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Gluckman, John Daniel

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Getting Rid of Number Features

A thesis submitted in partial satisfaction of the
requirements for the degree Master of Arts
in Linguistics

by

John Gluckman

2014

ABSTRACT OF THE THESIS

Getting Rid of Number Features

by

John Gluckman

Master of Arts in Linguistics

University of California, Los Angeles, 2014

Professor Anoop Mahajan, Chair

This thesis is a study of the featural representation of nominal number. By looking at patterns of agreement when 1st and 2nd person arguments interact, I argue that the expression of morphological number does not involve dedicated plural features (e.g., [+plural]). Instead, morphological number is dependent on multiple, privative, atomic features ([INDIVIDUAL]), essentially extending into morphology a standard semantic theory of nominal plurality (Link 1983, Schwarzschild 1992). A feature bundle containing more than one [INDIVIDUAL] feature is mapped to a plural exponent. The empirical discussion centers on agreement in LOCAL contexts, where a 1st or 2nd person acts on another 1st or 2nd person. In many languages, two singular arguments may result in plural morphology on the verb. I show that the plural morphology results from a single syntactic head copying phi-features from two different argument positions, “building” a plural feature bundle. I extend the discussion beyond local agreement contexts, and show how Individual Number can account for a large range of data. The proposed theory attempts to unify morphological and semantic representations within a Minimalist framework (Chomsky 1995, 2000, 2001)

The thesis of John Gluckman is approved.

Jessica Rett

Carson Schütze

Anoop Mahajan, Committee Chair

University of California, Los Angeles

2014

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LIST OF GLOSSES

1/2/3 = 1st/2nd/3rd person

12 = 1st inclusive

I/II/III = Set I/Set II/Set III

ABS = absolutive

ACC = accusative

ADD = addressee

AGR = agreement

CL = clitic

COFR = change of referent

DL = dual

DUR = durative

ERG = ergative

EXCL = exclusive

FUT = future

GEN = genitive

INCL = inclusive

IND = individual

INV = inverse

NEG = negative

NOM = nominative

NPIP = non-past imperfective aspect

NSG = nonsingular

PART = participant

PERF = perfective

PL = plural

PROG = progressive

PRON = pronominal

SG = singular

SPKR = speaker

SUBJ = subject

TNS = tense

1 Overview of the arguments

The morphological expression of number presents a specific challenge to morphosyntactic theories of agreement. Consider the phrases in (1).

- (1) a. The students are happy
b. John and Mary are happy

In both (1a) and (1b), the copular predicate *are* appears in a plural form. Accepting that in English, verbal predicates agree with their subjects, intuitively, the plural form of the verb in both examples is straightforward: the subject phrase is plural, thus the verb is plural. Morphologically, the plural agreement is much more mysterious. In (1a), the subject *the students* is plural, as signified by the *-s* nominal ending, and so is traditionally assumed to bear some feature which says as much (i.e., [+plural]). However, in (1b), *John and Mary* are unequivocally singular, and are assumed to bear some corresponding feature (i.e., [+singular]). The difficulty lies then in how the verb can nonetheless reflect a feature like [+plural], when there is overt evidence that such a feature has entered the derivation.

This is far from a new observation, and there have been numerous approaches to the syntactic, semantic, and morphological processes at work here (Givón 1970, Corbett 1983, Munn 1993, Dalrymple and Kaplan 1997, van Koppen and Rooryck 2008). The present study sheds light on the features used to compute morphological plurals by looking at a relatively unstudied phenomenon: LOCAL PERSON PORTMANTEAUX. Local arguments refer to arguments which are “local” to the speech act, i.e., 1st or 2nd person. It is shown here that the complex patterns displayed by a number of unrelated languages when a 1st/2nd person acts on another 1st/2nd person reveal a great deal about how features – specifically, number – are morphologically represented. I will argue that languages (and by extension, Universal Grammar) do not contain plural features like ±singular, ±plural, GROUP, etc. as primitives. Instead, plural morphology results from the semantic idea that plural entities are constructed from atomic elements, in this case, features denoting individuals. The proposal here not only requires us to reevaluate assumptions about feature inventories, but it

also has both theoretical and empirical consequences for theories of agreement. In the end, the theory will unify morphological and semantic theory.

The crucial data will involve agreement between a verb and two local arguments. Consider the forms below taken from a range of unrelated languages.¹

- (2) a. Yimas (Lower Sepik, Papuan)
ka-mpa-n-tpul
 1sg-**dual**-2/3sg-hit
 ‘I hit you(sg)’ (Foley 1991)
- b. Nocte (Tibeto-Burman)
hetho-e
 teach-**1pl**
 I will teach you(sg)’ (Trommer 2006)
- c. Siriono (Tupí-Guaraní)
oro- nupã
1pl.EXCL- beat
 ‘I beat you(sg)’
- d. Mapuche (isolate spoken in Chile and Argentina)
pe -e -yu
 see -INV -**1dl**.SUBJ
 ‘I see you(sg)’ (Arnold 1994:33)
- e. Anindilyakwa (Australian)
ngarra- rringka ningkwirriwa
1.INCL.**nsg**- see 2pl
 ‘I saw all of you’ (Leeding 1989:380)

¹Examples are given in the orthographies used in the sources. I have simplified some of the glosses.

- f. Karuk (Hokan)
pu- **kin-** *tcúphuunic-* *-eic* *-ara*
 NEG- **1pl-** talk.to -FUT -NEG
 ‘I will not speak to you’ (Macaulay 1992:185)
- g. Bolinao (Austronesian)
naʔkít =**ta** =*ka*
 saw =**Gen.1dl** =Nom.2sg
 ‘I saw you’ (Liao 2010), citing Pérez (1975)
- h. Agutaynen (Austronesian)
indi =*a* *itabid* =**ta**
 NEG =Nom.2sg accompany =**Gen.1pl.INCL**
 ‘I will not include you (sg)’ (Liao 2010), citing Quackenbush (2005)
- i. Surinam Carib (Cariban)
k- *amo* *-ya*
 12- weep.for -ASP
 ‘I weep for you’
 ‘You weep for me’ (Hoff and Kiban 2009:343)

The common factor unifying the examples in (2) is that the agreement marker in each phrase does not reflect the features of a single argument. Rather, each agreement marker appears to reflect either number or clusivity distinctions which are not transparent in either the subject or the object. For Yimas, in (2a), when a 1st person subject acts on a 2nd person singular object, dual morphology is triggered on verb, despite the fact that both arguments may be singular. Likewise, for Nocte in (2b), plural morphology is triggered on the verb, again, despite the fact that both arguments may be singular. We also see clusivity distinctions, such as in (2e), where a 1st person singular subject acting on a 2nd person object triggers 1st non-singular inclusive morphology on the verb. In (2h), the inclusive morpheme is used when a 1st person acts on a 2nd singular.

Our first question should be whether this plural morphology is accidental or systematic. To answer this question, we must briefly look at local agreement (or 1↔2) effects cross-linguistically.² As noted in Heath (1991, 1998) and (Noyer 1992), and more recently by Cysouw (2003), Trommer

²I will use the convention where a rightward arrow (→) indicates subject on the left acting on object on the right. A double-sided arrow (X↔Y) encompasses both X→Y and Y→X situations.

(2010), Bank et al. (2010), Georgi (2011), Woolford (2012), Georgi (2013), among others, when a 1st or 2nd person acts on another 1st or 2nd person, the resulting agreement morphology can result in PORTMANTEAUX affixes, which appear to be unpredictable(/unsegmentable) exponents in an otherwise (language internally) predictable system of verbal agreement. Heath proposes that 1↔2 effects arise because of pragmatic concerns, and he lists a number of strategies employed by languages in order to obviate contexts where local arguments interact.

- (3) Heath's strategies for dealing with 1↔2 marking (taken from Siewerska (2004:237)).
- a. marker disguised by partial phonological distortion
 - b. one of the two markers expressed by isolated suppletive allomorph
 - c. one of the two markers (elsewhere non-zero) expressed by zero
 - d. **number neutralization, sometimes including use of plural for semantic singular**
 - e. **1st or 2nd marker merged with (or replaced by) 3rd-person marker**
 - f. entire combination expressed by unanalyzable portmanteau
 - g. entire combination expressed by zero (special case of portmanteau)
 - h. **inclusive (+2) marker replaces 1st or 2nd marker, or entire combination**
 - i. **merged 1/2 marker is part of both 1↔2 and 2↔1 combination**
 - j. subject and object markers compete for a single slot
 - k. co-occurring 1st and 2nd markers are widely separated
 - l. combinations with identical segments differ in tone

(The bolded strategies will be of particular interest for the rest of this paper, but the others are germane as well, for the reasons discussed below.) There are a number of striking things about the various strategies mentioned above.

First, these oddities are confined generally to local agreement situations. That is, portmanteau agreement is most frequently observed in 1↔2 contexts, and we rarely see similar strategies for dealing with 1/2→3. In fact, 1/2→3 contexts are in general quite predictable from the rest of the system, given things like markedness theory (Heath 1998:84). Noyer (1992:290) in fact argues that the strangeness of 1↔2 contexts derives from an *ad hoc* universal constraint on 1↔2 agreement

(which can be “unlearned” in some languages) which deletes some of the phi-features that have entered the derivation.³

Second, these strategies generally surface in languages in which there are existing person hierarchy effects in the realization of agreement (although see discussion of non-local portmanteaux in §6.1.7).^{4,5} By this, I mean that the verb preferentially agrees with some subset of person features, no matter where in the syntactic structure the argument bearing the feature originates. The canonical example of this is found in many Algonquian languages, in which 2nd person morphology is expressed on the verb when either the subject or the object is 2nd person. This is important with respect to other languages where agreement may reflect a “choice” in which argument controls the agreement. For instance, Hindi has a system in which the subject or object may control agreement, depending on the case assignment.⁶ Crucially, though, Hindi does not show 1↔2 effects, as the choice of controller is not based on a person-hierarchy.

Third, for many of these languages, there is an apparent unidirectionality, in that in one configuration (i.e., 1→2) but not the other (2→1), a portmanteau form is used. For instance, in Yimas, we see 1↔2 effects when 1st acts on 2nd, but never when 2nd acts on 1st. This unidirectionality may be a direct reflection of the person hierarchy, in that some person feature is privileged over the others. But if so, it is puzzling why 1↔2 effects ever obtain. That is, if the person hierarchy is an algorithm which is used to determine how the verb should agree, then this algorithm systematically

³It turns out to be too strong a statement to say that portmanteau forms only occur in 1↔2 contexts, since some languages show apparent portmanteau forms in other contexts as well. This will be discussed in §6.1.7.

⁴With “person hierarchy”, I include other categories such as animacy, and proximity, which are well known to be ranked as well, cf (Silverstein 1976)

⁵This is not to say that a person hierarchy may not exist in the language, rather, I confine the discussion to person hierarchies with respect to agreement. So there are a number of other person-based issues, such the Person-Case Constraint, spurious *se*, *me-lui* constraint, which are all, arguably, due to similar person hierarchy effects. While these phenomena may (and likely do) have the same underlying source, I will not attempt to extend the present analysis to them.

⁶Briefly, if the subject is inherently marked for case, the object controls the agreement.

fails in all languages which display 1↔2 effects.⁷

And lastly, despite appearances, there is actually quite a bit of systematicity among different strategies in (3), and in general we can collapse them into six different categories:⁸

- (4) i. both arguments realized normally
- ii. completely unanalyzable portmanteau form
- iii. partially unanalyzable portmanteau form⁹
- iv. one argument has a partially reduced feature set
- v. one argument has a fully reduced feature set
- vi. combined feature set

There may be overlap and ambiguity among categories here. What we do not see, though, is insertion of “random” features – that is, features which are not a subset of any of the arguments. In other words, it is not that case that 1↔2 contexts in some language result in adding an obligatory morpheme realizing, say, a [+feminine] feature, although if the result of 1↔2 were completely random, we might expect exactly this state of affairs.

Heath explains the various 1↔2 strategies as a pragmatic effect, claiming that 1↔2 situations are pragmatically marked, and speakers tend to obviate or avoid them entirely. While it may be true that speakers tend to avoid 1↔2 contexts, this does not in fact offer a clear explanation about the systematicity observed in these situations. Nor in fact does it explain why there should be a morphological reflex. Whether transparent 1st/2nd morphology is used or not, a phrase meaning “I saw you” still *means* “I saw you”, and so it is unclear why a morphological change is better from a pragmatic point of view.

In fact, most current theories of agreement concur that 1↔2 effects are due to the verb trying to do “too much”. Based on the general observation that verbs cross-linguistically tend to express

⁷The use of one of Heath’s strategies in one direction, and a different strategy in the other direction is, I believe, unattested.

⁸See also Liao (2010) for a similar list discussing 1↔2 effects in Austronesian languages.

⁹This may be an affix which appears to display some recognizable parts, but also other unanalyzable parts.

an agreement relationship with an argument bearing a local person feature (instead of a 3rd person) (cf, Béjar and Řezáč (2009)), the verb in 1↔2 contexts attempts to mark all the person features present in the derivation, but is constrained in some way. The constraint is often, though not always, templatic in nature. There is only one agreement position on the verb, and two arguments are competing for that position. In the case of 1↔2 effects, the agreement mechanism on the verb essentially cannot decide, and attempts to reference both arguments.

This has been implemented theoretically in a number of ways. In Georgi (2011, 2013)'s analysis, a probe on some functional element is able to copy features from different syntactic positions at the same time, and thus bears a bundle with an accumulated set of features, which can be spelled out as a portmanteau. In her view, all 1↔2 portmanteaux are expressions of inclusive morphology.¹⁰

Woolford (2012)'s analysis assumes something like Georgi's for one type of portmanteau agreement, what she calls "syntactic portmanteaux agreement". She further argues for another type of agreement portmanteaux, "morphological portmanteaux", where the agreement morphology must satisfy some alignment constraint in which person features (which are only present on local arguments) are always aligned with the edge of the verb. Expressing the features of one person argument violates this constraint, just in cases when two are present in the structure. Portmanteau forms are the grammar's device for expressing all the person features in one morphological slot.

Trommer (2006, 2010) argues that 1↔2 effects are all post-syntactic in nature, and result from the ordering of insertion of vocabulary items and abstract markedness constraints. Thus, the cross-linguistic presence of person hierarchies and 1↔2 effects are somewhat epiphenomenal in that there is nothing built into the mechanism of agreement (or spell-out) which we can point to as the source of the portmanteau forms, apart from appeals to abstract notions of markedness.

Apart from Trommer's view, these analyses assume that the different 1↔2 strategies stem from the fact that the set of phi-features that are expressed on the verb is a *combination of the set of*

¹⁰The analysis presented later will accept that some instances of portmanteaux may reflect inclusivity, but that is not true in all cases.

features of the arguments. We see now how we can theoretically link $1 \leftrightarrow 2$ effects and agreement with coordinated phrases as in (1b); in both contexts, the verb can be analyzed as expressing the combined features from more than one syntactic position.

The significance that $1 \leftrightarrow 2$ effects bear on feature representation is that while the plural morphology expressed with coordinated elements can possibly be explained along semantic grounds, the same cannot be said of the plurals seen in $1 \leftrightarrow 2$ contexts. Simply, *there is no plural entity that can introduce a plural feature.* Note that this holds regardless of the type of feature we propose for plurality. That is, whether we assume [+plural], or [GROUP], or [AUGMENTED], or even [−singular], the syntax does not merge an argument bearing this feature, and yet it may be expressed on the verb.

There are many other factors to be discussed, but the point of this section is to assert that plural/clusivity marking in $1 \leftrightarrow 2$ is not a random occurrence, but in fact results from general, explicable, constraints on verbal agreement.

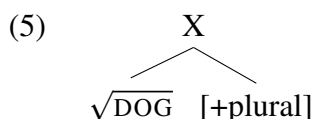
The rest of the paper is organized as follows. First, I will present the formal background and theoretical assumptions of Distributed Morphology in §2. In §3, I present the core proposal of the paper: the theory of Individual Number. §4 spells out some alternative theories of number features. §5 sketches the theory of agreement adopted throughout the paper. Then we will turn to empirical evidence, and examine a number of languages which show $1 \leftrightarrow 2$ agreement in §6. §7 will extend the analysis to languages showing inclusive/exclusive distinctions. In §8, I will look at how the proposed system interacts with other phenomena beyond $1 \leftrightarrow 2$ effects, and show that Individual Number easily solves many apparent problems of number exponence. §9 will conclude the paper.

2 Distributed Morphology

I adopt the theory of Distributed Morphology (henceforth (DM)) as proposed in Noyer (1992), Halle and Marantz (1993), *et seq.* In DM, the structures are built in the syntax by merging bundles of information which lack phonological content. The syntax manipulates the bundles and then

sends them off to the phonetic component (PF) and the logical component (LF). In the latter, the structures are interpreted according to the rules of the semantics. In the former, phonological content is inserted and perhaps filtered, according to phonological rules. DM also allows limited manipulation of the bundles themselves in PF. VOCABULARY ITEMS (VIs) are the phonological shapes that the bundles are mapped to via “rules of exponence”. VIs are inserted through a type of competition: more specific rules of exponence are ordered before less specified bundles.

I will exemplify DM with plural formation in English, using a conventional feature like [+plural]. The syntax is assumed to insert items like lexical roots (e.g., $\sqrt{\text{DOG}}$) and featural items (e.g., [+plural]). The rules of syntax manipulate this information (in a possibly language-specific way). In English, at the point of spell-out, we can assume that the noun and its associated number feature form some sort of constituent. (Note that I am ignoring for purposes of exposition the categorial n^0 nominalizer feature which combines with the root before the plural feature.)



