ABSTRACT: This paper proposes a pair of morphosyntactic number features, [Discrete] and [Non-Atomic], and shows how they can contribute to an understanding of how grammatical number is expressed cross-linguistically. Starting with English, where mass nominals pattern syncretically sometimes with plural count nominals and sometimes with singular ones, we use these features to improve upon a previous account (Cowper & Hall 2002), and then extend the analysis to mass–count syncretisms in Lingala and Manam and to classifiers in Western Armenian and Mandarin. We account for the cross-linguistic variation using a consistent set of features and a highly constrained theory of morphological exponence, and argue that the variation arises from differences in the syntactic structures in which the features appear and the paradigmatic systems of contrast in which they participate.

KEYWORDS: grammatical number, Distributed Morphology, contrast, features, nominals

1. INTRODUCTION*

1.1 Theoretical motivation

What is the purpose of a theory of morphological exponence? Given that lexical form–meaning associations are essentially arbitrary, one might expect there to be little of interest to say about the topic. In principle, inflectional paradigms could be populated with vocabulary items whose phonological shapes reveal nothing about the morphosyntactic features they spell out, as is the case with morphologically simple lexical items such as dog or pistachio. In practice, however, this is not what we find. Although the

* We thank the participants at the Workshop on the Representation and Selection of Exponents (CASTL, Universitetet i Tromsø) for helpful discussion. All errors are ours.
forms associated with inflectional meanings are indeed arbitrary, their distribution is not random; there are patterns whose regularity and cross-linguistic consistency do not appear to be wholly coincidental. A theory of exponence, therefore, should make it possible for surface patterns to offer insight into the systems of features that underlie them, and into the semantic contrasts that these features encode.

For example, while accidental homophony is certainly possible in inflectional paradigms, shared forms (syncretisms) more usually correspond to shared features (see, e.g., Corbett 2012: 35). If we assume that the mapping from syntactic structures to vocabulary items is governed by straightforward rules, then patterns in surface realizations can lead to new insights into morphosyntactic features, their syntactic configurations, and their semantic content. The less complicated and stipulative the rules, the stronger the predictions about the underlying features. To that end, we pursue a version of Distributed Morphology (DM) that avoids devices such as impoverishment and readjustment rules (Halle & Marantz 1993). Mechanisms of this sort make it easier for the grammar to generate quasi-regular syncretic patterns that do not correspond to any underlying featural unity. It is possible that they may ultimately prove to be necessary, but resorting to them too quickly would eliminate many opportunities for finding deeper explanations.

1.2 Empirical domain

In this paper, we consider the features of grammatical number, starting with some familiar syncretisms in the English nominal system. We propose a new system of features for number, with the initial goal of eliminating the need for a process of freezing stipulated in our earlier account of the data (Cowper & Hall 2002). We then explore the cross-linguistic consequences of the proposed feature system, showing how it offers elegant accounts of syncretisms in Lingala and Manam, and how it can be extended to languages with classifiers.

1.3 Assumptions

We make the following assumptions about morphosyntactic features and their semantic interpretation. First, we assume that features are privative; each one has only a single marked value.1 We further assume that each feature has a single, consistent meaning: features are monosemous.

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1 Binary features are used only if it can be demonstrated that both values of the opposition are active in the grammar. The burden of proof is thus on the analysis using binary features.
However, the semantic effect of a set of feature specifications depends not only on the positive semantic content of each of the features, but also on the system of grammatical contrasts in which they participate (as argued for phonological features by Trubetzkoy (1939), Dresher (2009), and Hall (2007, 2011), and for morphosyntactic features by Cowper (2005a,b), among others).

