Marked Targets versus Marked Triggers and Impoverishment of the Dual

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This article discusses morphological markedness as a trigger and target of postsyntactic feature-deletion operations (*impoverishment*; Bobaljik 2003, Bonet 1991, Halle 1997, Halle and Marantz 1993, Harley 2008, Noyer 1992, 1998) and, taking number as a case study, argues that dual is more marked than plural, in accordance with traditional and more recent approaches to inflectional morphology. In a system that employs abstract binary features, dual may be represented by a combination of the features [−singular,−augmented] (Conklin 1962, Noyer 1992), and the feature [−augmented] is marked in the context of [−singular]. This article draws a formal distinction between markedness-targeted impoverishment and markedness-triggered impoverishment, arguing that the latter is an important diagnostic for morphological markedness. Exemplification comes from syncretisms either directed at or conditioned by the dual in Sámi, Sorbian, Slovenian, Warlpiri, and Zuni, the last of which has been argued by Cowper (2005) to show that dual is less marked than plural.

Keywords: dual number, markedness, impoverishment, syncretism, morphology, Slovenian, Sorbian, Zuni

1 Features at Morphological Structure

Many morphological features that appear in the phonetic form of a morpheme carry person/number distinctions that are not interpreted by the semantics, for example, sequence of person (Rullmann 2004).

(1) a. We each think we're the only person on earth.
b. #We're the only person on earth.

It is clear that the morphological features [+author,−singular] on the embedded-clause subject *we* are not interpreted in (1a), since they lead to a semantic clash with the singular predicate, as shown in (1b). Rather, as Rullmann (2004) argues, the features of a binder are copied onto a bound variable by morphological rule. Cases such as these indicate that abstract ϕ-features of person and number may be directly manipulated in the morphological component, independently of their semantic contribution.

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Such mismatches can be understood in a model of grammar such as the Y-model of Chomsky 1993 and Halle and Marantz 1993, in which syntactic computation independently branches off to LF and PF. In Distributed Morphology, the structure of the PF component is further articulated into at least two basic stages. In the first of these, abstract morphological features may be copied or deleted; this is the *Morphological Structure* module, in which morphotactic well-formedness is evaluated and derived. In the second stage, the cycle of *Vocabulary Insertion*, terminal nodes and their constituent features are traded for phonetic content. It is not until this latter stage of linguistic computation that the actual phonological form of morphemes becomes visible and relevant to grammatical processes.

This article will focus on the representations and operations governing Morphological Structure, which by definition follow syntactic structure-building, independent of semantic interpretation, and precede the realization of features by phonological material. Morphemes are objects consisting of at least two types of information: morphosyntactic and phonological. Some morphemes lack underlying phonetic content and are supplied with this information by Vocabulary Insertion rules, applying within Morphological Structure. This module also includes feature-copying operations, such as the one responsible for copying the features [+author, −singular] from a binder onto its variable position prior to Vocabulary Insertion, and feature-deletion operations, which are driven by well-formedness requirements such as feature cooccurrence restrictions.

This modular organization of the grammar allows one to separate the markedness of featural categories from the specialization of the Vocabulary item exponents that a language may use to phonologically realize its abstract terminals. There is thus a sharp distinction between abstract markedness of morphological features and the distribution of phonological exponents, and failure to distinguish these can lead to certain conclusions about markedness—such as Cowper's (2005) conclusion that the Zuni dual is less marked than the plural—that are not based on the featural content of the categories. In this article, I argue that morphological markedness is a reflection only of the abstract featural content of terminal nodes and that this markedness can induce postsyntactic feature deletion affecting either the marked triggering category or an orthogonal feature, with no effect on interpretation, and with indirect effects on phonological realization that only arise in the subsequently ordered stage of Vocabulary Insertion.

Impoverishment rules (e.g., Bobaljik 2003, Bonet 1991, Halle 1997, Halle and Marantz 1993, Harley 2008, Noyer 1992, 1998) depend on a model of the syntax-phonology interface in which syntactic agreement occurs prior to the realization of features by phonological material, and in which feature-deletion operations may apply in between the output of syntax and the realizational procedure of choosing phonological exponents for morphosyntactic features. By deleting features, impoverishment operations decrease the number of possible overtly realized morphological distinctions, thereby giving rise to syncretism—the realization of two distinct morphosyntactic categories by the same phonological exponent. Impoverishment rules are formulated in context-sensitive terms and can delete featural content within environments that either are idiosyncratic (so-called special impoverishment) or fall under a more systematic pattern determined by markedness. A large part of the research program is to see how many environments now classed in the former category actually fall into the latter.

As an introductory example of impoverishment as a syncretism-yielding operation, we may consider the English ''*amn't* gap,'' discussed in Francis 1985, which is by hypothesis triggered by context-sensitive markedness. Although contraction of a pronoun and a copula in a sentence with negation is licit (e.g., *I'm not lucky*), when negation and the auxiliary contract as a result of question inversion, the expected *amn't* form cannot surface; thus, **Amn't I lucky?* is not a possible output for many dialects of British or North American adult English (though it is possible for Francis's dialect area Nb1). This gap is, by hypothesis, related to the featural content of the first person, which restricts its ability to locally combine with other features, such as negation or gender. In dialects where *amn't* is disallowed, this fact would arguably not be modeled formally by a syntactic restriction: there is little motivation for a syntactic rule that specifically bans head movement of negation together with 1st person copula to the complementizer position. More troubling for a syntactic account of this phenomenon is the fact that the result of attempting to ask a negated-copula question with a 1st person subject is not ineffable. Speakers who wish to convey such questions do so through the use of morphological exponents for the copula that exhibit a clear mismatch: **Amn't I lucky?* becomes *Aren't I lucky?* While a phonological motivation for the *amn't* gap may be plausible, its repair is clearly morphological (wholesale replacement of *am* by an unexpected auxiliary with different morphosyntactic features) rather than phonological (e.g., repair of a nasal cluster by vowel epenthesis). A well-known morphological mismatch is exhibited by forms such as *Aren't I lucky?*, discussed in Francis 1985; see also Bresnan 2001 and Nevins 2008. More exciting for present purposes, and less well known, is the dialect area Nb5 described in Francis 1985, which exhibits the following pattern:

(2) a. I am lucky. / *I is lucky.
    b. Isn't I lucky?

Speakers who utter (2b) exhibit a mismatch in the feature of person: the Vocabulary item *is* is not used with 1st person singular subjects, though it is used with 3rd person singular subjects. Such phenomena are modeled very well in an architecture with postsyntactic realization of inflectional features. With the serially modular and realizational architecture in hand, we may assume that the syntax always operates with the same process of head movement of negation and copula to the complementizer position in questions, regardless of the ϕ-features on the copula. The result of these syntactic operations, however, may ultimately contravene the following morphotactic prohibition on context-sensitive markedness, assuming that Neg^0 and the copula have formed a complex node by head movement:

(3) Amn't *Ban*
    *[+author,+singular] on the same complex node as [+negative] under $C^0 + T^0_{[+\text{present}]}$.

A contracted copula *'m* can cliticize leftward to a pronominal subject (yielding ***I'm***). However, in the case of subject-aux inversion, *amn't* would be expected to arise when contracted negation *n't* cliticizes to the copula in C^0. In examining the ban on this expected form in (3), we may understand it in terms of morphological markedness: as negation is marked (Croft 1990:93) and [+author] is marked (see Nevins 2007 for recent discussion), the ban in (3) may be seen as a

reaction to the presence of two marked features on the same node. The ban may be resolved by deleting one of the offending features. In particular, in response to (3), one may delete [+author].

(4) *English Nb5 Impoverishment Operation*
Delete [+author] when on the same complex node as [+singular] and [+negative] under C^0.

In order to have the appropriate effect, (4) must occur after the syntax has already generated the offending combination, and before Vocabulary Insertion has applied to insert the form of the copula. Such deletion rules that operate on ϕ-features after syntactic computation but before Vocabulary Insertion are called *impoverishment* rules, because they lead to a loss of morphosyntactic featural distinctions on the way to phonological realization.

Given the Vocabulary items realizing the copula and their distribution in English, the impoverishment rule in (4) will yield a set of features that can no longer be realized by the [+author] item *am*, and now must be realized by the Vocabulary item *is*. The result is that these dialects deal with the *amn't* gap by saying *Isn't I lucky?*, as an indirect result of the fact that the featural content on the auxiliary was partially deleted ([+author] being impoverished) during a point in the derivation at which the morpheme lacked phonetic content altogether.

Among the important claims within the attempt to tie morphosyntactic markedness to instances of featural impoverishment is that one will not find dialects of English that display unexpected morphological realizations in the 3rd person and negation alongside the absence of such effects in the 1st person, given that [+author] is marked with respect to [−author]. Thus, while Francis's dialect Nb1 tolerates 1st person + negation on the copula, it also tolerates 3rd person + negation. The prediction of an implicational marking statement is that no dialect will allow *amn't* while disallowing *isn't*, and more importantly, that no dialect will resolve a context-sensitive markedness filter on 3rd person features by overt use of the morphological realization for 1st person. A distinguishing feature of impoverishment theory is that there is no mechanism to convert 3rd person features into an even more marked set of feature specifications, and therefore an unattested outcome like the one just described cannot be achieved.

The article is organized as follows. In section 2, I introduce markedness diagnostics in morphological theory and narrow the focus of the discussion onto markedness-targeted and markedness-triggered impoverishment. Choosing the category of dual number as a paradigm case study of markedness undergoing both these types of feature-deletion operations, in section 3 I introduce the abstract binary features used to represent number distinctions. In section 4, I discuss markedness-targeted impoverishment of the dual in Sámi and Warlpiri. In section 5, I turn to the core demonstration of markedness-triggered impoverishment, showing how it operates on the featural content of the dual in Zuni. In section 6, I show that the Ljubljana variety of Slovenian exhibits both markedness-directed and markedness-targeted impoverishment for the dual. I conclude in section 7 with a case of markedness-triggered impoverishment by the dual in Upper Sorbian that persists even when the affixal exponents change—a concluding argument that impoverishment rules provide a model for persistent syncretisms, and that morphotactic well-formedness at the level of Morphological Structure is independent of the phonological exponents eventually chosen to realize those features.

