

# THE FEATURES AND EXPONENCE OF NOMINAL NUMBER

ELIZABETH COWPER

DANIEL CURRIE HALL

**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:** contrast, Distributed Morphology, features, grammatical number, 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 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.

---

\* 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.

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.<sup>1</sup> We further assume that each feature has a single, consistent meaning: features are monosemous. 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.

<sup>1</sup> Binary features should be 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.

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 contrastive behaviour is not found every time a feature is absent, however. Wiltschko (2008, 2009) shows that features like plurality can also behave like optional modifiers, in that their absence triggers no contrastive interpretation at all. She proposes a structural distinction between head features, whose absence is contrastive, and adjunct features, which behave like non-contrastive modifiers.

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*                      ii. *te lhíxw swíweles*  
               the three boy.PL                      the three boy  
               ‘the three boys’                      ‘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 cross-linguistically, 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).<sup>2</sup>

(2)	MASS	SINGULAR	PLURAL
a.	Ø/ <i>sōme tea</i>	<i>a book</i>	Ø/ <i>sōme books</i>
b.	<i>this tea</i>	<i>this book</i>	<i>these books</i>

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 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 (in the spirit of Chierchia 1998) will run into trouble with the exponence of number on 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.<sup>3</sup> Most roots can appear in either mass

<sup>2</sup> Here and below, we use *sōme* to represent the potentially unstressed indefinite determiner, as distinct from the obligatorily stressed quantifier *sōme*. For a discussion of the difference between these two vocabulary items, see Postal (1970) and Milsark (1976). There are also semantic differences between *sōme* and the null determiner Ø, which are not relevant to the issues discussed here.

<sup>3</sup> 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 rela-

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.<sup>4</sup>

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.

- |   |   |
|---|---|
| <p>(6) a.</p> <div style="margin-left: 40px;"> <p>D</p> <p style="text-align: center;"> </p> <p>[Specific]</p> <p style="text-align: center;"> </p> <p>[Definite]</p> <div style="display: flex; justify-content: center; gap: 20px;"> <div style="text-align: center;"> <p>└─</p> <p>[Deictic]</p> </div> <div style="text-align: center;"> <p>└─</p> <p>[Distal]</p> </div> </div> </div> | <p>b. [D]: (potentially referential)</p> <p>[Specific]: denoting a particular individual (or group)</p> <p>[Definite]: referentially indexed in the Universe of Discourse</p> <p>[Deictic]: identified by its relation to the deictic centre</p> <p>[Distal]: in the background</p> |
|---|---|

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), and 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  $\emptyset$  and

---

tions are intrinsic, in that they follow from the denotations of the features themselves. The feature trees thus have no independent theoretical status.

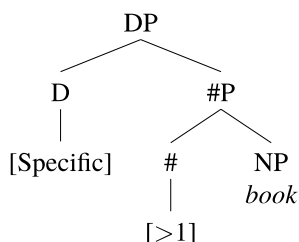
<sup>4</sup> See Borer (2005) for a similar view.

unstressed *sōme* spell out [D] alone. *This* spells out [Specific], and *these* spells out [Specific, >1].<sup>5</sup>

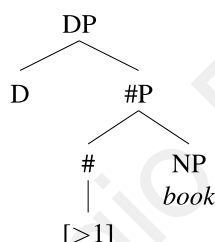
## 2.2 Problems

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].<sup>6</sup>

(7) *these books*:



(8) *(sōme) books*:



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  $\emptyset$  or *sōme*. 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*

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

<sup>6</sup> 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 ( $\sqrt{\text{RT}+n}$ ). For simplicity, we use NP in syntactic representations.

*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]   |

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).<sup>7</sup>

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 *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 and Harbour & Elsholtz 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:

<sup>7</sup> Harbour's (2011b) [–Singular] has essentially the same meaning as our [Non-Atomic].

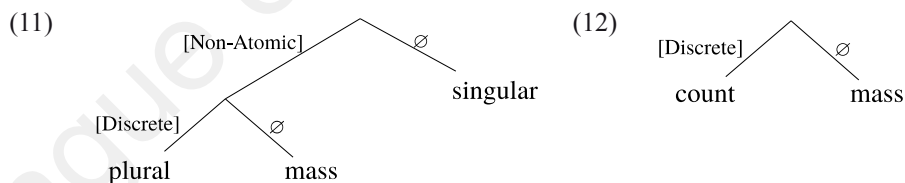


if [Non-Atomic] is contrastively absent, then [Discrete], being semantically implicit, cannot be contrastive. The contrastive presence of [Discrete] in English is thus possible only if [Non-Atomic] is present as well.