For example, consider the number feature \[>1\] proposed by Cowper (2005b). This feature has a single, consistent meaning: it indicates that the cardinality of the set of entities denoted by a nominal is greater than one. In a number system like that of English, a nominal with this feature is always interpreted as plural. However, if a number system also contains the feature \[>2\], then a nominal specified for \[>1\] that does not also bear \[>2\] is interpreted as contrastively not \[>2\]; i.e., as dual. In other words, in a system where \[>2\] can be present, its absence is contrastive. By itself, the meaning of \[>1\] is compatible with any number from two to infinity, but where the absence of \[>2\] is contrastive, the interpretation of \[>1\] by itself is restricted to dual by the Elsewhere Principle (Kiparsky 1973; Noyer 1992; Halle & Marantz 1993).

This pattern applies specifically to features that have the status of heads rather than modifiers, in the sense of Wiltschko (2008, 2009). Head features are by definition grammatically obligatory, and their absence is therefore contrastive. If a head feature is not present, its meaning cannot be present. Modifier features are grammatically optional, and their absence is non-contrastive. If a modifier feature is present, its meaning is present, but if it is absent, its meaning is not excluded.

For example, plurality is encoded in a head feature in English nominals; a DP such as the boy contrasts grammatically with its plural counterpart the boys, and therefore can only be interpreted as singular. This DP does not, however, contrast in the same way with alternatives containing optional modifiers, such as the tall boy. Height is not encoded by a grammatical head feature in English, and so while the tall boy can only refer to a boy who is tall, the boy can refer to a boy of any height.

A property that is encoded by a head feature in one language may be an optional modifier in another. For example, while number is a head feature projecting syntactically in English nominals, it is a modifier on nouns in Halkomelem, as illustrated in the examples in (1) from Wiltschko (2008: 642):

(1)  
a. English:  
i. the three boys  
ii. *the three boy
b. Halkomelem:
   i. te lhíxw swóweles
      the three boy,PL
      ‘the three boys’
   ii. te lhíxw swíweles
      the three boy
      ‘the three boys’

   In the English examples in (1a), the encoding of number is obligatory, and the absence of morphological plural marking on boy in (1a.ii) is thus contrastive, triggering a singular interpretation incompatible with the numeral three. In Halkomelem, on the other hand, the plural feature is a modifier, and so its absence (1b.ii) is not contrastive, leaving the nominal free to be interpreted as denoting a plurality. We follow Wiltschko in assuming that crosslinguistically, in languages with optional number marking, number features are optional modifiers rather than contrast-inducing head features.

   Finally, we assume that representations with more specified features are formally more marked than ones with fewer features, but that they are not necessarily more complex semantically. A combination of features may compose semantically to produce a very simple meaning, and a single feature may have a very complex denotation. This means, for example, that an intuitive sense that singular number is more basic than plural cannot be taken as evidence that plural is the marked feature (or vice versa); insight into the feature system can only come from applying the formal principles of the theory to the observed patterns of form and meaning.

2. THE PUZZLE, AND OUR PREVIOUS ACCOUNT

   English nominals present two contrasting syncretic patterns for number, as illustrated in (2).²

(2)

   a. ∅/sóme tea    a book    ∅/sóme books
   b. this tea      this book  these books

   Singular count nouns, but not mass nouns or plurals, take the indefinite determiner a(n), while demonstratives, plural marking on nouns, and number agreement on verbs treat mass and singular alike and distinguish

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² Here and below, we use sóme to represent the potentially unstressed indefinite determiner, as distinct from the obligatorily stressed quantifier sóme. For a discussion of the difference between these two vocabulary items, see Postal (1970) and Milisark (1976). There are also semantic differences between sóme and the null determiner ∅, which are not relevant to the issues discussed here.
the plural. Mass nouns thus pattern like plurals with respect to indefinite determiners, and like singulars with respect to demonstratives. Any analysis that treats mass nouns as covert plurals (e.g., Chierchia 1998) will run into trouble with demonstratives. On the other hand, any analysis that insists that mass nouns are less marked than count nouns, and that among count nouns, singulars are less marked than plurals, will have difficulty with the indefinite determiners. The account proposed by Cowper & Hall (2002) is an example of the latter type.