In the post-syntactic component PF, spell-out targets each terminal node of the tree (perhaps cyclically (Embick 2010)).¹¹ In the default case, /z/ corresponds to a feature [+plural], and /dɔg/ corresponds to $\sqrt{\text{DOG}}$.¹² We formalize this with the following notation.

(6) [+plural] \Leftrightarrow z

(7) $\sqrt{\text{DOG}}$ \Leftrightarrow dɔg

With these two correspondences,¹³ we realize two phonological morphemes, which are concatenated and subject to further phonological rules (such as devoicing, e.g., [kæts]). The VIs are

¹¹There is some variation among the literature as to what is targeted at spell-out, and whether a non-terminal node may be targeted for insertion. I abstract away from this here.

¹²This plural feature is also assumed to be restricted to apply only in the contexts of nouns.

¹³Note that the two-sided arrow is employed to differentiate this from a “rule”. For this paper, VIs are correspondences between feature bundles and phonological information. There is debate within DM whether VIs are better expressed as re-write rules, rather than correspondences, but the difference will not be crucial below.

underspecified in that they only need to correspond to a subset of the features contained by the bundle. This is known as the Subset Principle (Kiparsky 1973).

“The phonological exponent of a Vocabulary item is inserted into 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. 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.” (Calabrese 2008:172, citing Halle, 1997)

Thus, there may be other information in the bundle along with [+plural], such as [-singular], etc, but the insertion of the plural affix only makes use of the [+plural] feature in English.

Of course, not all plurals are formed identically. Irregular forms such as *oxen*, *mice*, *geese* are idiosyncratic, and so must be “listed”, or memorized. \sqrt{OX} needs a special rule to form its irregular plural form. This can be formalized with a context sensitive morpheme, which takes priority over the less specific spell-out.¹⁴

- (8) a. [+plural] \Leftrightarrow en / \sqrt{OX}
 b. [+plural] \Leftrightarrow z

The VIs cannot be freely ordered because if b. applied before a., [**aksəz*] would be a predicted surface form. Thus VIs are intrinsically ordered and the more specific ones apply first. The VI in b. applies in the elsewhere environment, just in cases where the conditions in a. are not met (i.e., the root is not \sqrt{OX}).

This overview of DM is cursory, and there are additional complications that I have either simplified or ignored. When necessary I will make them explicit as we proceed.

¹⁴I formulate these rules using context sensitivity, but we could also formulate them as spelling to a bundle containing both [+plural] and \sqrt{OX} . The difference between these two strategies are not relevant for the present discussion.

3 Individual Number

In this section, I will lay out the central claim of this paper, namely, that plural morphology corresponds to multiple atomic features. This diverges from the classical practice of specifying morphological plurality with bivalent features such as [\pm singular], or [\pm plural], etc. I also argue against featural representations in more recent accounts, which use monovalent features such *MINIMAL* to represent singular, and *GROUP* and/or *AUGMENTED* to represent plural, as argued or assumed in Harley and Ritter (2002), Cysouw (2003) among others. The difficulty with all of these features is not that they incorrectly represent the semantic notion of plurality (though some do), nor that they cannot be used to derive the morphological patterns we see (though some cannot). Rather, the problem comes in how the features are introduced into the derivation.

In the proposed system, which I call Individual Number, nominal plurals are constructed from multiple *INDIVIDUAL* features, which are “atomic” in the sense that they are indivisible (and privative). The premise behind Individual Number is that a standard semantic theory which underlies nominal plurality extends directly to morphology. “John is conceptualized as a single atomic entity, while John and Bill are conceptualized as a non-atomic entity that has the two atomic parts that correspond to John and Bill” (Sauerland et al. 2005:411) The semantics of plurals builds plural entities out of atomic elements. The present paper essentially argues that there is morphological evidence that this view of plurality is correct. Individual Number gives substance to the concept of a semantic “atom” – although bear in mind that it says nothing about the interpretation of the atoms. This issue, as well as the differences between a “Linkian” theory of plurals (Link 1983) versus a “Schwarzschildian” theory of plurals (Schwarzschild 1992) – both of which require atomic elements in the plural entity – will not be debated here. What is being presented here is, strictly speaking, a theory of morphology.

Morphological person/number features come in feature bundles. A 1st person singular and plural pronoun may be represented as in (9).¹⁵

¹⁵I have nothing to say about Class or Gender features, although it is assumed that they will be dependent on an

(9) a. *1st singular*

$$\left[\begin{array}{c} \text{INDIVIDUAL} \\ \text{PARTICIPANT} \\ \text{SPEAKER} \end{array} \right]$$

b. *1st plural*

$$\left[\begin{array}{c} \text{INDIVIDUAL} \\ \text{INDIVIDUAL} \\ \text{PARTICIPANT} \\ \text{SPEAKER} \end{array} \right]$$

A 1st singular contains exactly one IND(IVIDUAL) feature, one PART(ICIPANT) feature, and one SP(EA)K(E)R feature. Following Harley and Ritter (2002), Cowper (2005), Cowper and Hall (2005), a speaker is by definition a speech act participant, hence SPKR entails the presence of PART. The claim here is that PART, in turn, entails the presence of a unique IND feature.

In contrast to a 1st singular, the bundle in (9b), which contains two INDIVIDUAL features, corresponds to a 1st plural. In fact, the following bundles would also correspond to a 1st plural.

(10) a.
$$\left[\begin{array}{c} \text{IND} \\ \text{IND} \\ \text{IND} \\ \text{IND} \\ \text{IND} \\ \text{IND} \\ \text{PART} \\ \text{SPKR} \end{array} \right]$$

This bundle of features would represent a 1st person with five other people. While this bundle of features may be present on a pronoun, the rules of exponence need to make reference only to a minimal contrast.¹⁶ That is, in English, the difference between a singular and a plural is whether there is one or more than one IND feature, thus the VIs are formulated such that one IND maps to singular exponence, while two INDs map to plural exponence. Note that the rules of exponence

IND node as well. See also discussion of gender in French in §4.3

¹⁶This appeal to contrastiveness draws heavily on Cowper (2005), Cowper and Hall (2005).

are fixed. Once the rule which maps two INDS to plural is learned, it is this rule which applies whenever there are two or more IND features in the bundle.¹⁷

In languages which grammaticalize a dual number, the minimal contrasts needed are between one IND, two INDS, and more than two INDS. Thus, the bundle in (9b) would be mapped to 1st dual morphology, and the bundle in (11a) (or (10a)) would be 1st plural.

(11) a. *1st plural*

$$\begin{bmatrix} \text{IND} \\ \text{IND} \\ \text{IND} \\ \text{PART} \\ \text{SPKR} \end{bmatrix}$$

The same reasoning will apply to a language which has a trial number. Languages which exhibit a paucal number allow a flexible amount of IND nodes to be associated with the paucal meaning. In all languages, after a certain number of IND nodes, the exponent is plural.

Turning to other person categories, the bundles in (12) will correspond to a 2nd person, and 3rd person will be represented without any PART nodes (which entails the absence of SPKR), (13).¹⁸

(12) a. *2nd singular*

$$\begin{bmatrix} \text{IND} \\ \text{PART} \end{bmatrix}$$

¹⁷In other words, it is incorrect to say that the bundle in (10a) is mapped to *we/us*, rather, only the features $\begin{bmatrix} \text{IND} \\ \text{IND} \\ \text{SPKR} \end{bmatrix}$ are mapped to *we/us*. I should also note that there is a backdoor built into DM: underspecification. It may be possible that the plural exponent is the default exponent. This is ultimately an empirical issue; none of the cases discussed in this paper are compatible with such an analysis.

¹⁸The reader may notice that the features assumed here make it impossible for morphology to refer directly to a 2nd or 3rd person argument. In this regard I follow the standard assumption that there is a universal hierarchy such that 1>2>3. In truth, I have nothing against postulating a further ADDRESSEE feature. This is ultimately an empirical issue. See discussion in §6.1.7.

b. *2nd plural (or dual)*

$$\begin{bmatrix} \text{IND} \\ \text{IND} \\ \text{PART} \end{bmatrix}$$

(13) a. *3rd singular*

$$[\text{IND}]$$

b. *3rd plural (or dual)*

$$\begin{bmatrix} \text{IND} \\ \text{IND} \end{bmatrix}$$

Again, a bundle with more IND features is possible, but during spell-out, the rules of exponence will make reference only to those features which are referenced by the VIs.¹⁹

Clusivity distinctions posit multiple PART features, since an inclusive category involves more than one speech-act participant. In a language with a 1st inclusive/exclusive distinction, the following bundles would be representations of 1st inclusive and exclusive categories.

(14) a. *1st Inclusive*

$$\begin{bmatrix} \text{IND} \\ \text{IND} \\ \text{PART} \\ \text{PART} \\ \text{SPKR} \end{bmatrix}$$

¹⁹Like every other theory of person and number features, I must stipulate into the system why no language ever grammatically encodes things like choral-we or “choral-you”. Note that both are derivable in Individual Number, merely by adding PART and SPKR features under IND nodes. I will assume that there is some PF constraint against having more than one SPKR feature in one bundle, something like $* \begin{bmatrix} \text{SPKR} \\ \text{SPKR} \end{bmatrix}$. It is perhaps more difficult for me to derive why no language ever distinguishes between inclusive and exclusive 2nd person categories, which is perfectly derivable in my system by counting PART features. Again, though, almost every theory of phi-features must deal with this problem; it is not unique to Individual Number. One solution that might be implemented here is by appealing to semantic complexity. Because of the semantic complexity of SPKR and PART features (see Sudo (2012)), it may be that such feature bundle is prohibitively difficult to compute. However, this is clearly pure speculation. (Thanks to Jonathan Bobaljik for helpful discussion on this point.)

b. *1st Exclusive*

$$\begin{bmatrix} \text{IND} \\ \text{IND} \\ \text{PART} \\ \text{SPKR} \end{bmatrix}$$

As proposed above, each PART feature entails a unique IND feature. This captures the fact that a 1st inclusive is inherently non-singular.²⁰ Note that nothing prevents a language like English from postulating an argument with two PART nodes. However, the morphological expression of such representations will be merely plural. In this regard, plural subsumes dual, which tracks the cross-linguistic generalization that dual forms are generally syncretic with plurals, not with singulars (Corbett 2000, Cysouw 2011).²¹

Implicit in Individual Number is a relationship between SPKR, PART, and IND features. Consider a plural entity such as *John and me*. This entity denotes a plurality of two unique individuals, thus there are two IND features; there is a bijection between IND features and individuals. This can be notated using indices, IND_i and IND_j , corresponding to John_i and me_j . It is crucial, in fact, that we have some way of ensuring that each IND feature picks out a different individual, otherwise this bundle could apply to a 1st singular if each IND feature was defined such that it could pick out *any* individual. There is further a PART feature and a SPKR feature. However, what ensures that the SPKR feature picks out the same individual that is being picked out by IND_j , and not IND_i (or

²⁰This type of analysis, which derives inclusive/exclusive distinctions as being related to the number of PART nodes, stems from Cowper and Hall (2005). “The formal property that characterizes languages with an inclusive-exclusive distinction is... the possibility of more than one Participant dependent on a single instance of π .” (p. 3) This analysis differs from other accounts in which inclusive requires a feature which represents first person as well as a feature which distinctly represents second person, i.e., [+1, +2] or [SPKR, ADD(ressee)]. As argued by Cowper and Hall, a language which has both a PART feature as well as SPKR and ADD make PART essentially “unlearnable”, as it never makes a contribution to the meaning. However, it is not crucial to the theory developed here whether or not ADD exists as well.

²¹Jonathon Bobaljik (p.c.) points out that Individual Number might predict that we should see instances where dual syncretizes with singular, not plural, something which is generally thought not to exist. However, I would argue that dual-singular syncretism is precisely what is happening in the phenomenon of Constructed Number, where a dual subject (which morphologically looks plural) triggers singular agreement. I would argue that in these contexts, there is no agreement exponent that maps to dual morphology, so the elsewhere morpheme, singular, is used. See discussion in footnote 31.

for that matter, some other individual not present)? That is, what keeps us from interpreting the

SPKR feature as applying to the individual *John*? Thus, the bundle $\begin{bmatrix} \text{IND}_i \\ \text{IND}_j \\ \text{PART}_j \\ \text{SPKR}_j \end{bmatrix}$, in which we add indices, makes sure that each feature is mapped to the correct individual. Although I will not write in the indices in each bundle, the reader should assume their presence.²²

With a theory like Individual Number in which morphology can “count” instances of features, we need a way to constrain the system from over-generating. That is, it is striking that no language has anything like than a “quintal” number (and even quadral-number languages are exceedingly rare, if they exist at all (Corbett 2000)), although all of these are theoretically generable in the proposed system. I will assume that this is a reflex of human cognition in general. I assume there to be an inherent bias against dealing with sets of features greater than three or four. A great amount of work in the cognitive sciences (cf, the work of Stanislas Dehaene, Susan Carey, and Karen Wynn) has shown that children have an innate ability to compute simple math involving small sets of one, two, or three. The implication, then, is that at the time of acquisition, a child would be able build a VI from a bundle containing one, two, or three IND features, but would not be able to map a bundle of seven IND features to anything simply because a child cannot “handle” a set of seven elements. Thus, I will assume that the lack of higher number categories is the result of a cognitive bias.²³

A simple demonstration of the ordering of VIs within a rich agreement system is given with Spanish verbal inflection. Table 1 lists the agreement suffixes in Spanish.

²²I will decline from defining the actual interpretation of these features, but see Sudo (2012) (and references therein) for extensive discussion of the semantics of phi-features. Tentatively, I think the analysis proposed in Sudo (to appear) can straightforwardly be translated into Individual Number. I will leave this for further research.

²³An inherent cognitive bias should be visible elsewhere in the grammar. And indeed, similar constraints on cognitive processes being able to count only small sets (just composed of two or three) have been proposed for long-distance interactions in phonology as well (Paster 2014). We might also note that within syntax, something like center embedding (e.g., *The cat the dog chased ran*) become basically incomprehensible after two or three iterations.

	sg	pl
1 st	-o	-mos
2 nd	-s	-is
3 rd	-∅	-n

Table 1: Spanish verbal inflection

One proposed set of VIs is given in (15). Note that it may be possible to further segment portions of the exponents, or specify the VIs differently so that we can come up with an alternate ordering. This is just a demonstration of how an ordered list of VIs works with the proposed features.

(15) VI's for Spanish verbal inflection

- a. $\left[\begin{array}{c} \text{IND} \\ \text{IND} \\ \text{SPKR} \end{array} \right] \Leftrightarrow \text{mos}$
- b. $\left[\begin{array}{c} \text{IND} \\ \text{IND} \\ \text{PART} \end{array} \right] \Leftrightarrow \text{is}$
- c. $\left[\begin{array}{c} \text{IND} \\ \text{IND} \end{array} \right] \Leftrightarrow \text{n}$
- d. $[\text{SPKR}] \Leftrightarrow \text{o}$
- e. $[\text{PART}] \Leftrightarrow \text{s}$
- f. elsewhere $\Leftrightarrow \emptyset$

There are a number of other concerns which will be addressed in the coming sections. To reiterate the main claim, overt expressions of plurality are derived not by the spell-out of a specific feature which expresses the notion “plural”. Rather, the multiple instances of the atomic units are what are referenced by the morphological rules of exponence.²⁴

²⁴This begs the question whether *all* types of plurality, including verbal number, can be construed in a similar fashion. So, plural events would be concatenation of multiple sub-events, and may be morphologically expressed as such. While I will not address this issue here, we can perhaps speculate that verbal reduplication is a rather straightforward corollary of multiple sub-events being expressed morphologically. Note, in fact, that nominal reduplication is sometimes employed by languages to form plurals.

I will close this section with a short discussion of the scope of the issue addressed here. There are a number of questions which can be asked of the theory presented here, but the questions which involve the interaction between Individual Number and semantics will not be addressed in this paper. For instance, someone might ask how Individual Number interacts with (non-referring) quantified expressions, e.g., *no boys*, or *countless stars*, or what happens when *they* is used to refer to an unknown amount of people. That is, how many IND features are present in these expressions, and what is the interpretation of the IND feature in such contexts? I understand these questions to fundamentally questions for semantics, and as such, they fall outside of the scope of this paper, which is primarily concerned with morphology. I will not debate how to handle an infinite number of atomic elements (e.g., *countless stars*). Nor how can we count an unknown amount of atomic elements (e.g., indeterminate *they*). Nor will I define the “atomicity” of IND. These are all questions which have non-trivial answers, but I will only address the morphological issue in the present work, and leave for future research the interactions with, and implications for, semantics.

4 Alternative representations for number

In this section I will discuss several different approaches to how number is represented morphologically and discuss some of the empirical and theoretical difficulties each system encounters. In general, what Individual Number captures which these other theories lack is the inherent relationship between person and number features, in that number features can viewed as a consequence of person features.

4.1 Classic features

First, a feature such as $[\pm\text{plural}]$ meaning “strictly greater than 1” fails to capture the correct semantics for plurality. From a semantic perspective it is crucial that singular elements not be excluded from phrases denoting plurality – an idea that has been noted throughout the literature

(Baker and Bobaljik 2002, Cysouw 2003, Sauerland et al. 2005, Rooryck 2006, Sauerland 2008, Bale et al. 2011)

- (16) a. Carrying guns is illegal in Illinois (Nouwen 2014:1)
 b. My office has no windows. #It has one window (Bobaljik et al. 2011:133)
 c. You're welcome to bring your children (Sauerland et al. 2005:409)
 d. My friends attend good schools (Zweig 2009)

In (16a), the use of the bare plural *guns* entails that it is also illegal to carry a single gun. In (16b), negating something which means “greater than or equal to two” should mean “one or zero”, thus we would expect the continuation to be felicitous. In a context in which (16c) is uttered, it merely suffices that some parent has more than one child, but a parent who has only one child is still “welcome”. And (16d) is a type of example originally attributed to Chomsky (1975), who noted that a bare plural in the scope of another plural can act like a singular. So in (16d), it is not the case that each friend attends multiple schools, rather, each friend attends just one school (although it is still that case there must be more than one school in total). Such examples are arguments for a WEAK THEORY OF PLURAL (Sauerland et al. 2005), which “include[s] singulars in the denotation of the plural nouns” (Bale et al. 2011:5).²⁵ Any feature which means strictly “more than one” or “greater than or equal to two” (e.g., the classical view of [\pm plural]) fails to capture the fact that plural nominals can indeed include atomic elements.

