

CONSTRUCTING DUAL NUMBER IN HOPI*

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1. Introduction

The goal of this paper is to discuss an unusual way of expressing dual number in Hopi, a Northern Uto-Aztecan language spoken in Arizona. In Hopi, dual number can be ‘constructed’ from a plural pronoun and a singular verb, as illustrated in (1) below (Kalectaca 1978: 52):

- (1) a. Pam wari
3SG run.SG
‘S/he ran’
- b. Puma yuutu
3PL run.PL
‘They ran’
- c. Puma wari
3PL run.SG
‘They (two) ran’

In (1a) and (1b), the verb agrees with the pronoun, as expected. However, in (1c), the plural pronoun *puma* is used with the singular verb *wari*, and the interpretation is dual. Constructions such as this will be referred to as CONSTRUCTED DUALS.

In this paper, I demonstrate that constructed duals in Hopi involve verb agreement, and not verbal number, and I point out problems that this raises for Minimalist theories of agreement. In particular, I argue that constructed duals cannot be conceived of as being ‘constructed’ in the syntax, but are better understood in a late insertion model of morphology. I offer a late insertion account of Hopi constructed duals, which builds on Cowper’s (2004) account of the same phenomenon in Zuni, but relies on number feature representations that more accurately depict the relative markedness of dual number. Finally, I look at constructed duals in a wider context. Constructed duals are not only found in Hopi, but also in Kawaiisu, a Numic Uto-Aztecan language of California, and Zuni, a language isolate spoken in New Mexico (Newman 1965; Zigmond et al 1991), and all three languages construct dual number in the same way.

* I would like to thank Elizabeth Ritter and Amanda Pounder for their helpful comments on this material. In this handout, the following abbreviations are used: SG, DL, PL = singular, dual, plural; CAUS = causative, DEM = demonstrative, DUR = durative, HABIT = habitual, NEG = negative, OBJ = object, REDUP = reduplication

2. Verb Agreement or Verbal Number?

Corbett (2000: 171) speculates that number marking on verbs in constructed duals may not be signalling verb agreement, but may in fact be signalling verbal number. If this were the case, an account of constructed duals could be easily articulated, based on selectional restrictions of the verbs themselves. However, as will be demonstrated, this type of analysis is not feasible for Hopi. In this section, I will briefly define verbal number, and outline some of its basic characteristics. I will then go on to demonstrate that, although Hopi does have verbal number, constructed duals are in fact ‘constructed’ via verb agreement, and not verbal number.

2.1 What is Verbal Number?

Unlike verb agreement, verbal number is understood to be a derivational or lexical property of verbs, and verbal number distinctions are considered part of the inherent meaning of the verbs on which they appear (Corbett 2000; Durie 1986; Mithun 1988). Consistent with the notion that it is lexically specified, verbal number is often signalled by stem alternation.

Corbett (2000: 246) distinguishes two different types of verbal number – event number and participant number. Event number may be thought of as an aspectual distinction. Its function to quantify the number of verbal events, and it is described in various terms, such as repetitive, iterative, or pluractional. Participant number, on the other hand, functions to quantify the number of participants affected by a verbal event. The semantic distinction between verb agreement and verbal participant number is quite subtle. In the former, what is highlighted is the number of participants, and in the latter, while the number of participants is inevitably implicated, it is the relative effect of the verbal event that is being marked. In other words, what is being quantified by participant number is the “effect of actions, states, or events” (Mithun 1988: 214).

Verbal number (particularly participant number, upon which I will henceforth focus) and verb agreement often look very similar. Corbett (2000), following Durie (1986), identifies two main diagnostics for verbal number. The first is that verbal number always has an ergative basis. The second is that in morphosyntactic contexts where number agreement morphology is typically lost, verbal number distinctions are preserved. Using these diagnostics, I demonstrate in the next section that Hopi does have verbal number.

2.2 Verbal Number in Hopi

There are two distinct classes of verbs in Hopi, with respect to how they are pluralized. One class of verbs suppletes for number, while the other takes a plural suffix. As will be demonstrated in this section, suppletion in Hopi meets both criteria for verbal number, whereas suffixation meets neither.