2.1 Cowper & Hall’s (2002) proposal

Cowper & Hall (2002) propose the system of number features in (3), in which [#] marks individuation, and [>1], which is semantically dependent on [#], distinguishes plural from singular. Most roots can appear in either mass or count nominals, as illustrated in (4) and (5).

(3) Number features (to be revised):
   a. MASS 
   b. SINGULAR 
   c. PLURAL
   #
   |
   [>1]

(4) a. We forgot to buy milk.
    b. He ordered a milk with his sandwich.

(5) a. Wow; that’s a really impressive desk!
    b. Wow; that’s a lot of desk!

A nominal with no number features is interpreted as mass; if the feature [#] is present, the nominal is individuated, or countable. A countable nominal may also bear the feature [>1], in which case it is plural.

Cowper & Hall (2002) assume that English D is characterized by the features in (6a), with the approximate semantic content described in (6b). Each feature is semantically dependent upon all features that dominate it, and thus can only be interpreted if the dominating features are also present.

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3 We represent dependency relations among features in tree form, as is common since early work in feature geometry (Sagey 1986, Harley 1994). However, for us the dependency relations are intrinsic, in that they follow from the denotations of the features themselves. The feature trees thus have no theoretical status.

4 See Borer (2005) for a similar view.
D and #, in addition to being features with identifiable semantic content, are also syntactic heads. D can take either #P or NP as a complement; in mass nominals, where the semantic content of # is not present, there is no #P projection between D and NP.

Cowper & Hall (2002) assume that vocabulary insertion proceeds cyclically from the bottom up (Halle & Marantz 1993). They posit the following specifications for the functional vocabulary items in (2). The plural suffix -s, inserted in the # head, realizes [>1]. Determiners, including indefinite ones (contra Valois 1991 and Ghomeshi 2003, among others), are inserted in D. A(n) spells out [D, #], while both the null determiner∅ and unstressed sôme spell out [D] alone. This spells out [Specific], and these spells out [Specific, >1].

2.2 Problems

The difficulty for this account lies in the sensitivity of determiners to number. Consider a structure like (7), which has #P specified as [>1], and D bearing the feature [Specific].

5 The contrast between stressed this/thése, which are deictic, and unstressed this/thése, which are specific but not deictic, is not crucial here. (See Prince (1981), Vangsnes (2001: §2.4), and Cowper & Hall (2002) for discussion of this contrast.)

6 Nothing in this paper hinges on whether nominal roots are inherently categorial (N) or composed of an acategorial root and a category-determining functional head (√RT+n). For simplicity, we use NP in syntactic representations.
With cyclic vocabulary insertion, we would expect (7) to be spelled out as *this books. At #P, [>1] would be spelled out as the plural suffix -s, leaving only [Specific] to be spelled out at DP. Vocabulary insertion on D must therefore be sensitive to features of #P, either through direct access to the # head (contra Bobaljik 2000a,b), or through concord between D and #. But then, an incorrect prediction is made about the indefinite structure in (8). Here, as in (7), [>1] is spelled out as the plural suffix -s. But, if the features of # are spelled out again on D, then a, which spells out [D, #], is a better fit than ∅ or some. We thus expect *a books.

Cowper & Hall (2002: 64) were thus forced to stipulate (9) as part of the process of vocabulary insertion.

(9) **FREEZING:** Once a feature has been licensed by vocabulary insertion, all of its dominating features are invisible to later applications of vocabulary insertion.

Given (9), once [>1] has been spelled out by -s, in (8), [#] is no longer visible when vocabulary insertion applies to D. However, [>1] itself can still be seen, permitting the distinction between this and these in (7).

This account of the mass–plural syncretism in (2a) thus relies on an *ad hoc* stipulation. The problem, we claim, lies in the features underlying the system; specifically, in the relative markedness of the structures representing mass, singular, and plural nominals.

3. A NEW APPROACH

3.1 **General Properties**

We propose to replace the number features in (3) with those in (10), while retaining Cowper & Hall’s (2002) features of D from (6).

