

Numerals and the theory of number¹

Abstract. I argue for an account of the semantics and of the number marking of nouns in the numeral+noun construction in Turkish, Western Armenian and English that combines insights from Scontras' (2014) approach to the same data with Martí's (2017, 2019) treatment of grammatical number, based on Harbour (2014). Fundamental to my approach are two of Harbour's number features, [\pm atomic] and [\pm minimal], their compositional semantics, and a syntax where these features take the phrase that contains the numeral, which I call NumeralP, as their sister, following Scontras. The number marking we find on noun phrases with numerals across languages is thus viewed as a result of the principled interplay of the spell out of number features, their place, and that of numerals, in the syntactic structure of noun phrases, and their semantic import. Numerals are provided with a uniform semantics, no matter the language, and the semantics assumed for Turkish and Western Armenian noun phrases is empirically justified. I compare my proposal to Scontras (2014) and to Bale, Gagnon and Khanjian (2011a), highlighting in particular the empirical and theoretical shortcomings of the latter. The account uncovers a new domain where the effects of [\pm minimal] can be detected (cf. Harbour 2011, 2016), and demonstrates that an inclusive-only approach to plurality is not necessary in the account of the data, this time contra Scontras (2014).

1 Introduction

This paper is concerned with the morphology and compositional semantics of the numeral²+noun construction in plural-marking languages. At least three types of languages must be recognized, depending on the number marking that appears on the noun accompanying the numeral. In the first type of language, exemplified by English, Spanish or German, the numeral *one* obligatorily appears with morphologically singular nouns, and any numeral greater than 1, with morphologically plural nouns:³

- (1) One **boy**/***boys**
- (2) Two/three...etc. **boys**/***boy**

In the second type, exemplified by Turkish (Bale, Gagnon and Khanjian 2011a), Finnish (Nelson and Toivonen 2000), or Hungarian (Farkas and de Swart 2010), all numerals combine with morphologically singular nouns, even numerals greater than 1:^{4, 5, 6}

¹ Many thanks to Klaus Abels, Elias Boike, Gabi Danon, Hossep Dolatian, Emrah Görgülü, Nihan Ketrez, Hrayr Khanjian, Balkız Öztürk, Cilene Rodrigues, Greg Scontras, Nilüfer Şener, Michele Sigler, Kriszta Szendrői, Bert Vaux and two anonymous reviewers for very helpful criticism, judgements, discussion and/or support.

² By 'numeral', in this paper I mean 'cardinal numeral'.

³ Actually, a more accurate description, as discussed for example in Krifka (1989) and Borer (2005), is that numerals other than morphologically singular *one* in English combine with morphologically plural nouns: **zero boy* vs. *zero boys*, *1.0 boys* vs. **1.0 boy*. I put aside these cases in what follows.

⁴ Abbreviations in glosses are as follows: 1 = first person; 2 = second person; 3 = third person; ABL = ablative case; ABSOLUTIVE = absolutive case; ACC = accusative case; AOR = aorist; DAT = dative case; CLASS = classifier; DEF = definite determiner; ERG = ergative case; EVID = evidential; GEN = genitive case; HAB = habitual; IMP = imperfective; INDIC = indicative; LOC = locative case; NEG = negation; NOM = nominative case; PASS = passive; PAST = past tense; PL = plural; PRES = present; PROG = progressive; SG = singular.

⁵ The plural marker in Turkish is the suffix *-lar*, subject to vowel harmony (see Kornfilt 1997: 268). In Hungarian, it is the suffix *-(V)k* (see Farkas and de Swart 2003).

(3) *Turkish*
 Bir **çocuk**/***çocuk-lar**
 one boy.SG/boy-PL
 ‘One boy’

(4) *Turkish*
 İki **çocuk**/***çocuk-lar**
 two boy.SG/*boy-PL
 ‘Two boys’

In the third type, exemplified by Western Armenian (Bale, Gagnon and Khanjian 2011a, Donabédian 1993, Sigler 1997) or Miya (for its inanimate nouns, as discussed in Schuh 1989, 1998), plural marking on the noun is optional for numerals greater than 1:^{7, 8}

(5) *Western Armenian*
 Meg **dəgha**/***dəgha-ner**
 one boy.SG/boy-PL
 ‘One boy’

(6) *Western Armenian*
 Yergu **dəgha**/**dəgha-ner**
 two boy.SG/boy-PL
 ‘Two boys’

These patterns are summarized in Table 1:⁹

	Type 1	Type 2	Type 3
<i>One N</i>	morphologically singular N	morphologically singular N	morphologically singular N
<i>Two, etc. N</i>	morphologically plural N	morphologically singular N	morphologically singular or plural N
Example languages	English, Spanish, German	Hungarian ¹⁰ , Turkish, Finnish	Western Armenian, Miya

Table 1 The three language types

⁶ Thanks to Emrah Görgülü, Nihan Ketrez, Balkız Öztürk and Nilüfer Şener for their judgements and help with Turkish.