Noyer (1992) provides what I consider to be an updated model of this classical approach to features. His system is perhaps the most influential discussion of features in DM, and is summarized as follows,

“Each speaker of a language constructs a system of categories composed from the features afforded by Universal Grammar combined with specific choices motivated by the learning stimulus. These choices are encoded by means of filters which dictate

²⁵Here I am glossing over a fairly vast literature. I will not discuss the mass/count distinction, which, arguably, provides a counterpoint to the above claim.

which features and combinations of features may be active in the system.” (Noyer 1992:187)

Noyer’s number features include [\pm singular], and [\pm augmented], both of which exist in UG.²⁶ While all languages will presumably have a singular feature (according to a Markedness hierarchy), it will be parametric which languages select from UG the [\pm aug] feature. First, while Noyer argues forcefully that both [\pm sg] and [\pm aug] are needed in some language to express overt categorial distinctions, we should note that [-sg] is practically redundant with [+aug], both of which are defined as (I paraphrase), “a set containing more than one element”. While this does not have the issue of contradicting the Weak Theory of Plural, it does raise the question why UG should have two features, whose meaning is entirely redundant. That is, while these features might be motivated to deal with morphology, there is very little semantic motivation for such features.

And second, this system does poorly at capturing the inherent relationship between person and number. Noyer defines his features in terms of “anaphoric index sets”, such that “a plural argument has a nonsingleton index set” (p. 181). For person features, he stipulates that “no anaphoric index may be paired with more than one role” (p. 147, fn 2). This is required so that with a feature bundle with [+I, +you], a 1st person inclusive, it will not be the case that both [+I] and [+you] are mapped to the same index.²⁷ However, note that with a [+I, +you] bundle, a nonsingular number feature is redundant, and in fact can be seen as a consequence of there being two person features. That is, Noyer’s system fails to capture the fact that number categories are *defined* by computing the person features. This point, that number is essentially a product of computing person features is central to Individual Number, but is merely coincidental in Noyer’s system.

²⁶It is possible that Noyer also includes [\pm plural] in UG. He is not explicit on this point. For some languages, PLUR is a feature which represents a “plural gender” category. This extra PLUR category is ostensibly just plural, and accounts for the generalization that languages lose categorial distinctions for gender in plural categories. Later work (Nevins 2007) assumes that only [\pm singular] and [\pm augmented] are needed. A language like English would only need [\pm singular] to capture the surface patterns.

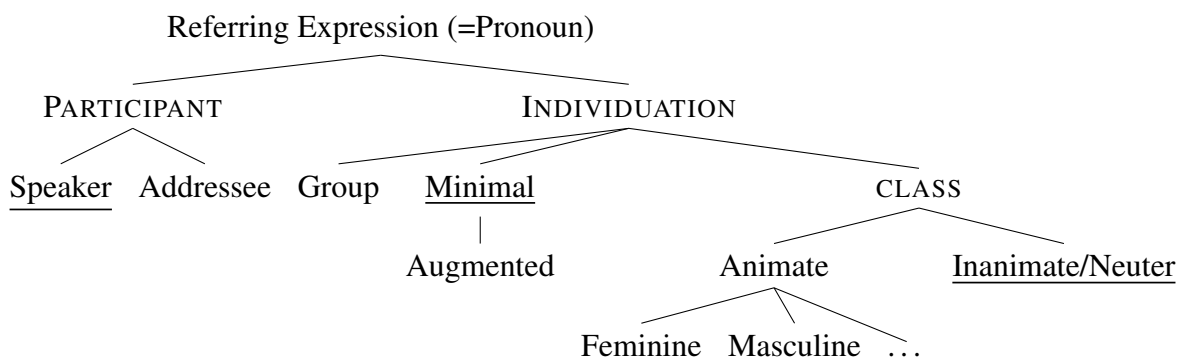
²⁷I require the same thing for IND features, as discussed earlier. Note that since this uniqueness condition is needed anyway, it is trivial to extend it to all person and number features.

Lastly, Noyer’s system relies on constraints on feature combinations, which are repaired by rules of impoverishment, deleting some features in the presence of others. These constraints capture both cross-linguistic as well as language internal patterns and syncretisms. But these constraints themselves suffer from the fact that they are essentially arbitrary bans on combinations of features. A theory like Individual Number, which minimizes appeals to such constraints (and in some cases can derive cross-linguistic and language internal patterns) is simply more plausible.

4.2 Harley and Ritter

In recent years, features like MINIMAL, AUGMENTED, and GROUP have recently replaced [\pm singular] and [\pm plural] (and, for that matter, [\pm dual] [\pm trial], etc) (Harley and Ritter 2002, Cysouw 2003). These features do exactly as the semantic analysis suggests, in that instead of denoting amounts greater than or equal to two, they represent sets – or restrictions on sets. In Harley and Ritter (2002) (hereafter H&R), MINIMAL may be used to represent singular, and GROUP may represent plural. The combination of MINIMAL and GROUP is dual, since “2” is the smallest group. AUGMENTED, as the name suggests, denotes an augmentation of the set – usually by one. An augmented dual is a trial/paucal. Their feature geometry is shown in (17).

(17) *H&R’s feature geometry*



In this system, person and number are dependent on different nodes, PARTICIPANT and INDIVIDUATION respectively (and CLASS feature are dependent on INDIVIDUATION). Underlined features are the “default interpretation of an unmarked organizing node” (p. 486). Number features

can be thought of as sets or set restrictors, operating intersectively.²⁸ That is, the feature MINIMAL semantically restricts the set GROUP. This has been viewed as a virtue, since many morphological plurals do indeed look like restrictions. For instance, paucal morphology in Yimas appears to be plural morphology plus an added morpheme, denoting “between 3 and 12”. This is as expected if the paucal is built from the plural by restricting the set denoted by the latter.

The theory of Individual Number adopts the argument that plurals should be thought of as sets or groups of individuals. However, it diverges from claiming that there is a primitive notion of a GROUP or MINIMAL feature; they are merely a (useful) shorthand for what is in essence a collection of atomic elements.²⁹

More fundamentally, just like for Noyer, the fact that clusivity distinctions should entail something about person is coincidental. That is, the interpretation of [Minimal] in the context of an inclusive pronoun (containing [Speaker] and [Addressee]) is necessarily non-singular, thus there is an interdependence between features that is not directly captured by H&R’s geometry. This failure is particularly notable for feature geometric theories, which are motivated by their ability to capture precisely these sorts of dependencies.³⁰

²⁸This differs from their conception of person features, which operate conjunctively (Harley and Ritter 2002:492, fn 10).

²⁹Perhaps a detriment to Individual Number is that it does not readily account for the fact that, say, a paucal form might morphologically look like plural form plus some extra piece of morphology, as in Yimas. However, I would suggest that looking carefully at the morphology of these languages might shed further light on this issue. Individual Number does not exclude the idea of some kind of set restrictor operating over the atomic IND features. This would suggest that what we consider “paucal number” is in fact a nominal plus an incorporated “paucal quantifier”. In fact, Noyer (1992) suggests a very similar idea for trials and quadrals, which, under his proposal, are actually plurals with an incorporated numeral “three” or “four” respectively.

³⁰A minor quibble is that H&R predict that a language might represent a dual category in two different ways, through the combination of [Minimal] and [Group] or through [Augmented] dependent on [Minimal]. This might predict that a language could have a dual without a plural, contradicting Greenberg’s universal that the presence of a dual category implies the presence of a plural category.

4.3 Iconic Representation of Number

Individual Number is quite similar to another theory about how number is represented, namely, The Iconic Representation of Number (IRN) (Trommer 2006, 2010). This formalism also does away with number features as primitives, and instead represents plurality by using “dots”, such as •. So a feature matrix containing [+1, •] might be 1st singular, and [+2, ••] might be 2nd plural. The parallel to Individual Number should be clear. Morphology (and semantics) counts the amount of •’s, just like IND features. The difference, however, comes in the relationship between person and number. In IRN, there is no inherent relationship between the two categories, while in Individual Number, person and number distinctions are conflated, or inseparable.³¹ This conflation is strongly motivated on a number of levels. For instance, within IRN, there is nothing *a priori* which excludes a first person choral-we reading when we combine a [+1] feature with [• •]. That is, this representation should be able to be interpreted as “two of +1” – precisely as the analogous situation in which we combine *chair* with [• •]. What we want is a representation in which only one of the •’s is associated with the +1 feature. In Individual Number, this is forced by the dependency between SPKR and IND (mediated by PART).

As a concrete example, consider gender in French pronouns. The referring pronoun *elles* can be used to refer to a group of feminine individuals. So it is felicitous with reference to *Marie*

³¹Trommer uses IRN to derive what he calls CONSTRUCTED NUMBER. In fact, I think there are two separate issues which have been labeled Constructed Number. One is exemplified by Hopi (examples from (Bliss 2005)).

- | | | |
|--|---|---|
| i. <i>pam wari</i>
3sg run.sg
'S/he ran' | ii. <i>puma yuutu</i>
3pl run.pl
'They ran' | iii. <i>puma wari</i>
3pl run.sg
'They (two) ran' |
|--|---|---|

The Constructed Number occurs in (iii.), where a plural pronoun triggers singular agreement on the verb, and this denotes dual number. Trommer also categorizes the 1↔2 effects studied in this paper as examples of Constructed Number, specifically citing Nocte as a prime example. I object to this classification. The example in (iii.) and those in this paper are fundamentally different. The Hopi-type examples are merely instances where morphology lacks a distinct form for a certain number distinction – precisely what we predict in a theory which allows underspecification of feature bundles and the Elsewhere Condition. So it is not the case that any plural pronoun with singular verbal agreement will result in a dual reading. In fact, 1st and 2nd person dual forms have distinct agreement forms in Hopi. It is merely the case that 3rd person dual agreement form is homophonous with singular. In contrast the number seen in 1↔2 effects is perhaps “true” Constructed Number, in that a number morpheme is in a sense being “built” by the agreement system.

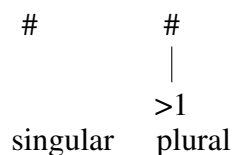
et Francine, but would be infelicitous with *Marie et Jean*, where one of the members (*Jean*) is masculine. Presumably, in IRN, the features of *elles* would be [+feminine, ••]. Note that here the feature [+feminine] is understood to distribute over each member of the set. That is, *elles* is true iff each individual is [+feminine]. However, the feature bundle [+1, ••] is not treated in the same way. [+1] does not distribute over the individuals in the set. Without further defining [+1] somehow, we cannot derive why gender and person features are fundamentally different. The obvious repair to IRN would stipulate a restriction on person features like [+1], in that they are not permitted to distribute. Note first, that this stipulation would have to be further modified to allow for choral-we. But moreover, the stipulation is precisely what is entailed in Individual Number, since a SPKR feature is dependent on a single IND.

4.4 Cowper and Hall

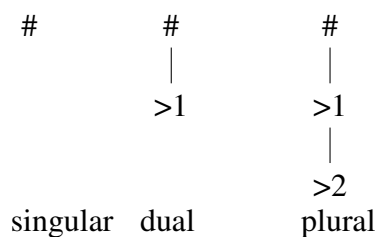
Cowper (2005), Cowper and Hall (2005) (henceforth C&H) also propose a “built” plural, using entailment relationships and contrastiveness as expressed in the diagrams in (18). (Note that “1” and “2” do not apply to person features here, rather, cardinality)

(18) Cowper’s expression of number

a. *languages with a singular/plural distinction*



b. *languages with a singular/dual/plural distinction*



We can see the similarity between C&H’s theory and that of Individual Number. Plural number is

“built” on top of a default number node. It is language specific contrastiveness of features which differentiates number. So in a language like English, anything greater than a singular will be plural. In language with a dual number, anything greater than a singular *but not greater than two* will be a dual, and so on.

It is not entirely clear to me, however, whether this sort of representation can account for the semantics. Recall from earlier that a feature which denotes “greater than or equal to two” fails to capture the semantic fact that plurality ranges over singular elements. In C&H’s theory the crucial component would be whether # “means” singular, or whether it gets a meaning of singular *in the absence of any further feature*. C&H imply the latter (and Trommer (2006) assumes this of C&H’s work as well), which suggests that the plural feature [>1] does not, in fact, include singular elements.

In sum, Individual Number takes the best parts of each proposed representation – namely, that plurals are built in some fashion – and dispenses with the semantic and/or morphological incongruities.

4.5 Other concerns

There is an alternative which would allow us to keep number features in morphology component and also allow us to keep these atomic features for LF. We could posit a redundancy rule, as in (19).³²

$$(19) \quad \left[\begin{array}{c} +sg \\ +sg \end{array} \right] \Rightarrow [+plural]$$

We can imagine this as an interface property between syntax-morphology. As syntactic structures are shipped off to PF, there is a mapping algorithm that translates features which syntax manipulates into features which PF manipulates. But the rule in (19) represents an entirely extra-

³²Thanks to Dave Embick for pointing out this possibility.

neous (or redundant) step in the derivation. At some later point in the derivation, we will have a VI as in (20).

$$(20) \quad [+plural] \Leftrightarrow X$$

By simple transitivity, we can now derive (21).

$$(21) \quad \left[\begin{array}{c} +sg \\ +sg \end{array} \right] \Leftrightarrow X$$

It is difficult to imagine that a learner could ever acquire a rule as in (20), when the child could easily map the feature bundle directly to the morphology. That is, the intermediate step of translating the IND features into [+plural] is merely a theoretical convenience, but it is not required for spell-out.

Moreover, we would need a rule for both the syntax-morphology interface as well as the syntax-semantics interface. This is because the definition of [+sg] is such that it defines a set of cardinality “1”. Thus, any amount of [+sg] features in a bundle will still just be singular. In order to interpret [+sg, +sg] as a plural, we would have to have a redundancy rule between syntax and semantics as well. This suggests that we are missing something. If syntax builds something which both PF and LF must change, why not just have syntax build it correctly from the start?

A valid objection to Individual Number would be to say that whether a language expresses morphological distinctions between number categories is entirely arbitrary. Indeed, I endorse the view that there is arbitrariness. However, the difference between a featural system of number and Individual Number lies in where the arbitrariness lies. For a featural system, it will be arbitrary which languages posit or make use of “extra” features like [+dual], or [\pm augmented], etc.³³ In In-

³³Noyer states, “Of the universal set of morphosyntactic features, some are active in a give morphosyntactic system, while others are inactive.” (Noyer 1992:43) That is, it will arbitrary from a cross-linguistic perspective which features from UG are active in a given language. For Individual Number, all phi-features are equally active in every language (with the exception of class/gender). Note that this point also applies to Markedness theories, in which the marked feature (say, between [+singular] or [+plural]) may be different in different languages (Harley and Ritter 2002, Bale et al. 2011). From a cross-linguistic perspective, it will be arbitrary in which language chooses which feature to be the marked feature. This type of markedness cannot exist in Individual Number.

dividual Number, the arbitrariness lies purely in phonological exponence. All languages will allow an argument with two IND features, and some languages will spell that out as a dual, while others as a plural. Arbitrariness of morphology is universally attested and in fact is fairly uncontroversial, while the arbitrariness in underlying representation is considerably more difficult to motivate.

Lastly, the proposed theory is in line with the Minimalist Program (Chomsky 1995, 2000, 2001), in that it reduces the language faculty to contain only those items which are essential for the computation of language, and nothing else. Note that this reduction in features does not entail an increase in computational complexity. Morphological spell-out functions precisely as before, with bundles of features being associated with phonological form.

5 Formalizing Agreement

The formal mechanism driving agreement used in this paper is the most theory dependent aspect of the analysis. It is also, however, somewhat orthogonal to the main point being argued: that plural morphology is the result of multiple IND features. The formalism proposed here is an attempt to account for the unidirectionality displayed by many languages with respect to $1 \leftrightarrow 2$ agreement.

I will adopt a modified version of the operation Agree (Chomsky 2000, 2001), in which a functional element bearing a probe containing unvalued, uninterpretable features, searches for an argument on which it can value its features. Because the core observation here is that in $1 \leftrightarrow 2$ contexts, verbs are agreeing with more than one argument, I will adopt a system in which probes can relate to more than one syntactic position, as proposed in a number of recent works (Anagnostopoulou 2005, Alexiadou and Anagnostopoulou 2006, Richards 2008, Béjar and Řezáč 2009, Nevins 2011). I will also assume that 1st and 2nd person arguments must be licensed by entering into an agreement relationship with some functional projection (Béjar and Řezáč 2003).

Cyclic Agree (Béjar 2003, Řezáč 2003, Béjar and Řezáč 2009) (henceforth B&R) will be the mechanism utilized in the discussion below. Like Chomsky's Agree, it has operations MATCH and VALUE. Béjar (2003:15) paraphrasing Chomsky (2000), states,

“Agree consists of a sequence of three procedures: (i) probe (p): the initiation of a search for a controller (the goal) with value (p); (ii) match: the evaluation of whether or not an object in the search space of the probe is a possible goal (i.e whether it has interpretable features that can potentially value the probe); (iii) value: the assignment of a value to the probe.”