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 Section 4.2.2 for Mandarin.

It can be seen, from the two different ways [Discrete] can function, that the system of contrasts in which a feature participates is crucial to its interpretation. This 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: Section 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.



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.<sup>8</sup>

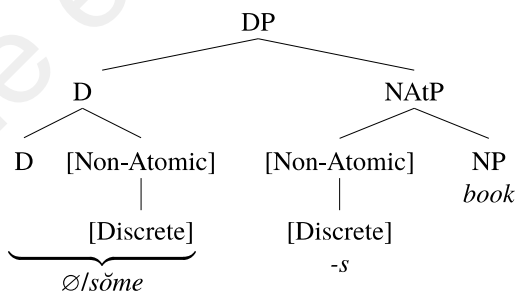
In addition, we propose that the features [Non-Atomic] and [Discrete], when they appear, are copied onto D in the syntax. Along with the D features in (6), they give the dependency structure in (13), and are spelled out as in (14).

- (13)
- ```

      D
     / \
    D   [Non-Atomic]
    |   |
  [Specific] [Discrete]
    |
  [Definite]
   /  \
[Deictic] [Distal]
    
```
- (14)
- |               |                               |
|---------------|-------------------------------|
| <i>a(n)</i>   | ⇔ [D]                         |
| <i>∅/some</i> | ⇔ [D, Non-Atomic]             |
| <i>the</i>    | ⇔ [Definite]                  |
| <i>this</i>   | ⇔ [Specific]                  |
| <i>this</i>   | ⇔ [Deictic]                   |
| <i>these</i>  | ⇔ [Specific, Discrete]        |
| <i>these</i>  | ⇔ [Deictic, Discrete]         |
| <i>that</i>   | ⇔ [Distal]                    |
| <i>that</i>   | ⇔ [Distal, Deictic]           |
| <i>those</i>  | ⇔ [Distal, Discrete]          |
| <i>those</i>  | ⇔ [Distal, Deictic, Discrete] |

In this system, *a(n)* is the least marked spellout of D. *∅* and unstressed *some*, which Cowper & 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 *∅* or *some*, as shown in (15).<sup>9</sup>

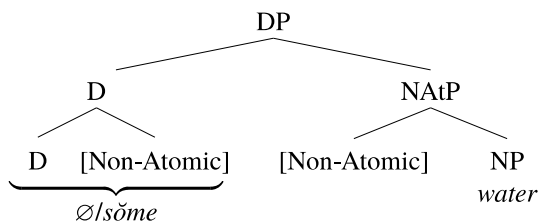
- (15) a. *∅/some books*



<sup>8</sup> For the purposes of this discussion, we abstract away from irregular plural morphology.

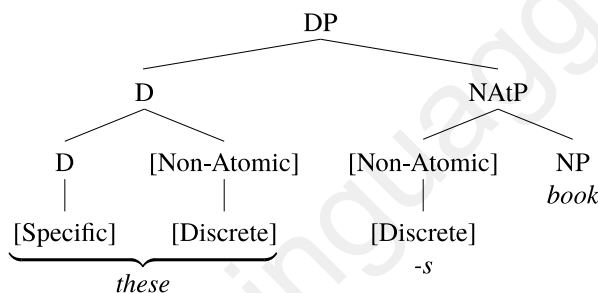
<sup>9</sup> We have replaced #P with NAtP (Non-Atomic Phrase), consistent with the view (Chomsky 1995) that syntactic heads are exhaustively characterized by their features.

b.  $\emptyset$ /*some* *water*:



Copying the features of individuation to D eliminates the need to 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) *these books*



This analysis places the mass–count distinction in the functional projection NAtP, consistent with the observation that most English nouns can more or less freely occur with either mass or count syntax (as in (4) and (5)). However, there are some exceptions, such as *furniture*, which both resist plural marking and cannot occur with the singular determiner *a*. Updating the analysis of Cowper & Hall (2012), we assume that nouns like *furniture* are lexically specified with [Non-Atomic] as a modifier feature on N; this specification precludes the addition of a separate NAtP in the syntax while also blocking the insertion of the vocabulary item *a* in D.

