

# Dual Number and Context-Sensitive Markedness

Andrew Nevins\*  
Harvard University

May 31, 2007

**Abstract** This paper discusses diagnostics of morphological markedness and their formal expression within impoverishment theory (Bobaljik (2002); Bonet (1991); Halle (1997); Halle and Marantz (1993); Harley (in press); Nevins (in press); Noyer (1992, 1998)), and, using number as a case study, argue that dual is more marked than plural, in accordance with traditional and more recent approaches to inflectional morphology. The specific proposal is that dual is represented by a combination of the features [–singular, –augmented], and that the feature [–augmented] is marked in the context of [–singular]. Exemplification comes from syncretisms either directed at or conditioned by the dual in Sámi, Sorbian, Slovenian, Warlpiri, and Zuni, the latter of which has been recently argued by Cowper (2005) to show that dual is less marked than plural. The larger goal of this paper is to exemplify the treatment of feature-based markedness and syncretism within the Distributed Morphology operation of impoverishment, and to illuminate some questions about the behavior of dual number as both a conditioner and undergoer of markedness-based neutralization.

## 1 A Review of Markedness Diagnostics

There is not yet a full consensus on what constitutes morphological markedness within the theory of Distributed Morphology. Noyer (1998) contains an important discussion of impoverishment *of* marked features, but to date there is little emphasis on impoverishment *caused by* marked features. This paper aims to contribute to that discussion by specifically arguing that implicational statements over impoverishment operations are a diagnostic for markedness and that markedness of inflectional categories is a consequence of context-sensitivity of feature-value combinations. The category of dual number is used as a specific case study. An examination of Zuni, Slovenian, and Sorbian reveals a role of the markedness due to the presence of dual number that triggers impoverishment of *other* inflectional distinctions, namely case and gender. The exemplification of this *dual-triggered* impoverishment of case features as the result of the markedness of the dual is of some interest because these same facts have been recently argued by Cowper (2005) to demonstrate the opposite conclusion. One consequence of the argumentation in this paper, then, will be that a look at Zuni case-impoverishment within the context of Impoverishment theory actually upholds the claim that dual is more marked than plural. Before

---

\*Many thanks to Aleksandra Derganc, Julie Legate, Lynn Nichols, Mikael Vinka, and Eduard Werner for suggestions and clarifications on the dual in the languages discussed in this article. I am grateful to two anonymous reviewers and Jeffrey Parrott for numerous comments leading to improvement of an earlier version of this paper.

proceeding any further, however, we turn to a discussion of markedness within grammatical theory.

Markedness, simply put, is the asymmetric treatment of two categories within an opposition where otherwise equal behavior might be expected. The specific formal treatment of markedness adopted in this paper is that one value of a binary feature is marked, i.e. asymmetrically treated with respect to a variety of linguistic processes. Typological and pre-generative research contains a number of diagnostics for markedness. Under Jakobson's definition of markedness, a marked category is one that is acquired later in acquisition, one that is more likely to be lost in language change, and typologically rarer (Jakobson, 1941). Dual number clearly qualifies as marked by these criteria:

- (1)
  - a. Dual is correctly mastered later than plural number by children (Ravid and Hayek (2003) on Palestinian Arabic)
  - b. Dual has been lost or declined to lexical usage in many language families (e.g. Greek, Semitic, much of Slavonic; Corbett (2000, p.269) and references therein)
  - c. Dual is typologically rarer than plural number (Corbett, 2000).

Thus, by Jakobson's traditional diagnostics, dual clearly qualifies as more marked than plural. A separate tradition, initiated by Greenberg, pursues a different set of markedness diagnostics. One is inventory-based implication: a marked category is one that implies the presence of the unmarked category. The dual qualifies as marked under this definition, as expressed in Universal 34: "The presence of dual implies the presence of plural" (Greenberg, 1963). In (2), we review the eight diagnostics for morphosyntactic markedness of Greenberg (1966), as compiled by Croft (1990, p.71), alongside a discussion of whether they are applicable and what they reveal for dual as opposed to plural number.<sup>1</sup>

---

<sup>1</sup>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:

- (i)
  - a. Material markedness: existence of more morphologically overt material to realize the category. Applicable to dual: This is equivalent to (2)[a]
  - b. Semantic markedness: existence of more additional semantic information conveyed by the category. Applicable to dual: see (2)[c] and the definition of [–augmented], which adds additional information to [–singular] (namely the fact that no subsets of a dual satisfy [–singular])
  - c. Implicational markedness: The number of distinct forms shown by the dual is not greater than that of the number of distinct forms shown by the plural, in terms of allomorphy, syncretism, and defectivization: this corresponds to (2)[b], (2)[d], and (2)[e].
  - d. Abstract syntactic markedness: 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. Not obvious how that current syntactic theory requires a dependency relation for dual number on nouns (though perhaps one could argue that dual number requires specific licensing by an abstract Num<sup>0</sup> 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 ap-

- (2) 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)  
 Limited applicability of Dual: zero morphemes rare for plural marking to begin with. See however, Manam duals (14), in which there are more morphemes than in 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: see (3-b) below: this is one of the central themes of this paper
- 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 10 on facultative uses of plural with inherently dual nouns in Slovene
- d. In certain grammatical environments, only the unmarked value will appear (contextual neutralization)  
 Applicable for Dual: see (3-a) below: this is one of the central themes of this paper
- 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 Slovene that show different stems in the plural but not in the dual but not vice-versa, e.g. *človek* 'person' has the allomorph *ljude* with nominative plural but not dual.
- f. An unmarked form will display at least as great a range of grammatical behavior as that of the marked form  
 Possibly applicable: Relevant examples might be limitation of duals to animate arguments while plural can be used with inanimates, e.g. in Manam (Corbett, 2000, p.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

---

plicable to dual, as nouns do not commonly bear an inherent dual classification; even count nouns which often "come in pairs" can be referred to the singular in languages with robust use of the dual.

- f. Stylistic markedness: Is the form avoided in casual speech registers? Applicable to the dual, though most data that I have on this point is anecdotal. 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 (2)[h].

In sum, these diagnostics converge on the dual as marked as well.

- h. In text counts, the unmarked value has at least as great frequency as the marked value.  
Applicable for Dual: confirmed in Sanskrit, Slovene, and Upper Sorbian in Corbett (2000, p.281)

The most robustly applicable of these diagnostics that bear directly on the featural representation of morphosyntactic categories as formalized in this paper are (2-d) and (2-b), which are implemented in terms of impoverishment operations over values of binary features in (3). One is that a marked category is frequently neutralized in certain environments, which we will call *Markedness-Directed Neutralization*. The second is that a marked category causes neutralization of **other** categories, which we will call here *Marked-Triggered Syncretism*.