⁷ The most productive strategy for pluralization in Miya adds *-a-C-aw* to the noun, where C is the final consonant of the noun stem. The plural marker in Western Armenian is the suffix *-(n)er*. For semantic differences between the two versions of (6), see section 4.2.2.

⁸ Thanks to Hossep Dolatian, Hrayr Khanjian, Michele Sigler and Bert Vaux for their judgements and/or help with Western Armenian.

⁹ Languages that have no inflectional plural marking to begin with, such as Japanese (cf. Nakanishi and Tomioka 2004 for the argument that *-tati* is not an inflectional plural marker but a marker of associativity), are not part of the current study. More complex patterns are attested in other languages (see, e.g., Corbett 2000: 210-6 and Franks 1995 on Slavic languages, Mittendorf and Sadler 2005 and Sadler 2000 on Welsh). I also do not consider the case of pluralized numerals (see Danon 2012 and references cited there), or of complex numerals (see Ionin and Matushansky 2006) in this paper, among other issues. I do think that the proposal developed in this paper is compatible with Ionin and Matushansky’s view of complex numerals as syntactically complex.

¹⁰ Thanks to Kriszta Szendrői for her judgements and help with Hungarian.

Bale, Gagnon and Khanjian (2011a) argue for an account of these patterns where both the semantics of numerals and the semantics of noun phrases may vary from one language type to another: numerals in different languages may have either subsective or intersective semantics, the numeral *one* may or may not have the same kind of denotation as other numerals within the same language, and morphologically singular noun phrases may also have a different semantics in different languages (singular in English, number neutral in Turkish or Western Armenian). On the other hand, Scontras (2014) assumes a single semantics for all numerals (including *one*) and a single semantics for morphologically singular noun phrases—in his account, the observed variation results from a different semantics for the feature [SINGULAR] in different languages.¹¹

I show in this paper that the assumptions Bale, Gagnon and Khanjian (2011a) make concerning the semantics of morphologically singular noun phrases in Turkish and Western Armenian are empirically flawed (cf. Martí 2017, Sağ 2016, 2017). Given that Bale, Gagnon and Khanjian also assume that numerals have different semantics in different languages, and, sometimes, as I show, within the same language, Scontras' treatment is both empirically and theoretically superior to theirs.

However, Scontras' explanation relies on the stipulative claim that languages of types 2 and 3 use a singular feature that is sensitive to elements without minimal parts in a certain domain, which may or may not be atoms. I improve Scontras' account by appealing to Harbour's (2011, 2014) theory of grammatical number, where the source of sensitivity to minimal parts is the feature [\pm minimal], different from [\pm atomic]. [\pm Minimal] is involved, according to Harbour, in the generation of a series of number distinctions across languages and its use goes well beyond its role in the numeral+noun construction; thus, it is independently motivated. Hence, the compositional semantics of the number features that are needed for Scontras' explanation to work does not need to be stipulated in my analysis.

Embedding Scontras' account within Harbour's theory of number, however, cannot be done without changing Scontras' assumptions about plurality. Scontras builds his account on Sauerland (2003), where singular features are semantically contentful but plural features are semantically empty. Martí (2017, 2019), however, demonstrates that this approach to plurality is not compatible with Harbour's theory of number, but that an alternative, ambiguity account is. My proposal has, therefore, three key ingredients: Martí's account of plurality, Harbour's features, and Scontras' idea about the interaction between the semantics of number features and numerals. With these ingredients, I derive the variation in Table 1 on principled grounds. I demonstrate that neither presuppositions nor semantically vacuous plurals are necessary in the account of the data. Like its predecessors, the syntactic and semantic proposal defended here can be viewed as an alternative to taking the variation in Table 1 to be the result of morphological agreement between numerals and nouns.