#### 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 *Ø/söme*.

##### 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. <i>pátu i-lába.</i>  | b. <i>pátu di-lába.</i> |
| stone 3SG.REALIS-be.big | stone 3PL.REALIS-be.big |
| ‘The stone is big.’     | ‘The stones are big.’   |

Lichtenberk (1983: 269, 499) 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-éno.*  
           water 3PL.REALIS-exist  
           ‘There is water (available).’
- b. *day muʔú-muʔu-Ø i-éno.*  
           water little-RED-3SG 3SG.REALIS-exist  
           ‘There is little (i.e., a small quantity of) water (available).’

## 4.2 Classifier languages

#### 4.2.1 Western Armenian

(20) a. *Shenk-me*                      *desa-r.*                      c.     *yergu had*     *shenk*  
           building-INDF.SG     saw-2SG                      two     CLF     building  
           ‘You saw a building.’  
       b. *Shenk-er*                      *des-ar.*                      d.     \**yergu had*     *shenk-er*  
           building-PL     saw-2SG                      two     CLF     building-PL  
           ‘You saw some buildings.’                      intended: ‘two buildings’

(21) a. *Maro-n tuz g-uđe-Ø gor.*  
 Maro-DEF fig IPFV-eat-3SG PROG  
 ‘Maro is eating fig(s).’ (Sigler 1996: 73)

b. *Bezdi vaze-ts.*  
 child run-PAST.3SG  
 ‘One or more children ran.’ (Bale & Khanjian 2002: 100)

74

- c. *Menk surj xame-c-ink.*  
 we coffee drink-AORIST-1PL  
 ‘We drank coffee.’ (Sigler 1996: 60)

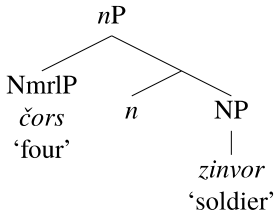
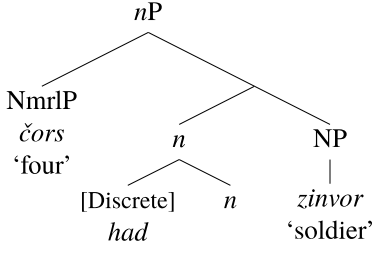
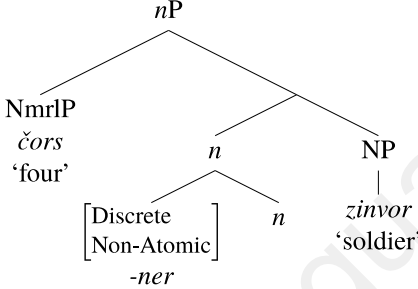
The addition of a quantifier or a numeral can force a plural reading, but does not require the presence of the plural suffix or a classifier:

- (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 Section 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].<sup>11</sup> 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*.

<sup>11</sup> 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].

- (23) a. 
- b. 
- c. 

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. | <i>Hufei mai shu qu le.</i>       | b. | <i>Hufei he-wan-le tang.</i>  |
|    | 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. | <i>san ben shu</i>               | b. | <i>*san shu</i> |
|    | three CLF <sub>VOLUME</sub> 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)).

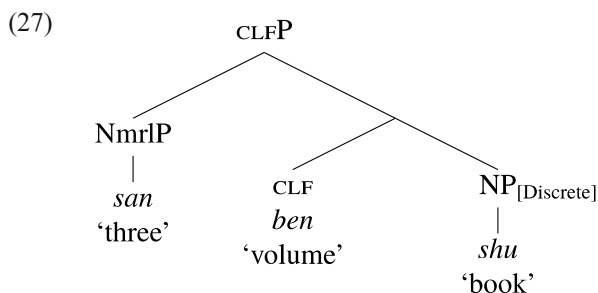
- (26) Mandarin (Cheng & Sybesma 1999)
- |    |                                |    |                             |
|----|--------------------------------|----|-----------------------------|
| a. | <i>san wan tang</i>            | b. | <i>liang xiang shu</i>      |
|    | three CLF <sub>BOWL</sub> soup |    | two CLF <sub>BOX</sub> 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.