2 Markedness Diagnostics as Applied to the Dual

The point of departure for this study is the observation that certain morphological categories that are formally expressible in a language sometimes go unexpressed. Following Bonet (1991), Noyer (1992, 1998, 2001) proposes that when morphologically marked features exceed language-specific thresholds of complexity, postsyntactic impoverishment rules delete those features, suppressing their morphological realization. For example, a language such as Russian that has robust distinctions among declension classes (roughly correlated with gender) may nonetheless fail to express them in certain environments (e.g., plural nouns in oblique cases). While Noyer 1998 contains an important discussion of the impoverishment *of* marked features, to date there has been little emphasis within Distributed Morphology on impoverishment that is *caused by* marked features but that affects orthogonal, possibly nonmarked features along other ϕ-featural dimensions. This article aims to contribute to that discussion by specifically arguing that implicational statements over impoverishment operations diagnose markedness and that markedness of inflectional categories may be a consequence of context sensitivity of feature-value combinations. To illustrate the distinction between *markedness-targeted* and *markedness-triggered* impoverishment, I use the category of dual number as a specific case study throughout the rest of the article.

I will look especially at markedness-triggered impoverishment induced by the features underlying dual number in Zuni, Slovenian, and Sorbian. These case studies reveal the role of markedness—due to the presence of dual number—in triggering impoverishment of *other* inflectional distinctions, namely, case and gender. Demonstrating that this *dual-triggered* impoverishment of case features results from the markedness of the dual is of some interest because these same facts have been argued by Cowper (2005) to demonstrate the opposite conclusion. We will find instead that Zuni case-impoverishment within the context of impoverishment theory actually upholds the claim that dual is more marked than plural. Before proceeding further, however, we turn to a discussion of markedness within grammatical theory.

Simply put, markedness is the asymmetric treatment of two categories within an opposition where equal patterning might otherwise be expected. The specific formal treatment of markedness adopted here is that one value of a binary feature is marked, that is, treated asymmetrically with respect to a variety of linguistic processes. Typological and pregenerative research contains a number of diagnostics for markedness. Under Jakobson's (1941) definition of markedness, a marked category is mastered later in acquisition, more likely to be lost in language change, and typologically rarer. By these criteria, dual number clearly qualifies as marked, and as more marked than plural.

(5) a. Dual is correctly mastered later than plural number by children (Ravid and Hayek 2003 on Palestinian Arabic).
b. Dual has been lost or has declined to lexical usage in many language families (e.g., Greek, Semitic, much of Slavonic; Corbett 2000:269 and references therein).
c. Dual is typologically rarer than plural number (Corbett 2000).

A separate tradition, initiated by Greenberg, pursues different markedness diagnostics. One is inventory-based implication: a marked category is one that implies the presence of the unmarked

category. Dual qualifies as marked under this definition, as expressed in Universal 34: ''The presence of dual implies the presence of plural'' (Greenberg 1963). In (6), I review Greenberg's (1966) eight diagnostics for morphosyntactic markedness, as compiled by Croft (1990:71); I also discuss whether they are applicable and what they reveal for dual as opposed to plural number.[1] (Note that two of the diagnostics, (6a) and (6c), are stated in terms of tendencies.)

(6) a. ''The surface realization of the unmarked value is frequently that of zero vs. nonzero morpheme (more generally: the realization of the marked value will involve at least as many morphemes as the realization of the unmarked value).''
Applicable for dual in only limited fashion: Zero morphemes are rare for plural marking to begin with. See, however, Manam duals (19), which are expressed using more morphemes than the plural.

b. ''*The marked member will display syncretization of its inflectional possibilities with respect to the unmarked member (that is, there will be at least as many distinct forms in the paradigm with the unmarked value as in the paradigm with the marked value).*''
Applicable for dual: This is one of the central themes of this article, markedness-triggered impoverishment; see (7b).

[1] Zwicky 1978 contains a different set of diagnostics for markedness, some of which overlap with Greenberg's/Croft's in the text. The seven diagnostics, and their applicability to the dual, are these:

(i) a. Material markedness: The category is realized using more morphologically overt material.
Applicable to dual: This is equivalent to (6a).

b. Semantic markedness: The category conveys additional semantic information.
Applicable to dual: See (6c) and the definition of [−augmented] in (14), which adds information to [−singular] (namely, the fact that no proper subsets of a dual satisfy [−singular]).

c. Implicational markedness: The number of distinct forms shown by the dual is not greater than the number of distinct forms shown by the plural, in terms of allomorphy and syncretism. This corresponds to (6b), (6d), and (6e).

d. Abstract syntactic markedness: The category is asymmetrically treated as the result of a syntactic relation such as agreement, case assignment, government, concord, or licensing. For example, infinitives do not undergo agreement, pronouns must be assigned case, negative quantifiers must be licensed. It is not obvious how current syntactic theory would require a dependency relation specifically for dual number on nouns (though perhaps one could argue that dual number requires specific licensing by an abstract Num^0 head above the noun root).

e. Productive markedness: Are new nouns (e.g., loanwords or coinages) assigned to the category? Examples include gender and declension class assignment.
Likely not applicable to dual: Nouns do not commonly bear an inherent dual classification; even count nouns that often ''come in pairs'' still have singular forms in languages with robust use of the dual.

f. Stylistic markedness: Is the form avoided in casual speech registers?
Applicable to dual: However, most evidence that I have on this point is anecdotal. For example, Lanko Marušič (pers. comm.) reports that omission of the dual with 1st person is common when inviting a friend for a beer in Goriška Slovenian.

g. Statistical markedness: Equivalent to (6h).

In sum, these diagnostics also converge on assessing the dual as marked. As the distinction between (6b) and (6d) is crucial in this article, in the text I focus on the diagnostics in (6).

c. ''The form that normally refers to the unmarked value will refer to either value in certain contexts ('facultative' use).''
Applicable for dual: See footnote 23 on facultative uses of plural with inherently dual nouns in Slovenian.

d. ''*In certain grammatical environments, only the unmarked value will appear (contextual neutralization).*''
Applicable for dual: This is one of the central themes of this article, markedness-targeted impoverishment; see (7a).

e. ''An unmarked form will have at least as many allomorphs or paradigmatic irregularities as the marked form.''
Applicable (though limited) for dual: There are nouns in Slovenian that show different stems in the plural but not in the dual; for example, *človek* 'person' has the allomorph *ljud* in nominative plural but not in nominative dual. The converse pattern does not exist.

f. ''An unmarked form will display at least as great a range of grammatical behavior as that of the marked form.''
Possibly applicable for dual: Relevant examples might be limitation of use of duals to animate arguments while plural can be used with inanimates, as in Manam (Corbett 2000:93).

g. ''The plural form of the unmarked gender is used to refer to collections consisting of objects of both genders ('dominance').''
Inapplicable for dual: This diagnostic looks at the agreement that is triggered by conjunctions (e.g., *a boy and a girl*) and can be used to determine gender markedness but not dual markedness.

h. ''In text counts, the unmarked value has at least as great frequency as the marked value.''
Applicable for dual: Confirmed for Sanskrit, Slovenian, and Upper Sorbian in Corbett 2000:281.

As (6) shows, these diagnostics converge on assessing dual as marked with respect to plural. Two of the criteria bear directly on the featural representation of morphosyntactic categories as formalized here: (6d) and (6b), which are implemented in terms of impoverishment operations over values of binary features in (7). In *Markedness-Targeted Neutralization*, a marked category is frequently neutralized in certain environments. In *Markedness-Triggered Neutralization*, a marked category causes neutralization of *other* categories.

(7) For a marked feature *mF* and its unmarked counterpart *uF*:

a. *Markedness-Targeted Neutralization:* The expression of *mF* is identical to the expression of *uF* in an environment *E*.

b. *Markedness-Triggered Neutralization:* A feature [±G], $F \neq G$, is not distinguished in the presence of *mF* although it is distinguished in the presence of *uF*.

As I will demonstrate, the dual participates in both of these neutralization processes, revealing its marked status. More important, however, is the absence (or extreme rarity) of a singular-dual-plural number system in which plural undergoes these processes but dual does not. The predictions of implicational markedness-based neutralization can thus be summarized as follows:

(8) Universal Grammar will disprefer a singular-dual-plural number system in which the less-marked plural undergoes (7a) or (7b) while the more-marked dual does not.

Although at times there have been questions about whether all markedness diagnostics converge for certain categories (see, e.g., the discussion of the relative markedness of 1st and 2nd person in Croft 1990:chap. 4), for the case of dual versus plural, *all* of these diagnostics appear to converge.[2] Dual number is thus an ideal case study in context-sensitive markedness and neutralization processes.

3 Context-Sensitive Markedness and Number Features

3.1 The Features [±singular] and [±augmented]

When we consider markedness in classical terms, as a relation among members of an opposition, the ternary opposition of singular-dual-plural systems clearly becomes problematic.

> If we examine the standard typological evidence for markedness, we find that in comparing the dual and plural, the dual is marked and the plural is unmarked. In the classical theory of markedness this leads to a paradox: on the one hand the evidence indicates that the plural is marked, but other evidence indicates that the plural is unmarked. (Croft 1990:95)

[2] As a reviewer notes, assessing markedness through the convergence of various criteria has come under scrutiny in Haspelmath's (2006) article ''Against Markedness (and What to Replace It With),'' which argues that the formal concept of markedness can be replaced by frequency asymmetries in usage. While there is much to be discovered about the relationship between corpus frequency and the formal theory of markedness (see Pustet 2009), it appears most prudent to adhere to the observation that frequency of use is a symptom, rather than a cause, of grammatical asymmetries. More specific to Haspelmath's claims that frequency can replace markedness, it has been known since Greenberg 1966:45 that frequency counts for the category of person are highly unreliable, owing to genre-dependence of the texts chosen for counting. (See also Bobaljik and Zocca, to appear, for evidence that Haspelmath's claims that semantic markedness among gender terms result from frequency alone do not hold up when actual corpus counts are conducted.)

Haspelmath's arguments ''against markedness'' revolve around the fact that the term *markedness* has many different uses in linguistic theory; he enumerates 12, and argues that certain ones should be replaced by measurements of frequency, semantic complexity, and phonetic difficulty. Of these 12 senses of *markedness* used in various domains of language research, from phonetics to semantics to language acquisition to diachronic change, only the first is directly relevant to the current discussion: the sense based on Trubetzkoy's (1969) concept in terms of asymmetric neutralization, about which Haspelmath says this:

> Trubetzkoy's notion of mark is an abstract one that cannot be read off directly from a segment's phonetic properties. . . . ''Functioning of the system'' seems to refer primarily to neutralization: in a language like German, where the syllable-final position only allows *t*, the mark-bearing member of the opposition is *d*. This sense of ''mark'' was not widely adopted by later phonologists, so I will not specifically argue against it here. (p. 28)

The final remark is deeply inaccurate, as this sense of markedness is widely used by phonologists, and morphologists as well. More important for the current discussion is that Haspelmath explicitly fails to offer an argument against neutralization-based markedness and does not propose anything ''to replace it with.''

