from the usual five (*-e*, *-er*, *-en*, *-s*, *-o*) to three (*-er*, *-en*, *-s*) by taking prosodic requirements seriously, and allowing them to play an active role in the formation of word forms. In other words, there is considerable benefit to be gained from taking further steps in the prosodification of morphology.

Non-standard dialects often make use of a subset of the suffixes mentioned. Equally importantly, by looking at a set of German dialects, it is possible to demonstrate that an extensive typology of rankings of relevant constraints is operative. The variation between dialects of German results from the status of the disyllabic requirement, the presence or absence of the affixes (*-n* in particular), and the necessity to mark the plural. Such differences receive a natural interpretation in terms of constraint reranking. Concentrating on the prosodic condition named TROCHEE and the intraparadigmatic distinctness requirement (PARADIGMCONTR), a cross-classification of German plurals emerges as in (34). For the four logically possible types, this paper has discussed dialects of German which realise all of these typological possibilities.²⁷

(34) Micro-typology of German plurals

		Trochee	
		yes	no
Within-paradigm contrast	yes	Westphalian	Horath
	no	Standard German	Bavarian

Standard German, the system most thoroughly studied here as well as in German linguistics in general, turns out to be just one natural variant, predicted by the typology, among others. The Kirn dialect as studied in Section 5.1 is a mixed system with respect to the trochaic requirement, while the Zornthal dialect requires further differentiation with respect to case features. An over-all typology considering *all* relevant constraints and the possible systems derived from them would be desirable but goes beyond the scope of the present paper. In total, a more principled view on the inflectional paradigms for the number category of nouns is available and leads to a more insightful analysis of plural marking and its variation in German. This is made possible by relying on a clearer division of labor between prosody, morphology, and lexical specification (the latter in terms of class-specific suffixation and exception marking). A further lesson to be learned from the analyses provided above might be that the move to look beyond segments and their role in phonology and morphology is still an important topic on the agenda of linguistic descriptions.

²⁷ The ‘yes’ and ‘no’ values in (34) are to be taken with a grain of salt. According to OT, constraints are not on or off, but either high-ranked or low-ranked in the grammar of a given language.

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