(10) a. **SINGULAR**   b. **MASS**   c. **PLURAL**
    [Non-Atomic]   [Non-Atomic]   [Discrete]
    |   |
    [Discrete]

Singular count nominals, in this system, are less marked than mass nominals, which carry the feature [Non-Atomic]. Plurals, as before, are the most marked; they are characterized by the feature [Discrete], a dependent of [Non-Atomic]. The feature [Non-Atomic] indicates that a nominal does not denote a single indivisible entity: a nominal with this feature is either plural (composed of multiple discrete entities) or mass (non-discrete, and
thus arbitrarily divisible).\footnote{Harbour’s (2011b) [-Singular] has essentially the same meaning as our [Non-Atomic].}

Since [Non-Atomic] in English is a head feature, its absence is contrastive, and a nominal lacking it will be interpreted as atomic (i.e., contrastively \textbf{not} Non-Atomic), and thus as both count and singular. The class of non-atomic nominals thus excludes only singular count nominals, and includes both mass nominals and plurals. Within this class, plurals are distinguished from mass nominals by the feature [Discrete]. Something that is both discrete and non-atomic must be composed of multiple discrete entities; i.e. plural.

We now turn to the status of the feature [Discrete], which appears in (10) as a dependent of [Non-Atomic], and to the status of feature dependency trees in general. Normally, we assume that feature geometries simply provide a convenient way of representing semantic entailment relations; they do not contribute any additional co-occurrence restrictions on the features themselves (see Harbour (2011a, 2012) for a similar view).

However, in (10) it is not precisely the case that the presence of [Discrete] semantically entails the presence of [Non-Atomic]. A single atom is by definition semantically discrete; in a sense, [Discrete] is implicit in the contrastive absence of [Non-Atomic]. There is nonetheless a semantic dependency between [Discrete] and [Non-Atomic], albeit of a different sort: if [Non-Atomic] is contrastively absent, then [Discrete], being semantically implicit, cannot be contrastive. The contrastive presence of [Discrete] in English is thus possible only if [Non-Atomic] is present as well.

This is not the only way [Discrete] can be used, however. Cross-linguistically, there are two types of nominals within which [Discrete] can be contrastive. In languages like English, among [Non-Atomic] nominals, [Discrete] distinguishes plurals from mass nominals. In languages that do not make contrastive use of [Non-Atomic], there are nominals whose atomicity is completely unspecified. Among such nominals, [Discrete] can distinguish countable (singular or plural) nominals from mass nominals, as will be shown in §4.2.2 for Mandarin.

It can be seen, from the two different ways [Discrete] can function, that not only the semantic content of a given feature, but the contrasts in which it participates, are crucial in determining the interpretation of elements bearing the feature. This result is similar to the role played in phonology by the contrastive scope of a given feature (Dresher 2009; Hall 2007). For example, consider the relation between [Sonorant] and [Voice] in a language whose phonemic inventory includes voiced sonorants and voiced and voiceless obstruents, but no voiceless sonorants. If [Voice] is taken as...
having wider scope, then [Sonorant] is contrastive only among voiced segments, but if [Sonorant] has wider scope, then [Voice] is contrastive only among obstruents. These two possibilities permit cross-linguistic variation in the representation of consonant voicing along the lines of Avery (1996).

The relative scope of [Discrete] and [Non-Atomic] varies analogously. The number system in (10) corresponds to the contrastive hierarchy in (11), represented here as a branching diagram in the style of Halle (1959: §1.53). [Non-Atomic] takes wide scope, and [Discrete] is contrastive only among non-atomic nominals. However, it would also be possible for [Discrete] to take wider scope, yielding a contrast between count and mass represented as in (12); this is what we propose for Mandarin.

(11)

(12)

To sum up, replacing the features # (Individuated) and [>1] with [Non-Atomic] and [Discrete] in the English nominal number system permits a straightforward account of the fact that mass nominals can pattern either with plurals or with singulars. Like plurals, mass nominals bear the feature [Non-Atomic]; like singulars, they lack the feature [Discrete]. We turn in the next section to the featural specifications of the various vocabulary items of the English nominal system.