All three of these processes are needed. PROBE is motivated by UNINTERPRETABLE features seeking to check against an interpretable counterpart. There is must also be a strict division between MATCH and VALUE. The former merely identifies a possible target. That is, in a system in which number features and person features can probe separately, a number probe will only match with something that bears number features. Value is the uninterpretable feature checking against the interpretable counterpart, which renders it interpretable, or “inactive” for further probing.³⁴

With Cyclic Agree, the probes are highly “articulated” or “relativized”, in that they are specified to look for specific features, as opposed to a “brute force” agreement process. Under Cyclic Agree, a probe may fail to value its features due to the argument lacking (a) certain feature(s) which the probe is specified to look for. The “cyclicality” of Cyclic Agree manifests itself in how the projection hosting the probe can expand its search domain. For instance, 3rd person is understood to lack person features (Benveniste 1971), and so a probe specified to look for person features will fail to value them on a 3rd person argument. With a 3rd object (and nothing else in the c-command domain), the probe is allowed to expand the search domain by including a specifier.³⁵ I assume that probes must attempt to agree immediately upon entering the derivation. In a transitive phrase, the probe on *v* will always probe an object before a subject.³⁶ The probes themselves contain

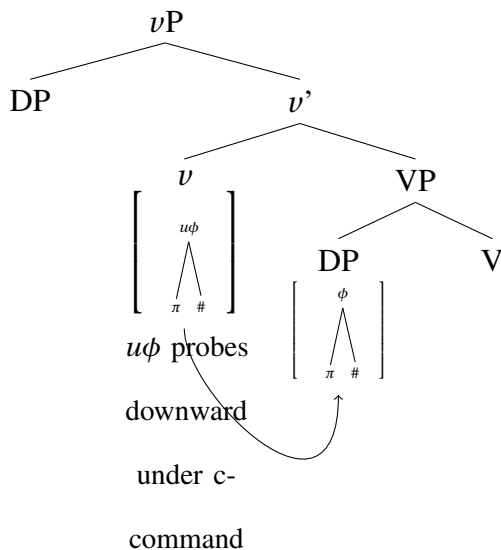
³⁴The term “interpretable” is somewhat misleading, but I use it by convention. It really stands for “I’m a feature which needs something done to me”. See Pesetsky and Torrego (2007) for discussion of the difference between (un)valued and (un)interpretable.

³⁵I note here in passing that this “expansion” of the search domain can be subsumed under the recent proposal in Chomsky (2013) where specifiers are merged countercyclically.

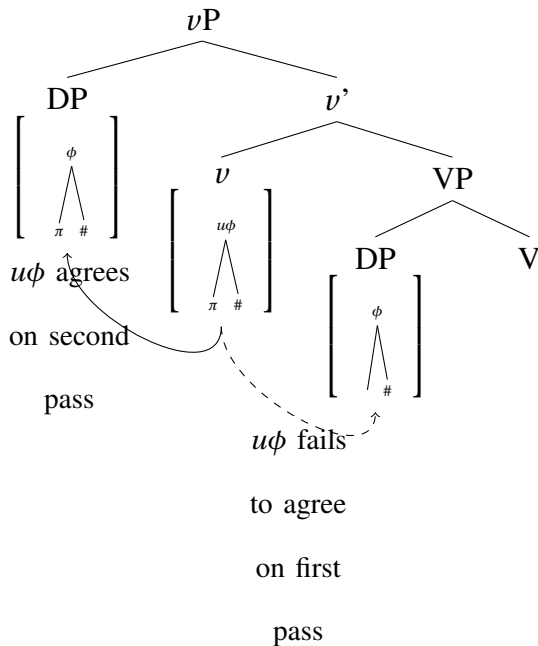
³⁶The original proposal instantiates a higher projection of *v* above the *v*P, thereby preserving agreement under c-command. I consider the difference theory-internal, and is immaterial to the discussion here. However, I will return to

(uninterpretable) phi-features (ϕ) of person (π) and number ($\#$). (B&R require that π and $\#$ be able to probe separately in some languages, although that is not what is being represented in (22).)

(22) a. Agree on first pass; no further probing is necessary



b. Agree fails on first pass due to underspecification of the object;
successful Agree on second pass



this in the later discussion.

In (22), match is the identification of $u\phi$ with an interpretable counterpart. It is assumed by B&R that successful value copies all features of the argument to the head containing the probe, not solely the features which have been checked.³⁷ The main motivation behind this type of mechanism is to deal with person hierarchy effects, and what appears to be a preference in many languages for a verb to agree with the object over the subject, indicating that the verb “looks at” the object, before the subject. The structures in (22) apply to a language where a 1st person argument ranks over a 3rd person argument. When the 1st person argument is an object, agreement happens on the first pass, because the object pronoun can value the features of the probe. When the grammatical roles are reversed, agreement skips the 3rd person object, which is underspecified for person. Agreement obtains with the subject.³⁸

Adopting Individual Number, the cyclic nature of agreement is identical to B&R’s theory: probes can be specified, and probes can expand the search domain just in case they have failed to value all their features. Just as in Cyclic Agree, match and value are relevant processes, defined the same way. The difference lies in what the features on the probe are. Since we no longer have number features *per se*, there can be no # probe. With Individual Number, match occurs when $uIND$ identifies an IND feature within its domain. Value obtains when any PART or SPKR feature on the probe finds a counterpart.³⁹ Both match and value are necessary for features to be copied to

³⁷Although this may be parametric. There may be languages in which only some features get copied. This is an empirical issue. The languages discussed below are all consistent with the assumption that value copies all features of the argument to the head.

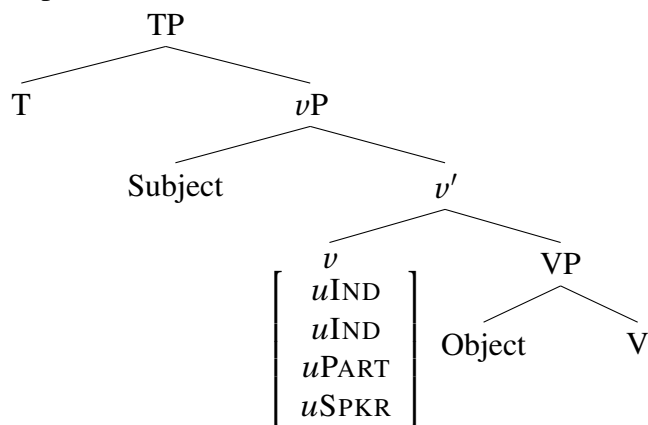
³⁸Note that in many languages number agreement appears to be “parasitic” on person agreement, in that number agreement can only obtain if person agreement obtains. For instance, in (22), the inability for person features to value requires the object to be skipped. But if, instead, the # feature of the object were impoverished, we would not see cyclicity of the probe. Given a theory in which number and person may be separate probes, as in B&R’s proposal, this parasitic relationship is somewhat strange. Particularly when we consider the fact that the other implicational relationship, that of person agreement being dependent on number agreement, is never found. The theory adopted here gives a straightforward explanation for this dichotomy in saying that number distinctions are in a sense an epiphenomal effect of computing person distinctions, and thus are always parasitic on person. (Note that this does not preclude the idea that probes located on different heads may be specified to look for (and/or spell-out) just number or person features.)

³⁹In fact, it is probably the case that any feature which is dependent on an IND node can lead to successful valuation, including features like ANIMATE or FEMININE etc.

the probe. So match must obtain for value to obtain, and value results in all features of the argument being copied to the probe. As such, the system described so far is identical to that proposed by B&R, *modulo* differences in feature specifications.

The crucial difference that Individual Number imposes is that in some languages, transitive verbs are specified to look for two IND nodes.

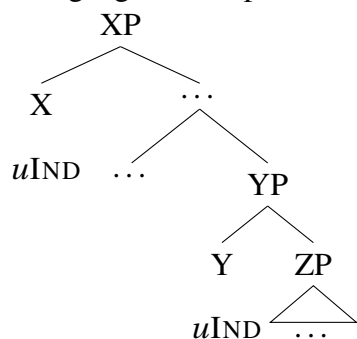
(23) Probe specified with two $uIND$ features.



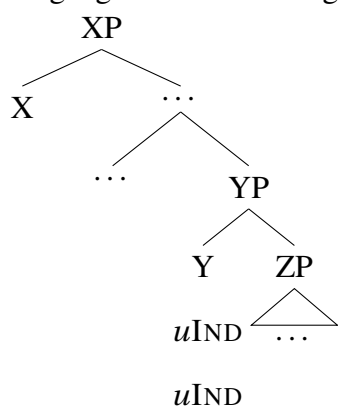
On the surface, this seems rather stipulatory: we are merely adding uninterpretable features onto the probe. However, we can also imagine a slightly more complex (and intuitive) system. The appearance of two $uIND$ features is encoding formally that a transitive verb requires two arguments.⁴⁰ In languages with $1 \leftrightarrow 2$ effects, this requirement is concentrated into one head, but in other languages, these two $uIND$ features are on separate probes – i.e., they are associated with separate syntactic projections. Thus, this is parallel to the idea that Voice and v can be separate in some languages, or “bundled”, i.e., merged as a single head, in others, as argued in Pytkäinen (2008).

⁴⁰The system suggested here has a parallel in Haeberli (2003) (drawing on Chomsky (1970)), which states that verbs have something like an uninterpretable [-N] (i.e., a “noun”) feature, which must be checked and deleted against something which bears a [+N] feature (e.g., an NP/DP). (Thanks to Martin Walkow to pointing out this possibility.)

- (24) a. A language with separated agreement



- b. A language with bundled agreement



This parametrization of where probes are merged is already quite prevalent in the literature on agreement, where phi-probes are associated with T, or an aspect head, or v . And in fact, B&R argue for exactly this type of parametrization with respect to the distribution of agreement probes. The importance is that we might be able to predict portmanteau phenomena by the loci of these two agreement heads. As a proposal for further research, we should look at correlations of bundled heads and $1 \leftrightarrow 2$ effects. The intuition behind the probe in (23) is merely a suggestion; the full consequences of such an implementation are beyond the scope of this paper. However, it should be clear that adopting Individual Number requires a fairly substantial reanalysis of how agreement should work.

The probe in (23) will be explored in depth in the next section, so I will postpone discussion until then. This formulation of agreement is meant to capture the unidirectionality observed in many languages. That is, with a probe situated between the subject and the object and specified to look for SPKR, only $1 \rightarrow 2$ will lead to agreement with two arguments. The opposite configuration,

2→1, will merely reflect 1st (object) agreement.

At the risk of undermining the proposals in the last few pages, I think it is important to reiterate that the theory of agreement utilized here is not the central claim of this paper. I make use of Cyclic Agree because it is “out-of-the-box” machinery that requires minimal adjustments to be adapted to Individual Number. The central claim argued in the next few sections is that (no matter how we formalize agreement), in precisely one syntactic configuration, a feature bundle is built which is spelled-out as a plural exponent.

6 Example cases

In the next few sections, I exemplify how Individual Number works in languages which display 1↔2 effects. For each, the person hierarchy effects are responsible for the accumulation of a complex feature bundle bearing features from different arguments. The resulting feature bundle will have all the features of a 1st plural, and so will be spelled out as 1st plural during vocabulary insertion.

6.1 Nocte

Nocte is a Tibeto-Burman language (subgroup, Naga) spoken in North-Eastern India. As of 2001, there are a reported 33,000 speakers.⁴¹ The language is generally SOV. Nocte has been characterized as displaying a “tripartite” case system DeLancey (1981), Deal (2010), in that it appears to have distinct ergative, accusative, and nominative case markers. The verb can appear with a fair amount of additional morphology, such as a productive causative. All the examples are from Gupta (1971), although the glosses have been adjusted according to DeLancey (1981).

⁴¹<http://www.ethnologue.com/language/njb>

6.1.1 Person competition in Nocte

When there is a local person in the same phrase as a 3rd person argument, only the features of the local person are reflected on the verb. When the higher ranked argument is the object, we see an INVERSE marker, *-h*.⁴²

(25) a. *nga -ma ate hetho -ang*
1sg -ERG 3sg teach -1sg
'I shall teach him' (21)

b. *ate -ma nga -nang hetho -h -ang*
3sg -ERG 1sg -ACC teach -INV -1sg
'He shall teach me' (21)

(26) a. *nang -ma thannin -nang hetho -o*
2sg -ERG 3pl -ACC teach -2sg
'You shall teach them' (21)

b. *ate -ma nang -nang hetho -h -o*
3sg -ERG 2sg -ACC teach -INV -2sg
'He shall teach you' (21)

In 2→1 contexts, the 1st person marker appears on the verb as expected, as does the inverse morpheme *-h*.⁴³

(27) a. *nang -ma nga hetho -h -ang*
2sg -ERG 1sg teach -INV -1sg
'You shall teach me' (21)

b. *nang -ma ni -nang hetho -h -e*
2sg -ERG 1pl -ACC teach -INV -1pl
'You shall teach us' (21)

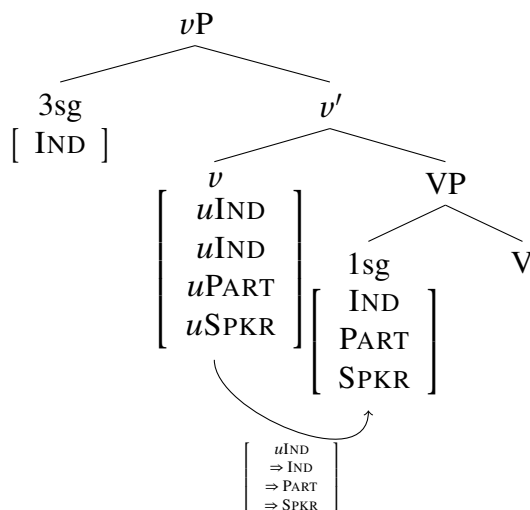
Since inverse marking is associated with a lower ranking argument acting on a high ranking argument, we have a good indication that 1st ranks over 2nd on the person hierarchy here.

⁴²Examples are cited as page numbers in Gupta (1971).

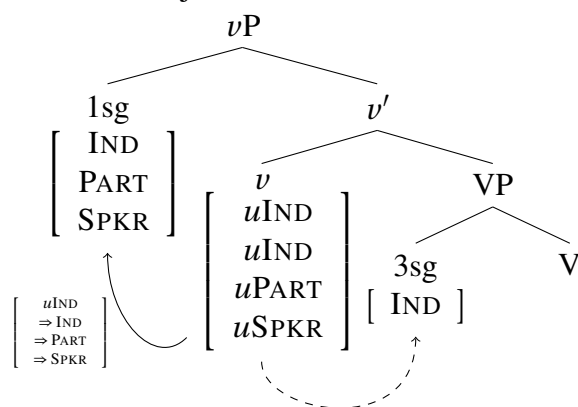
⁴³If there are only 3rd person arguments, the marker is null, but a tense/aspect morpheme, *-a*, appears.

Before turning to $1 \leftrightarrow 2$ effects, let's see how the system works with a cyclic probe on v . Because of the ranking of $1 > 2 > 3$, we specify the probe to agree with a SPKR feature, which entails PART and (one) IND feature. The probe also contains a further IND feature, as proposed above.

- (28) a. *ate-ma nga-nang hetho-h-ang*
 'He shall teach me'
 [match and value with object]



- b. *nga-ma ate hetho-ang*
 'I shall teach him'
 [Match with object, but no value; Match and value with subject]

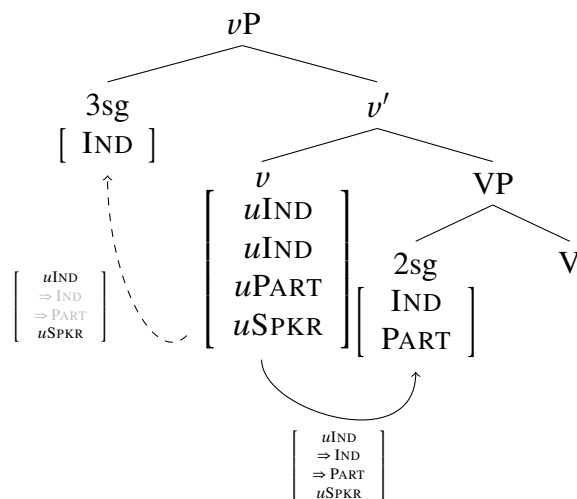


In each situation, only the features that have been copied onto v will be spelled-out. When $3 \rightarrow 1$, the 1st person features of the object are copied onto v . There may in fact be a second cycle due to the unvalued features of the probe, but because only $uIND$ is unchecked, there can be only match, and not value. Likewise, when $1 \leftrightarrow 3$, the 1st person features will be copied onto v on the

second cycle. In both cases, the features copied to v will constitute an identical bundle spelled out as a 1st person morpheme.

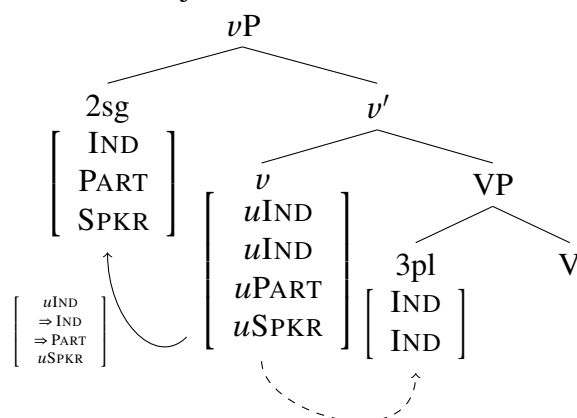
In 2↔3 situations, the same process will apply, except that the probe will never be able to value its $uSPKR$.⁴⁴ Note that this will allow a vacuous second cycle when 3→2sg, since after the first cycle, the probe will still contain both $uIND$ and $uSPKR$. However, a 3rd subject will still fail to value these features on the second cycle.