Regarding Corbett’s first diagnostic, suppletive verbs follow an ergative pattern. When intransitive, these types of verbs supplete for the number of the subject, as illustrated in (2) below:

- (2) a. Nu' yev **qatu-wta**
 1SG here sit.SG-DUR
 'I am sitting here' (Kalectaca 1978: 69)
- b. Itam **yeese**
 1PL sit.PL
 'We (pl) sit' (Kalectaca 1978: 74)

In (2a), the singular verb *qatu* is used with a singular subject, *nu'*. In (2b), the suppletive plural form *yeese* is used with a plural subject *itam*. In contrast with intransitive forms, transitive suppletive verbs alternate according to the number of the object. This is illustrated in (3):

- (3) a. Nu' Mano-t **wiiki**
 1SG Mano-OBJ take.along.SG
 'I took Mano along' (Hale, et al 1990: 266)
- b. Nu' mambahoy-mu-y **caama**
 1SG girl-PL-OBJ take.along.PL
 'I took the girls along' (Hale, et al 1990: 266)

In both (3a) and (3b), the subject is singular, but in (a), the object is singular and in (b) it is plural. The alternating verb stems *wiiki* and *caama* reflect the number of the object rather than that of the subject.

The ergative pattern that is evident with suppletive verbs is not observed with suffixing verbs. Both intransitive and transitive verbs of this type take the plural suffix if the subject is plural. The nominative agreement pattern observed with suffixing verbs is exemplified in (4) and (5) below:

- (4) a. Nu' **hohonaq**
 1SG play
 'I am playing' (Hale, et al 1990: 258)
- b. Itam **hohonaq-ya**
 1PL play.PL
 'We (pl) are playing' (Hale, et al 1990: 258)
- (5) a. I' tsiro nu-y **maamatsi**
 DEM.SG bird 1SG-OBJ recognize
 'This bird recognized me' (Kalectaca 1978: 35)
- b. Puma nu-y qa **maamats-ya**
 3PL 1SG-OBJ NEG recognize-PL
 'They didn't recognize me' (Kalectaca 1978: 79)

In (4), a contrast is observed with the intransitive verb *hohonaq* 'play'. When used with a singular subject, it remains bare, but when used with a plural subject, it takes the plural suffix *-ya*. A similar contrast is observed in (5) with

the transitive verb *maamats(i)*, which takes the plural suffix when used with a plural subject. With regards to ergativity as a diagnostic for verbal number, suppletion meets this criterion, but suffixation does not.

The second diagnostic for verbal number is that in morphosyntactic environments where verb agreement distinctions are typically lost, verbal number distinctions are preserved. Two contexts in which number agreement is neutralized are considered here: derived agentive nouns and derived causative verbs. With both, suppletive verbs retain their number distinctions, but suffixing verbs do not. As with the first diagnostic, this suggests that, in Hopi, suppletion is verbal number, and suffixation is verb agreement.

In Hopi, there is an agentive suffix *-qa*, analogous to the English *-er*. This suffix changes the lexical category of the stem to which it attaches from verb to noun. Number agreement morphology is not expected to be preserved in this environment. However, suppletive verbs retain their number distinctions when they are used with the agentive suffix. Consider the following examples, each with an incorporated object:

- (6) a. **masa-'ta-qa**
 wing-have.SG-AGENT
 'airplane' (lit. 'wing-haver') (Kalectaca 1978: 197)
- b. **masa-'yung-qa-m**
 wing-have.PL-AGENT-PL
 'airplanes' (lit. 'wings-havers') (Kalectaca 1978: 197)

In (6a), the deverbal noun 'airplane' (literally 'wing-haver') is formed with the singular form of the verb 'to have', 'ta. In (6b), plural 'airplanes' uses the plural form of the verb, 'yung, in conjunction with the nominal plural marker *-m*. This 'double-marking' of the plural seen with suppletive verbs is not similarly observed with suffixing verbs. This is illustrated in (7) below:

- (7) a. **penta-ngwu-qa**
 write.DUR-HABIT-AGENT
 'writer' (Kalectaca 1978: 124)
- b. **penta-ngwu-qa-m**
 write.DUR-HABIT-AGENT-PL
 'writers' (Kalectaca 1978: 124)

In (7), the singular and plural forms of the agentive noun writer(s) are contrasted. Importantly, the plurality of (7b) is indicated only by the nominal plural suffix; the verbal plural suffix *-ya* is absent. Thus, with respect to derived agent nouns, suppletive number marking is preserved, but suffixing number marking is not.