- (3) For a marked feature  $mF$  and its unmarked counterpart  $uF$ ,
  - a. Markedness-Directed Neutralization: The expression of  $mF$  is identical to the expression of  $uF$  in an environment  $E$ . (“Vertical Syncretism”)
  - b. Markedness-Triggered Neutralization: A feature  $[\pm G]$ ,  $F \neq G$ , is not distinguished in the presence of  $mF$  although it is distinguished in the presence of  $uF$  (“Horizontal Syncretism”)

As will be demonstrated in this paper, the dual participates in both of these neutralization processes, revealing its marked status. More importantly, however, is the fact of the absence (or extreme rarity) of a singular-dual-plural number system in which plural undergoes these processes but dual does not. We may thus summarize the predictions of implicational markedness-based neutralization as follows:

- (4) Universal Grammar will disprefer a singular-dual-plural number system in which plural undergoes (3-a) or (3-b) while dual does not.

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

## 2 Context-Sensitive Markedness and Number Features

In considering markedness purely in terms of a relation among members of an opposition, singular - dual - plural systems clearly become 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, p.95)

It is precisely for these reasons that we need *two* binary features. In the framework developed here, this is due to fact that dual possesses a marked feature which plural does not, namely [–augmented]. The formalization of this markedness will be undertaken with the features in (5) and the markedness statement in (6):

- (5) *Feature-Based Representations of Number Categories* ((Conklin, 1962; Harbour, 2006; Noyer, 1992)
  - a. Singular = [+singular, –augmented]
  - b. Dual = [–singular, –augmented]
  - c. Plural = [–singular, +augmented]
- (6) *Context-sensitive markedness of number features:*  
 In the context [–singular], the marked value of [ $\pm$  augmented] is –

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

- (7) *Context-sensitive markedness of laryngeal features:*  
 In the context [–sonorant], the marked value of [ $\pm$  voice] is +
- (8) *Context-sensitive markedness of vowel color features:*  
 In the context [–back], the marked value of [ $\pm$  round] is +

More generally, given the fact that all sonorants are voiced in, for example, Turkish, it would not make sense to claim that [+voice] was context-free marked, thus necessitating the use of context-sensitive markedness as in (8). Similarly, neither [+round] nor [–back] are marked on their own in vowel systems, but their combination is marked, most likely due to the contradictory effects of tongue body fronting and lip rounding on formant frequencies. Returning to morphosyntactic number, given the definition of the feature [ $\pm$  augmented] (9), 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 (6).

We turn to a definition and a motivation of the features above. [+singular] should not need much discussion; it is true if the cardinality of the reference set is equal to 1. The feature [ $\pm$ augmented], however, departs from more familiar usage of phi-features, as it is always *relativized to another feature*. Pursuing a model in which all features are represented as truth-conditional predicates here, a definition for [+augmented] is given in (9):

- (9) *Definitions of Number Features:*
  - a.  $[+F] = \neg[–F]$
  - b.  $[+augmented] = \lambda P \lambda x \exists y [y \subset x \wedge P(x) \wedge P(y)]$

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

Now consider a set of cardinality 100. This set is [–singular], and there is indeed at least one subset (in fact, many of them) that is still [–singular]. 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 subset of a set of cardinality 2 that is still [–singular]*. Thus, this set is [–augmented] for its value of [±singular].

Independent use of the feature [± augmented] was developed by Conklin (1962) for the pronoun system of Ilokano. Recall that [± augmented] is always relativized to another feature. In the case of the dual, above, [± augmented] is relativized to the value of [± singular]. However, in principle [± augmented] could be used in combination with any other phi-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 if the reference set contains the addressee, respectively. What is interesting about the Ilokano pronoun system is that there is no use of [±singular] at all. The definition of [± augmented] alone, coupled with the person features as predicates, derives the system. The traditional classification is given in (10), while the classification using only [± augmented] in (11).

(10) Traditional classification of Ilokano pronominal system

	singular	dual	plural
1st exclusive	ko		mi
1st inclusive		ta	tayo
2nd	mo		yo
3rd	na		da

(11) Ilokano pronoun system with [± augmented]

	[–augmented]	[+augmented]
+author	ko	mi
+auth, +addr	ta	tayo
+addressee	mo	yo
–auth, –addr	na	da

The system as classified in (10) is obviously strange: why should only one person category have a dual number? By contrast, the classification of this system in (11) 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 second person is [–augmented] because no subset of a set containing just the addressee would still contain the addressee.

Thus, the feature [ $\pm$  augmented] is one of sufficiently general use in phi-feature systems and is motivatable (and in fact was introduced) independently of its role in full-blown singular-dual-plural systems. What is particularly interesting about its role in such systems is the combination of [–augmented] and [–singular] that leads to context-sensitive markedness in the case of the dual.

## 2.1 Morphological Evidence for Two Features

An important empirical argument that dual number should be composed of two features, rather than viewed as a third value of one category, are cases in which overt morphological evidence is found for both [–augmented] and [–singular]. Such a case can be found, for example, in Manam, in which the formation of dual number involves an additional morpheme added to the [–singular] form<sup>2</sup>:

- (12) áine    ɲara  
       woman that  
       “that woman”
- (13) áine    ɲara- di  
       woman that- 3PL  
       “those women”
- (14) áine    ɲara- di- a- ru  
       woman that- 3PL -ep- DL  
       “those two women”

The example in (14) 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*.<sup>3</sup> If dual were treated as simply another value for “number”, it would be difficult to explain the presence of two distinct morphemes in (14).

A possibly more dramatic case of the composition of duals by two distinct morphemes can be found in the case of the “constructed duals” of Hopi (Cowper, 2005; Hale, 1997; Harley and Ritter, 2002; Noyer, 1992), in which [–singular] and [–augmented] appear on distinct syntactic elements

- (15) Pam wari  
       He ran-SG
- (16) Puma yùutu  
       They ran-PL

<sup>2</sup>This and all subsequent examples have been glossed using abbreviations specified in the Leipzig Glossing Rules (<http://www.eva.mpg.de/lingua/files/morpheme.html>). The vowel *-a-* appearing between the plural marker and the dual marker is a morphological buffer, according to Lichtenberk (1983) and Croft (1990).

<sup>3</sup>Manam also has a paucal number, developed from an original trial (Corbett, 2000, p.25). Harbour (2006) accounts for the paucal in terms of iterative application of the feature [ $\pm$  augmented]. I will not treat the paucal formally in this paper.