- (29) a. *ate-ma nang-nang hetho-h-o*
 ‘He shall teach you’
 [match and value with object]



⁴⁴See Preminger (2011) for why failure to check uninterpretable features does not lead to a crash.

- b. *nang-ma thannin-nang hetho-o*
 ‘You shall teach them’
 [Match with object, but no value; Match and value with subject]



When no SPKR feature is available on either argument, the $u\text{SPKR}$ feature will fail to be valued. With $3 \rightarrow 2$, this will result in a vacuous step in which the probe will look up and not be able to value any more features, despite the fact that it still has both $u\text{IND}$ and $u\text{SPKR}$ features.

Turning now to $1 \leftrightarrow 2$ effects, with $1 \rightarrow 2\text{sg}$, we observe that the morpheme which shows up is that which is normally used for $1\text{pl} \rightarrow 3$ and also for 1pl intransitive subjects.

- (30) a. *nga -ma nang hetho -e*
 1sg -NOM 2sg teach -1pl
 ‘I/we shall teach you’ (21)

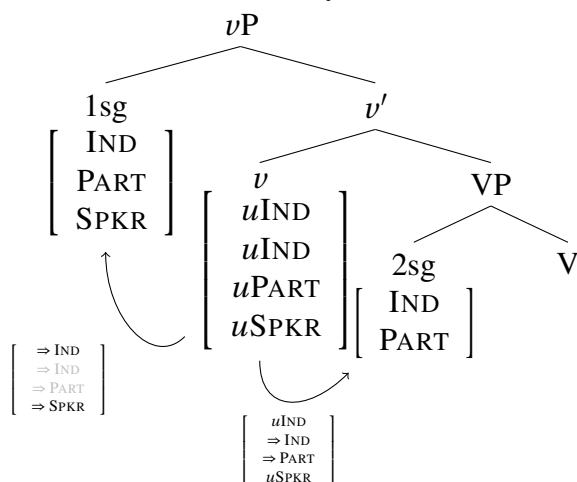
- b. *ni -ma ate -nang chien -r -e*
 1pl -NOM 3sg -ACC ask -PERF -1pl
 ‘We asked him/them’ (20)

- c. *ni we -ik -e*
 1pl read -PROG -1pl
 ‘We are reading’ (17)

The syncretism between 1pl intransitives, $1\text{pl} \rightarrow 3$, $3 \rightarrow 1\text{pl}$, and $1 \rightarrow 2\text{sg}$ is predicted by how probing works: the probe specified with $u\text{SPKR}$ agrees with the 1^{st} person argument. In the $1 \rightarrow 2\text{sg}$ contexts, agreement occurs with the lower argument, copying two features onto v : IND, PART. The probe on v still contains unvalued $u\text{IND}$ and $u\text{SPKR}$ features, and so a second cycle of agreement

is invoked, and agreement occurs with the subject, copying IND, SPKR. Crucially, both match and value can occur on the second cycle.

- (31) *nga-ma nang hetho -e*
 ‘I shall teach you (sg)’
 [Match and value on first cycle; Match and value on second cycle]



Thus, at spell-out, the feature bundle on v will contain at least

$$\begin{bmatrix} \text{IND} \\ \text{IND} \\ \text{PART} \\ \text{SPKR} \end{bmatrix}$$

, which is equivalent

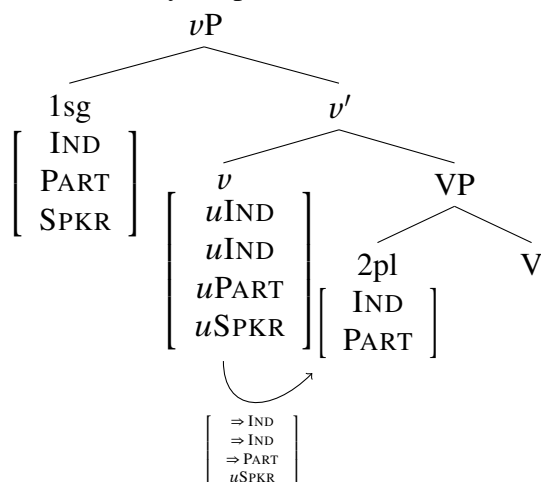
to a 1st plural feature bundle and thus the morpheme that is inserted is *-e*, 1pl.⁴⁵

Furthermore, because the transitive verb is specified to agree with two IND nodes, we predict that a second cycle will be unavailable with a 2nd plural object, since there is no unused $u\text{IND}$ to allow match with the higher argument – match being required for value. This is precisely what see:

⁴⁵Recall from earlier that features are assumed to be indexed for the sake of semantic interpretability. As such, the bundle in (31) would have the following representation. $\begin{bmatrix} \text{IND}_i \\ \text{IND}_j \\ \text{PART}_i \\ \text{SPKR}_j \end{bmatrix}$. This bundle cannot be given a semantic interpretation because there is no PART_j feature. However, because the features on v are assumed to all be uninterpretable, this does not cause a semantic problem, because the bundle is not visible to LF. Note that this predicts that we should never see 1↔2 effects on agreement elements which are LF-interpretable, such as clitic agreement. This prediction is borne out, as far as I am aware. 1↔2 effects are only seen in contexts of “true” agreement. (Thanks to Dave Embick for pointing out this prediction to me.)

in 1→2pl contexts, the marker associated with 2pl surfaces.⁴⁶

- (32) *ate-ma nang-nang hetho-h-an*
 ‘I shall teach you (pl)’



The probe ends up with an unvalued $u\text{SPKR}$ feature, which cannot be checked because there is no $u\text{IND}$ to successfully match. Thus, a 2pl object bleeds agreement with a 1st person argument. By specifying a probe on v with two $u\text{IND}$ features, as well as further relativizing it to privilege agreement with a 1st person argument, we can accommodate the entire agreement paradigm.

What about alternatives? In the next few sections I will run through number of relevant alternatives to the proposed system and we will see that they all fail to correctly derive the observed patterns.

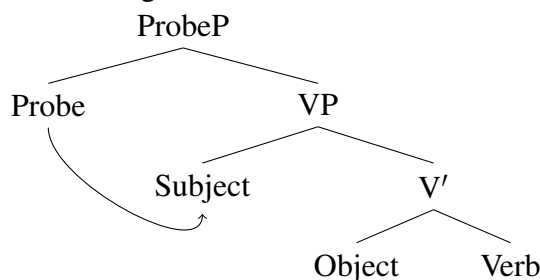
6.1.2 Probe-goal with one-to-one agreement

First, what would happen if we took a “classic” probe-goal agreement mechanism? Without relativizing the probe, we would not be able to derive the person hierarchy effects; agreement with any argument should be enough. This is, in fact, one of the main arguments in favor of relativized probing to begin with.

⁴⁶This particular portion of the agreement paradigm is inconsistently marked in Gupta (1971) and appears to be more sensitive to other factors such as tense or negation. In other parts of the paradigm all 1→2 are marked as *-e*. I have no comment about this.

However, even with a relativized probe, in which phi-features such as person and number are separate and are further specified to look for certain features, but agreement is still restricted to a relationship between the head hosting the probe and the target of probing (a one-to-one relationship), we will still not be able to cover the surface patterns. Crucially, in some instances (namely, $1 \rightarrow 2\text{sg}$), the surface allomorphy is dependent on being able to see both arguments, which is impossible if agreement is a one-to-one relationship.

(33) One-to-one agreement



In (33), if the subject is 1sg and the object 2sg, the probe would be predicted to spell-out a 1st singular morpheme (as it does in intransitives). Only when there is a 2sg object present, does this morphology change, thus the surface forms are dependent on there being information from both argument positions.

Note that this is true in Nocte, where the surface form corresponds to 1st plural, but it is also true of languages in which $1 \leftrightarrow 2$ effects result in unanalyzable portmanteaux, since the allomorphy seen is dependant on the person features of two competing arguments merged in a certain order.

6.1.3 Probe-goal with two-to-one agreement and number features

But suppose the classic system can achieve this, namely, agreement with two different syntactic positions (two-to-one agreement). There are two further problems. First (the main claim of this paper), assuming that singular arguments are associated with a feature [+sg], then we need to explain why [+sg, +sg] should result in a plural morpheme, which is assumed to be associated with a feature [+pl] (or equivalent). Note that we cannot rely here on simple underspecification of a particular morpheme within the ordering of the VIs, since with a head that has agreed with

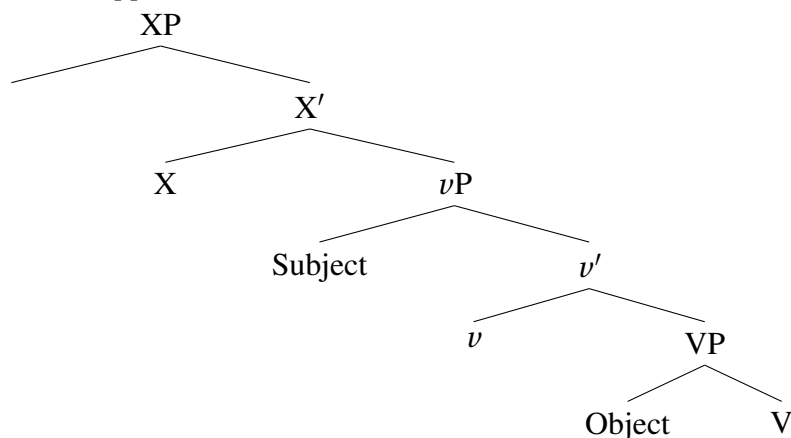
two positions, any VI which would have applied under agreement with either argument should be expected to obtain as well. That is, given that the features of 2sg and 1 are on the head, we would expect either of these to surface before an elsewhere morpheme. (Furthermore, allowing the 1pl form to be an elsewhere morpheme contradicts the general cross-linguistic tendency for 3rd singular to be the default form.)

Second, we need to explain the interaction of number and person seen in Nocte (and other languages). Nocte's "person hierarchy" is not, in fact, confined to just person features. When 1 → 2sg, 1st person wins. But when 1 → 2pl, 2nd person wins. The number of the object can contribute to determining which argument wins the person hierarchy competition. In total, the classic (and updated) probe-goal system fails to capture the full range of the patterns in Nocte.

6.1.4 Movement

Next, let's consider a movement approach, in which there are syntactic positions above the ν P where arguments bearing person features move. (The argumentation here can be equally applied to a probe-goal approach in which the probe is above the subject.) Such movement is well motivated within the literature on object-shift and case-licensing in general. We might assume that 1st and 2nd person arguments are forced to move to this position, perhaps for case-licensing purposes.

(34) *A movement approach*



The problem, however, comes down to Minimality. In $3 \rightarrow 1/2$ contexts, the 1st or 2nd person object moves into the higher phrase XP, because the features on the object must be licensed. Likewise, in $1/2 \rightarrow 3$, it is the subject which moves, again for licensing purposes. But what about $2 \rightarrow 1$? Here, due to Minimality, we expect the 2nd person subject to be the marker which surfaces, since it is closer to the X head under c-command. Instead, we see 1st person agreement morphology on the verb. We could maybe add in a stipulation about 1st person arguments needing to move before 2nd and 3rd, except that when we have $1 \rightarrow 2\text{pl}$, we see exactly the opposite pattern, where the morphology that shows up is the 2pl morphology (again, violating Minimality). And lastly, this does not tell us anything about what happens with $1 \rightarrow 2\text{sg}$ contexts. Assuming only one argument can move into this XP phrase, why would we ever see portmanteau? And allowing a system in which XP can take multiple specifiers, thus allowing multiple movements, we need to further explain why this only obtains in one syntactic configuration of the person features ($1 \rightarrow 2\text{sg}$), but not the other ($2\text{sg} \rightarrow 1$).

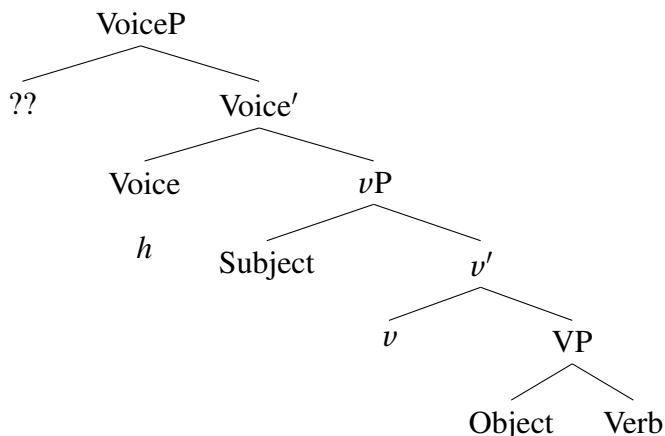
This is not to say that we cannot contrive a way to make a movement approach work. We could specify the features of XP and stipulate further projections which mitigate Minimality concerns via freezing, etc. However, any approach needs to say something particular about $1 \rightarrow 2$ contexts. Specifically, any analysis must account for the fact that the agreement morphology is sensitive to the features on *both arguments*. And furthermore, because we only see $1 \leftrightarrow 2$ effects in one direction (i.e., $1 \rightarrow 2$, not $2 \rightarrow 1$), the syntactic configuration in which the features are merged is also significant. And most importantly, the theory needs to explain why the subsequent realization is homophonous with the morpheme associated with 1pl.

6.1.5 Passive Voice

The movement approach does raise an issue with respect to the inverse marker *-h* in general. It is tempting to tie this morpheme to a specific head in the syntax. It has been noted elsewhere that inverse systems are akin to passive systems in that a patient argument is marked as a subject, and there is additional morphology on the verb (cf, Siewerska (1998)). The analogy to Nocte would be that *-h*, the inverse marker, instantiates Voice. Perhaps 3rd person subjects are viewed as poor

subjects, for some reason, and so an object of a transitive verb with a 3rd person subject necessarily promotes to subject.

(35) Inverse as passive



Let's assume that agreement then happens further along in the derivation, perhaps on T. We have already seen that just relying on moving a DP argument will result in Minimality concerns. But what about a smuggling approach to passives, in which the entire VP moves into Voice (a la Collins (2005))? Again, the difficulty to this approach will come precisely when we have two local arguments, although now we have a selectional issue. Assuming the passive Voice selects for a certain type of ν P (in English this would be PartP), this selection must now be sensitive to the features of both arguments. For 3→2, the passive ν P is selected. However, for 1→2sg, the non-passive form is selected. Again, the surface form that results in this context must be aware of the features of both arguments. Without building in some further stipulations about the features of both arguments being visible, this system will, again, fail to give us the desired output.⁴⁷

However, can the Cyclic Agree mechanism fair any better? I see two possible answers here. First, we could propose that *-h* reflects a case morpheme, like accusative case. It only shows up in inverse contexts precisely because this is when the probe has agreed with an object. The problem here is that we might wonder why we do not see *-h* with 1→2sg, where agreement has taken place

⁴⁷We should further note that the case-marking of overt independent pronouns does not alter from its normal alignment, further arguing against a passive analysis. It does not appear that Nocte has a passive voice.

with an object (and a subject).⁴⁸

A second way to handle this within Cyclic Agree would be to say that the spell-out of different cycles can result in different morphology. That is, agreement on the first pass (with an object) yields *-h*, while agreement on a second cycle is spelled out as \emptyset . In this view, *-h* and \emptyset are realizations of ν . Perhaps this is conditioned allomorphy, or perhaps it reduces to what B&R call “second cycle effects”. In the original formulation of Cyclic Agree, the second cycle involves the projection (or re-projection) of a second ν (labelled ν_{II}) above the subject. Second cycle effects involve impoverishing the probe on ν , which results in ν_{II} containing less features. The fact that the second cycle is spelled out as a null morpheme is compatible with the idea that ν has less features to spell-out on a second cycle.

6.1.6 Georgi

Let’s turn to some other approaches proposed in the literature for $1 \leftrightarrow 2$ effects. Georgi (2011, 2013)’s analysis claims that all $1 \leftrightarrow 2$ effects are instantiations of inclusive morphology. Her mechanism for how these morphemes are formed is actually quite similar to my own: a single, articulated probe can copy features from two different argument positions. While the resulting feature bundle may spell-out as inclusive in some cases (see §7.2), it cannot be right for Nocte. What we would have to say is that *-e*, since it is employed in $1 \rightarrow 2$ sg contexts, is actually an inclusive marker. However, surely *-e* can be used to represent 1st plural in non-inclusive scenarios when employed as a “normal” 1st plural marker. We would need two homophonous suffixes, with overlapping distribution, and overlapping featural content. This seems unlikely.

6.1.7 Woolford

Woolford (2012) proposes that portmanteau forms are derived in two different mechanisms, depending on the language. There are MORPHOLOGICAL PORTMANTEAUX and SYNTACTIC PORT-

⁴⁸There is a further problem having to do with differential object marking, in that some objects are not case-marked, but *-h* will invariably appear.

MANTEAUX. For morphological portmanteaux, she argues that in languages with a structurally case-marked subject (so, non-ergative languages⁴⁹) 1→2 effects involve ranked PF constraints on the alignment of person features.