The organization of the paper is as follows. In section 2, I present my account of the data in Table 1, introducing first the basic assumptions of Harbour (2014) and Scontras (2014) that it relies on. In section 3, I compare my proposal to Scontras'. In

¹¹ A third type of account of the contrast between type 1 and type 2 languages can be found in Farkas and de Swart (2010). Theirs is an optimality-theoretic account that I don't discuss in the text, since I'm interested in demonstrating that a compositional semantics account works for the data at hand. Note that a different part of Farkas and de Swart's (2010) analysis, regarding the distribution of exclusive and inclusive plurality, is compatible with the account I propose in section 2.2. See Martí (2019) for more on this issue.

section 4, I compare it to Bale, Gagnon and Khanjian's (2011a) account. Section 5 is the conclusion.

2 Semantics and number marking in the numeral+noun construction

In this section I present my account of the patterns in Table 1. Section 2.1 introduces the necessary background, and section 2.2 presents my proposal.

2.1 Background: Harbour (2011, 2014) and Scontras (2014)

There are two main ingredients of the account I will propose that need to be introduced now. The first ingredient is Harbour's (2011, 2014) number features. The second is Scontras' (2014) syntactic assumptions about the numeral-noun construction, as well as the crucial role that number features play in deriving not only the correct semantics for it, but the correct number marking on the noun that accompanies the numeral, as seen in Table 1.

Languages make grammatical number distinctions beyond the familiar singular and plural, such as dual, trial, minimal, augmented, paucal, or greater plural, among others (see Corbett 2000 for more). In addition, as we know at least since Greenberg (1966), there is a typology of grammatical number, so that not all possible number value combinations lead to attested linguistic systems; e.g., there are no attested number systems that distinguish singular from dual only, or paucal from plural only, or trial from plural only, etc. The full set of cross-linguistic generalizations is in (7) (from Harbour 2014: 186):

- (7) Trial requires dual
- Dual requires singular
- Singular requires plural
- Plural requires singular or minimal
- Unit augmented requires augmented
- Minimal requires augmented or plural
- Augmented requires minimal
- Greater paucal requires (lesser) paucal
- Paucal requires plural
- Greater (and global) plural requires plural or augmented

The challenge for a theory of number is to explain why only a subset of the logically possible combinations of number values leads to attested number systems in the languages of the world. Harbour (2014) attempts one such theory, and it is this theory that I use in my proposal below.

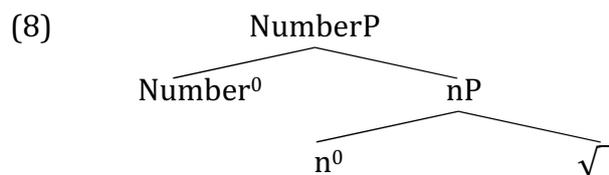
Harbour (2014) postulates three different, semantically contentful features, [\pm additive], [\pm atomic], [\pm minimal]¹², and, together with the following assumptions, derives the cross-linguistic typology implied in (7): (a) NumberP¹³ takes nP as complement, as in (8); (b) n⁰, the head of nP, assigns roots to the category of nouns and structures them into semilattices; (c) up to three features can appear in Number⁰, the

¹² Harbour (2011) only had [\pm atomic] and [\pm minimal] and is the precursor of Harbour (2014).

¹³ Given the varied ways in which authors designate the head that hosts number features, I've decided to call it simply Number⁰. It is '#' in Scontras (2014) (see section 3), 'ϕ' in Sauerland (2003), and 'Num⁰' in Harbour (2014). The term 'noun phrase' as used in this paper is merely descriptive.

head of NumberP, either alone or in combination with each other: [\pm additive], [\pm atomic], [\pm minimal]; (d) these features operate on the lattices provided by nP; (e) the repetition of a particular feature in Number⁰ may or may not be allowed in a language; and (f) the semantic range of the [\pm additive] cut is subject to social convention. Not all of these assumptions are new to Harbour's work; in particular, the structural assumptions and the function of n⁰ and nP are quite common in the literature (see Borer 2005 and much subsequent work based on that). We will consider only certain aspects of these assumptions here, as not all of them are relevant in what follows; for example, we will ignore the feature [\pm additive] (hence also (f)), since this feature is only involved in the generation of values, such as paucal, which do not concern us here.