- (17) Puma wari  
 They ran-SG  
 “They (two) ran-dual”

This is an instance of syncretism due to the structure of the vocabulary items of Hopi. Corbett (2000, p.169-171) discusses parallel phenomena in Zuni and in Kawiisu (Uto-Aztecan). In Hopi, the pronouns morphologically distinguish only [ $\pm$  singular], while the verbs morphologically distinguish only [ $\pm$  augmented]:

- (18) a. /puma/  $\Leftrightarrow$  [ $-\text{singular}, +\text{pronominal}$ ]  
 b. /pam/  $\Leftrightarrow$  [ $+\text{singular}, +\text{pronominal}$ ]  
 c. /wari/  $\Leftrightarrow$  [ $-\text{augmented}, \text{RUN}$ ]  
 d. /yùutu/  $\Leftrightarrow$  [ $+\text{augmented}, \text{RUN}$ ]

By hypothesis, the syntax is fully specified in the case of (17): both the pronoun and the verb with which it has agreed are [ $-\text{singular}, -\text{augmented}$ ]. However, the morphological vocabulary of the language does not make the full range of distinctions on either pronouns or verbs, and hence the “constructed” dual emerges as a consequence of a [ $-\text{augmented}$ ] pronoun and a non-singular verb. This pattern is not limited to pronouns; determiners syncretize dual/plural (although nouns do not) as the following examples demonstrate (Jeanne, 1978, p.73):

- (19) mi? maana paki  
 that.SG girl.SG entered.SG  
 “That girl entered”  
 (20) mima mamant yiq<sup>v</sup>a  
 those.PL girl.PL entered.PL  
 “Those girls entered”  
 (21) mima maanat paki  
 those.PL girl.DL entered.SG  
 “Those (two) girls entered-dual”.

Much like the pattern with pronouns above, determiners only express a distinction in [ $\pm$ singular], while the suppletive verb manifests a distinction between [ $\pm$  augmented]. By contrast, nouns express the full three-way distinction. Again, the expression of dual on determiners and verbs here provides confirmation for a theory of number features in which the distinctions [ $\pm$  singular] and [ $\pm$  augmented] are independent.

### 3 Impoverishment Rules: Postsyntactic Feature Deletion

Impoverishment Theory (e.g. Bobaljik (2002); Bonet (1991); Halle (1997); Halle and Marantz (1993); Harley (in press); Nevins (in press); Noyer (1992, 1998)) is a model of the syntax-phonology interface in which morphosyntactic feature agreement occurs prior to the realization of features by phonological material,



and in which feature-deleting operations (called *impoverishment* rules) 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 often formulated in context-sensitive terms, and may delete feature content within environments that are either idiosyncratic (so-called “Special Impoverishment”) or fall under a more systematic pattern determined by markedness. Clearly a large part of the research program is to see how many of the former category actually fall into the latter.

As an introductory example of impoverishment as a syncretism-yielding operation, we may consider the “*amn’t* gap”, discussed by (Francis, 1985), which is by hypothesis triggered due to 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 due to question-inversion, the expected *amn’t* form cannot surface; thus *\*Amn’t I lucky* is not a possible output for many dialects British or North American adult English (though it is possible for Francis’ dialect area “Nb 1”). For speakers who disallow *amn’t*, this is arguably not something we would want to model as a syntactic restriction: there is little motivation for a syntactic rule that bans head-movement of negation together with 1st person copula to the complementizer position. More damning for a syntactic account of this phenomenon is the fact that the result of attempting to ask a negated-copula question with a first 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. A well-known mismatch is exhibited by forms such as *Aren’t I lucky*, discussed in (Francis, 1985); see also Bresnan (2001); Nevins (2007). More exciting for present purposes, and less well-known, is the dialect area “Nb 5” of (Francis, 1985), which displays the following pattern:

- (22)    a.    I am lucky / \* I is lucky  
           b.    Isn’t I lucky?

Speakers who utter (22-b) exhibit a mismatch in the feature of person: the vocabulary item *is* is not used with first person singular subjects, though it is used with third person singular subjects. Such phenomena are modeled very well in an architecture with post-syntactic realization of inflectional features. With the realizational assumption 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 phi-features on the copula. The result of these syntactic operations, however, may ultimately contravene the following post-syntactic limitation on context-sensitive markedness:

- (23)    ***Amn’t* Ban**  
           \*[+author +singular] on the same node as [+negative] under C<sup>0</sup>

Thus, while a contracted copula *'m* can cliticize leftward to a pronominal subject (yielding *I'm*), in the case of subject-aux inversion, *amn't* would be expected to arise when contracted negation *n't* cliticizes to the uncontracted copula in C. In examining the ban on this expected form in (23), we may attempt to understand it in terms of markedness: as negation is marked (Croft, 1990, p.93), and [+author] is marked, the ban in (23) may be seen as a reaction to the doubly marked presence of these features on the same node. Resolution of (23) may occur via deletion of one of the offending features. In particular, in response to (23), one may delete [+author].

- (24) *Nb5 Impoverishment operation*  
Delete [+author] when on the same node as [+singular] and [+negative]  
under  $C^0$

In order to have the appropriate effect, (24) must occur after the syntax has already generated the offending combination, and before vocabulary insertion has applied to insert the form of the copula. Deletion rules that operate on phi-features after syntactic computation but before vocabulary insertion are called *impoverishment* rules, as 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 (24) will yield a set of features that is no longer realizable by the [+author] item *am*, and now must be realized by the vocabulary item *is*. The result is that these dialects that deal with the *amn't* gap by saying *Isn't I lucky?*

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 while not finding such effects in the 1st person. Thus, while Francis' 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. An unattested outcome like the one just described cannot be achieved in impoverishment theory, which governs postsyntactic deletion of features and thus has no mechanism to convert 3rd person features into an even more marked set of feature specifications.

In introducing impoverishment as an operation intended to reduce context-sensitive markedness via feature deletion, it is important to make a distinction between this model and a class of models that implements markedness reduction through scalar hierarchies. For example, the cases of dual impoverishment that we consider in this paper and the resolution of Croft's quotation at the beginning of Section 2 would countenance a rather different solution under a hierarchy of markedness constraints such as the Optimality Theoretic hierarchy in (25):

(25) \*DUAL >> \*PLURAL >> \*SINGULAR

The reasoning for why harmonic scales such as (25) would be insufficient for expressing the markedness of the dual compared to the plural is as follows: (25) 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, the decision for what the output should be is left purely up to markedness constraints, which would naturally favor the least-marked category. However, this pattern of neutralization of dual to singular never occurs in languages that neutralize the dual in a subset of morphosyntactic environments.