What Croft is referring to is the fact that plural is *unmarked* with respect to dual, but *marked* with respect to singular. In absolute terms, then, plural cannot be characterized as either a marked or an unmarked category of number. It is precisely for these reasons that we need *two* binary features. In the framework developed here, plural is unmarked with respect to dual because dual possesses a marked feature-value that plural does not, namely, [−augmented].[3] At the same time, plural (as well as dual) contains a marked feature-value that singular does not, namely, [−singular]. This relative markedness can be formalized in terms of decomposition into features (9), and the markedness statements in (10) and (11).[4]

(9) *Feature-based representations of number categories* (Conklin 1962, Harbour 2006, Noyer 1992)
a. Singular = [+singular,−augmented]
b. Dual = [−singular,−augmented]
c. Plural = [−singular,+augmented]
d. The combination [+singular,+augmented] is impossible.

(10) *Context-free markedness statement*
The marked value of [±singular] is −.

(11) *Context-sensitive markedness statement*
In the context [−singular], the marked value of [±augmented] is −.

The appeal to context-sensitive markedness in morphology parallels its use in phonology.

(12) *Context-sensitive markedness of laryngeal features*
In the context [−sonorant], the marked value of [±voice] is +.

(13) *Context-sensitive markedness of vowel color features*
In the context [−back], the marked value of [±round] is +.

Given the definition of the feature [±augmented] in (14) and the fact that all [+singular] referents are [−augmented], it would not make sense to say that [−augmented] was context-free marked, thus necessitating the use of context-sensitive markedness in (11); it is only in combination with [−singular] that [−augmented] is marked.

Next, let us define and motivate the above features. [+singular] should not need much discussion; it is true if the cardinality of the reference set is equal to 1. The feature [±augmented], however, departs from more familiar ϕ-features in that it is always *relativized to another feature*. Pursuing a model in which all features are represented as truth-conditional predicates, [+augmented] can be defined as follows:

[3] See Watanabe 2009 for a related though distinct use of this feature for numerals inside noun phrases.

[4] As (10) and (11) make clear, with binary features there is no necessary relation between the marked value of a feature and the positive value, as the latter is related to the truth-functional denotation of the feature.

(14) *Definitions of number features*

a. $[+F] = \neg [-F]$

b. $[+\text{augmented}] = \lambda P \lambda x \exists y [y \subset x \wedge P(x) \wedge P(y)]$

In prose, what [+augmented] means is, Given some predicate P that is true of some set *x*, *x* is [+augmented] if there is a proper subset of *x* for which P is also true. Thus, if P is [+singular], and the reference set contains only one member, this set is [−augmented] for its value of [±singular], because there is no proper subset that is still [+singular]. Sets of cardinality 1 are thus [−augmented] for [±singular].

Now consider a set of cardinality 100. This set is [−singular], and there is indeed at least one proper subset that is still [−singular] (in fact, there are many of them). Thus, this set is [+augmented] for its value of [±singular].

Finally, consider a set of cardinality 2. This set is [−singular]. However, *there is no proper subset of a set of cardinality 2 that is still [−singular]*. Thus, this set is [−augmented] for its value of [±singular].

The feature [±augmented] was developed for an independent reason by Conklin (1962) for the pronoun system of Ilokano. Recall that [±augmented] is always relativized to another feature. In the case of the dual, [±augmented] is relativized to the value of [±singular]. However, in principle [±augmented] could be used in combination with any other ϕ-feature. In Ilokano, it is used in combination with the person features [+author] and [+addressee], which are true if the reference set contains the speaker and the addressee, respectively. What is interesting about the Ilokano pronoun system is that [±singular] is not used at all. The definition of [±augmented] alone, coupled with the person features as predicates, derives the system. The traditional classification is given in (15), and the classification using only [±augmented] in (16).

(15) *Traditional classification of Ilokano pronominal system*

	Singular	Dual	Plural
1st inclusive		ta	tayo
1st exclusive	ko		mi
2nd	mo		yo
3rd	na		da

(16) *Ilokano pronoun system with [±augmented]*

	[−augmented]	[+augmented]
[+auth,+addr]	ta 'you and I alone'	tayo 'you and I and others'
[+auth,−addr]	ko 'I alone'	mi 'I and others (*but not* you)'
[−auth,+addr]	mo 'you alone'	yo 'you and others (*but not* I)'
[−auth,−addr]	na 'he, she, it'	da 'they'

The system as classified in (15) is obviously strange: why should only one person category have a dual number? The classification of this system in (16) answers this question. Dual is the only possible number for a set that contains both the author and the addressee and is [−augmented]

for these person features: anything smaller would no longer satisfy the two predicates [+author, +addressee]. The other person categories can be derived similarly: singular number for 2nd person is [−augmented] because no proper subset of a set containing just the addressee would still contain the addressee. There is no feature like [±dual] in Ilokano, or in any language.

Instead, the feature [±augmented] is of sufficiently general use in ϕ-feature systems and can be motivated (in fact, was introduced) independently of its role in full-blown singular-dual-plural systems. What is particularly interesting about its role in number categories is the combination of [−augmented] and [−singular], which leads to context-sensitive markedness in the case of the dual.

3.2 Morphological Evidence That Dual Is Composed of Two Features

An important empirical argument that dual number should be viewed as the result of combining two features rather than as a third value of one feature comes from cases in which overt morphological evidence is found for both [−augmented] and [−singular]. Such a case can be found, for example, in Manam, where the formation of dual number involves a morpheme added to the [−singular] form.[5]

(17) áine ŋara
woman that
'that woman'

(18) áine ŋara- di
woman that- 3PL
'those women'

(19) áine ŋara- di- a- ru
woman that- 3PL- EP- DL
'those two women'

The example in (19) shows that the category [−singular] is expressed by the suffix *-di*, and that the realization of dual (in present terms, [−augmented] in the context of [−singular]) is the additional morpheme *-ru*.[6] If dual were treated as simply another value for ''number,'' it would be difficult to explain the presence of two distinct morphemes in (19).

A more dramatic case of composing duals with two distinct morphemes is the ''constructed duals'' of Hopi (Bliss 2005, Cowper 2005, Hale 1997, Harley and Ritter 2002, Noyer 1992), in which [−singular] and [−augmented] appear on distinct syntactic elements.

[5] All examples are glossed using abbreviations specified in the Leipzig Glossing Rules (http://www.eva.mpg.de/lingua/resources/glossing-rules.php). The vowel *-a-* appearing between the plural marker and the dual marker is an epenthetic morphological buffer, according to Lichtenberk (1983) and Croft (1990), represented in (19) as *-EP-*.

[6] Manam also has a paucal number, developed from an original trial (Corbett 2000:25). Harbour (2006) accounts for the paucal in terms of iterative application of the feature [±augmented]. I will not treat the paucal formally here.

(20) Pam wari.
he ran.SG

(21) Puma yùutu.
they ran.PL

(22) Puma wari.
they ran.SG
'They (two) ran-dual.'

I assume that the features of the subject pronoun are copied to the verb by ordinary syntactic agreement, that it is at the point in the derivation after the ϕ-features have been copied onto the verb that Vocabulary Insertion furnishes abstract morphemes with phonetic content, and that what is special about Hopi is that its subject pronouns and its verbs undergo different types of feature-deletion operations in reaction to the context-sensitive markedness of the combination [−singular,−augmented]. As a result of these impoverishment rules prior to Vocabulary Insertion, the pronouns show syncretism between dual and plural forms but the verbs show syncretism between singular and dual forms. These syncretisms are due to neutralization in the structure of the Vocabulary items of Hopi. (Corbett (2000:169–171) discusses parallel phenomena in Zuni and in Kawiisu (Uto-Aztecan).) In Hopi, the pronouns morphologically distinguish only [±singular], while the verbs morphologically distinguish only [±augmented].

(23) a. /puma/ ⇔ [−singular,+pronominal]
b. /pam/ ⇔ [+singular,+pronominal]
c. /wari/ ⇔ [−augmented,RUN]
d. /yùutu/ ⇔ [+augmented,RUN]

As a consequence of the ordered interaction between feature deletion and Vocabulary Insertion, Hopi does not make an exclusive singular-dual-plural distinction in pronoun-verb combinations; hence, the ''constructed'' dual emerges as a consequence of a [−augmented] pronoun and a [−singular] verb, thereby demonstrating that ''dual'' itself does not exist as a primitive feature. This pattern is not limited to pronouns. Determiners syncretize dual/plural (although nouns do not), as the following examples demonstrate (Jeanne 1978:73):

(24) Miʔ maana wari.
that.SG girl.SG ran.NONAUG
'That girl ran.'

(25) Mima mamant yùutu.
those.NONSG girl.PL ran.AUG
'Those girls ran.'

(26) Mima maanat wari.
those.NONSG girl.DL ran.SG
'Those (two) girls ran-dual.'

Much like the pattern with pronouns above, determiners express a distinction only in [±singular], while the suppletive verb manifests a distinction between [+augmented] and [−augmented]. By

contrast, nouns express the full three-way distinction. By hypothesis, postsyntactically deletion (via impoverishment rules) targets the feature [±augmented] on D^0 elements and the feature [±singular] on verbs. Again, the expression of dual on determiners and verbs provides confirmation for a theory of number features in which the distinctions [±singular] and [±augmented] are independent of each other, and in which the category dual is the result of a marked combination of [−singular] and [−augmented].

It is important to distinguish between the current model, based on binary features and their context-sensitive deletion, and a class of models that implements markedness reduction through scalar hierarchies. For example, the cases of dual neutralization to singular on Hopi determiners but to plural on Hopi verbs cannot be accounted for straightforwardly under a hierarchy of markedness constraints such as the optimality-theoretic hierarchy in (27).

(27) *Dual ≫ *Plural ≫ *Singular

Tripartite harmonic scales such as (27) would be insufficient for expressing the markedness of dual compared with plural, since (27) predicts that, when a faithfulness constraint such as Ident(dual) is ranked below *Dual, the result will be neutralization to *singular*. When Ident(dual) is outranked, what the output should be is decided purely by markedness constraints, which would naturally favor the least marked category. However, as we see in Hopi verbs, the neutralization results in plural, rather than singular.