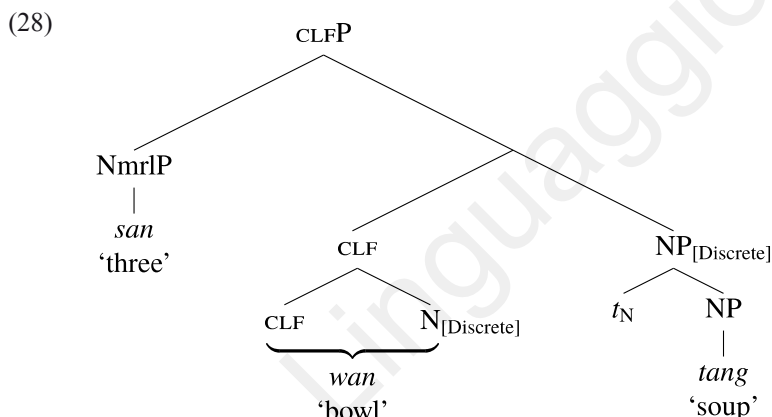
Regular classifiers are syntactic heads<sup>12</sup> that select a complement NP bearing the feature [Discrete], and may provide some further – possibly non-featural – elaboration of what the discrete units are. We assume that a regular classifier cannot compose semantically with an NP that lacks [Discrete], but leave the semantic details aside here.

<sup>12</sup> This differs from the syntactic status of classifiers in Western Armenian, which are modifiers of *n*.





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.



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:

- (29) a. *Wo qu zhao haizi-men.*      b. \**san ge xuesheng-men*  
       I go find child-*men*            three CLF student-*men*  
       'I will go find the children.'    intended: 'three students'

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 are 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.

## REFERENCES

- Avery, J. P. (1996). *The representation of voicing contrasts*. Toronto: University of Toronto Ph.D. dissertation.
- Bale, A. & H. Khanjian (2009). Classifiers and number marking. In T. Friedman & S. Ito (eds.), *Proceedings of SALT XVIII*, 73-89. Ithaca: Cornell University.
- Bobaljik, J. D. (2000a). The ins and outs of contextual allomorphy. *University of Maryland Working Papers in Linguistics* 10. 35-71.
- Bobaljik, J. D. (2000b). Implications of Itelmen agreement asymmetries. *Berkeley Linguistics Society* 28. 300-310.
- Borer, H. (2005). *In name only*. Oxford: Oxford University Press.
- Cheng, L. L.-S. & R. Sybesma (1998). *yi-wan tang, yi-ge Tang*: Classifiers and massifiers. *Tsing-Hua Journal of Chinese Studies* 28(3). 385-412.
- Cheng, L. L.-S. & R. Sybesma (1999). Bare and not-so-bare nouns and the structure of NP. *Linguistic Inquiry* 30(4). 509-542.
- Cheng, L. L.-S. & R. Sybesma (2005). Classifiers in four varieties of Chinese. In G. Cinque & R. S. Kayne (eds.), *Handbook of comparative syntax*, 259-292. Oxford: Oxford University Press.
- Chierchia, G. (1998). Plurality of mass nouns and the notion of 'semantic parameter'. In S. Rothstein (ed.) *Events and grammar*, 53-103. Dordrecht: Kluwer.
- Chomsky, N. (1995). Bare phrase structure. In G. Webelhuth (ed.), *Government and Binding Theory and the Minimalist Program*, 383-439. Oxford: Blackwell.
- Corbett, G. G. (2000). *Number*. Cambridge: Cambridge University Press.
- Corbett, G. G. (2012). *Features*. Cambridge: Cambridge University Press.
- Cowper, E. (2005a). The geometry of interpretable features: Infl in English and Spanish. *Language* 81(1). 10-46.
- Cowper, E. (2005b). A note on number. *Linguistic Inquiry* 36(3). 441-455.
- Cowper, E. & D. C. Hall (2002). The syntactic manifestation of nominal feature geometry. In S. Burelle & S. Somesfalean (eds.), *Proceedings of the 2002 Annual Conference of the Canadian Linguistic Association*, 55-66. Montreal: Cahiers Linguistiques de l'UQAM.
- Cowper, E. & D. C. Hall (2009). Argumenthood, pronouns, and nominal feature geometry. In J. Ghomeshi, I. Paul, & M. Wiltschko (eds.), *Determiners: Universals and variation*, 97-120. Amsterdam & Philadelphia: John Benjamins.
- Cowper, E. & D. C. Hall (2012). Aspects of individuation. In D. Massam (ed.), *Count and mass across languages*, 27-53. Oxford: Oxford University Press.
- Dresher, B. E. (2009). *The contrastive hierarchy in phonology*. Cambridge: Cambridge University Press.
- Ghomeshi, J. (2003). Plural marking, indefiniteness, and the noun phrase. *Studia Linguistica* 57(2). 47-74.
- Hall, D. C. (2007). *The role and representation of contrast in phonological theory*. Toronto: University of Toronto Ph.D. dissertation.
- Hall, D. C. (2011). Phonological contrast and its phonetic enhancement: Dispersedness without dispersion. *Phonology* 28(1). 1-54.
- Halle, M. (1959). *The sound pattern of Russian*. The Hague: Mouton.