The focus in this paper is on impoverishment operations that are markedness-directed, and the specific claim about the formal representation of the markedness of the dual is that it is the result of the contextual-markedness of the feature-value [–augmented] when co-occurring with the feature-value [–singular]. Given that the markedness of the dual is localized to the particular value of a particular feature, we expect that the target of markedness-directed impoverishment will include specifically this value. As a result, a post-syntactic feature-deletion rule affecting the bundle [–augmented, –singular] will never target [–singular] to the exclusion of [–augmented], as it is the latter that is marked in the context of the former, rather than vice-versa:

(26) *Impoverishment may not exclude the contextually-marked feature:*  
 Post-syntactic feature-deletion rule affecting the bundle [–augmented, –singular] will never target [–singular] to the exclusion of [–augmented]

A direct consequence of (26) is that contextual-markedness-driven impoverishment of the dual will “turn it into” (i.e. render featurally indistinct from) the plural, rather than the singular. As we see throughout the case studies in this paper, the effects of neutralization cause the expected dual form to be realized by the morphology associated with plural number on the morphemes affected by the impoverishment operation.

We turn to an investigation of the impoverishment-related diagnostics in (3) by way of case studies. Section 4 discussed Markedness-Directed Impoverishment in Sámi and Warlpiri, Section 5 discusses Markedness-Triggered Impoverishment in Zuni, and Section 6 shows that the Ljubljana variety of Slovenian exhibits both Markedness-Directed and Markedness-Triggered Impoverishment for the dual. Section 7 concludes with a case of Markedness-Triggered Impoverishment in Upper Sorbian that persists even when the affixal exponents change, thereby providing a concluding argument that Impoverishment rules provide a good model for persistent syncretisms.

#### 4 The Dual undergoes Markedness-Directed Impoverishment

One of the central claims of this paper, 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-directed impoverishment specifically targets marked features as a deletion operation that reduces markedness, and the empirical fact that plural never neutralizes to dual confirms that plural is not more marked than dual. Cases of the opposite direction of neutralization, 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<sup>4</sup>:

- (27) Dat guokte mánat        **bohtiba**        deike.  
          those two    children.NOM come.PRS.DU here  
          Those two children come here.
- (28) \*Dat guokte mánat        **bohte**        deike.  
          those two    children.NOM come.PRS.PL here  
          Those two children come here.

However, this distinction is neutralized when the subject is indefinite, and plural agreement occurs for both dual and plural subjects.

- (29) Mánat        **bohte**        deike.  
          children.NOM come.PRS.PL here  
          Children come here.
- (30) \*Guokte mánat        **bohtiba**        deike  
          two    children.NOM come.PRS.DU here  
          Two children come here.
- (31) Guokte mánat        **bohte**        deike.  
          two    children.NOM come.PRS.PL here  
          Two children come here.

The form in (31) clearly demonstrates an instance of (3)[a]: in the environment of indefinite subjects, the expression of dual is identical to that of the plural (and in fact, it is the plural form that is used). Given that the feature [ $\pm$ augmented] distinguishes the [ $-$ singular] categories dual and plural, and that [ $-$ augmented], the value of this feature for the dual, is the marked value among these, a formal characterization of the North Sámi paradigm is as follows:<sup>5</sup>

- (32) *Markedness-Directed Neutralization of [ $-$ augmented] in North Sámi:*  
       The expression of [ $-$ augmented,  $-$ singular] is identical to the expression of [ $+$ augmented,  $-$ singular] in the environment of indefinite subjects

<sup>4</sup>Segmentation of morphemes on the verbs is not available in the source, most likely due to the effects of the stem readjustment rules of vowel alternation and geminate common through Sámi inflectional morphology.

<sup>5</sup>Mikael Vinka (pers. comm.) has made me aware of additional data on South Sámi. Although the phonological form diverges from North Sámi in certain ways, the dual-directed impoverishment rule is identical to that described in the text for North Sámi.

Vinka (2001) proposes an implementation of (32) in terms of impoverishment. The key to understanding impoverishment is that it is an operation that leads to *emergence of a less-specific exponent*. Distributed Morphology is a theory in which the phonological realization of inflectional morphology is determined post-syntactically, through the operation of Vocabulary Insertion. 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  $\phi$ -features will be realized by a phonological exponent called a Vocabulary Item, as determined by the Subset Principle, defined below (based on Halle (1997)):

- (33) 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 (34) for [–singular] present tense forms of the verb ‘to come’ in Sámi.

- (34) a. /boahtiba/  $\Leftrightarrow$  [–singular, –augmented]  
 b. /bohte/  $\Leftrightarrow$  [–singular]

When the output of the syntax results in the features [–singular, –augmented] on the present tense form of ‘to come’, as in (27), the Maximal Subset Clause of (33) will require that (34-a) is inserted rather than (34-b), correctly ruling out (28). On the other hand, when there is an indefinite subject, we assume that a postsyntactic impoverishment rule applies *prior to Vocabulary Insertion*:

- (35) Sámi feature-deletion rule:  
 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, formally identical to a rule of final devoicing, for example in Turkish:

- (36) Turkish feature-deletion rule:  
 Delete marked [+voice] in the context of [–sonorant] under a timing slot that is linked to the coda position of a syllable

The result of (35) applying prior to Vocabulary Insertion will be that the verbal node in (31) will not contain the feature [–augmented]. As a result, in accordance with the Subset Clause of (33), the Vocabulary Item (34)[a] cannot

be inserted, as the terminal node of the syntax does not contain the feature [–augmented], and only the less-specific Vocabulary Item (34)[b] may be inserted, as shown in (31).

Markedness-triggered impoverishment is thus a very general operation that operates across a wide range of inflectional categories and serves as an important diagnostic for markedness. By hypothesis, the rule of impoverishment in (35) is motivated by the markedness of [–augmented]: as discussed by Trubetzkoy (1969), when neutralization between a binary opposition occurs in favor of one of two categories, it is always 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, which is counter to fact (29). Importantly, the formulation of (35) makes clear that the feature-deletion operation affects only [–augmented], and that the resulting syncretism is therefore dual → plural, rather than to singular.

As an additional and slightly more intricate case study of the markedness of dual, let us consider the impoverishment of the 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 person and number morphemes. (37) and (38) show the ordinary distinct marking of dual and plural.<sup>6</sup>

- (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, p.320)
- (38) nganimpa-rlu ka-rna-ngku-lu nyuntu  
 We.plural-erg pres.impf.AUX-1EXCL.SUBJ-2OBJ-PL.SUBJ you  
 nya-nyi  
 see-nonpast  
 “We (plural) see you (singular) Hale (1973, p.328)

Like in Sámi, in Western Warlpiri, dual behaves 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 an adjacent context (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 there is a dual clitic on the same auxiliary node as another nonsingular clitic, the dual is neutralized and assumes the form of the plural. Thus in (39) although the pronouns remain dual, verbal agreement does not.