By contrast, in a binary-feature system, the marked combination [−singular,−augmented] is resolved at Morphological Structure by deletion of either [−singular] *or* [−augmented]. Deletion of the latter may feed subsequent Vocabulary Insertion of a phonological exponent realizing only [−singular], which then leads to a neutralization between the realization of dual and the realization of plural.

4 The Dual Undergoes Markedness-Targeted Impoverishment

4.1 Context-Sensitive Impoverishment of [±augmented] in Sámi

One of the central empirical claims of this article, that dual is more marked than plural, is supported by the fact that while dual undergoes neutralization to plural, plural does not undergo neutralization to dual. Markedness-targeted impoverishment specifically targets marked features for deletion and thereby reduces markedness, and the empirical fact that plural never neutralizes to dual confirms that plural is not more marked than dual. Cases where neutralization goes in the opposite direction, from more-marked dual to less-marked plural, are by contrast well attested. In Northern Sámi, as discussed by Vinka (2001), verbal agreement makes a dual/plural distinction for definite subjects.[7]

[7] Sámi has a productive process of diphthong simplification in syllables preceding mid vowels [e,o], hence the monophthongization in the plural forms. It may be possible to analyze the stem as /boahti/, with final vowel deletion before the vowel-initial ending. I thank Peter Svenonius for helpful discussion on the morphophonology of Sámi verbs.

(28) Dat guokte mánat *boahti- ba* deike.
those two children.NOM come.PRES- DL here
'Those two children come here.'

(29) *Dat guokte mánat *boht- e* deike.
those two children.NOM come.PRES- PL here
'Those two children come here.'

However, this distinction is neutralized when the subject is indefinite, and the verb takes plural agreement with both dual and plural subjects.

(30) Mánat *boht- e* deike.
children.NOM come.PRES- PL here
'Children come here.'

(31) *Guokte mánat *boahti- ba* deike.
two children.NOM come.PRES- DL here
'Two children come here.'

(32) Guokte mánat *boht- e* deike.
two children.NOM come.PRES- PL here
'Two children come here.'

The form in (32) clearly demonstrates an instance of (7a): in the environment of indefinite subjects, the expression of dual is identical to that of plural (in fact, it is the plural form that is used). Given that the feature [±augmented] distinguishes the [−singular] categories dual and plural, and that [−augmented], the value of this feature for dual, is the marked value of the two, the North Sámi paradigm can be characterized formally as follows:[8]

(33) *Markedness-Targeted Neutralization of [−augmented] in North Sámi*
The expression of [−singular,−augmented] is identical to the expression of [−singular,+augmented] in the environment of indefinite subjects.

Vinka (2001) proposes an implementation of (33) in terms of impoverishment. The key to understanding impoverishment is that it is an operation that leads to *emergence of a less-specific exponent*, because it feeds the later operations of Vocabulary Insertion that turn abstract feature-containing terminals into phonological exponents. In Distributed Morphology, it is assumed that inflectional morphemes may be underspecified with respect to the features that they realize (Halle and Marantz 1993). A terminal node in the syntax with a set of ϕ-features will be realized by a

[8] Mikael Vinka (pers. comm.) has made me aware of additional data on South Sámi. Although the phonological form of particular morphemes diverges from that of particular North Sámi morphemes in certain ways, the dual-targeted impoverishment rule is identical to that described in the text for North Sámi.

phonological exponent called a Vocabulary item, as determined by the Subset Principle, defined in (34) (based on Halle 1997).

(34) *The Subset Principle for Vocabulary Insertion*

a. *The Subset Clause:* A phonological exponent realizes a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme.

b. *The Maximal Subset Clause:* Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

Let us assume the partial list of Vocabulary items in (35) for [−singular] present tense forms of the verb 'to come' in Sámi (see footnote 7 on the phonology of the stem).

(35) a. /-ba/ ⇔ [−singular,−augmented]

b. /-e/ ⇔ [−singular]

When the output of the syntax results in the features [−singular,−augmented] on the present tense form of 'to come', as in (28), the Maximal Subset Clause of (34) will require that (35a) be inserted rather than (35b), correctly ruling out (29). On the other hand, when there is an indefinite subject, we assume that a postsyntactic impoverishment rule applies *prior to Vocabulary Insertion*.

(36) *Sámi Markedness-Targeted Impoverishment Operation*

Delete marked [−augmented] in the context of [−singular] on a terminal node of a verb when the subject noun phrase is indefinite.

This is a context-sensitive neutralization rule, necessarily ordered prior to Vocabulary Insertion. As a result, it bleeds the otherwise normal insertion of (35a). Since the verbal node in (32) will not contain the feature [−augmented], in accordance with the Subset Clause of (34), only the less-specific Vocabulary item (35b) may be inserted as the realization of the remaining feature [−singular].

Markedness-targeted impoverishment is thus a very general operation that affects a wide range of marked inflectional categories and serves as an important diagnostic for markedness: dual is neutralized to plural in certain contexts. By hypothesis, the impoverishment rule in (36) is motivated by the content-sensitive markedness of [−augmented]: as Trubetzkoy (1969) discusses, when a binary opposition is neutralized in favor of one of two categories, it is always neutralized in favor of the unmarked category. The Sámi facts do not receive a natural analysis if dual is less marked than plural; if it were, we would expect that in the environment of indefinite subjects, the dual form of the verb would be used regardless of the number of the subject, contrary to fact (30). Importantly, the formulation of (36) makes clear that the feature-deletion operation affects only [−augmented] and that the resulting syncretism after Vocabulary Insertion is therefore ''dual → plural,'' rather than ''dual → singular.''

4.2 Dual-Targeted Dissimilation in Warlpiri

A slightly more intricate case of the markedness of dual is found in the dissimilative impoverishment of dual in Western Warlpiri, described by Hale (1973). Warlpiri has clitics on the second-position auxiliary that agree with subject and object. Warlpiri has distinct clitics for 1st person dual subjects and 1st person plural subjects: 1st person dual is realized by a single fused clitic, while 1st person plural is realized by distinct 1st person and plural number morphemes. (37) and (38) show the ordinary distinct marking of dual and plural.[9]

(37) Ngaju manu yali ka-rlijarra purla-mi.
I and that PRES.IMPF.AUX-1EXCL.SUBJ.*DL* shout-NONPAST
'I and that one are shouting.'
(Hale 1973:320)

(38) Nganimpa-rlu ka-rna-ngku-lu nyuntu nya-nyi.
1PL-ERG PRES.IMPF.AUX-*1EXCL.SUBJ*-2OBJ-*PL.SUBJ* 2SG see-NONPAST
'We (plural) see you (singular).'
(Hale 1973:328)

As in Sámi, in Western Warlpiri, dual is targeted as a marked category that undergoes impoverishment in a specific context. In this case, the context is a syntagmatic rule of dissimilation. Thus, just as the marked nature of [+voice] in Japanese obstruents is best detected when there are *two* instances of it in adjacent contexts (Ito and Mester 2003), in Western Warlpiri the marked nature of [−augmented] in [−singular] referents is best detected by observing the effects when two duals are adjacent. Hale (1973) observes that whenever a dual clitic occurs on the same auxiliary node as another nonsingular clitic, the dual is neutralized and assumes the form of the plural. Thus, although the pronouns remain dual in (39), verbal agreement does not.

(39) *Ngajarra-rlu ka-rlijarra-ngku-pala nyumpala nya-nyi.
1DL-ERG PRES.IMPF.AUX-*1DL*-2.OBJ-*DL.OBJ* 2DL see-NONPAST
'We two see you two.'
(Hale 1973:330)

We saw in (38) that when a dual argument is the only nonsingular clitic, it is realized by a specialized dual clitic form. However, when there are two dual arguments, the doubly marked presence of both is enough to trigger an impoverishment rule that causes the dual arguments to be realized exactly like the corresponding plural arguments (see Noyer 2001:769: ''Evidently, the combination of two such [dual] features in Warlpiri surpasses a language-specific limit on informational richness''). Thus, in (40), while a 1st person subject dual clitic and a 2nd person object dual clitic would be expected and would be able to surface independently of each other,

[9] Examples have been updated from Hale's transcription to the standard Warlpiri orthography; I thank Julie Legate for assistance.

two duals cannot be realized together, owing to the markedness-based dissimilatory impoverishment rule in (41).[10]

(40) Ngajarra-rlu ka-rna-lu-nyarra nyumpala nya-nyi.
1DL-ERG PRES.IMPF.AUX-1SUBJ-*PL.SUBJ*-*2PL*.OBJ *2DL* see-NONPAST
'We two see you two.'
(Hale 1973:330)

(41) *Warlpiri Markedness-Targeted Impoverishment Operation*
Delete [−augmented] on a [−singular] clitic when adjacent to a [−singular] clitic.

This impoverishment rule deletes the contextually marked [−augmented] in the presence of another [−singular] clitic. The environment for the [−augmented] deletion rule is either a dual or a plural coargument, illustrating again that dual and plural numbers behave as a natural class sharing the conditioning feature [−singular].[11] Rules such as (41), like all context-sensitive impoverishment rules, are not obligatory in every language. Impoverishment can be understood as the result of markedness, but languages clearly may vary in whether they tolerate marked configurations or not. While Warlpiri neutralizes the dual/plural distinction when another dual is present, we do not expect a language in which the dual/plural distinction is *only* manifested when another dual is present.

Warlpiri thus exhibits a ''morphological Obligatory Contour Principle'' effect, stated over abstract binary features, in which the dual/plural distinction is neutralized, and is neutralized in favor of the less-marked plural clitics. Syncretic neutralizations that are the result of impoverishment can be thought of as ''emergence of the unmarked.'' As there are no known syntagmatic dissimilation rules in natural language in which an expected *plural* form is neutralized in favor of a dual, whereas Warlpiri provides an instance of an expected dual neutralized in favor of the plural, we may conclude that plural is the less marked.

[10] The formulation in (41) correctly captures the fact that both dual clitics in (40) undergo impoverishment to become realized by plural.

[11] Noyer (1998) presents a similar case in the language Nimboran in which the dual/plural distinction within subject agreement is neutralized in the presence of the plural object marker, thereby bearing a high resemblance to (41).

(i) a. ŋgedóu- k- d- u
draw.DL- NONSG- FUT- 1
'We (dual) will draw.'
b. ŋgedói- i- d- u
draw.DL- PL- FUT- 1
'We (plural) will draw.'
c. ŋgedói- i- dar- um
draw.DL- PL- OBJ.PL- NONMASC
'They (dual/plural) will draw them (plural).'