“Infl/T probes only the nominative subject, and thus carries only the phi features from that argument. The object is cross-referenced by a different element, e.g. a pronominal clitic. At PF, if these two cross-referencing forms are adjacent, features from both can be spelled out with one portmanteau agreement morpheme, in order to satisfy certain grammatical constraints. One constraint requires all local (1st and 2nd person) features to be perfectly aligned to the left edge of the verb. . . . Another constraint requires all local features to be spelled out, even when the language has morphological ‘slot’ competition and allows only one morpheme to be spelled out at PF in the relevant ‘slot’.” (p. 3)⁵⁰

In 1→2 contexts, we posit the tableau in Table 2. (The following is simplified from Woolford’s example (12). The input is what the syntax generates – “Cl” is clitic, “Agr” is true agreement; the constraint says “align local person features with the left edge of the verb”. There are assumed to be further lower ranked Faithfulness constraints.)

The b. form in the tableau above loses because the 1st person features are not aligned with the edge of the verb. As pointed out and discussed at length by Woolford, the main difficulty is that in positing an alignment constraint in local contexts, it is necessary to make further stipulations to account for the unidirectionality. That is, if there is a constraint which requires 1st and 2nd person

⁴⁹As such, Woolford will not predict Nocte to display morphological portmanteau, so it would be unfair to attribute the following analysis to her. In Woolford’s system, Nocte displays syntactic portmanteaux.

⁵⁰I consider contrasts between constraint-based systems versus derivational systems to be in most respects simply differences in formalisms. For instance, Woolford assumes a family of person-ranking constraints in which only the categories 1st person and local person can be referenced. That is, it would be impossible to formulate a constraint that targets solely a 2nd person or 3rd person argument. This is true of the feature-system I have adopted as well in that it is impossible to directly reference a 2nd or 3rd person argument. It would be trivial to devise an algorithm which could transform my feature system to a set of ranked constraints. In other words, deciding between the two systems is essentially a debate concerning the fundamental differences between constraint-based versus derivational approaches to morphosyntax, which is well outside of scope of this paper.

	2 nd Cl 1 st Agr verb	[local]→verb
☞	a. portmanteau-verb	
	b. 2 nd Cl-1 st Agr-verb	*

Table 2: Woolford’s derivation for morphological portmanteau

features to be aligned with the left edge of the verb, why is this constraint limited to 1→2 contexts, and not 2→1? Woolford proposes the following generalization.

(36) **Portmanteau Person Constraint (Description Generalization)**

The person of the subject must be higher than the person of the object in order to use a portmanteaux agreement morpheme. (Woolford 2012:7)

First, the generalization in (36) would have to be parametrically formulated, since not all 1↔2 effects are restricted to 1→2 contexts. As detailed in Heath (1991, 1998), some languages show 1↔2 effects when 2→1, and not 1→2.⁵¹

Furthermore, note crucially that the generalization in (36) makes specific reference to grammatical categories. And in the footnote associated with (36), Woolford admits another telling point: “A way needs to be found to formulate a constraint (or constraints) that produce the descriptive generalization in (17) [= (36)], but which makes no direct reference to the person hierarchy” (p. 7, fn 7). Both of these facts point to the conclusion that the generalization in (36) should be a constraint on syntax, not on morphology, since it appears to require reference to grammatical categories and their interaction with person features. Thus, her claim that 1↔2 effects should be treated as a consequence of PF, not syntax, is undermined, since the constraint in (36) needs to make reference to syntactic information that is not widely assumed to be available in PF.

The constraint that Woolford suggests in (36) is easily accounted for in the system I have proposed by locating an articulated probe in-between the subject and object. The fact that the generalization in (36) makes reference to grammatical category and person features is due to the

⁵¹Acoma (Keresan) appears to display this pattern, as does Southern Sierra Miwok (Penutian).

fact that the probe is specified to look for certain features, and is merged above the object, but below the subject, thereby deriving the structural dependency.

Besides morphological portmanteaux, Woolford argues that some languages derive portmanteau forms via a different mechanism, namely, syntax. This system is, in fact, what I have already suggested: a single probe can copy features from two arguments.⁵² However, the languages which she describes as having syntactic portmanteaux are those languages which show portmanteaux forms in non-local environments (i.e., Inuit, Kiowa, etc.). These languages differ from those that I discuss in this paper in that they show portmanteaux forms in, say, $1 \rightarrow 3$, and $3 \rightarrow 3$, etc.

I would propose, in fact, the exact opposite association than what Woolford makes. Languages which show portmanteaux in $1 \leftrightarrow 2$ contexts are the result of syntax. We can observe this through the extreme systematicity and the reference to hierarchical structure and grammatical category. In contrast, languages which display portmanteaux in non-local environments are actually the result of post-syntactic locality effects. Consider this quote from Woolford in her analysis of Inuit, which is argued to have syntactic portmanteaux.

“There is a disagreement in the literature as to exactly how many portmanteau agreement forms there are in Inuit. The reason for this disagreement is the difficulty of distinguishing between **two adjacent morphemes with phonological changes at their juncture point**, and a single portmanteau morpheme which shows historical traces of having been reanalyzed at some point from previously separate adjacent morphemes.”

(p. 15, emphasis mine)

This ambiguity about how to separate the forms strongly suggests post-syntactic processes based on locality conditions. Particularly telling is the fact the the morphemes are always adjacent, and that there are “phonological changes at their juncture point[s]”.

⁵²Woolford assumes Multiple Agree (Anagnostopoulou 2005), in which a probe on Infl/T can probe downward, and if it encounters an inherently case-marked argument (e.g., an ergative subject) it can copy features from this but not discharge its case features, which it give to the object, while also copying the object’s phi-features.

Finally, whether the portmanteaux in Nocte is morphological or syntactic, Woolford's system does not account for why two singular arguments should trigger plural agreement. That is, merely having a process which bundles person features, whether intra- or post-syntactic, does not explain why this bundling should result in plural morphology.⁵³

6.1.8 Trommer

Trommer (2006) offers an analysis in which he proposes “to treat the phenomenon not as a competition process, but as direct suppression of features with lower prominence in the context of a head with higher-prominence features” (p. 223). There are a number of issues with Trommer's analysis, but I will focus only on two here. First, he derives the surface patterns using the VIs in (37).

- (37)
- a. $\emptyset \leftrightarrow [\bullet] / +1 \text{ Acc } [-3 \bullet]$
 - b. $-h \leftrightarrow [-1 \text{ Nom}] / [-3 \text{ Acc}]$
 - c. $-e \leftrightarrow [+1 \bullet] / \{-3 \bullet\}$
 - d. $\emptyset \leftrightarrow [+3] / [-3]$
 - e. $\emptyset \leftrightarrow [+2] / [-3]$
 - f. $-an \leftrightarrow [+2 \bullet \bullet]$
 - g. $-ang \leftrightarrow [+1]$
 - h. $-o \leftrightarrow [+2]$
 - i. $-a \leftrightarrow [+3]$

In this system, all of the work is done in the post-syntactic component by the ordering of the VIs and the contexts in which they are inserted.⁵⁴ Crucially, he provides three “suppressing” VIs (37a,d,e), which spell-out null morphology for one head in the presence of another head bearing a specific feature or features. This in effect derives the person hierarchy. The problem is this utterly

⁵³However, adopting Individual Number into Woolford's system should be able to derive the correct results *modulo* the objections already raised. Actually, this should be expected if a constraint-based system and a derivational system are merely differences in formalisms.

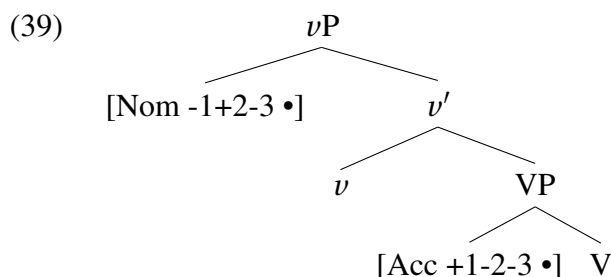
⁵⁴Note that contexts for insertion after the backslash are features on a different head if they are in brackets, and on the same head if not. ((37a) contains both types.) Features in braces can be in either, (37c). This type of context sensitivity is extremely vague and much too powerful.

lacks predictability; it is entirely too powerful. That is, why can we not have a pair of VIs as in (38)?

- (38) a. $\emptyset \leftrightarrow [+2] / [-3]$
 b. $\emptyset \leftrightarrow [+1] / [-3]$

This hypothetical language would favor 3rd person agreement over 1st and 2nd, something we never see. There is nothing built into Trommer’s system that can rule this out, without reference to an abstract prominence hierarchy or markedness theory.

The other problem with Trommer’s analysis is that it allows long-distance conditioning of allomorphy. The VI insertion is assumed to spell-out the features of different heads, either the subject or the object. But the conditioning environments must take the features of the VIs on both heads into account. Thus, the contextual conditioning for VI insertion is non-local, something that is strictly disallowed in DM (cf. (Embick 2010)). Consider the derivation provided by Trommer for a 2sg→1sg context (p. 225). (I provide the tree.)



2sg	→	1sg		
[Nom -3+2-1•]		[Acc -3-2+1•]	-h	↔ [-1 Nom] / [-3 Acc]
[Nom -3+2-1•]		[Acc -3-2+1•]	∅	↔ [+2] / [-3]
[-3+2 •]		[Acc -3-2+1•]	∅	↔ [•] / +1 Acc {-3,•}
[-3 •]		[Acc -3-2+1•]	-ang	↔ [+1]
[-3 •]		[Acc -3-2+1]		

Table 3: Trommer’s derivation of agreement in Nocte

The spell-out of each head is potentially dependent on the features of another non-local head.

Without some way of concatenating these features, we allow morphological properties to act globally.⁵⁵

6.1.9 Impoverishment

As a last proposal, we could assume that there is some kind of impoverishment of the feature bundle in certain contexts, as proposed in Noyer (1992). Impoverishment rules in DM are post-syntactic rules which delete features from a bundle. Again, for 1↔2 effects, this would require potentially non-local interactions of feature bundles. Furthermore, we would run into the same problems discussed earlier that the 1st plural form is very unlikely to be an elsewhere form from a cross-linguistic perspective. Lastly, this lacks any sort of explanatory power, since it appears to be missing a generalization. In language after language, we would have to posit similar impoverishments to accomplish the surface patterns.

In sum, the proposed account covers the entire surface paradigm in a straightforward mechanism. To reiterate, there are two main points to keep in mind. First, the system diverges from a systematic agreement pattern in one context. Second, the resulting form reflects plural morphology. In response to the first point, I have offered a (theory dependent) mechanism for deriving the surface patterns. In response to the second, I have argued that the surface patterns go beyond theoretical differences, in that the apparent plural morphology is a result of atomic features.

In the next few sections I will extend the analysis for Nocte to other languages. Each language deserves (and has received) a more extensive treatment than I can give here, since each language will introduce idiosyncrasies. However, I aim to show that in certain configurations, multiple agreement occurs, resulting in a plural morpheme which has been “built”.

⁵⁵Head movement will not solve this problem, since we would end up with a morphological structure with [AgrS [ν [AgrO]]]. AgrO would have to be conditioned by AgrS, which is equivalent to look-ahead in DM (Embick 2010).

6.2 Karuk

Karuk (also Karok) is a isolate (though classified as Hokan) language spoken in Northern California. To date, there are relatively few native speakers, although there are currently efforts to preserve the language aimed at childhood education. Karuk is a highly agglutinating polysynthetic language fairly free word order but over all verb finality. Karuk has been given a relatively large amount of theoretical attention (Bright 1957, Macaulay 1992, Béjar 2008, Sappir 2010). Karuk may allow the verb to (partially) supplete for number indicating plural action. I will ignore this factor while looking at the person agreement markers.

6.2.1 Person competition in Karuk

Just as in Nocte, we see a similar, though somewhat more complex pattern of pronominal affixation in Karuk: The form used for 1pl with intransitives and 1→3 contexts (*nu-*) is used in 1→2sg contexts as well. Table 4 shows the pattern.⁵⁶

A \ O	1sg	1pl	2sg	2pl	3sg/intrans	3pl
1sg	–	–	nu-	ki·k–ap	ni-	ni–
1pl	–	–	nu-	ki·k–ap	nu-	nu-
2sg	ná-	kín-	–	–	ʔi-	ʔi-
2pl	ka-ná-	kín-	–	–	ku-	ku-
3sg	ná-	kín-	ʔi–ap	ki·k–ap	ʔu-	ʔu-
3pl	ka-ná-	kín-	ʔi–ap	ki·k–ap	kun-	kin-

Table 4: Karuk transitive and intransitive agreement

Furthermore, the form associated with 2pl object marking is also used in 1→2pl contexts (*ki·k–ap*), bleeding the hierarchy of 1>2>3. In the majority of cases, though, “we can view [the agreement markers] as simply marking the involvement of one participant of a specific person and

⁵⁶Agreement affixes may vary depending on mood and negation. Here I give the prefixes with “Positive” form of the verb, according to Macaulay (1992). The pattern with respect to homophonies among the markers is consistent across paradigms.

number. Under this approach, the person and number of the second participant is left unspecified” (Macaulay 1992:187). The difference between Karuk and Nocte is that in Karuk, the realization of the person marking differs depending on whether the argument is an object or a subject. That is, agreement reflecting, say, a 1pl object (*kín-*), differs from that reflecting a 1pl subject (*nu-*). Just as with the inverse morpheme in Nocte, we can analyze the difference in agreement as being related to the “version” of *v*. Agreement on the first cycle conditions one type of allomorphy, while agreement on the second cycle conditions a second type.⁵⁷

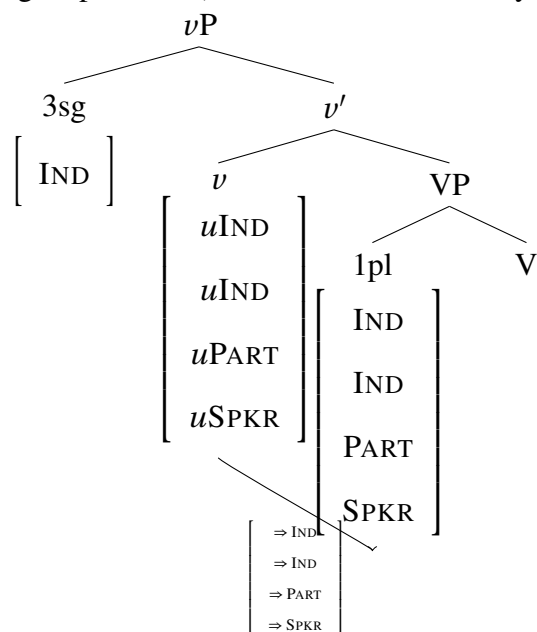
Explicitly, when a $1/2 \leftrightarrow 3$, we see only the features of the $1/2$ argument, which differ depending on whether the argument is an object or a subject.⁵⁸

- (40) a. *karuk xás ni- mah*
 upriver then **1sg-** see
 ‘I saw it when I was upriver’ (Macaulay 1992:185)
- b. *pu= kín- čúphi- uniš- aviš- ara*
 NEG= **1pl-** talk- to- FUT- NEG
 ‘I will not speak to you’ (Macaulay 1992:185)
- c. *?i-m pú= kín- ?á·ku- tih- ap*
 2sg.PRON NEG= **1pl-** hit- DUR- *ap*
 ‘You’re not hitting us’ (Macaulay 1992:185)

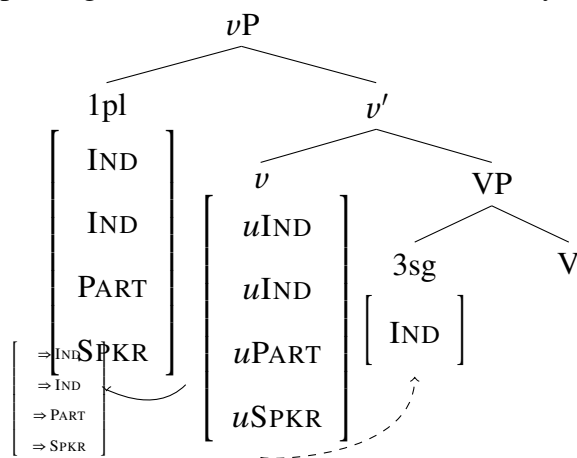
⁵⁷See Sappir (2010) for an analysis of Karuk using case and impoverishment. Macaulay (1992) argues that *-ap* is an inverse marker, “albeit a somewhat imperfect one” (p. 182). The “person” hierarchy in her system is $2pl > 1 > 2sg > 3$. Note that this interaction of person and number is entirely consistent with the approach to morphology proposed here, whereas in other systems in which person and number are separated, the interaction between person and number is not predicted and must be stipulated into the system. Béjar (2003, 2008) argues that *-ap* is a plural morpheme.

⁵⁸The examples given below are from Macaulay (1992), which are in turn cited from other sources. I have simplified the glosses somewhat to reflect my analysis.