<sup>6</sup>Examples have been updated from Hale’s transcription to the standard Warlpiri orthography; I thank Julie Legate for assistance with this.

- (39) ngajarra-rlu ka-rljarra-ngku-pala                      nyumpala nya-nyi  
       \*1.DL-ERG    PRES.IMPF.AUX-1.DL-2DL.OBJ 2DL                      see-nonpast  
       ‘‘We two see you two’’
- (40) ngajarra-rlu ka-rna-lu-nyarra                                      nyumpala  
       1DL-ERG    PRES.IMPF.AUX-1SUBJ-PL.SUBJ-2PL.OBJ 2DL  
       nya-nyi  
       see-nonpast  
       ‘‘We two see you two’’ Hale (1973, p.330)

We have seen in (38) that when a dual argument is the only non-singular 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 renders the realization of dual arguments as identical to that of corresponding plural arguments. Thus, in (40), while a 1st-subject dual clitic and a 2nd-object dual clitic would be expected and would be able to surface independently of each other, two duals cannot be realized together, due to the markedness-based dissimilatory impoverishment rule in (41):<sup>7</sup>

- (41) 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 deletion rule is either a dual or a plural co-argument, illustrating again that dual and plural numbers behave as a natural class sharing [–singular]. In a similar case in the language Nimboran, Noyer (1998) presents an 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). Of course, it is important to point out that the rule in (41), as with 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. For example, English lacks Coda voice-neutralization, but this does not detract in any way from the fact that Coda-neutralization is the result of markedness. It would be rare for a language to have a voicing distinction that is *only* manifested in Codas, and this is the prediction of markedness theory as used in phonology. Similarly, while Warlpiri impoverishes 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.

The marked status of dual is thus confirmed in Warlpiri, where the dual/plural distinction is neutralized and it 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

<sup>7</sup>The formulation in (41) correctly captures the fact that both dual clitics in (40) undergo impoverishment to become realized by plural.

is neutralized in favor of a dual, but whereas Warlpiri provides us with an instance of an expected dual neutralized in favor of the plural, we may conclude that plural is the less marked.

## 5 The Dual Conditions Markedness-Triggered Impoverishment

Markedness-triggered impoverishment is an operation of feature-deletion that is *conditioned* by a marked feature  $mF$  and causes a neutralization of a distinction for some other feature. For example, there are few, if any, languages that have gender distinctions in the plural but not in the singular (Corbett, 2000). This is arguably due to the fact that an impoverishment rule may delete gender only in the marked environment of the plural but that 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 (Siewerska, 2000). Again, this is arguably due to the fact that an impoverishment rule may delete gender only in the marked environment of 1st person, but that it is rare if not impossible for an impoverishment rule to delete gender only in the unmarked third person.<sup>8</sup>

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 (call it [+author]) is present.

Rather than being an accident of Portuguese that all environments where [+author] occurs are ones where there is no distinction made for the gender feature [ $\pm$  feminine], this can be instead analyzed as the consequence of a systematic rule of feature deletion that applies to the output of syntax (Noyer, 1992):

- (43) *Markedness-Triggered Gender Impoverishment Rule:*  
       Delete the feature [ $\pm$ feminine] on all terminal nodes that bear the feature [+author]

---

<sup>8</sup>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, chapter 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 markedness-directed (e.g. the *amn't*  $\rightarrow$  *isn't* pattern of Section 3) as well as markedness-triggered diagnostics, in addition to clitic combination restrictions (Nevins, 2007).



Impoverishment operations thus reinforce the systematicity of a morphologically-neutralized distinction that we know to be syntactically present.

We turn to the dual. Despite the evidence amassed in (1) that dual is more marked than plural, Cowper (2005) argues that the contrary is true, on the basis of syncretism in the Zuni (spoken in New Mexico) pronominal paradigm. 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*.

We find a number of instances of 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. Slovene distinguishes dative and 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 et al., 2005, p.21).
  - e. Yava (Papuan) distinguishes inclusive vs. exclusive “we” in the plural, but not in the dual (Siewerska (2000, p.89))

These are classic instances of the markedness of dual: the presence of marked dual causes neutralization of other featural distinctions. As Croft (1990, p.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 provide this evidence. In Impoverishment Theory, these systematic neutralizations can be enforced and maintained by impoverishment rules, such as (45), which is responsible for (44-a), for example.

- (45) Dual-triggered Impoverishment yields absence of gender distinctions:  
Delete [ $\pm$ feminine] in the marked environment [–augmented, –singular]

Before proceeding, it is important to point out that all of the cases in (44) could potentially be handled without the mechanism of Markedness-Triggered impoverishment, by instead assuming underspecified vocabulary items. For example, one might alternatively 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 such an approach is the fact that it situates the locus of the gender-syncretism in the contents of the lexical inventory of affixes, and therefore one could easily imagine an opposite inventory of Vocabulary Items, with a feminine dual and a masculine dual but a gender-unspecified plural. Moreover, such an approach would predict that new vocabulary items could be innovated which would fill

the gap, e.g. that Classical Arabic could suddenly develop a feminine dual marker. Such an approach is therefore akin to a phonological account of German final devoicing which says that a rule of neutralization of  $[\pm \text{voice}]$  in the marked environment of the Coda does not exist, and that there is simply a lexical inventory of surface forms which 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, occurring in both pronouns and agreement across all tenses and cases.

An important case of neutralization of featural distinctions in the marked environment of the dual occurs in Zuni. The relevant facts can be shown below, for the 2nd.pers pronoun forms in non-nominative cases (Newman, 1965). The facts for 1st and 3rd person are identical.<sup>9</sup>

(46)		Obj	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 non-nominative 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 it is compatible with any non-singular features, and thus can show up in the dual), while /toʔnʔa:wan/ is specified for the features  $[>1, >2, \text{poss}]$ , meaning it is only compatible with plural possessive features. Cowper's conclusion is that in order to get /toʔnʔa:wan/ to block /toʔnaʔ/, plural must bear a feature that can be referred to. Cowper employs a system of underspecification and markedness unlike the one adopted here: in Cowper's system, "more features = more markedness".<sup>10</sup> As Cowper's privative theory requires that whenever reference is made to a feature, it must be the marked value, and since one must refer to the feature of plural in /toʔnʔa:wan/, Cowper's conclusion is that the 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 is an assumption that must be rejected for independent grounds: the distribution of 3rd person singular -s in

<sup>9</sup>Nichols (1997), describing fieldwork with younger speakers, found the dual/plural distinction to be leveled in the accusative and possessive pronouns (fn35, p.24-25). However, she remarks (pers. comm.) that elderly speakers appear to have the distinctions reported in Newman (1965) which form the basis of argumentation in the text.