3.2 Vocabulary items of the English Number and Determiner system

Below the level of D in English, the only overt morphological contrast is between plural and non-plural. Straightforwardly, [Discrete] is spelled out by -s, which is pronounced on the head noun.8

In addition, we propose that the features [Non-Atomic] and [Discrete], when they appear, are copied onto D in the syntax. Along with the D features in (6), they give the dependency structure in (13), and are spelled out as in (14).

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8 For the purposes of this discussion, we abstract away from irregular plural morphology.
In this system, \( a(n) \) is the least marked spellout of D. \( \emptyset \) and unstressed \( s\)ôme, which Cowper and Hall (2002) took as the least marked exponents of D, are now more marked than \( a(n) \); they spell out [Non-Atomic]. In indefinite plurals and mass nominals, both of which carry at least the feature [Non-Atomic], \( a(n) \) will be blocked by either \( \emptyset \) or \( s\)ôme, as shown in (15).\(^9\)

(15)  

a. \( \emptyset /s\)ôme books:  

\[
\begin{array}{c}
\text{DP} \\
\text{D} \\
\text{D} \\
[\text{Non-Atomic}] \\
[\text{Discrete}] \\
\emptyset /s\)ôme
\end{array}
\]

b. \( \emptyset /s\)ôme water:  

\[
\begin{array}{c}
\text{DP} \\
\text{D} \\
\text{D} \\
[\text{Non-Atomic}] \\
\emptyset /s\)ôme
\end{array}
\]

Copying the features of individuation to D eliminates the need to

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\(^9\) We have replaced #P with NAIP (Non-Atomic Phrase), consistent with the view (Chomsky 1995) that syntactic heads consist only of the features that make them up.
stipulate that vocabulary insertion on D has access to some, but not all, of the features of the lower projection. Given the revised feature system, both the incompatibility of \(a(n)\) with plurals, as in (15), and the sensitivity of demonstratives to number, as in (16), follow from the assumption that all of the features of NAtP are visible on D.

\[(16) \quad \text{thése books} \]

Most English nouns can be used with either count or mass syntax (i.e., with or without NAtP). One exception to this is the class of nouns like furniture, which both resists plural marking and cannot occur with the singular determiner \(a\). Updating the analysis of Cowper & Hall (2009), we assume that nouns of this class are lexically specified with the feature Non-Atomic as a modifier on N, and thus cannot appear with a syntactically projected NAtP.

4. EXTENSIONS

We turn now to a demonstration of how the same features can account for patterns in some languages whose nominal systems are superficially very different from that of English.

4.1 Mass and plural as the natural class [Non-Atomic]

Mass–plural syncretisms are predicted by the feature [Non-Atomic]. If this feature is used in other languages, we should find more patterns similar to the behaviour of English \(\emptyset/\text{sôme}\).

4.1.1 Lingala

Mufwene (1980) describes one such pattern in Lingala (Bantu). Lingala nouns with the class 6 prefix \(ma\)- are usually plural counterparts to singular nouns in class 5 (\(li\)-). However, some nouns with \(ma\)- are ambiguous
between a plural and a mass reading, as in (17).

(17) a. li-lalá b. ma-lalá
    CLASS_5-orange CLASS_6-orange
    ‘an orange’ ‘mass of orange’ or ‘two or more oranges’

Mufwene (1980) argues that the contrast between li- and ma- is individuated/non-individuated rather than singular/plural; our feature [Non-Atomic] marks this same contrast.

4.1.2 Manam

Manam (Austronesian) has a singular–plural contrast for nominals in general (and also distinguishes dual and paucal for human beings and some animals). Number is not overtly marked on nouns themselves, but is reflected in agreement morphology on verbs and adjectives:

(18) Number agreement in Manam (Lichtenberk 1983: 107)

a. pátu i-lába. b. pátu di-lába.
    stone 3SG.REALIS-be.big stone 3PL.REALIS-be.big
    ‘The stone is big.’ ‘The stones are big.’