- Halle, M. & A. Marantz (1993). Distributed morphology and the pieces of inflection. In K. L. Hale & S. J. Keyser (eds.), *The view from Building 20: Essays in linguistics in honor of Sylvan Bromberger*, 111-176. Cambridge, MA: The MIT Press.
- Harbour, D. (2011a). Descriptive and explanatory markedness. *Morphology* 21(2). 223-245.
- Harbour, D. (2011b). Valence and atomic number. *Linguistic Inquiry* 42(4). 561-594.
- Harbour, D. & C. Elsholtz (2012). *Feature geometry: Self-destructed*. Ms. Queen Mary University of London & Technische Universität Graz.
- Harley, H. (1994). Hug a tree: Deriving the morphosyntactic feature hierarchy. *MIT Working Papers in Linguistics* 21. 289-320.
- Kiparsky, P. (1973). Elsewhere in phonology. In S. R. Anderson & P. Kiparsky (eds.), *A Festschrift for Morris Halle*, 93-106. New York: Holt, Rinehart and Winston.
- Li, Y.-H. A. (1999). Plurality in a classifier language. *Journal of East Asian Linguistics* 8. 75-99.
- Lichtenberk, F. (1983). *A grammar of Manam*. Honolulu: University of Hawaii Press.
- Milsark, G. (1976) *Existential sentences in English*. Bloomington: Indiana University Linguistics Club.
- Mufwene, S. S. (1980). Number, countability and markedness in Lingala LI-/MA-noun class. *Linguistics* 18(11-12). 1019-1052.
- Noyer, R. R. (1992) *Features, positions and affixes in autonomous morphological structure*. Cambridge, MA: Massachusetts Institute of Technology Ph.D. dissertation.
- Postal, P. (1970). On so-called pronouns in English. In R. A. Jacobs & P. S. Rosenbaum (eds.), *Readings in English Transformational Grammar*, 56-82. Waltham: Ginn and Co.
- Prince, E. (1981). On the inferencing of indefinite-*this* NPs. In A. Joshi, I. A. Sag & B. L. Webber (eds.), *Elements of discourse understanding*, 231-250. Cambridge: Cambridge University Press.
- Sagey, E. (1986). *The representation of features and relations in non-linear phonology*. Cambridge, MA: Massachusetts Institute of Technology Ph.D. dissertation.
- Sigler, M. (1996). *Specificity and agreement in Standard Western Armenian*. Cambridge, MA: Massachusetts Institute of Technology Ph.D. dissertation.
- Trubetzkoy, N. S. (1939). *Grundzüge der Phonologie*. Prague: Travaux du Cercle Linguistique de Prague.
- Valois, D. (1991). *The internal syntax of DP*. Los Angeles: University of California, Los Angeles (UCLA) Ph.D. dissertation.
- Vangsnes, Ø. A. (2001). On noun phrase architecture, referentiality, and article systems. *Studia Linguistica* 55(3). 249-299.
- Wiltschko, M. (2008). The syntax of non-inflectional plural marking. *Natural Language and Linguistic Theory* 26(3). 639-694.

Wiltschko, M. (2009). What's in a determiner and how did it get there? In J. Ghomeshi, I. Paul & M. Wiltschko (eds.), *Determiners, variation and universals*, 35-66. Oxford: Oxford University Press.

*Elizabeth Cowper*

University of Toronto, Department of Linguistics  
100 St. George Street, Room 4073  
Toronto, ON M5S 3G3, Canada  
e-mail: cowper@chass.utoronto.ca

*Daniel Currie Hall*

Saint Mary's University, Program in Linguistics and Department of English  
923 Robie Street  
Halifax, NS B3H 3C3, Canada  
e-mail: daniel.hall@utoronto.ca