<sup>10</sup>Cowper's theory also does not seem to employ impoverishment rules. Investigating the consequences of modifying Cowper's theory of underspecification and markedness with the introduction of impoverishment operations is beyond the scope of this paper.

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.

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 context-sensitive marking statement, as in (6). 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) can be observed by looking at the horizontal rows of the table: in Zuni, while the Plural makes a distinction between Objective and Possessive Case forms, the Dual does not make a distinction between Objective and Possessive Case forms.

This statement is true across the board in Zuni: first person dual is *hoʔnaʔ* for both objective and possessive, and third person dual is *ʔa:xiyaʔ* for both objective and possessive. Thus Zuni represents 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 non-nominative 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 thus far pointed. It is precisely *because* dual number is marked that the process in (50) applies, yielding the paradigm in (46).<sup>11</sup>

<sup>11</sup>A reviewer points out that while (50) captures the case syncretism in the dual, there is the additional syncretism of dual-plural in the objective. While this is treated with an elsewhere [–singular] item in the text, this could perhaps be alternatively analyzed with a markedness-directed impoverishment rule:

- (i) Delete [± augmented] in the environment [–sg, –sup, –obl]

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

- (50) *Zuni Dual-triggered Impoverishment yields absence of case distinctions:*  
Delete [ $\pm$ oblique] in the marked environment [ $-$ augmented,  $-$ singular]

As a useful parallel, in order to demonstrate 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 pattern that is formally identical to the 2nd person non-nominative cases in Zuni: four slots, three of which are covered by a single form (cf. (46)):

		Singular	Plural
(51)	2nd	do	do
	3rd	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  $\sqrt{do}$ <sup>12</sup> in English, as shown with the Vocabulary Items in (52)

- (52) a. /does/  $\Leftrightarrow$  [ $-$ participant,  $+$ singular]  
b. /do/  $\Leftrightarrow$  [elsewhere]

An explanation of 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 a “meta-syncretism”, in the sense of Bobaljik (2002); Harley (in press); 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. Harley (in press) notes, for example, that no English main verbs show agreement distinctions in the past tense – even the irregular past-tense verbs. As the past tense of *brought* arguably requires some degree of lexical listing, one might imagine a 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 phi-features on all main verbs in the past tense will enforce the meta-syncretism: the pattern of neutralization across many distinct subconjugations of irregular verbs.

Thus, in viewing the systematic neutralization of number distinctions in the present tense verbal agreement for 1st and 2nd person for all English main verbs and non-copular auxiliaries, an implementation in terms of markedness-triggered impoverishment will ensure this meta-syncretism. Number features are systematically deleted in the environment of the marked person category [ $+$ participant] in all main verbs, thus yielding use of the less specified Vocabulary Item, in accordance with (33).

---

in objective or possessive case.

<sup>12</sup>The lexeme, or set of features corresponding to this auxiliary, are abbreviated with the root notation here, though alternative representations are possible.

- (53) Participant-triggered impoverishment yields absence of number distinctions:  
Delete the feature  $[\pm \text{ singular}]$  on a main verb in the environment of  $[+\text{participant}]$

The effect of (53) is that agreement will be systematically identical for singular and plural in 1st and 2nd person. 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  $[+\text{participant}]$  in English. The fact that a highly specified vocabulary item (namely *toʔnʔa:wan* in Zuni and *does* in English) has a more narrow distribution than the elsewhere item is a consequence of the fact that the elsewhere item is used to realize features that have undergone impoverishment due to markedness.

## 6 Ljubljana Slovenian: Both Types of Impoverishment

Having examined dual-directed impoverishment in Sámi and Warlpiri and dual-triggered impoverishment in Zuni, we turn to a case study in which both processes jointly occur. In Slovenian grammatical studies it is agreed that the dual is more marked than the plural (Toporišič, 2000, p.271). We thus expect a variety of markedness-related impoverishment operations to apply. In this section we examine the case and number system of two varieties of Slovenian: Standard Slovenian (Derganc, 2003) and Ljubljana Slovenian (Amanda Saksida and Rok Žaucer, pers. comm.). Both varieties show impoverishment of gender distinctions in the dual, exhibiting markedness-triggered Impoverishment. For ease of presentation we present only the nominative cases, as these show the fullest range of potential distinctions to begin with.

- (54) Standard Slovenian nominative (relevant dual syncretism in bold):

	masc	neut	fem
dual	stol- <b>a</b>	okn- <b>i</b>	knjig- <b>i</b>
plural	stol-i	okn-a	knjig-e
	'table'	'window'	'book'

- (55) Ljubljana Slovenian nominative (relevant dual syncretism in bold):

	masc	neut	fem
dual	stol- <b>a</b>	okn- <b>a</b>	knjig-e
plural	stol-i	okn-a	knjig-e

The following is a list of the relevant Vocabulary Items occurring in the category of dual number:<sup>13</sup>

<sup>13</sup>In addition, there are the following two Vocabulary Items, which are unrelated to those in (63):

- (i) a. /i/  $\Leftrightarrow$   $[+\text{masc}, +\text{aug}]$   
b. /a/  $\Leftrightarrow$   $[-\text{fem}, -\text{masc}, +\text{aug}]$

It may be possible to reduce the inventory of Vocabulary items by treating *-a* as a radically under-specified Vocabulary item throughout the nominal declension but I will not pursue this here.

- (56) a. /i/ ⇔ [-masc, -aug, -sing]  
 b. /a/ ⇔ [-fem, -aug, -sing]  
 c. /e/ ⇔ [+fem, -sg]

As can be seen by comparing the boldfaced syncretisms in (54) and (55), the direction of gender impoverishment differs: while Standard Slovenian neutralizes the *neuter-feminine* distinction in the dual, Ljubljana Slovenian neutralizes the *neuter-masculine* distinction. The impoverishment rules in (57) capture these syncretisms:

- (57) a. Standard Slovenian:  
 Delete [±fem] in the environment of marked Dual  
 b. Ljubljana Slovenian:  
 Delete [±masc] in the environment of marked Dual

This is yet another instance of markedness-triggered impoverishment: both dialects reduce the gender distinctions from three to two, though they accomplish this neutralization in different ways. Thus, while markedness-triggered neutralization prescribes an impoverishment operation in the orthogonal category of gender, its precise target may be the locus of microvariation. The impoverishment rules in (57) are general impoverishment rules that are operative across categories, and evidence can be found from the fact that the numeral 2, which agrees for gender with its head noun, shows the same pattern of syncretism as well (58).