Lichtenberk (1983: 269) writes that “for purposes of number indexing, mass nouns are considered plural unless they refer to a single quantity,” giving the examples in (19):

(19) a. day di-énō.
    water 3PL.REALIS-exist
    ‘There is water (available).’

b. dan muʔu~muʔu∅ i-énō.
    water little-RED-3SG 3SG.REALIS-exist
    ‘There is little (i.e., a small quantity of) water (available).’

This suggests that the ‘plural’ prefix di- in fact spells out [Non-Atomic], and is ambiguous between plural and mass in the absence of any vocabulary item specified for [Discrete]. (Dual and paucal markers presumably spell out features dependent on [Discrete], and are also marked for animacy/sentience.)

Corbett (2000: 238), citing Lichtenberk (1983), interprets the singular agreement in (19b) as indicating small quantity (parallel to the use of plural
to indicate large quantities of mass nouns in other languages. However, it is not at all clear from Lichtenberk’s description that this is the case; it could be that the singular prefix merely indicates that the water is in a single quantity (as in English a water), with the smallness of that quantity coming entirely from the adjective.

4.2 Classifier languages

The same two features we have proposed for English, [Non-Atomic] and [Discrete], can also account for how number is realized in classifier languages. The crucial differences between English and classifier languages come not from the features themselves, but from their syntactic position and their contrastive status.

4.2.1 Western Armenian

Western Armenian has both classifiers and plural marking, but the two cannot co-occur in a single nominal (Bale & Khanjian 2009: 75).

\begin{align*}
(20) & \quad \text{a. Shenk-me} & \text{desa-r.} & \quad \text{c. yergu} & \text{had} & \text{shenk} \\
& \quad \text{building-INDF,SG} & \text{saw-2SG} & \quad \text{two} & \text{CLF} & \text{building} \\
& \quad \text{‘You saw a building.’} & \quad \text{‘two buildings’} \\

& \quad \text{b. Shenk-er} & \text{des-ar.} & \quad \text{d. *yergu} & \text{had} & \text{shenk-er} \\
& \quad \text{building-PL} & \text{saw-2SG} & \quad \text{two} & \text{CLF} & \text{building-PL} \\
& \quad \text{‘You saw some buildings.’} & \quad \text{intended: ‘two buildings’}
\end{align*}

Bare nouns in Western Armenian are vague as to number, and can be count or mass:

\begin{align*}
(21) & \quad \text{a. Maro-n} & \text{tuz g-ude-∅} & \text{gor.} \\
& \quad \text{Maro-DEF} & \text{fig IPFV-eat-3SG} & \text{PROG} \\
& \quad \text{‘Maro is eating fig(s).’} & \quad \text{[Sigler 1996: 73]} \\

& \quad \text{b. Bezdi} & \text{vaze-ts.} \\
& \quad \text{child run-PAST,3SG} \\
& \quad \text{‘One or more children ran.’} & \quad \text{[Bale & Khanjian 2009: 85]} \\

& \quad \text{c. Menk} & \text{surf xame-c-ink.} \\
& \quad \text{we coffee drink-AORIST-1PL} \\
& \quad \text{‘We drank coffee.’} & \quad \text{[Sigler 1996: 60]}
\end{align*}

\footnote{See Cowper & Hall (2009: §3.7.2) for a discussion of this phenomenon in Persian, with an argument that the relevant suffix -\textit{ha} does not actually spell out plural number.}
The addition of a quantifier or a numeral can force a plural reading, but does not require the presence of the plural suffix or a classifier:

(22)  

   a.  *Yergu bezdig vaze-ts.*  
       two child run-PAST.3SG  
       ‘Two children ran.’  
       (Bale & Khanjian 2009: 85)  

   b.  *Šad derev ing-av.*  
       many leaf fall,AORIST-3SG  
       ‘There fell many leaves.’  
       (Sigler 1996: 167)  

   c.  *dasə zinvor(-ner)*  
       ten soldier-PL  
       ‘ten soldiers’  
       (Sigler 1996: 190, 192)  

   d.  *čors (had) zinvor*  
       four CLF soldier  
       ‘four soldiers’  
       (Sigler 1996: 47)  