The causative suffix *-na* is a transitivity suffix that demotes the subject to object position. When suppletive verbs are used with the causative suffix, number distinctions are preserved. Verbs that mark the number of the subject when they are not causative mark the number of the object when they are causative. In other words, the referent with which the verb "agrees" remains

static in both non-causative and causative verb forms. Consider the following examples:

- (8) a. puuwi
sleep.SG
'(sg) sleep' (Hale et al 1990: 262)
- b. puw-na
sleep.SG-CAUS
'put (sg) to sleep' (Hale et al 1990: 262)
- (9) a. tookya
sleep.PL
'(pl) sleep' (Hale et al 1990: 262)
- b. tok-na
sleep.PL-CAUS
'put (pl) to sleep' (Hale et al 1990: 262)

In (8), the singular form of the verb 'sleep' is shown, in both the non-causative (a), and causative (b) forms. In the non-causative, the subject is singular, but in the causative, the object is singular. Similarly, in (9), the plural form of 'sleep' is used with plural subjects when non-causative, and plural objects when causative.

In contrast, suffixing verbs always mark the subject, whether non-causative or causative, as shown in (10) below:

- (10) a. Saa-saqa leepek-ya
REDUP.PL ladder fall-PL
'Ladders fell' (Kalectaca 1978: 75)
- b. Tootim saaqa-t leepek-na-ya
boy.PL ladder-OBJ fall-CAUS-PL
'The boys made the ladder fall' (Kalectaca 1978: 75)

These examples are much different from those in (8) and (9) above, where the plurality of the referent remained static with both non-causative and causative verb forms. In (10), on the other hand, the referent does not remain static, but the subject argument does. This contrast can be captured by treating suppletion as reflecting an inherent number distinction, and suffixation as reflecting a syntactic means of marking the number of the subject. In other words, with respect to the preservation of number values with derived causatives, suppletion patterns like verbal number, whereas suffixation patterns like verb agreement.

In this section, I outlined a number of distributional differences between verbs that supplete for number and verbs that take a plural suffix. These differences are summarized in (11).

(11)

Summary of Verbal Number in Hopi		Suppletion	Suffixation
Ergativity		✓	✗
Number Values Preserved	Derived Agent Nouns	✓	✗
	Derived Causatives	✓	✗

The table in (11) illustrates the fact that, with respect to both ergativity and the preservation of number values, suppletion meets both criteria for verbal number, whereas suffixation meets neither. The most basic conclusion that can be drawn from this is that Hopi does have verbal number. Yet, Hopi also has verb agreement. The next factor to consider is whether or not constructed duals are in fact formed via verbal number, as Corbett (2000) suggests.

2.3 Constructed Duals ARE Agreement

Corbett (2000) speculates that constructed duals are constructed from verbal number distinctions. Although Hopi does have verbal number, I demonstrate in this section that constructed duals are constructed via verb agreement, and not verbal number.

First, consider the fact that only suppletive verbs exhibit verbal number distinctions in Hopi. If constructed duals were constructed via verbal number, then it is predicted that only suppletive verbs could be used with constructed duals. However, as seen in (12) below, constructed duals may be formed with suffixing verbs, as well:

- (12) Itam peena (PL = peena-ya)
 1PL write
 ‘We (DL) write’ (Kalectaca 1978: 26)

In (12), the plural pronoun *itam* is used in conjunction with the singular (suffixing) verb *peena*, and the interpretation is dual. The fact that constructed duals can be formed with suffixing verbs suggests that constructed duals do not utilize verbal number in their construction.

Furthermore, constructed duals do not follow an ergative pattern. They may be the subjects of intransitive verbs, as in (12), or the subjects of transitive verbs, as in (13):

- (13) Itam sikwit nöösa
 1PL meat eat.SG
 ‘We (DL) ate meat’ (Kalectaca 1978: 52)

In (13), the plural pronoun *itam* is used with the singular verb *nöösa*, and the interpretation of the subject is dual. Although dual number can be constructed for subjects of both intransitive and transitive verbs, it cannot be constructed for objects. As previously noted, verbal number typically has an ergative basis. In contrast, verb agreement in Hopi follows a nominative/accusative pattern. The fact that constructed duals are restricted to subject position suggests that they are formed via verb agreement, and not verbal number. In the following section, I

highlight some of the problems that constructed duals present for Minimalist theories of agreement.

3 Constructing Duals in the Syntax

Although constructed duals have been shown to employ a formal system of agreement, on the surface they involve a fundamental *disagreement* between the subject and the verb. As such, constructed duals are difficult to account for in standard theories of agreement. In this section, I outline two different Minimalist theories of agreement, and demonstrate precisely why duals cannot be constructed at the syntactic level.