(41) a. 3sg → 1pl = *kín-* (in the context of a first cycle *v*)

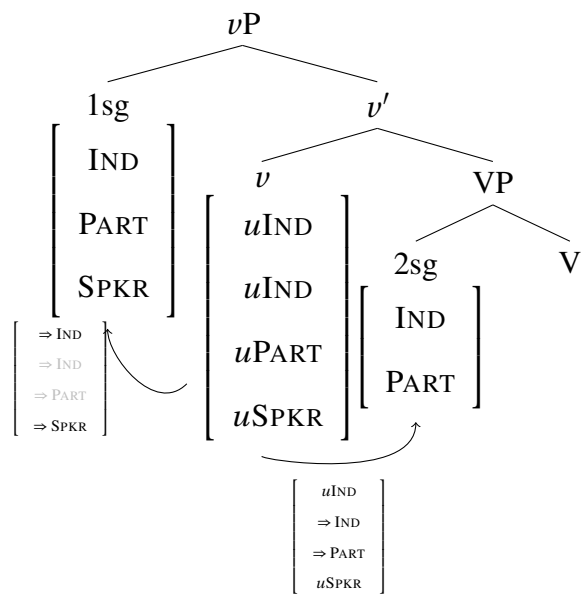


b. 1pl → 3sg = *nu-* (in the context of a second cycle *v*)



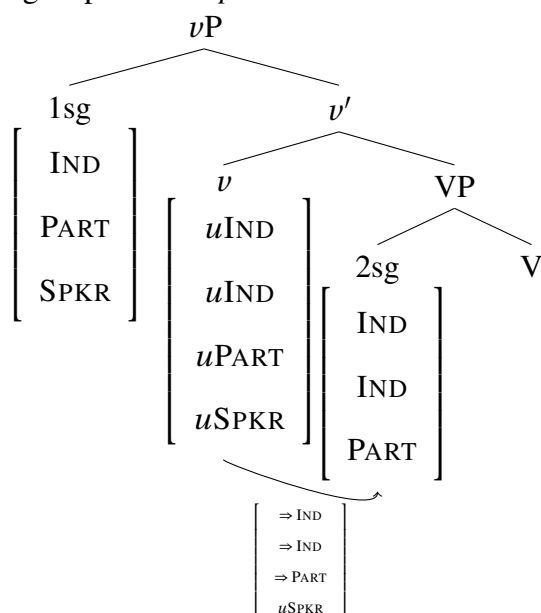
Turning to 1 ↔ 2 effects, with 1 → 2sg, we see *nu-*, the morpheme associated with 1pl in other environments.

(42) 1sg → 2sg = *nu-*



Just as in Nocte, the probe on v allows multiple features to accumulate on the head, and the resulting feature bundle is functionally equivalent to a 1pl morpheme. Note that we do not see the morpheme associated with 1pl object agreement, presumably because there has been a second cycle.

Crucially, in 1→2pl contexts, we see that agreement reflects 2pl object agreement.

(43) 1sg → 2pl = *ki·k-ap*

Here, again, the added IND feature bleeds a second cycle because there is no available *uIND* feature to allow match with the subject. Only one set of features is copied onto the head, and the result is simply spelling out the 2pl object argument. Note again that the “person” hierarchy is not entirely restricted to person features. The fact that there is a difference in how agreement works dependent solely on the number of the object suggests that number and person are interdependent. This is not easily captured in a system in which person and number may be separate probes on with separate, unrelated feature sets.

This latter approach, in fact, is precisely what Béjar (2003, 2008), Béjar and Řezáč (2009) claim in their discussion of agreement in Karuk. In their system, phi-probes can be divided into π -probes for person and ω -probes for number. In some languages, these π -probes and ω -probes are located on different heads. In this way, they account for the fact that in Erza Mordvinian (Uralic) the preferred controller of the number probe is the subject (because ω -probe is located above the subject) while the preferred controller for the person probe is the object (because the π -probe is located on *v*). However, in Karuk, because the object is the preferred controller for both number and person, they argue that both probes are hosted on the same head, but that each can still act separately. This should cause us to be skeptical of the system in general. In some languages, when

π - and ω -probes are hosted on the same head, they are required to act “as one”, and cannot value at different arguments (e.g., verbal agreement in Romance, Germanic, etc). However, in a language like Karuk, the probes on the same head can act separately. But why? Is there a predictable pattern for why some languages can and some cannot allow two probes on one head to probe separately?

More detrimental to B&R’s analysis, their approach does not explain the interaction of person and number. Given separate probes, we expect person features of one argument and number features of one argument to be each be reflected on the verb. But that is not always the case. In some instances (namely, 1→2sg), the surface form does not cleanly express the features of either argument, and what shows up is contingent on how both ω and π are valued. That is, the interaction of the probes is what is lost in B&R’s approach.

6.3 Yimas

Yimas is classified as a Lower Sepik language, spoken in Papua New Guinea. Current estimates list there to be around 300 speakers, as of 2000.⁵⁹ Yimas is an SOV language, with largely free word order. It has a Nominative-Accusative syntactic alignment. It has been analyzed as exhibiting a person-based split-ergative system in its agreement morphology (Foley 1991, Phillips 1993, Wunderlich 2001). As we will see, though, the ergativity is only superficial, and is derived straightforwardly via the proposed mechanism.

Because of Yimas’ rich and complex agreement processes, it has been given a relatively large amount of theoretical attention (Phillips 1993, 1994, 1995, Wunderlich 2001, Woolford 2003, Harbour 2008). I do not have the space to exemplify all aspects of agreement in Yimas.⁶⁰

⁵⁹<http://www.ethnologue.com/language/yee>

⁶⁰All examples in all cited texts are drawn from a single source, Foley’s grammar (Foley 1991).

6.3.1 Person competition in Yimas

Yimas contains three sets of “dependent” agreement markers – meaning that there are three distinct sets of agreement markers which are affixed to the verbal stem.⁶¹ Set I, which are clitics, are always initial on the verb stem. Sets II and III, which are in complementary distribution, are prefixed directly to the verb root.

(44) *Yimas’ verbal template*

Set I – Set II/Set III – root – TENSE/ASPECT

Arguments compete for the Sets II/III slot; the argument which is higher on the Person Hierarchy (where 1>2>3) wins. In (45), the directly preverbal slot is always filled by the 1st person argument, regardless of where the argument originates. Set II is used if the argument which appears in this position is a subject; Set III is used when the argument which appears in this position is an object.

(45) 1↔3

a. *pu- ŋa- tay*
3pl.I- 1sg.III- see
‘They saw **me**’

b. *pu- ka- tay*
3pl.I- 1sg.II- see
‘**I** saw them’

Similarly, in (46), the 2nd person argument occupies the preverbal agreement slot when the other argument is third person. Again, we see a morphological distinction between object and subject forms.⁶²

⁶¹A fourth set of suffixal number morphemes, which are confined to certain contexts will not be discussed.

⁶²Note that the 3rd person argument, which is always represented by Set I when the other argument is local, will surface identically regardless of where it originates. The fact that these Set I clitics are also used in intransitive agreement, has lead previous researchers to call these absolutive markers, in a split-ergative system where only 3rd person arguments are marked as absolutives (Foley 1991, Wunderlich 2001). Under the present analysis, since 3rd

(46) 2↔3

a. *impa- ŋkul- cay*
 3dl.I- **2pl.II**- hit
 ‘**You two** hit them two’ (205)

b. *impa- ŋkran- cay*
 3dl.I- **2dl.III**- see
 ‘They two saw **you two**’ (206)

In 2→1 situations, the 1st person object occupies the preverbal position, and the 2nd person subject is expressed with Set I, as expected if 1st outranks 2nd.

(47) 2→1

a. *ma- ŋa- tay*
2sg.I- **1sg.III**- see
 ‘You saw **me**’ (206)

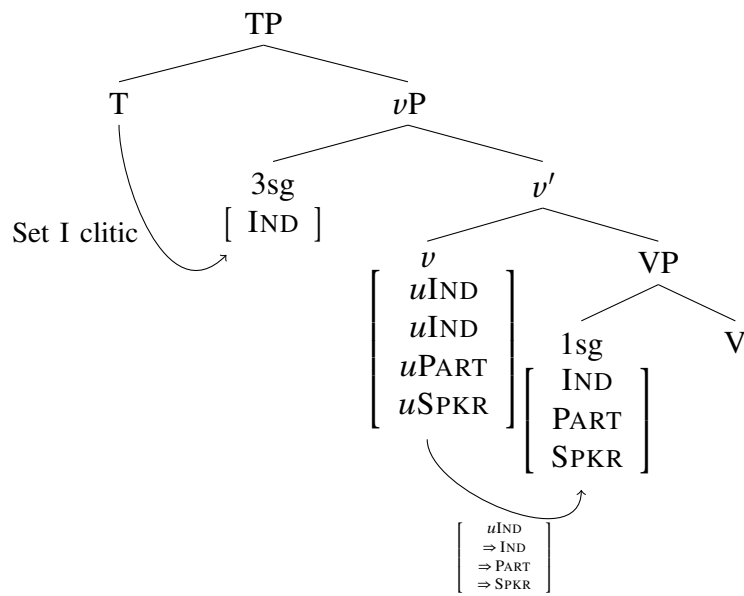
b. *ipwa- ŋkra- tay*
2pl.I- **1dl.III**- see
 ‘You all saw **us two**’ (206)

The system here falls out from situating two probes within the syntax, one on ν , and one on T.⁶³ ν is articulated and can agree cyclically. ν agreeing with an object results in Set III, and ν agreeing with a subject results in Set II. The Set I clitics are licensed from T.

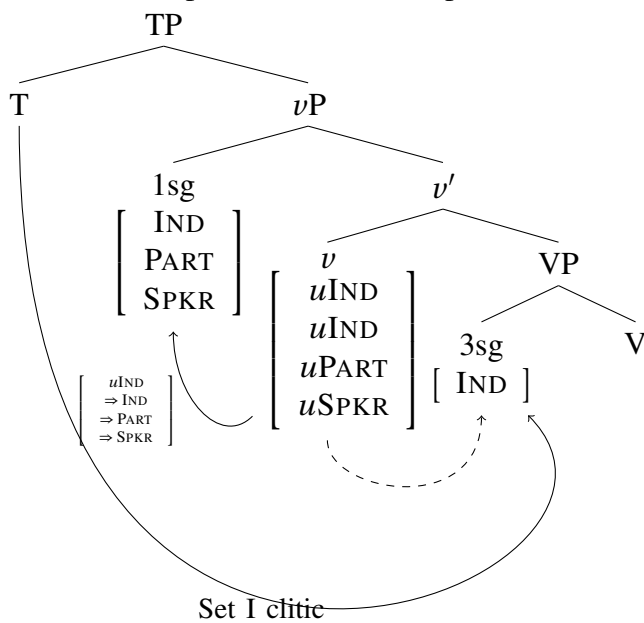
(48) a. *pu-ŋa-tay*
 ‘They saw me’
 [match and value with object]
 [Set III used for 1st person; Set I for 3rd person]

person is underspecified for person, it will always fail to value the probe, and will appear as a clitic. Thus, the present analysis quite straightforwardly derives why agreement appears to pattern as a (person-based) split-ergative system. Note that Yimas is otherwise nominative-accusative for case and other syntactic tests.

⁶³The ideas here are similar in spirit to those which have already been proposed for Yimas in Phillips (1993) *et seq* and Woolford (2003).



- b. *pu-ka-tay*
 'I saw them'
 [Match with object, but no value; Match and value with subject]
 [Set II used for 1st person; Set I for 3rd person]



I assume some sort of Activity Condition which prevents T from agreeing with an argument which has already agreed, thus ruling out both T and *v* agreeing with the subject in (48b). Furthermore, clitic agreement is assumed to operate using a different mechanism than the true agreement of *v*. That is, instead of feature copying, it perhaps instantiates an A-chain (Preminger 2009).

Turning to 1↔2 effects, just as in Nocte and Karuk, when 1→2sg, we get an unpredictable combination of forms, *kampan-*.^{64,65}

- (49) a. *kampan-* *tay*
 1→2sg- see
 ‘I saw you (sg)’ (207)

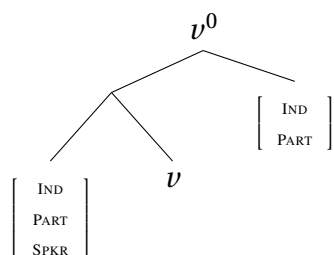
This pattern differs somewhat from what we have seen before, in that the marker used in this context is not identical with any other marker. That is, unlike in Nocte and Karuk, where in 1→2 contexts the morpheme which appeared was homophonous with another agreement marker. In Yimas, *kampan-* does not show up anywhere else. However, we can transparently break this form down into *ka-*, 1sg Set II, *mpa-*, 3dl Set III, *n-*, 2/3 Set III. Both arguments still get reflected in the *ka-* and *n-* morphemes, plus, there is a third morpheme expressing the combined number. Note further that *ka-* belongs to the Set II series, which is the subject marking series appearing closest to the verb. Furthermore, the other two morphemes belong to Set III. Crucially, none of the markers is a Set I marker. These patterns fall out straightforwardly by assuming that *v* is responsible for Sets II and III, while T is responsible for Set I. When *v* agrees with an object, Set III surfaces; when it agrees with a subject, Set II surfaces. Because T cannot agree with something that has already agreed (cf. the Activity Condition from earlier) we readily derive why there is no Set I morphology here. Thus, in the portmanteau form in (49), *ka-mpa-n* transparently reflects *v* agreeing with both argument positions.

⁶⁴The number of the subject may be expressed using an independent pronoun.

⁶⁵Things are complicated with negation and a few other clitic prefixes where the Set I clitics are banned. Instead, a suffix indicating the number of the argument not referenced by the Set II/III agreement prefix is employed. In 1→2sg contexts, though, the prefix *mpa-* appears, again, indicating dual number with *mpa-*. The number suffix does not appear.

It is worth asking why in Yimas we see three morphemes in 1→2sg contexts, while in the other languages surveyed so far, we always get a single morpheme. I do not have an answer for this, but I might speculate about what could be happening. Imagine that ν has agreed twice, and has built something where there are two bundles of features, as in (50).

(50) ν after agreeing with both object and subject



What morphology seems to be doing is spelling out the person features separately, as they are copied onto ν , but it is fusing the IND features in a single bundle, which gets realized as *mpa*. Perhaps we could postulate a very specific rule in which only IND features percolate up to ν^0 . This is not an easy interaction to derive in any theory of morphology. We would further have to ask why we do not see the same thing other languages.

The added morphological complexity muddies the derivation somewhat. What is important here is that in exactly one configuration of features within the syntax, the surface form reflects a number morpheme which is a combination of the number of both arguments. On the view that agreement can only ever reflect a relationship between one probe and one head, then this is entirely unexpected, since the morphology is conditioned by the features from two different syntactic positions.

Significantly, if the 2nd person object is non-singular, then only the object is referenced on the verb with the expected Set III form; the 1st person subject may appear as an independent pronoun.

- (51) a. (ama) *ɲkul- cay*
 (1sg) 2dl.III- see- PERF
 ‘I saw you two’ (207)
- b. (kapa) *kul- cay*
 (1dl) 2pl.III- see

‘We two saw you all’ (207)

Again we see that the Person Hierarchy is shown to be dependent not solely on the person of the arguments, but also on the number as well. The same probe on ν that was argued for Nocte and Karuk applies here as well. Situated between the subject and object, it will agree with 1st objects completely, but 2sg objects incompletely.

Woolford (2012) presents an analysis of Yimas as an example of morphological portmanteau, that is, the portmanteau form is computed in PF, not syntax. The arguments against her approach carry over from the discussion of Nocte in §6.1.7. (The agreement is dependent on interacting person information along with grammatical category). There is a further factor that would argue against Woolford’s analysis. Notice that when there is $1 \rightarrow 2$ [nonsingular], the only agreement expressed on the verb is 2nd person agreement. Thus, in these contexts, the 1st person morphology is actually being deleted, in favor of expressing 2nd person forms. This is in fact impossible in Woolford’s system. Recall that her Faithfulness constraints can only target either 1st person or local person, but not 2nd. Thus, it should theoretically be impossible to derive a system which preserves “normal” agreement in $2 \rightarrow 1$ contexts, allows portmanteau in $1 \leftrightarrow 2$ contexts, but deletes 1st person in $1 \rightarrow 2$ [nonsingular] contexts.

Again, it is beyond the scope of this paper to give a full description of the processes at work in Yimas. The salient point is that in the configuration of $1 \rightarrow 2$ sg we see a morpheme expressing dual number on the verb. The appearance of this dual morphology is not accidental given the type of probe I have proposed. Agreement with two heads builds a feature bundle which expresses non-singular morphology. Furthermore, we derive why this process can only happen in one direction, and how the number specification of the object can affect the surface form.

7 Clusivity

So far, we have seen instances where the number of both arguments may be expressed in one agreement marker. However, in many cases, for languages which display an inclusive/exclusive

distinction, what we see in 1↔2 contexts is inclusive morphology.

In this section, I will demonstrate briefly that these facts are subsumed by the present proposal. In short, nothing further needs to be added to the theory to capture the clusivity facts: agreement with two arguments in some languages will result in an inclusive morpheme precisely because features from both arguments have been copied to the head bearing the probe.⁶⁶

7.1 Carib

Surinam Carib, as reported in Hoff (1968, 1995), Hoff and Kiban (2009), marks agreement on the verb in a relatively simple system. The markers do not distinguish number, however there is a marker representing a 1st person inclusive (denoted as “12”).

The agreement markers do distinguish between whether the person features are associated with an object or a subject position. So a 1st subject is *s-*, while a 1st object is *y-*. (I do not discuss *kīs-*, although, it is clearly related.)

		O			
		1	2	12	3
A	1		k		s
	2	k			m
	12				kīs
	3	y	ay	k	n

Table 5: Transitive agreement in Surinam Carib

Since the system only overtly shows a person hierarchy in which 1/2>3, we cannot state an ordering between local persons. And in fact, the surface patterns suggest that they are equally ranked, since whenever we get two local arguments, the surface form reflects both of them by using the inclusive morpheme *k-*. In (52), only 1st person features are seen on the verb.⁶⁷

⁶⁶This section is essentially identical to what is argued in Georgi (2011, 2013), *modulo* formal and featural differences.

⁶⁷Glosses have been adjusted from Hoff (1995). Hoff and Kiban (2009) do not gloss the *ya* suffix. It does not

- (52) a. *s- uku:ti -i*
 1_{subj}- know -PERF
 ‘I have known him’ (Hoff 1995:352)
- b. *y- u:ku:ti -i*
 1_{obj}- know -PERF
 ‘He has known me’ (Hoff 1995:352)

Carib displays an Active-Stative alignment, in that intransitives may be marked with object-like or subject-like agreement. So both *s-* and *y-* may mark a 1st person intransitive subject, depending on further factors (Hoff 1995). Thus, the instances of *s-* and *y-* in (53) are not assumed to contain any reference to a 3rd person argument.