- (58) Syncretism for nominative forms of the number ‘two’ in Slovenian:
- |                     | masc | neut | fem |
|---------------------|------|------|-----|
| Standard Slovenian  | dva  | dve  | dve |
| Ljubljana Slovenian | dva  | dva  | dve |

In accounting for the gender-syncretism with the numeral 2 that occurs in a dual noun phrase, the existing impoverishment rules in (57), coupled with the Vocabulary Items in (59), yield the syncretism patterns in (58):

- (59) Vocabulary Entries for Slovenian nominative ‘two’:  
 a. /dva/ ⇔ [TWO, -fem]  
 b. /dve/ ⇔ [TWO]

Thus, in Standard Slovenian, impoverishment of [± fem] yields use of *dve* for both neuter and feminine, while in Ljubljana Slovenian, impoverishment of [± masc] yields use of *dva* for both [–fem] forms. Much like the comparison of the varieties of English in Section 3 that either 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.

The Ljubljana variety of Slovenian is of further interest, because, as an additional neutralization, the feminine dual shows a form identical to that of the feminine plural. This pattern thus instantiates another instance of markedness-

directed impoverishment whereby dual asymmetrically syncretizes with plural.<sup>14</sup> This is due to the additional impoverishment rule in (60), which is markedness-directed:

- (60) Ljubljana Slovenian dual feminine impoverishment:  
Delete [ $\pm$  augmented] in the environment: [+fem, -sg].

The resulting dual-plural syncretism in the feminine is much like the markedness-directed impoverishment of [-augmented] with indefinite subjects in Sámi. To illustrate the results of these impoverishment rules in Ljubljana Slovenian, (61) shows the feature specifications prior to impoverishment, while (62) shows the resulting feature specifications after deletion and their accompanying Vocabulary Items:

- (61) Ljubljana Slovenian nominative feature specifications:
- |           |                     |                     |                     |
|-----------|---------------------|---------------------|---------------------|
|           | [+masc, -fem]       | [-masc, -fem]       | [-masc, +fem]       |
| -aug, -sg | [+m, -f, -aug, -sg] | [-m, -f, -aug, -sg] | [-m, +f, -aug, -sg] |
| +aug, -sg | [+m, -f, +aug, -sg] | [-m, -f, +aug, -sg] | [-m, +f, +aug, -sg] |
- (62) Ljubljana Slovenian nominative feature specifications after impoverishment rules (57)[b] and (60):
- |           |                     |                     |               |
|-----------|---------------------|---------------------|---------------|
|           | [+masc, -fem]       | [-masc, -fem]       | [-masc, +fem] |
| -aug, -sg | [-f, -aug, -sg]     | [-f, -aug, -sg]     | [+f, -sg]     |
| +aug, -sg | [+m, -f, +aug, -sg] | [-m, -f, +aug, -sg] | [-m, +f, -sg] |

Given the Vocabulary Items relevant for the dual, repeated below, their insertion into (62) will result in (64), demonstrating the results of syncretism:

- (63) a. /i/  $\Leftrightarrow$  [-masc, -aug, -sing]  
b. /a/  $\Leftrightarrow$  [-fem, -aug, -sing]  
c. /e/  $\Leftrightarrow$  [+fem, -sg]
- (64) Ljubljana Slovenian Vocabulary Insertion into (62):
- |        |        |        |         |
|--------|--------|--------|---------|
|        | "Masc" | "Neut" | "Fem"   |
| "Dual" | stol-a | okn-a  | knjig-e |

Thus, Ljubljana Slovenian demonstrates an active pattern of impoverishment directed at and triggered by the dual, affecting both nouns and numerals, with variations in what is deleted, but always with markedness as the conditioning factor and impoverishment as the result.<sup>15</sup>

<sup>14</sup>Eduard Werner (pers. comm.) points out that the resulting system, in which masculine and neuter syncretize in the dual and feminine dual syncretizes with feminine plural, is entirely parallel to the system of the case marking by paucal numerals 2,3,4 within contemporary Russian.

<sup>15</sup>Additional instances of markedness-directed impoverishment can be found in dialects of Slovenian in which the dual is lost in non-nominative 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.

## 7 Conclusion: Enduring Effects of Impoverishment Under Affixal Change

It has been shown that adopting the number features in (5) and the marking statement in (6) integrates the markedness of dual on a crosslinguistic scale and the within-language markedness of dual that lead to neutralization-of-dual (Section 2) or neutralization-by-dual (Section 3) or both (Section 4). The inclusion in the theory of impoverishment operations as feature-deletion rules triggered by or acting on marked features enabled an alternative to Cowper's (2005) analysis of Zuni pronominal paradigms, thereby upholding the traditional claim that dual is more marked than plural.<sup>16</sup>

Before concluding, I would like to re-emphasize 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. 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 discussed in Wornar (2007), this importation of the dual ending for hard stems into the soft stems as well 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 below.

The table in (65) represents the traditional endings for feminine nouns:

(65) Traditional forms of Upper Sorbian feminine duals

	Hard Stem	Soft Stem
Sg	žon-a	bróžnj-a
Dl	žon-je	bróžn-i
Pl	žon-y	bróžnj-e
	'woman'	'barn'

The issue is that in final unstressed position, the distinction between the vowels *e* and *y* is lost, and thus both the dual and plural forms of soft stems end in

<sup>16</sup>An issue left largely untouched in this paper is the pragmatic use of the dual for nouns that normally come in pairs. It has been observed since Kopitar (1808) 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 Priestly (1993, p.440) and Dvořák and Sauerland (2005). The dual can be used with nouns such as 'shoes' only when there is specific emphasis on the cardinality two, or in the context of two unrelated shoes that do not form a pair. Such a 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, p.180). Thus, Slovenian and Sanskrit would seem to represent two extremes in obligatoriness of dual with paired objects. Quite interestingly, Eduard Werner (pers. comm.) informs me that while Upper Sorbian contains 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.



surface [e]. In addition, many contemporary speakers are losing palatalization (indicated by consonant+j). Thus, the opposition of 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:

(66) Surface forms of innovative Upper Sorbian feminine duals

	Hard Stem	Soft Stem
Sg	žon-a	bróžnj-a
Dl	žon-i	bróžn-i
Pl	žon-e	bróžnj-e
	'woman'	'barn'

Upper Sorbians, 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 stems. What is perhaps most interesting is the form that the reanalysis of the ending *-i* for hard-stem feminine duals has arguably taken:

(67) Innovated general marker for Non-Masculine Duals in Upper Sorbian:  
/i/ ⇔ [-masc, -aug, -sing]

The Vocabulary Item in (67) is identical to the specification given above for Standard Slovenian, and the featural 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: extension of the use of *-i* has taken place for hard stem neuters, even though no phonological reduction rule threatens the dual/plural distinction in the neuters.