In earlier manifestations of the Minimalist Program, feature checking was conceived of as a one-step process (Chomsky 1995). Items were thought to enter a derivation bearing all of their features – both interpretable and uninterpretable. Feature checking was simply a matching process, by which features with matching values were checked (and the uninterpretable ones deleted) under the appropriate syntactic conditions. More recently, feature checking has evolved into a two-step process (Chomsky 2001). In this version, uninterpretable features enter a derivation unvalued, and feature checking involves both valuing uninterpretable features to match interpretable features and then checking the newly valued uninterpretable features under the appropriate conditions. The debate over which of these approaches to feature checking is more feasible is far from resolution, so I consider both as possibilities to account for agreement in constructed duals. In this paper, the former approach is referred to as PURE CHECKING, and the latter as VALUATION.

Assuming a basic lexicalist model of morphology, in which the morphology essentially feeds the syntax, then neither of these models – valuation nor pure checking – can account for constructed duals. In what follows, I go through the derivations of constructed duals for each of these models, highlighting the problems with both.

In a pure checking approach, the subject DP enters the derivation bearing an interpretable [PL] feature, and the verb bears an uninterpretable [SG] feature. Because these two features do not match, the uninterpretable feature on the verb cannot be checked, and the derivation thus crashes.

In a valuation approach, the problem is of a different sort. Here, the subject DP enters the derivation with an interpretable [PL] feature, but the verb enters the derivation with an unvalued number feature. The verb is then valued as [PL], in accordance with the number feature on the subject DP. This derivation does not yield the correct result. While the derivation crashes with pure checking, there is simply no way to construct dual number via valuation. What this suggests is that feature checking alone cannot account for constructed duals.

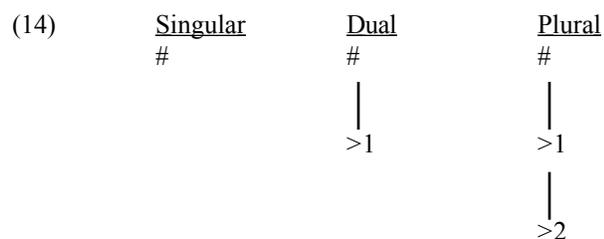
4 Constructing Duals in the Morphology

In the previous section, it was demonstrated that constructed duals cannot adequately be accounted for in the syntax. In this section, I motivate a late insertion account for constructed duals, in which dual number is constructed not

at the syntactic level, but at the morphological level. In particular, the framework that I adopt is Distributed Morphology (Halle and Marantz 1993). In Distributed Morphology, the insertion of vocabulary items (i.e., morphemes) occurs after all syntactic operations have taken place. In short, the syntax “tells” the morphology what it wants, and the morphology finds the closest possible match from amongst the possible vocabulary items. Regarding constructed duals, I assume a model in which constructed duals behave as regular duals in the syntax, allowing feature checking to take place. It is at the point of vocabulary insertion that dual “construction” occurs. In other words, I argue that constructed duals are constructed in the morphology, not in the syntax. Another account that adopts this perspective is found in Cowper (2004).

4.1 Cowper (2004)

Cowper (2004) presents a late insertion account of Zuni constructed duals, based on the number feature representations given in (14):



In (14), singular number is represented by a bare # node. Dual number is seen as ‘greater than 1,’ and plural number is ‘greater than 1,’ but also ‘greater than 2.’ Importantly, the representations in (14) are what Cowper proposes for three-way number systems, in which singular, dual, and plural number are all activated. For two-way (singular/plural) number systems, the representation of singular would remain the same, but plural number would be represented by the [>1] feature that is provided in (14) for dual number. This captures the idea that the meaning of ‘plural’ may vary, depending on how many number values the system contains.

The other main advantage of these representations is that they predict syncretisms that could arguably be found in languages with constructed duals. Because dual differs in only one feature from the singular, and in one feature from the plural, singular-dual and dual-plural syncretisms are predicted in this system. These two types of syncretism are exactly what Cowper suggests to explain constructed duals in Zuni.

Cowper claims that the so-called ‘plural’ pronouns in constructed duals are in fact syncretic dual/plural forms, and the ‘singular’ verbs are syncretic singular/dual forms. In her model, at the syntactic level, both the subject and verb are dual, allowing feature checking to take place. Then, at the morphological level, the subject DP is spelled out as [>1]. This is a dual/plural syncretism, because plural pronouns are spelled out in the same way. Because there is no uniquely dual verb form available in the list of vocabulary items, the verb is spelled out with a bare number node, just as singular verbs are.