A dissimilatory impoverishment rule parallel to (41) that accounts for the Nimboran dual/plural neutralization is (ii), based on Noyer 1998:281.

(ii) Delete [−augmented] on a [−singular] affix when adjacent to a [−singular] affix.

5 The Dual Induces Markedness-Triggered Impoverishment

Markedness-triggered impoverishment is an operation of feature deletion that is *conditioned by* a marked feature *mF* and causes a distinction in some other feature to be neutralized. For example, there are few languages, if any, that have gender distinctions in the plural but not in the singular (Corbett 2000). This is arguably because an impoverishment rule may delete gender only in the marked environment of the plural, whereas it is much rarer if not impossible for an impoverishment rule to delete gender only in the unmarked singular. Similarly, no language has gender distinctions in the 1st person but not in the 3rd person (Siewierska 2000). Again, this is arguably because an impoverishment rule may delete gender only in the marked environment of 1st person, whereas it is rare if not impossible for an impoverishment rule to delete gender only in the unmarked 3rd person.[12]

Consider the very common impoverishment operation targeting gender in the environment of 1st person, exemplified here with Brazilian Portuguese.

(42) Eu estou bêbada.
1.NOM be.stage-level.1SG drunk.F.SG
'I am drunk.' (feminine)

Clearly, the feature [+feminine] must be present on the subject pronoun in order to trigger feminine concord on the adjective. However, it fails to show up on the agreeing auxiliary or on the pronoun itself. Notably, both of these items are ones where the feature of 1st person (namely, [+author]) is present.

The fact that all environments where [+author] occurs are ones where no distinction is made for the gender feature [±feminine], rather than being an accident of Portuguese, can be analyzed as the consequence of a systematic feature-deletion rule that applies to the output of syntax (Noyer 1992).

(43) *Portuguese Markedness-Triggered Impoverishment Operation*
Delete the feature [±feminine] on all terminal nodes that bear the feature [+author].

Impoverishment operations thus reinforce the systematicity of a morphologically neutralized distinction that is known to be syntactically present.

Let us next turn to the dual. On the basis of syncretism in the Zuni pronominal paradigm, Cowper (2005) argues that plural is more marked than dual (though without discussing the evidence in (5)–(6) to the contrary). Here, I will show that the Zuni pronominal paradigm actually further upholds the traditional wisdom that dual is more marked than plural, as it exemplifies yet another case of markedness-triggered impoverishment.

[12] With respect to 2nd person, the direction of markedness is not entirely clear, perhaps because of politeness-based honorification. (I thank an anonymous reviewer for bringing up this issue.) For example, some languages, such as Basque, do allow gender agreement on auxiliaries only for 2nd person. See Croft 1990:chap. 4 for additional discussion of some conflicting markedness diagnostics with 2nd person. By contrast, the markedness relation between 1st and 3rd person is entirely clear: the latter is unmarked, as revealed by a host of both markedness-targeted (e.g., the *amn't* → *isn't* pattern of section 1) and markedness-triggered diagnostics, in addition to clitic combination restrictions (Nevins 2007).

Various languages display markedness-triggered impoverishment in the presence of the dual.

(44) *Neutralizations in the environment of the dual*

a. Classical Arabic and Tunica distinguish gender in the plural, but not in the dual (Greenberg 1966).

b. Slovenian distinguishes dative from instrumental in the plural, but not in the dual (Börjesson 2006).

c. Sanskrit distinguishes six cases in the plural and only three in the dual (MacDonell 1927).

d. Kobon distinguishes between 2nd and 3rd person in the plural, but not in the dual (Baerman, Brown, and Corbett 2005:21).

e. Yava (Papuan) distinguishes between inclusive and exclusive 'we' in the plural, but not in the dual (Siewierska 2000:89).

These are classic instances of the markedness of the dual: the presence of marked dual causes neutralization of other featural distinctions. As Croft (1990:78) states, ''If one is looking for inflectional-behavioral evidence for the markedness patterns of values in a grammatical category, one must look at other categories orthogonal to the category in question and count morphological distinctions.'' In (44), neutralization in the orthogonal categories of gender, case, and person provides this evidence. In impoverishment theory, these systematic neutralizations can be enforced and maintained by impoverishment rules, such as (45), which is responsible for (44a), for example.

(45) *Classical Arabic/Tunica Markedness-Triggered Impoverishment Operation yields absence of gender distinctions*

Delete [±feminine] in the marked environment [−singular, −augmented].

Before we proceed, it is important to point out that all of the cases in (44) could potentially be handled without markedness-triggered impoverishment, by instead assuming underspecified Vocabulary items. For example, one might propose that Classical Arabic and Tunica have two Vocabulary items, masculine plural and feminine plural, and simply one Vocabulary item, dual, which is unspecified for gender. The problem with this approach is that it situates the gender syncretism in the contents of the lexical inventory of affixes, and therefore one could easily imagine the opposite inventory of Vocabulary items, with a feminine dual and a masculine dual but a gender-unspecified plural. Moreover, this approach would predict that new Vocabulary items could be innovated that would fill the gap—for example, that Classical Arabic could suddenly develop a feminine dual marker. This type of analysis is therefore akin to a phonological account of German final devoicing which says that a rule neutralizing [±voice] in the marked environment of the coda does not exist, and that there is simply a lexical inventory of surface forms that lacks items with a voiced final coda. Such an approach is rejected throughout phonological theory because it does not capture the generalization that voicing contrasts cannot exist in the marked environment of the coda as a general rule. Similarly, the impoverishment rule in (45) renders the neutralization of gender systematic in the marked environment of the dual, causing gender distinctions to collapse in both pronouns and agreement across all tenses and cases.

An important case where featural distinctions are neutralized in the marked environment of the dual occurs in Zuni. The relevant facts are shown in (46) for the 2nd person pronoun forms in nonnominative cases (Newman 1965). The facts for 1st and 3rd person are identical.[13]

(46)

	Objective	Possessive
Dual	toʔnaʔ	toʔnaʔ
Plural	toʔnaʔ	toʔnʔa:wan

The form *toʔnaʔ* is used for dual objective, dual possessive, and plural objective, while the form *toʔnʔa:wan* is used for plural possessive only. In other words, the two nonnominative cases, possessive and objective, are not distinguished in the dual, though they are distinguished in the plural.

However, Cowper (2005) interprets these facts as demonstrating that *toʔnaʔ* is specified for the feature [>1], meaning that it is compatible with any nonsingular features and thus can show up in the dual, while *toʔnʔa:wan* is specified for the features [>1, >2, poss], meaning that it is only compatible with plural possessive features. Cowper concludes that in order for *toʔnaʔa:wan* to block *toʔnaʔ*, plural must bear a feature that can be referred to. Cowper employs a system of underspecification and markedness rather unlike the one adopted here: in her system, ''more features = more markedness.''[14] Since Cowper's privative theory requires that whenever reference is made to a feature, it must be to the marked value, and since the feature of plural must be referred to in *toʔnaʔa:wan*, Cowper concludes that plural is more marked than dual in Zuni. This conclusion is crucially based on the idea that unmarked features cannot serve as the context for insertion of Vocabulary items, because Cowper's featural system is privative. However, the assumption that Vocabulary items can only refer to marked values must be rejected on independent grounds: the distribution of 3rd person singular *-s* in English clearly requires reference to unmarked person and to unmarked number features as the context for Vocabulary Insertion. Once privative features and the marked-reference restriction for Vocabulary Insertion are given up, the argument that plural is more marked than dual loses its force.

The principal flaw in Cowper's argument that plural in Zuni is ''more marked'' than dual lies in conflating two distinct notions: the markedness of abstract categories and the markedness of the exponents/Vocabulary items.[15] The *exponent* for the plural possessive 2nd person is ''marked'' (e.g., specialized) compared with the exponent used in the other [singular] forms, but this does not imply that the abstract category ''plural'' is marked relative to ''dual.''

[13] Lynn Nichols, doing fieldwork with younger speakers, found the dual/plural distinction to be leveled in accusative and possessive pronouns (1997:24–25n35). However, she notes (pers. comm.) that elderly speakers appear to have the distinctions reported in Newman 1965 that form the basis of the argument in the text.

[14] Cowper's theory also does not seem to employ impoverishment rules. Investigating the consequences of modifying Cowper's theory of underspecification and markedness by introducing impoverishment operations is beyond the scope of this article.

[15] I thank an anonymous reviewer for making this point succinctly and for pointing out that the analysis of Nimboran stem allomorphs in Noyer 1998 also includes a case in which the dual is expressed by an elsewhere exponent, akin to the heterogeneous distribution of Zuni *toʔnaʔ*.

In the theory of markedness employed here, markedness is a universal property of a given value of a feature in either a context-free or a context-sensitive marking statement, as in (11). Thus, the claim that [−augmented] is marked in the context of [−singular] is the cause and not the consequence of the distribution of these features. Let us consider a plausible assignment of features to Vocabulary items for 2nd person pronouns in Zuni (48), adopting the case features of Halle and Vaux (1997) as shown in (47).

(47) *Featural representation of case*
a. Nominative = [+superior,−oblique]
b. Accusative = [−superior,−oblique]
c. Possessive = [−superior,+oblique]

(48) a. /toʔnʔa:wan/ ⇔ [−singular,−superior,+oblique]
b. /toʔnaʔ/ ⇔ [−singular,−superior]

Taking a step back, the relevant descriptive observation about (46) emerges from the horizontal rows of the table: in Zuni, while the plural makes a distinction between objective and possessive case forms, the dual does not.

This statement is true across the board in Zuni: 1st person dual is *hoʔnaʔ* for both objective and possessive, and 3rd person dual is *ʔa:čiyaʔ* for both objective and possessive. Thus, Zuni is an instance in which the pattern of (44) encompasses case distinctions as well.

(49) *Neutralizations in the environment of the dual (cf. (44))*
Zuni distinguishes nonnominative cases in the plural, but not in the dual.

With an impoverishment-based implementation of (49), Zuni pronominal paradigms fit into a coherent picture of the markedness of dual number, to which all diagnostics for markedness have pointed thus far. It is precisely *because* dual number is marked that the process in (50) applies, yielding the paradigm in (46).[16]

(50) *Zuni Markedness-Triggered Impoverishment Operation yields absence of case distinctions*
Delete [±oblique] in the marked environment [−singular,−augmented].

As a useful parallel, to see the generality of this approach to the distribution of marked and unmarked forms within a paradigm, consider the English copula paradigm, which has a syncretism

[16] A reviewer points out that while (50) captures the case syncretism in the dual, Zuni also exhibits dual-plural syncretism in the objective. While this is treated with an elsewhere [−singular] item in the text, it could perhaps be analyzed instead with a markedness-targeted impoverishment rule.