We propose that in Armenian, the vocabulary items known as classifiers spell out [Discrete], and the plural marker -(n)er spells out both [Discrete] and [Non-Atomic]. The complementary distribution of classifiers and plural marking indicates that these vocabulary items compete for insertion in the same syntactic head, and the fact that they are optional tells us that the features they realize must be modifiers and not head features (sensu Wiltschko 2008, 2009; see §1.3). If [Discrete] and [Non-Atomic] are modifiers, then their absence is non-contrastive, and bare nouns can thus be interpreted as singular or plural, and as count or mass. Because they are not contrastive, they do not enter into scope relations like the one in (11), and so it is possible for [Discrete] to appear without [Non-Atomic].11 For concreteness, we assume that the syntactic head that these features modify is n. Numerals appear in the specifier of nP, and can do so whether or not n has any adjunct features.

The trees in (23) illustrate the three possible structures for a semantically plural nominal with a numeral. In (23a), n has no modifier features, and is not overtly realized; in (23b), n is modified by [Discrete], which is spelled out as the classifier had; and in (23c), n is modified by both [Discrete] and [Non-Atomic], spelled out by the plural suffix -ner.

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11 In principle, it is also possible for [Non-Atomic] to appear without [Discrete], but we are not aware of any Armenian vocabulary items that spell out only [Non-Atomic].
A full discussion of the features active in Armenian nominals is beyond the scope of this paper. One intriguing morpheme is the indefinite marker -me (20a), which forces a singular interpretation of the nominal, and also has consequences for specificity/scope (Sigler 1996). This latter property suggests that -me spells out features of D. Our treatment of Armenian here, though confined in scope to NP, shows that the proposed feature system is consistent with the interaction between plural marking and classification in this typologically unusual classifier language.

4.2.2 Mandarin

Mandarin is a more typical classifier language. Bare nouns can be referential, as in (24), and no overt morphological indication is required for singular, plural, or mass readings to be possible. The semantically count bare noun in (24a) can be interpreted as singular or plural, and the bare noun in (24b) receives a mass interpretation.
(24) Mandarin (Cheng & Sybesma 2005)
   a. Hufei mai shu qu le.  b. Hufei he-wan-le tang.
      Hufei buy book go PARTICLE Hufei drink-finished-PRF soup
      ‘Hufei went to buy a book/books.’ ‘Hufei finished the soup.’

In order to combine with numerals, however, nouns require classifiers:

(25) Mandarin (Cheng & Sybesma 1999: 514)
   a. san ben shu  b. *san shu
      three CLF,VOLUME book three book
      ‘three books’

   As argued by Cheng & Sybesma (1998, 1999), there is a lexical contrast between count nouns (such as shu ‘book’) and mass nouns (such as tang ‘soup’). Mass nouns cannot occur with regular classifiers. Rather, they can combine with what Cheng & Sybesma (1998, 1999) call ‘massifiers,’ or mass classifiers. While ordinary classifiers like the one in (25) simply name the unit inherent in the meaning of the count noun, a massifier names a unit of measurement or a container, combining with mass nouns to form expressions that can be counted (as in (26a)). Count nouns can also combine with massifiers (as in (26b)).

(26) Mandarin (Cheng & Sybesma 1999)
   a. san wan tang  b. liang xiang shu
      three CLF,BOWL soup two CLF,BOX book
      ‘three bowls of soup’ ‘two boxes of books’

   We follow Cheng & Sybesma (1998, 1999) in assuming that the distinction between mass and count nouns is lexically marked, and propose that it is encoded by the feature [Discrete] on N: count nouns are lexically marked with [Discrete], and mass nouns are not. Crucially, however, we claim that unlike English, Mandarin does not make use of [Non-Atomic] as a head feature in the number system. In the absence of a contrastive [Non-Atomic] feature, [Discrete] distinguishes count from mass, as in (12), rather than (as in English) subdividing non-atomic nominals into those that are plural and those that are mass.