In (53), we see what happens when there are two local persons in the phrase.

- (53) a. *kis- amo -ya*
 12- weep.for -ASP
 ‘The two of us weep for him’ (Hoff and Kiban 2009:343)
- b. *k- amo -ya*
 12- weep.for -ASP
 ‘He weeps for the two of us’
 ‘**I weep for you**’
 ‘**You weep for me**’ (Hoff and Kiban 2009:343)

Hoff and Kiban (2009) report that the ambiguity in (53b) is resolved using independent pronouns. The descriptive generalization is that when there is agreement with an object, and when there are two speech act participants, then *k-* is used.⁶⁸

How do we account for these patterns? The simplest answer would posit a probe on which there are two *uIND* nodes, both are which are also specified as *uPART*.

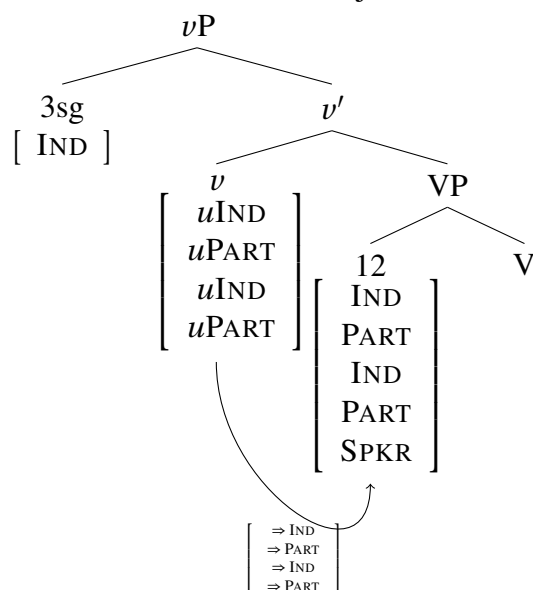
$$\left[\begin{array}{c} uIND \\ uPART \\ uIND \\ uPART \end{array} \right]. \text{ Such a}$$

contribute to the person marking paradigm, so I have assumed that it, too, is an aspectual affix.

⁶⁸The latter point also carries over to the /k/ in *kis-*.

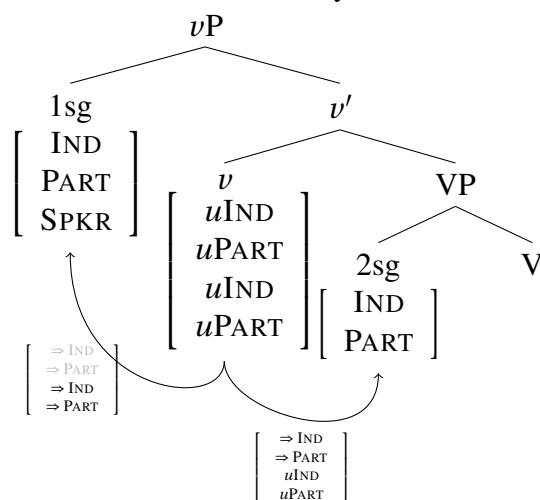
probe will be able to match and value two local arguments, regardless of the grammatical role. A feature bundle containing two PART features will be spelled out as an inclusive, since two speech-act participants would entail 1st person and 2nd person. Thus, whenever there are two speech-act participants as core arguments, *no matter where they originate*, the resulting morphology will reflect an inclusive morpheme.⁶⁹

- (54) a. *k- amo -ya*
 ‘He weeps for the two of us’
 [match and value with the object; no second cycle]

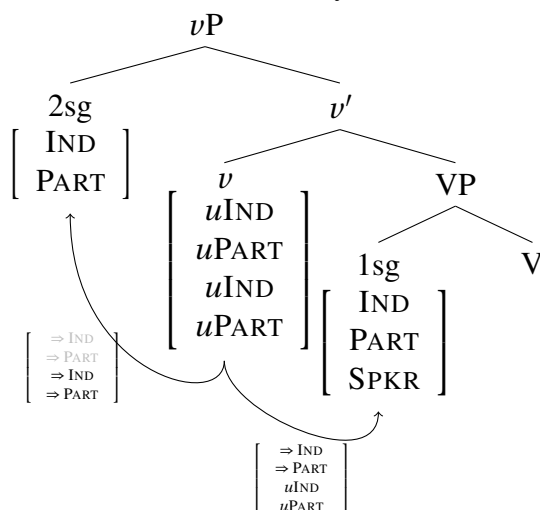


⁶⁹A SPKR feature will also be copied onto the probe, although that is not expressed in the trees in (54).

- b. *k- amo -ya*
 ‘I weep for you’
 [match and value on first cycle; match and value on second cycle]



- c. *k- amo -ya*
 ‘You weep for me’
 [match and value on first cycle; match and value on second cycle]



Whether 1→2, (54b), or when 2→1, (54c), the features that are copied to the probe are exactly equivalent to when there is complete agreement with an inclusive object pronominal, (54a).⁷⁰

Thus, the fact that some languages show inclusive morphology in 1↔2 contexts is subsumed

⁷⁰Note that to derive the inclusive pattern, we do not need to rely on a probe situated between the subject and the verb. The probe as stipulated will get the same result whether it is situated above the subject and object (as argued by Georgi), or in between the two. As stated above, I assume that there may be parametric variation in where a language all situate the agreement probes.

under the present analysis, under the assumption that the probe on v can be parametrically articulated to look for different features.

7.2 Exclusives

As mentioned above, Georgi (2011, 2013) claims that all $1 \leftrightarrow 2$ effects are instances of inclusive morphology. As argued in the section on Nocte, this cannot be maintained to cover all the cases. There are other instances which argue against Georgi's account. Take for instances, Siriono, where the $1 \leftrightarrow 2$ effects spell-out an exclusive morpheme.

(55) Siriono (Tupí-Guaraní)

oro- nupã

1pl.EXCL- beat

'I beat you(sg)

The problem that Siriono poses for Georgi is that she predicts any instance in which there is irregular agreement morphology due to agreement with two heads to be a spell-out of the features $[+1, +2]$ (denoting inclusive) on an agreement head. However, given that these languages have morphemes which correspond to $[+1, +2]$ but they are not employed in these circumstances severely undermines her argument. Instead, it suggests that what is happening here is that sometimes the spell-out of the feature bundle reflects a number distinction, and not aclusivity distinction. However, this does not negate the generalization that in *some* languages, the result of two arguments copying features onto one head will result in an inclusive morpheme.

8 Beyond $1 \leftrightarrow 2$ contexts

Expanding the empirical ground, there are further implications for getting rid of number features. In this section I will discuss other phenomena which require morphological number to be construed as built from multiple atomic elements.

8.1 Resolved agreement

Consider first Resolved Agreement, discussed at the beginning of this paper. In (56), plural agreement on the verb reflects the semantic notion of a set of individuals, but cannot occur from a plural feature on either argument.

- (56) a. John and Mary are eating rice
- b. *Juan y María comieron arroz*
 Juan and Maria ate.3pl rice
 ‘Juan and Maria ate rice’

English is rather a poor example of this phenomenon, considering the overall lack of verbal inflection, (56a), but languages which encode more on the verb also show plural agreement in these situations, e.g., Spanish, (56b).⁷¹ Again, the plural form of the verb is intuitive given that the subject phrase is a plural entity, consisting of two people. But this does not explain why morphology should reflect a feature [+plural] when none has been merged in the derivation. Under Individual Number, the plural morphology seen on the verb is derived via feature percolation, where the features of the two arguments are collected on AndP, which is what the verb agrees with. The mechanism for agreement is simple and entirely without extra stipulation. Moreover, the morphological reflex of agreement is derived from precisely the same intuitions about semantic number.

8.2 Split-antecedent pronominal binding

Consider next split-antecedent pronominal binding. In these contexts, the bound pronoun is necessarily plural and in fact reflects the phi-features of both of its (structurally independent) antecedents.

⁷¹Note that a default agreement approach in the context of coordinated subjects is difficult to maintain because languages still retain certain featural information, like person. Furthermore, languages which display further number distinctions, like dual, are sensitive to how many elements are coordinated.

- (57) {Each of the students}_i told {each of the professors}_j that their_{i+j} meeting was fun. (Sudo 2012:178)

The relevant interpretation of (57) is the one in which the pronoun *their* has two (singular) antecedents, *each of the students* and *each of the professors*. In this type of partial binding, the plural number on the pronoun reflects the singular features on two syntactically distinct antecedents. That is, precisely as with 1↔2 effects, and Resolved Agreement, the features of two (syntactically distinct) arguments may be morphologically reflected in one place. In the case of (57), the number features are added. Consider further the examples in (58), in which the split antecedents vary in person features.

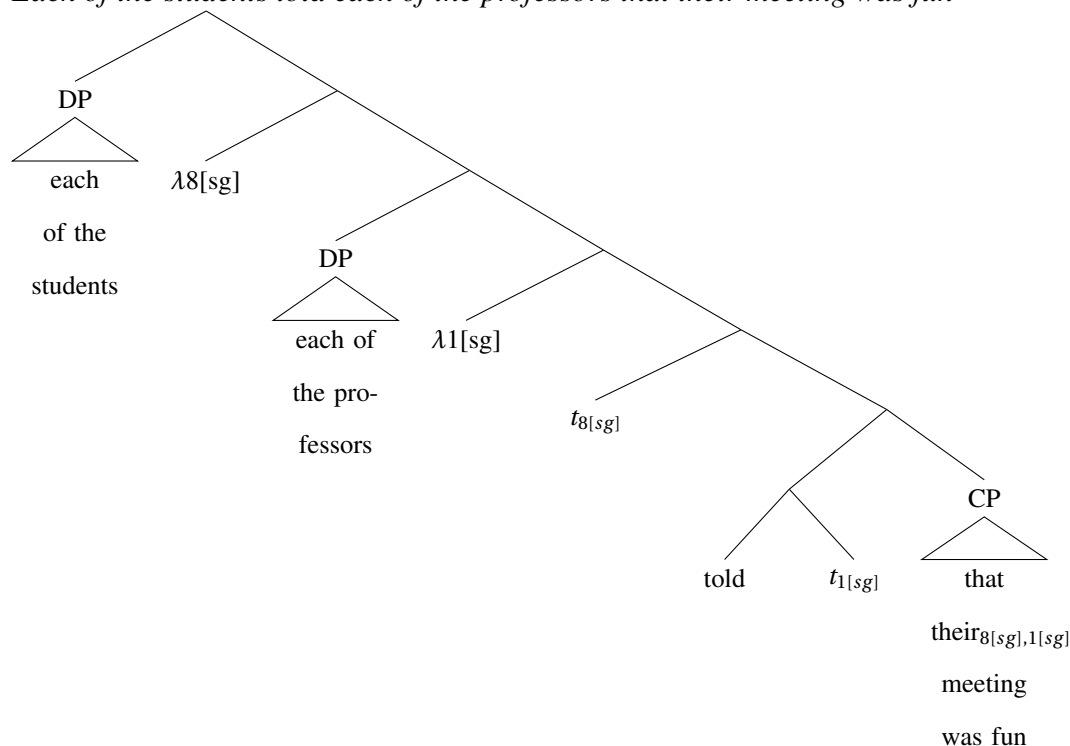
- (58) a. 3rd + 1st
Mary_i told me_j that we_{i+j} should get married.
b. 3rd + 2nd
Mary_i told you_j that you_{i+j} should get married
c. 2nd + 1st
You_i told me_j that we_{i+j} should get married.

What is most remarkable here is that the combination of pronominal forms is exactly what we observe in coordination contexts, as well as 1↔2 agreement, where there is a ranking of 1>2>3. That is, with the combination of 2nd and 1st person, only a 1st person pronoun can be used. The pronoun *we* “ranges over pairs consisting of the speaker and one of the relevant people that includes the hearer.” (Sudo 2012:178)

Heim (2008)’s analysis for these situations involves FEATURE TRANSMISSION, in which the bound pronoun gets its phi-features through a PF operation which allows the binders to pass features to an “empty” bound variable. Sudo (2012) and Sudo (to appear)’s analysis, which resembles Heim’s in many ways, argues that the mechanism in which the bound pronominal form obtains its features is not restricted to a PF operation. He achieves the surface patterns by enriching the information contained in the indices. Crucially, both assume that the phi-features on the bound pronoun (which invariably displays plural number) reflects the sum of the features of the two antecedents.

An extremely simplified version of the idea behind this approach is represented in (59), employing standard analyses for variable binding (cf. Heim and Kratzer (1998)).

(59) *Each of the students told each of the professors that their meeting was fun*



In (59), both of the binders contribute their phi-featural information to the pronoun *their*, which then reflects the sum total of the features. That is, $their_{8[sg],1[sg]}$, containing two [sg] features, will be spelled out as plural. Crucially, neither argument provides a [pl] feature. Instead, it is the combination of features which results in plural morphology. Note that Sudo and Heim both take it as a given that two [sg] features might result in plural morphology. This is only true if morphological number is precisely as I have described it, namely, built from atomic features.

Note, however, that we do not expect these scenarios to be precisely analogous to the local effects discussed in this paper. $1 \leftrightarrow 2$ effects, resolved agreement, and split antecedents are separate phenomena, resulting from different processes: $1 \leftrightarrow 2$ effects from verbal agreement; resolved agreement from percolation; and split antecedents from something else, maybe feature transmission. So we should not be surprised that, as opposed to $1 \leftrightarrow 2$ effects, which are confined to a specific configuration of person features within the structure, the feature resolution involved in

split antecedents, stemming from a difference source, is subject to difference conditions. In other words, I do not claim that the same agreement process that gives rise to 1↔2 effects should operate in all contexts.⁷²

8.3 Et cetera

Looking at other aspects of cross-linguistic variation, the “prominence” of person features is less mysterious when we eliminate number features. A variety of phenomena have been tied to person features, while number (and gender/class) is less important: The Person-Case Constraint (PCC) (Bonet 1994); movement (EPP, Object Shift/Scrambling) (Sigurðsson 2007); agreement-as-movement (Baker 2008); Case (Chomsky 2000); argument licensing (Béjar and Řezáč 2003); and pro-drop (Shlonsky 1987). There are of course phenomena that make reference to number (e.g., selection restrictions for predicates like *form a circle*), but what sets person apart is that the phenomena listed above are usually taken to be purely syntactic. No one has ever proposed that only [+pl] arguments can be targeted by an EPP feature, although there certainly are proposals that only [+part] arguments can (or must) move (Sigurðsson 2007, Baker 2008). But why not have a similar rule targeting [+pl], if [+pl] and [+part] are both represented in the syntax? What would stop a language from postulating a rule in which movement targeted number features, not person features?

I have argued throughout this paper that number distinctions do not involve dedicated number features, and showed that plural morphemes are best understood as collections of atomic features. We could ask a slightly different question, though, namely, are there instances that *require* number features, which cannot be explained using multiple instances of IND features? In response, let’s consider the PCC. There is no (legitimate) semantic constraint on having two local persons in some minimal domain. Rather, the syntax appears to ban these structures through some syntax-specific

⁷²Jonathan Bobaljik (p.c.) points out that it is somewhat surprising that we do not see 1↔2 effects on bound pronouns, since it is not necessary that the phi-features on a bound pronoun be interpretable. Thus, it should in theory be possible to have portmanteaux bound pronouns. I will leave this for further exploration.

constraint banning, say, two PART features within some domain. Can we find some sort of *syntactic* constraint analogous to the PCC that targets something like [+pl] in the presence of another [+pl] – a hypothetical Number-Case Constraint? If so, it would be difficult for Individual Number to account for this, because under Individual Number, the syntax would need the ability not only to count features, but also to compare the numbers of features between different arguments. Such a mechanism is entirely antithetical to current theory; it grants the syntax far too much power. However, such a concern is moot, since no one has proposed a Number-Case Constraint, or anything like it, as far as I am aware. (See Nevins (2011) for discussion of the absence of a Number-Case Constraint.) Until we can find some definite evidence that dedicated number features exist, the explanatory power of Individual Number is much greater.

And lastly, as discussed at length above, the proposed theory of morphological number essentially merges morphological and semantic theories, or, more accurately, it derives the morphology from the semantics. Given an architecture of grammar in which PF and LF are fed from a single source, our semantic and morphological theories should converge on similar representations for categories which are shared by both components. The proposed theory also fits firmly within the Minimalist Program (Chomsky 1995, 2000, 2001) in doing away with extraneous features. Only the features which are needed for the derivation are merged in the syntax.

9 Conclusion

The present study has argued for a reanalysis of the featural representation of morphological number. Focusing on a subset of languages within the empirical domain of Local Person Portmanteaux, it was shown that a surface plural agreement marker used in $1 \leftrightarrow 2$ contexts is the result of a single probe agreeing with two arguments, copying the phi-features of those arguments onto itself. A theory of featural representation, Individual Number, was proposed to account for the plural morphology in these contexts. The crucial insight was that even though no plural entity was merged in the syntax, plural morphology can be expressed due to the fact that plural exponence does not rely

on the availability of a dedicated plural features, rather it relies on the presence of more than one atomic IND feature. Data from a number of languages was provided to support the claim, including languages which exhibit inclusive and exclusive distinctions.

The arguments were extended to other empirical domains, and it was shown that Individual Number correctly accounts for a wide range of phenomena. It was further argued that Individual Number is theoretically superior in that it merges semantic and morphological (and syntactic) theories, and adheres to the principles of a Minimalist view of linguistic theory.

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