(i) Delete [±augmented] in the environment [−singular,−superior,−oblique].

This rule asymmetrically syncretizes dual to plural in the objective case. It remains to be determined whether objective case is more marked than possessive within a general theory of case markedness; at present, there is no decisive evidence either way. Note however that as a general principle, markedness-targeted impoverishment (i.e., dual → plural) could apply equally in objective or possessive case.

pattern formally identical to that of the 2nd person nonnominative cases in Zuni: four slots, three of which are covered by a single form (cf. (46)).

(51)

	Singular	Plural
2nd person	do	do
3rd person	does	do

On the basis of (51), we would not want to conclude that 3rd person is more marked than 2nd. Rather, we might follow the general insight that *do* is the most general form of present tense $\sqrt{do}$[17] in English, as shown with the Vocabulary items in (52).

(52) a. /does/ ⇔ [−participant,+singular]
b. /do/ ⇔ [elsewhere]

An explanation for the distribution of forms in (51) will note that there is something special about the 1st and 2nd person—*namely, markedness*—that yields identical agreement for singular and plural. While these Vocabulary items alone are sufficient to explain the distribution of forms, the general pattern throughout all English main verbs is one of ''metasyncretism,'' in the sense of Bobaljik (2003), Harley (2008), Williams (1994), and others: a systematic pattern of syncretism across lexical items and/or categories that is the result of a rule rather than an accident of the inventory of affixes (see also the rules of referral in Stump 1993 and Zwicky 1985, intended to capture systematic syncretisms). Harley (2008) notes, for example, that no English main verbs—even the irregular ones—show agreement distinctions in the past tense. As the past tense of an irregular verb (e.g., *brought*) arguably requires some degree of lexical listing, one might imagine that it's possible for some of these main verbs to happen to have distinct plural forms as yet another listed and irregular fact. But a systematic impoverishment rule deleting ϕ-features on all main verbs in the past tense will enforce the metasyncretism: the pattern of neutralization across many distinct subconjugations of irregular verbs.

In view of the systematic neutralization of number distinctions in the present tense verbal agreement for 1st and 2nd person for all English main verbs and noncopular auxiliaries, an implementation in terms of markedness-triggered impoverishment will ensure this metasyncretism. Number features are systematically deleted in the environment of the marked person category [+participant] in all main verbs, yielding use of the less specified Vocabulary item, in accordance with (34).

(53) *English Markedness-Triggered Impoverishment Operation on English main verbs yields absence of number distinctions*
Delete the feature [±singular] on a main verb in the environment of [+participant].

[17] The lexeme, or set of features corresponding to this auxiliary, is abbreviated with the root notation here, though alternative representations are possible.

The effect of (53) is that agreement will be systematically identical for singular and plural in 1st and 2nd person: for example, *I walk/we walk*, *you walk/y'all walk*. Just as objective and possessive are identical in the marked environment of the dual in Zuni, singular and plural are identical in the marked environment of [+participant] in English. The fact that a highly specified Vocabulary item (namely, *toʔnʔa:wan* in Zuni and *does* in English) has a narrower distribution than the elsewhere item is a consequence of the fact that the elsewhere item is used to realize morphemes that have undergone impoverishment due to markedness.

6 Ljubljana Slovenian: Both Types of Impoverishment

Having examined dual-targeted impoverishment in Sámi and Warlpiri and dual-triggered impoverishment in Zuni, we turn to a case in which both processes occur. In Slovenian grammatical studies, it is agreed that dual is more marked than plural (Toporišič 2000:271). We thus expect a variety of markedness-related impoverishment operations to apply. In this section, we will compare the case and number system of a regional variety of Slovenian, spoken in Ljubljana (Amanda Saksida and Rok Žaucer, pers. comm.), with that of Standard Slovenian (Derganc 2003). First, let us look at the nonsingular endings of the nominative case in the Standard variety.

(54) *Standard Slovenian nonsingular nominative*

	Masculine	Neuter	Feminine
Dual	stol-a	okn-i	knjig-i
Plural	stol-i	okn-a	knjig-e
	'table'	'window'	'book'

The syncretism between neuter and feminine in the dual is, by hypothesis, the result of shared features. However, the formal identity between the masculine plural and these two is arguably a case of accidental homophony, as these two diagonal sets of categories share no features.[18] Assuming that neuter gender is represented by the features [−masculine, −feminine], the following Vocabulary items may be posited:

(55) *Vocabulary items for Standard Slovenian nonsingular nominative*
a. /a/ ⇔ [−feminine, −singular]
b. /e/ ⇔ [−masculine, −singular]
c. /i_d/ ⇔ [−masculine, −singular, −augmented]
d. /i_{mp}/ ⇔ [+masculine, +singular, +augmented]

The analysis in (55) encodes the hypothesis that *-a* and *-e* are ''default'' items in the nonsingular, with no specification for [±augmented]. The two endings *-i* (glossed as i_d for the *d*ual form and

[18] For recent discussion of the differences between systematic and accidental homophony in developing a theory of inflectional identity, see Harbour 2009.

i_{mp} for the *m*asculine *p*lural form), however, are specified for [±augmented], as well as for gender. These latter forms are thus more specific, and block the insertion of (55a–b). In addition, (55a) must be extrinsically ordered for Vocabulary Insertion before (55b).

As discussed in the preceding sections, syncretism that is grammatically represented (in the form of an impoverishment rule) is more pervasive and systematic than syncretism that results purely from underspecification; therefore, the feminine dual and neuter dual syncretism in (54) is arguably more intentionally encoded in the form of an impoverishment rule rather than purely via underspecification, as in (55c). Let us therefore take up Frampton's (2002:216) observation that impoverishment rules ''introduce a certain amount of rigidity'' into the morphology, in the sense that inflectional innovation that deneutralizes an existing syncretism would require a change in both Vocabulary items and the neutralizing rule, and let us posit (56) as an impoverishment rule of Standard Slovenian that enforces the syncretism between two of the dual forms.

(56) *Standard Slovenian Markedness-Triggered Impoverishment Operation*
Delete [±feminine] in the environment of marked [−masculine, −singular, −augmented].

A rule such as (56), neutralizing the feminine/neuter distinction in the dual, is justified particularly when its effects are found in other inflectional categories. The nominative forms of the numeral 'two', while lacking the specialized Vocabulary item in (55c), show the same feminine/neuter syncretism. If Vocabulary Insertion with the Vocabulary items (55a–b) is fed by the same impoverishment rule in (56), the syncretism between [−masculine] dual forms is enforced.

(57)

Masculine	Neuter	Feminine
dva	dve	dve

Having looked at Standard Slovenian, we turn to Ljubljana Slovenian, where both a horizontal syncretism (an instance of markedness-triggered impoverishment) and a vertical syncretism (an instance of markedness-targeted impoverishment) affect the paradigm in (54). In particular, in the dual in Ljubljana Slovenian, the neuter and the *masculine* are syncretic—again a reduction of three categories to two exponents, but yielding a gender neutralization in a different direction than in Standard Slovenian. An even more striking change is the fact that the neuter feminine now becomes syncretic with the neuter plural, thereby instantiating a neutralization in number. (In (58), endings that differ from those in Standard Slovenian are italicized.)

(58) *Ljubljana Slovenian nominative nonsingular*

	Masculine	Neuter	Feminine
Dual	stol-a	okn-*a*	knjig-*e*
Plural	stol-i	okn-a	knjig-e

The inflectional variation that distinguishes Standard Slovenian and Ljubljana Slovenian in the nonsingular nominative endings results not from different Vocabulary items but from different

impoverishment rules. Given the same Vocabulary items in (55), but capitalizing on the fact that masculine and neuter are now systematically syncretic, we may posit the following markedness-triggered impoverishment rule:

(59) *Ljubljana Slovenian Markedness-Triggered Impoverishment Operation*
Delete [±masculine] in the environment of marked [−feminine,−singular,−augmented].

(59) will prevent the insertion of the Vocabulary item (55c) in the neuter, because i_d is specified as [−masculine]. The parallelism between (56) and (59) (in that each affects the neuter dual, though collapsing it in different directions) is likewise found in the forms of the numeral 'two' in Ljubljana Slovenian.

(60)

Masculine	Neuter	Feminine
dva	dva	dve

While the Vocabulary items for *-a* and *-e* are equally (un)specified for gender features and would thereby cause a crash in the Maximal Subset Clause of (34), the impoverishment rule in (56) knocks *-a* out of the competition for neuter dual in Standard Slovenian, while the impoverishment rule in (59) knocks *-e* out of the competition for neuter dual in Ljubljana Slovenian. These two impoverishment rules, each effecting a neutralization in the neuter dual, thus display symmetric effects in the two varieties of the language.

Both dialects' rules instantiate markedness-triggered impoverishment, reducing the gender distinctions from three to two, though they accomplish this neutralization in different ways.[19] Thus, while markedness-triggered neutralization prescribes an impoverishment operation in the orthogonal category of gender, its precise target may be the locus of microvariation. Much like the varieties of English in section 1 that impoverish the marked combination of 1st person and negation with varying targets to yield either *Aren't I?* or *Isn't I?*, these two varieties of Slovenian differ in which binary gender feature they impoverish.

As mentioned above, Ljubljana Slovenian is of further interest because, as an additional neutralization, the feminine dual form is identical to that of the feminine plural. The Vocabulary item *-i* is blocked in Ljubljana Slovenian by the impoverishment rule in (61), which is markedness-targeted.

(61) *Ljubljana Slovenian Markedness-Targeted Impoverishment Operation*
Delete [±augmented] in the environment [−singular,+feminine].

[19] While masculine-neuter syncretisms are more common than feminine-neuter syncretisms in Slavic, the latter are still fairly well attested. Upper Sorbian, discussed in section 7, shows the same feminine-neuter syncretism in the dual. Slovenian feminine adjectives and first declension feminine nouns show syncretism with the neuter in the accusative. Polish plural nouns distinguish between masculine personal gender and all others (including feminine and neuter). Further research is needed on three-gender systems to determine whether the markedness of [+feminine] relative to [−feminine] is greater than the markedness of [+masculine] relative to [−masculine], and if so, how this is to be formally represented, if an asymmetry in frequency of occurrence in one direction is to be accounted for.