This account yields the correct result. Syntactically, the construction is dual, and this is how it is interpreted at LF. Morphologically, the subject appears to be plural, and the verb appears to be singular. However, the feature representations employed in this model fail to encode the relative markedness of dual number over plural number.

In the representations in (14), plural number is more marked than dual number. However, both cross-linguistically and within languages that exhibit a singular/dual/plural number contrast, dual number is arguably more marked than plural number. The relative markedness of dual over plural across languages can be captured by Cowper's system, because for her, two-way systems use a proper subset of the representations required to specify three-way systems. However, within languages with a three-way number contrast, dual number still appears to be more marked, simply by virtue of it being more limited in distribution. A clear example of this is found in Hopi.

In Hopi, dual number is expressed morphologically on nouns, as in (15):

- (15) Maana-**vit** pitu
 girl-DL arrive.SG
 'The girls (DL) arrived' (Kalectaca 1978: 51)

In (15), the suffix *-vit* indicates that the subject is dual. Although dual number can be expressed morphologically on nouns, it must be constructed for pronouns, as has been illustrated throughout this paper. Furthermore, as previously noted, constructed dual pronouns are restricted to subject position. In contrast, plural number is not restricted in its distribution; plural number may appear with both nouns and pronouns, in various positions. Similarly, although there is no dual verb agreement, there is plural verb agreement, again with both nouns and pronouns. The limited distribution of the dual, in contrast with the plural, in Hopi, suggests that, at least in this language, dual number is more marked than plural number. Cowper's number feature representations do not capture this markedness fact, and in light of this, I suggest an alternative account for constructed duals in Hopi.

4.2 An Alternative: Default Valuation

The analysis laid out in this section builds on Cowper's basic framework, but uses number feature representations that encode the relative markedness of dual number over plural number. In particular, I adopt the feature representations given in Harley and Ritter (2002). These are illustrated in (16) below:

- (16) Singular Plural Dual
 INDIVIDUATION INDIVIDUATION INDIVIDUATION
- | / \
 Group Minimal Group

In (16), singular number is represented by a bare Individuation node (analogous to Cowper's # node). Plural number is represented with one dependent, Group, and dual number is represented by the simultaneous activation of both Minimal

not related to either of these languages (it is an isolate), but all three are spoken in the southwestern United States. Thus, it is quite possible that the construction of dual number is an areal feature. Nevertheless, all three languages exhibit striking similarities both in their construction of dual number and elsewhere. In this section, I will highlight some of these similarities.

First, verbal morphology is often suppletive in all three of these languages, and all three have verbal number. While a precise analysis of the relationship of this shared property to constructed duals is beyond the scope of this paper, what this does suggest is that there may be something ‘special’ about verbs in these languages. Thus, the notion of default valuation as something applying only to verb agreement, and not other types of concord, may in fact be a reasonable possibility.

Second, in all three languages, dual number is constructed from a plural DP and a singular verb. There is no documented case of dual number being constructed the other way around, from a singular DP and a plural verb. The default valuation account, but not Cowper’s account, predicts exactly this. Default valuation applies only to uninterpretable features, and thus predicts that only verbs, but not nouns, could be singular in constructed duals.

Third, and finally, all three languages have morphological duals in addition to constructed duals. Furthermore, morphological duals in these languages always trigger singular, and not plural, verb agreement. Typologically speaking, this is quite a surprising pattern, because most languages with dual number trigger either dual agreement (if available) or plural agreement (Corbett 2000). Again, however, the default valuation account predicts exactly this pattern.

5. Conclusion

In summary, the fact that Hopi constructed duals are formed via verb agreement, and not verbal number, poses a significant challenge to Minimalist theories of agreement. I have argued that constructed duals are best handled in a late insertion model of morphology, in which the ‘construction’ of dual number takes place post-syntactically. I have also argued that in three-way number systems, such as that observed in Hopi, dual number is more marked than plural number, and this markedness relation is encoded in the feature representations available at the point of vocabulary insertion. The precise mechanism that I propose for constructing dual number in Hopi I refer to as default valuation, which allows number features on nouns to seek a closest match in the morphology, but prevents number features on verbs from doing so, forcing them to resort to a default value. Although this analysis cannot accurately predict all of the number concord patterns observed in Hopi, it does predict some of the cross-linguistic patterns observed with constructed duals. What this indicates is that the question of how to account for constructed duals is far from resolved, but in looking at constructed duals in a wider context, both across languages and within the larger context of individual languages, valuable ground may be gained.

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