   Regular classifiers are syntactic heads\(^{12}\) that select a complement NP bearing the feature [Discrete], and may provide some further—possibly non-featural—elaboration of what the discrete units are. We assume that a

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\(^{12}\) This differs from the syntactic status of classifiers in Western Armenian, which are modifiers of \(n\).
regular classifier cannot compose semantically with an NP that lacks [Discrete], but leave the semantic details aside here.

\[(27)\]

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NmrP
  \(san\)
  ‘three’
  CLF
  \(ben\)
  ‘volume’
  NP
  \(shu\)
  ‘book’
```

In contrast, massifiers are portmanteau morphemes consisting of a regular classifier component, and a nominal component marked with [Discrete]. For concreteness, we follow Cheng & Sybesma (1998, 1999) in assuming that the nominal component of the massifier moves syntactically from N to Clf, as shown in (28), creating a complex head to be spelled out by the massifier.

\[(28)\]

```
NmrP
  \(san\)
  ‘three’
  CLF
  \(wan\)
  ‘bowl’
  NP
  \(tang\)
  ‘soup’
```

We assume that numerals appear in the specifier of ClfP, and thus cannot appear without some kind of classifier, either a regular classifier as in (27), or the more complex massifier, as in (28).

Having provided an account of the features and syntax of Mandarin classifiers and massifiers, we now turn to the status of plural number. Although Mandarin mostly lacks morphological plural marking, there is a suffix \(-men\), used only on nominals that are not only plural, but also definite and animate. It cannot co-occur with classifiers (Li 1999), and thus cannot be used if the nominal also contains a numeral:
Unlike plural marking in English, "-men is not required in order for a nominal to have plural reference, as is clear from the examples in (24)–(26). The absence of "-men is therefore not contrastive, suggesting that whatever feature it spells out must be an adjunct feature in the sense of Wiltschko (2008, 2009). In addition, the fact that when "-men appears on a nominal it forces an interpretation of both animacy and definiteness shows that "-men spells out features of D as well as plurality.

We thus propose that [Non-Atomic] may appear as a modifier on D in Mandarin, and that "-men spells out the features [Definite, Animate, Non-Atomic] in D. We assume that [Animate] semantically entails [Discrete] (see Cowper & Hall 2009), giving any nominal with "-men both of the ingredients found in the English plural: [Discrete] and [Non-Atomic], though with different contrastive status.

When "-men is inserted, we assume, following Li (1999), that N must move to D to serve as a morphological host for the affix. The presence of a classifier blocks the movement of N to D, making it impossible for "-men to co-occur with a classifier, or with a numeral.

5. CONCLUSIONS

We have argued that several quite different nominal number systems can be accounted for with the features [Non-Atomic] and [Discrete]. The account captures the initially puzzling syncretisms of English, connecting them to patterns found in Lingala and Manam, while at the same time permitting a straightforward analysis of the interaction of classifiers and plural marking in both Western Armenian and Mandarin. No rules of impoverishment or readjustment were required, and the features have the same semantic content in all languages. Cross-linguistic differences in the surface morphology of number—i.e., in how patterns of PF realizations correspond to LF interpretations—were shown to arise from three parametric properties of each feature: where it appears in the syntactic structure (e.g., [Discrete] appears on a functional head in English, but as a lexical property of nouns in Mandarin); whether the feature is a contrastive head feature, like [Non-Atomic] in English, or a non-contrastive modifier, like [Non-Atomic] on D in Mandarin; and finally, the contrastive scope of the feature (e.g., [Discrete] subdivides [Non-Atomic] nominals in English, but all nominals in Mandarin). The combination of a relatively small number of features, and a
relatively small number of parametric choices, gives a wide range of superficially divergent patterns.

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