This pattern is an instance of markedness-targeted impoverishment whereby dual asymmetrically syncretizes with plural.[20] The Vocabulary item i_d, specialized for nonmasculine duals, can no longer be inserted, as the feature distinguishing dual from plural has been removed from the representation. The resulting dual-plural syncretism in the feminine is much like the markedness-targeted impoverishment of [−augmented] with [−singular] indefinite subjects in Sámi.

To illustrate the results of these two impoverishment rules in Ljubljana Slovenian, (62) shows the original nominative feature specifications, and (63) shows the specifications resulting from impoverishment.

(62) *Ljubljana Slovenian nominative feature specifications*

	Masculine	Neuter	Feminine
Dual	[+m,−f,−sg,−aug]	[−m,−f,−sg,−aug]	[−m,+f,−sg,−aug]
Plural	[+m,−f,−sg,+aug]	[−m,−f,−sg,+aug]	[−m,+f,−sg,+aug]

(63) *Ljubljana Slovenian nominative feature specifications after impoverishment rules (59) and (61)*

	Masculine	Neuter	Feminine
Dual	[−f,−sg,−aug]	[−f,−sg,−aug]	[−m,+f,−sg]
Plural	[+m,−f,−sg,+aug]	[−m,−f,−sg,+aug]	[−m,+f,−sg]

Given the Vocabulary items of (55), repeated in (64), and their ordering relations, their insertion into (63) will result in (65), demonstrating the results of syncretism.

(64) *Vocabulary items for Standard Slovenian nonsingular nominative*
a. /a/ ⇔ [−feminine,−singular]
b. /e/ ⇔ [−masculine,−singular]
c. /i_d/ ⇔ [−masculine,−singular,−augmented]
d. /i_{mp}/ ⇔ [+masculine,−singular,+augmented]

(65) *Ljubljana Slovenian nominative nonsingular (neutralization resulting from impoverishment indicated in italics)*

	Masculine	Neuter	Feminine
Dual	stol-*a*	okn-*a*	knjig-*e*
Plural	stol-i	okn-a	knjig-*e*

As a consequence of the impoverishment rule (59), the neuter dual becomes not only horizontally syncretic with the masculine dual, but also vertically syncretic with the neuter plural. As [−mascu-

[20] Eduard Werner (pers. comm.) points out that the resulting system, in which masculine dual syncretizes with neuter dual, and feminine dual with feminine plural, is entirely parallel to the system of case marking by the paucal numerals 2, 3, 4 in contemporary Russian.

line] is deleted in the neuter dual, the highly underspecified Vocabulary item (64a) is the only one that can be inserted in all three of these contexts.

Given the two impoverishment rules posited for Ljubljana Slovenian, the Vocabulary item in (64c) can never be inserted: its [−masculine] context is destroyed by rule (59), and its [−augmented] context by (61). This illustrates the ''rigidity'' of impoverishment rules: they stand above the inventory of memorized Vocabulary items that a language learner may inherit, and they enforce feature neutralization that may prevent a *potential* Vocabulary item from ever surfacing. Ljubljana Slovenian speakers, therefore, have no reason to ever posit a Vocabulary item i_d, as its insertion will always be bled.[21] The impoverishment rules for Ljubljana Slovenian, posited on the basis of markedness reduction yielding a dual-plural syncretism in the feminine and a masculine-neuter syncretism in the dual, have the surface effect of enforcing the impossibility of a Vocabulary item like i_d, specialized for nonmasculine duals.

Ljubljana Slovenian demonstrates an active pattern of impoverishment both directed at and triggered by the dual, affecting both nouns and numerals, with variations from Standard Slovenian in what is deleted, but always with markedness as the conditioning factor and impoverishment as the result.[22]

7 Conclusion: Enduring Effects of Impoverishment under Affixal Change

We have seen that adopting the number features in (9) and the marking statement in (11) integrates the crosslinguistic and within-language markedness of dual that lead to neutralization-of-dual (section 4) or neutralization-by-dual (section 5) or both (section 6). By including in the theory impoverishment operations conceived as feature-deletion rules triggered by or acting on marked features, we can develop an alternative to Cowper's (2005) analysis of Zuni pronominal paradigms, thereby upholding the traditional claim that dual is more marked than plural.[23]

[21] The assertion in the text idealizes over issues of diglossia and knowledge of standard dialects alongside regional varieties. A more realistic assumption may be that Ljubljana speakers indeed possess the Vocabulary items of (55), but accommodate dialect-switching by turning on or off the relevant impoverishment rules.

[22] Additional instances of markedness-targeted impoverishment can be found in dialects of Slovenian in which the dual is lost in nonnominative cases. In these dialects, much like in Zuni, the dual/plural distinction is lost in the oblique cases. Tesnière (1925) discusses a hierarchy of case-based dual loss: dialects in which dual is impoverished only in the locative, followed by dialects in which it is additionally impoverished in the genitive, dative, and instrumental. See Jakop 2003 for a more recent survey of variation in dual morphology across Slovenian dialect areas.

[23] An issue largely untouched in this article is the pragmatic use of the dual for nouns referring to items that normally come in pairs. Since Kopitar 1808, it has been observed that Slovenian does not allow dual number with nouns such as 'shoes', using plural instead, possibly because it is redundant to overtly specify that there are two shoes (see also Dvořák and Sauerland 2005, Priestly 1993:440). The dual can be used with nouns such as 'shoes' only when there is specific emphasis on the cardinality 2, or in the context of two unrelated shoes that do not form a pair. This use is called *facultative number* by Greenberg (1966) and Corbett (2000). By contrast, in Sanskrit, ''the dual number is in regular use and of strict application, the plural practically never referring to two objects'' (MacDonell 1927:180). Thus, Slovenian and Sanskrit would seem to represent two extremes with regard to obligatoriness of dual with paired objects. Quite interestingly, Eduard Werner (pers. comm.) informs me that while *Upper* Sorbian observes the same restriction as Slovenian in this respect, in *Lower* Sorbian it is entirely possible and normal to use the dual form with nouns such as 'shoes'. This suggests that the pragmatic ban is subject to microvariation even within closely related dialects.

Before concluding, I would like to reemphasize that impoverishment theory provides a way of stating generalizations over inflectional distinctions (i.e., metasyncretisms) that may be completely independent of the particular Vocabulary items of a language.[24] Indeed, an interesting change-in-progress in contemporary Upper Sorbian (spoken in the Lusatia region of Germany) is the analogical ''borrowing'' of the dual allomorph from palatalized (soft) feminine stems into unpalatalized (hard) feminine stems. As Wornar (2007) discusses, this importation of the dual ending for hard stems into the soft stems is occurring specifically for the purpose of maintaining a dual/plural distinction that is being threatened by an independent phonological process. The formal implementation of this analogical borrowing is the reanalysis of the features corresponding to a phonological Vocabulary item. This in turn interacts in an interesting way with a markedness-triggered impoverishment rule of gender neutralization in the dual, as we will see.

The table in (66) represents the traditional endings for feminine nouns in Upper Sorbian.

(66) *Traditional forms of Upper Sorbian feminine duals*

	Hard stem	Soft stem
Singular	žon-a	bróžnj-a
Dual	žon-je	bróžn-i
Plural	žon-y	bróžnj-e
	'woman'	'barn'

The issue is that in final unstressed position, the distinction between the vowels *e* and *y* is lost; thus, both the dual and plural forms of hard stems end in surface [e]. In addition, many contemporary speakers are losing palatalization (indicated by consonant + *j*). As a result, [žon-e] would express both dual and plural number: the opposition of feminine endings for singular, dual, plural in their surface forms becomes *-a,**-e**,**-e*** for hard stems and *-a,**-i**,**-e*** for soft stems. Rather than losing the dual/plural distinction, however, Upper Sorbian speakers have generalized the soft-stem dual feminine ending *-i* to the hard stems.

(67) *Surface forms of innovative Upper Sorbian feminine duals*

	Hard stem	Soft stem
Singular	žon-a	bróžnj-a
Dual	žon-*i*	bróžn-i
Plural	žon-e	bróžnj-e
	'woman'	'barn'

Speakers of Upper Sorbian, therefore, are effectively refusing to lose the morphological encoding of the dual/plural distinction in the face of a phonological change that threatens it in the hard

[24] See Aalberse and Don, to appear, for an impoverishment analysis of metasyncretisms across Dutch dialects with distinct exponents but the same pattern of neutralization, triggered by initially accidental patterns of contact and phonological change. Also, see Bobaljik 2009 for an analysis of Khairjuzovo Itelmen, where a phonological change yielding neutralization in the indicative spread to the irrealis, thereby showing that learners actively extended patterns of impoverishment across distinct paradigms.

stems. What is perhaps most interesting is the form that the reanalysis of the ending *-i* for hard-stem feminine duals has taken, without a specification for the phonologically conditioned allomorphy.

(68) *Innovated general marker for nonmasculine duals in Upper Sorbian*
/i/ ⇔ [−masculine, −singular, −augmented]

The Vocabulary item in (68) recalls the specification given above for Standard Slovenian i_d, and the feature specification for gender predicts that the new Vocabulary item *-i* will be used in *neuter* hard stems as well. It is interesting to note that this has in fact happened: use of *-i* has extended into hard-stem neuters, even though no phonological reduction rule threatens the dual/plural distinction in this gender.

(69) *Traditional forms of Upper Sorbian neuter duals*

	Hard stem	Soft stem
Singular	piw-o	dźěćo
Dual	piw-je	dźěsći
Plural	piw-a	dźěći
	'beer'	'child'

(70) *Surface forms of innovative Upper Sorbian neuter duals*

	Hard stem	Soft stem
Singular	piw-o	dźěćo
Dual	piw-i	dźěsći
Plural	piw-a	dźěći
	'beer'	'child'

The ''importation'' of the ending *-i* (68) to the neuter hard-stem dual is not motivated by any threat of collapse; rather, it represents the systematic identity of feminine and neuter within the dual that is already in effect in Upper Sorbian, as enforced by the impoverishment rule in (71).

(71) *Upper Sorbian Markedness-Triggered Impoverishment Operation*
Delete [±feminine] in the environment of marked dual.

The Upper Sorbian case presents an important instance of a change-in-progress motivated within the feminine nouns by a phonological distinction that nonetheless, because of the existing dual-triggered impoverishment of gender distinctions, leads to an effect in the neuter as well. The importance of impoverishment rules in guiding syncretism is thus confirmed here: an innovation in the feminine duals automatically takes effect in neuter duals because a postsyntactic deletion rule renders these genders identical in the dual.