(68) Traditional forms of Upper Sorbian neuter duals

	Hard Stem	Soft Stem
Sg	piw-o	džěčo
Dl	piw-je	džěšći
Pl	piw-a	džěći
	'beer'	'child'

There is no threat of a collapse of the dual and plural endings in the hard stems, as no phonological rule would neutralize *a* with *e*. Nonetheless speakers are using the Vocabulary Item in (67) which, as formulated, is fully compatible with the dual hard stem neuter form:

(69) Surface forms of innovative Upper Sorbian neuter duals

	Hard Stem	Soft Stem
Sg	piw-o	džěčo
Dl	piw-i	džěšći
Pl	piw-a	džěći
	'beer'	'child'

The “importation” of the ending *-i* (67) to the neuter hard stem dual is not motivated by any threat of collapse but rather represents the systematic identity of feminine and neuter within the dual that is already in effect Upper Sorbian, as enforced by the impoverishment rule in (70):<sup>17</sup>

(70) Delete [ $\pm$ fem] 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, due to the existing Dual-Triggered impoverishment of gender distinctions, leads to an effect in the neuter as well. The importance of impoverishment rules in playing a guiding hand in 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.

Impoverishment rules thus represent a coherent set of morphological operations: they delete features due to (contextual) markedness and thereby yield persistent patterns of inflectional syncretism. Continued development of Impoverishment Theory and a feature-based formalization of inflectional categories can only further sharpen our understanding of morphological markedness and its role in syncretism.

## References

- Baerman, Matthew, Dunstan Brown, and Greville Corbett. 2005. *The Syntax-Morphology Interface*. Cambridge University Press.
- Bobaljik, Jonathan. 2002. Syncretism without Paradigms. *Yearbook of Morphology* 2001 .
- Bonet, Eulalia. 1991. Morphology after Syntax: Pronominal Clitics in Romance. Doctoral Dissertation, MIT.
- Börjesson, Kristin. 2006. Argument Encoding in Slovene: A Distributed Morphology Analysis of Slovene Noun Declension. In *Subanalysis of Argument Encoding in Distributed Morphology (Linguistische Arbeits Berichte 84)*, 115–130. Institut für Linguistik, Universität Leipzig.
- Bresnan, Joan. 2001. Explaining Morphosyntactic Competition. In *The Handbook of Contemporary Syntactic Theory*, 11–44. Blackwell.
- Conklin, H.C. 1962. Lexicographic treatment of folk taxonomies. In *Problems in Lexicography*. Indiana University Research Center in Anthropology, Folklore and Linguistics.
- Corbett, Greville. 2000. *Number*. Cambridge University Press.
- Cowper, Elizabeth. 2005. A note on number. *Linguistic Inquiry* 36.3:441–455.
- Croft, William. 1990. *Typology and Universals*. Cambridge University Press.

<sup>17</sup>Note that this rule is identical to that of Standard Slovenian, as presented above in (57)[a].

- Derganc, Aleksandra. 2003. The Dual in Slovenian. In *Slovenian from a typological perspective*, (*Sprachtypologie und Universalienforschung /Language typology and Universals*, vol. 56, issue 3), 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*, 98–112. Ann Arbor: Michigan Slavic Publications.
- Francis, Nelson. 1985. *Amn't I*, or the hole in the pattern. In *Focus on England and Wales*, 141–152. Amsterdam: John Benjamins.
- Greenberg, Joseph. 1963. Some universals of grammar with particular reference to the meaning of elements. In *Universals of Language*, 73–113. MIT Press.
- Greenberg, Joseph. 1966. *Language universals, with special reference to feature hierarchies*. Janua Linguarum, Series Minor, 59. The Hague: Mouton.
- Hale, Kenneth. 1973. Person Marking in Walbiri. In *A Festschrift for Morris Halle*, 308–344. Holt, Rinehart and Winston.
- Hale, Kenneth. 1997. Some observations on the contributions of local languages to linguistic science. *Lingua* 100:71–89.
- Halle, Morris. 1997. Impoverishment and Fission. *PF: Papers at the Interface*, MITWPL 425–450.
- Halle, Morris, and Alec Marantz. 1993. Distributed Morphology and the Pieces of Inflection. In *The View from Building 20*, 111–176. Cambridge, MA: MITWPL.
- Halle, Morris, and Bert Vaux. 1997. Theoretical Aspects of Indo-European Nominal Morphology. In *Mir Curad: Studies in Honor of Calvert Watkins*, 223–240. Innsbruck: Innsbrucker Beitrage zur Sprachwissenschaft.
- Harbour, Daniel. 2006. *Morphosemantic Number: From Kiowa Noun Classes to UG Number Features*. Dordrecht: Springer.
- Harley, Heidi. in press. The Importance of Impoverishment. In *Phi Theory*. Oxford University Press.
- Harley, Heidi, and Elizabeth Ritter. 2002. Person and Number in Pronouns: A Feature-Geometric Analysis. *Language* 78.3:482–526.
- Ito, Junko, and Armin Mester. 2003. *Japanese Morphophonemics: Markedness and Word Structure*. 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. Asepts of Hopi Grammar. Doctoral Dissertation, MIT.

- 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*. London: Oxford University Press.
- Nevins, Andrew. 2007. The Representation of Third Person and its Consequences for Person-Case Effects. *Natural Language and Linguistic Theory* 25.2:273–313.
- Nevins, Andrew. in press. Cross-Modular Parallels in the Study of Phon and Phi. In *Phi Theory*. 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.
- Noyer, Rolf. 1992. Features, Positions and Affixes in Autonomous Morphological Structure. Doctoral Dissertation, MIT.
- Noyer, Rolf. 1998. Impoverishment theory and morphosyntactic markedness. In *Morphology and its Relation to Syntax*, 264–285. CSLI Publications.
- Priestly, Tom. 1993. Slovene. In *The Slavonic Languages*, 388–451. London: Routledge.
- Ravid, Dorit, and Lubna Hayek. 2003. Learning about different ways of expressing number in the development of Palestinian Arabic. *First Language* 23.1:41–63.
- Siewerska, Anna. 2000. *Person*. Cambridge University Press.
- 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 & 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.
- Williams, Edwin. 1994. Remarks on Lexical Knowledge. *Lingua* 92:7–34.
- Wornar, Edward. 2007. Wo změnach w paradigmaticie femininowych a-zdonkow w dzensnišej hornjoserbšćinje. *Lětopis* 2:(to appear).

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

317 Boylston Hall  
Harvard University  
Cambridge, MA 02139  
nevins@fas.harvard.edu