The ''persistent syncretism'' effect of a dual/plural distinction in the Upper Sorbian feminine nouns being automatically extended through impoverishment to yield a surprising effect in the neuter nouns is a good case to close this article with. Impoverishment rules are a coherent set of morphological operations that delete features as a result of (contextual) markedness and thereby yield persistent patterns of inflectional syncretism. Continued development both of impoverish-

ment theory in the light of markedness theory and of feature-based formalizations of inflectional categories can only further sharpen our understanding of morphological markedness and its role in syncretism.

References

Aalberse, Suzanne, and Jan Don. To appear. Person and number syncretisms in Dutch. *Morphology*. DOI: 10.1007/s11525-010-9164-3.

Baerman, Matthew, Dunstan Brown, and Greville Corbett. 2005. *The syntax-morphology interface*. Cambridge: Cambridge University Press.

Bliss, Heather. 2005. Constructing dual number in Hopi. In *Proceedings of the 2004 Canadian Linguistics Association Annual Conference*, ed. by Marie-Odile Junker, Martha McGinnis, and Yves Roberge. Available at http://www.carleton.ca/~mojunker/ACL-CLA/pdf/Bliss-CLA-2004.pdf.

Bobaljik, Jonathan David. 2003. Syncretism without paradigms: Remarks on Williams 1981, 1994. In *Yearbook of Morphology 2002*, ed. by Geert Booij and Jaap van Marle, 53–85. Dordrecht: Kluwer.

Bobaljik, Jonathan David. 2009. Conspiracies in Chukotko-Kamchatkan agreement. Paper presented at Morphology of the World's Languages, Leipzig.

Bobaljik, Jonathan David, and Cynthia Levart Zocca. To appear. Gender markedness: The anatomy of a counter-example. *Morphology.* DOI: 10.1007/s11525-010-9155-4.

Bonet, Eulàlia. 1991. Morphology after syntax: Pronominal clitics in Romance. Doctoral dissertation, MIT, Cambridge, MA.

Börjesson, Kristin. 2006. Argument encoding in Slovene: A Distributed Morphology analysis of Slovene noun declension. In *Subanalysis of argument encoding in Distributed Morphology*, ed. by Gereon Müller and Jochen Trommer, 115–130. Leipzig: Universität Leipzig, Institut für Linguistik.

Bresnan, Joan. 2001. Explaining morphosyntactic competition. In *The handbook of contemporary syntactic theory*, ed. by Mark Baltin and Chris Collins, 11–44. Oxford: Blackwell.

Chomsky, Noam. 1993. A minimalist program for linguistic theory. In *The view from Building 20*, ed. by Kenneth Hale and Samuel Jay Keyser, 1–52. Cambridge, MA: MIT Press.

Conklin, Harold C. 1962. Lexicographic treatment of folk taxonomies. In *Problems in lexicography*, ed. by Fred W. Householder and Sol Saporta, 119–141. Bloomington: Indiana University Research Center in Anthropology, Folklore and Linguistics.

Corbett, Greville. 2000. *Number*. Cambridge: Cambridge University Press.

Cowper, Elizabeth. 2005. A note on number. *Linguistic Inquiry* 36:441–455.

Croft, William. 1990. *Typology and universals*. Cambridge: Cambridge University Press.

Derganc, Aleksandra. 2003. The dual in Slovenian. In *Slovenian from a typological perspective (Sprachtypologie und Universalienforschung/Language Typology and Universals, vol. 56, issue 3)*, ed. by Janez Orešnik and Donald Reindl, 165–181. Berlin: Akademie Verlag.

Dvořák, Boštjan, and Uli Sauerland. 2005. The semantics of the Slovenian dual. In *Formal Approaches to Slavic Linguistics 14: The Princeton Meeting 2005*, ed. by James Lavine, Steven L. Franks, Mila Tasseva-Kurktchieva, and Hana Filip, 98–112. Ann Arbor: Michigan Slavic Publications.

Frampton, John. 2002. Syncretism, impoverishment, and the structure of person features. In *CLS 38: The Main Session. Papers from the 38th Meeting of the Chicago Linguistic Society, vol. 1*, ed. by Mary Andronis, Erin Debenport, Anne Pycha, and Keiko Yoshimura, 207–222. Chicago: University of Chicago, Chicago Linguistic Society.

Francis, Nelson. 1985. *Amn't I*, or the hole in the pattern. In *Focus on England and Wales*, ed. by Wolfgang Viereck, 141–152. Amsterdam: John Benjamins.

Greenberg, Joseph. 1963. Some universals of grammar with particular reference to the order of meaningful elements. In *Universals of language*, ed. by Joseph Greenberg, 73–113. Cambridge, MA: MIT Press.

Greenberg, Joseph. 1966. *Language universals, with special reference to feature hierarchies*. The Hague: Mouton.

Hale, Ken. 1973. Person marking in Walbiri. In *A festschrift for Morris Halle*, ed. by Stephen Anderson and Paul Kiparsky, 308–344. New York: Holt, Rinehart and Winston.

Hale, Ken. 1997. Some observations on the contributions of local languages to linguistic science. *Lingua* 100:71–89.

Halle, Morris. 1997. Impoverishment and fission. In *PF: Papers at the interface*, ed. by Benjamin Bruening, Yoonjung Kang, and Martha McGinnis, 425–450. MIT Working Papers in Linguistics 30. Cambridge, MA: MIT, MIT Working Papers in Linguistics.

Halle, Morris, and Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In *The view from Building 20*, ed. by Kenneth Hale and Samuel Jay Keyser, 111–176. Cambridge, MA: MIT Press.

Halle, Morris, and Bert Vaux. 1997. Theoretical aspects of Indo-European nominal morphology. In *Mír curad: Studies in honor of Calvert Watkins*, ed. by Jay Jasanoff, Craig Melchert, and Lisi Oliver, 223–240. Innsbruck: Innsbrucker Beiträge zur Sprachwissenschaft.

Harbour, Daniel. 2006. *Morphosemantic number: From Kiowa noun classes to UG number features*. Dordrecht: Springer.

Harbour, Daniel. 2009. On homophony and methodology in morphology. *Morphology* 18:75–92.

Harley, Heidi. 2008. The importance of impoverishment. In *Phi theory*, ed. by Daniel Harbour, David Adger, and Susana Béjar, 251–294. Oxford: Oxford University Press.

Harley, Heidi, and Elizabeth Ritter. 2002. Person and number in pronouns: A feature-geometric analysis. *Language* 78:482–526.

Haspelmath, Martin. 2006. Against markedness (and what to replace it with). *Journal of Linguistics* 42: 25–70.

Ito, Junko, and Armin Mester. 2003. *Japanese morphophonemics: Markedness and word structure*. Cambridge, MA: MIT Press.

Jakobson, Roman. 1941. *Kindersprache, Aphasie und allgemeine Lautgesetze*. Uppsala: Almqvist & Wiksell.

Jakop, Tjaša. 2003. Dvojina v slovenskix narečjih. Doctoral dissertation, Ljubljana University.

Jeanne, LaVerne. 1978. Aspects of Hopi grammar. Doctoral dissertation, MIT, Cambridge, MA.

Kopitar, Jernej. 1808. *Grammatik der slavischen Sprache in Krain, Kärnten und Steyermark*. Ljubljana: Wilhelm Heinrich Korn.

Lichtenberk, Frantisek. 1983. *A grammar of Manam*. Honolulu: University of Hawaii Press.

MacDonell, Arthur. 1927. *A Sanskrit grammar for students*. Oxford: Oxford University Press.

Nevins, Andrew. 2007. The representation of third person and its consequences for person-case effects. *Natural Language and Linguistic Theory* 25:273–313.

Nevins, Andrew. 2008. Cross-modular parallels in the study of Phon and Phi. In *Phi theory*, ed. by Daniel Harbour, David Adger, and Susana Béjar, 329–367. Oxford: Oxford University Press.

Newman, Stanley. 1965. *The Zuni language*. Albuquerque: University of New Mexico Press.

Nichols, Lynn. 1997. Topics in Zuni syntax. Doctoral dissertation, Harvard University, Cambridge, MA.

Noyer, Rolf. 1992. Features, positions and affixes in autonomous morphological structure. Doctoral dissertation, MIT, Cambridge, MA.

Noyer, Rolf. 1998. Impoverishment theory and morphosyntactic markedness. In *Morphology and its relation to syntax*, ed. by Steven G. Lapointe, Diane K. Brentari, and Patrick M. Farrell, 264–285. Stanford, CA: CSLI Publications.

Noyer, Rolf. 2001. Clitic sequences in Nunggubuyu and PF convergence. *Natural Language and Linguistic Theory* 19:751–826.

Priestly, Tom. 1993. Slovene. In *The Slavonic languages*, ed. by Bernard Comrie and Greville Corbett, 388–451. London: Routledge.

Pustet, Regina. 2009. On the correlation between discourse frequency and structural complexity in markedness theory. *Discours* 5. Available at http://discours.revues.org/index7683.html.

Ravid, Dorit, and Lubna Hayek. 2003. Learning about different ways of expressing number in the development of Palestinian Arabic. *First Language* 23:41–63.

Rullmann, Hotze. 2004. First and second person pronouns as bound variables. *Linguistic Inquiry* 35:159–168.

Siewierska, Anna. 2000. *Person*. Cambridge: Cambridge University Press.

Stump, Gregory. 1993. On rules of referral. *Language* 69:449–479.

Tesnière, Lucien. 1925. *Les formes du duel en slovène*. Paris: Champion.

Toporišič, Jože. 2000. *Slovenska slovnica*. Maribor: Obzorja.

Trubetzkoy, Nikolai. 1969. *Principles of phonology*. Berkeley and Los Angeles: University of California Press.

Vinka, Mikael. 2001. Impoverishment as feature deletion: Dual and plural agreement in Sámi. *Lund University Working Papers in Linguistics* 48:183–191.

Watanabe, Akira. 2009. Vague quantity, numerals, and natural numbers. *Syntax* 13:37–77.

Williams, Edwin. 1994. Remarks on lexical knowledge. *Lingua* 92:7–34.

Wornar, Edward (Eduard Werner). 2007. Wo změnach w paradigmatice femininowych a-zdonkow w dźensnišej hornjoserbšćinje. *Lětopis* 54:103–109.

Zwicky, Arnold M. 1978. On markedness in morphology. *Die Sprache* 24:129–143.

Zwicky, Arnold. 1985. How to describe inflection. In *Proceedings of the 11th Annual Meeting of the Berkeley Linguistics Society*, ed. by Mary Niepokuj et al., 714–733. Berkeley: University of California, Berkeley Linguistics Society.

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