Consider first the structure in (8), assumed to be part of the structure of noun phrases:



At the bottom of the projection is a root, $\sqrt{\quad}$. After n⁰ operates on it, we obtain a join semilattice, so, for three individuals a, b and c, we have¹⁴:

(9) $\llbracket \text{nP} \rrbracket = \{a, b, c, ab, ac, bc, abc\}$

The compositional semantics for the number features is as follows¹⁵:

(10) $\llbracket +\text{atomic} \rrbracket = \lambda P. \lambda x. P(x) \ \& \ \text{atom}(x)$
 $\llbracket -\text{atomic} \rrbracket = \lambda P. \lambda x. P(x) \ \& \ \neg \text{atom}(x)$

(11) $\llbracket +\text{minimal} \rrbracket = \lambda P. \lambda x. P(x) \ \& \ \neg \exists y P(y) \ \& \ y \sqsubset x$
 $\llbracket -\text{minimal} \rrbracket = \lambda P. \lambda x. P(x) \ \& \ \exists y P(y) \ \& \ y \sqsubset x$

¹⁴ Harbour (2014) is not explicit about what the exact denotations of roots should be—however, this issue is orthogonal to our purposes, as what matters to us is what the meaning of nP is, not how that meaning is arrived at.

¹⁵ Following Martí (2019), I treat the contribution of number features to be entirely made up of entailments, whereas for Harbour (2011, 2014) some of the content of some features is presupposed. For example, his actual semantics for [\pm minimal] is as in (i):

(i) $\llbracket +\text{minimal} \rrbracket = \lambda P. \lambda x. P(x). \ \neg \exists y P(y) \ \& \ y \sqsubset x$
 $\llbracket -\text{minimal} \rrbracket = \lambda P. \lambda x. P(x). \ \exists y P(y) \ \& \ y \sqsubset x$

Nothing of what I say here depends on this—this is because in (i) the main effect of the features is still an entailment.

For consistency with [\pm minimal], I assume that [\pm atomic] is also of type $\langle \text{et}, \text{et} \rangle$, not $\langle \text{e}, \text{t} \rangle$ as in Harbour's proposal, but, again, this difference has no consequences. If so desired, one can define [\pm atomic] in terms of numerosity, a notion I borrow from Scontras (2014) and others below:

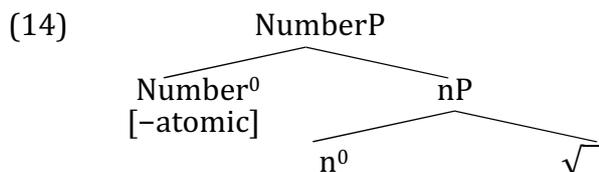
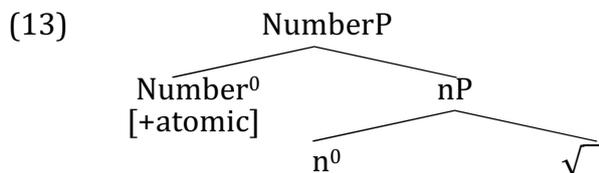
(ii) $\llbracket +\text{atomic} \rrbracket = \lambda P. \lambda x. P(x) \ \& \ \#x = 1$
 $\llbracket -\text{atomic} \rrbracket = \lambda P. \lambda x. P(x) \ \& \ \#x \neq 1$

Q is a free variable, \sqcup is the join operation, \sqsubset is the proper subpart relation. Lower case variable names range over both atomic and non-atomic individuals.

- (12) $\llbracket +\text{additive} \rrbracket = \lambda P. \lambda x. Q(x) \ \& \ Q \sqsubseteq P \ \& \ \forall y \ Q(y) \rightarrow Q(x \sqcup y)$
 $\llbracket -\text{additive} \rrbracket = \lambda P. \lambda x. Q(x) \ \& \ Q \sqsubseteq P \ \& \ \neg \forall y \ Q(y) \rightarrow Q(x \sqcup y)$

$[\pm\text{Additive}]$ is concerned with whether the output set contains, for any two of its members, their join ($[\text{+additive}]$) or not ($[\text{-additive}]$). It is involved in deriving approximative number values such as *paucal* in Harbour’s system. Both $[\pm\text{atomic}]$ and $[\pm\text{minimal}]$ give rise to exact number values, which are what concerns us here. $[\pm\text{Atomic}]$ is sensitive to atoms ($[\text{+atomic}]$) vs. non-atoms ($[\text{-atomic}]$).

Consider a singular-plural system, with trees as in (13) for singular and (14) for plural:



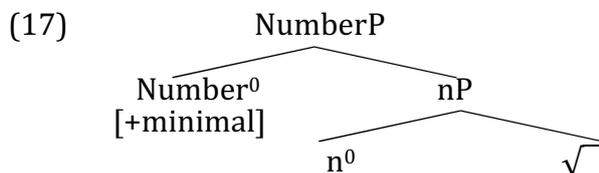
(13) is the representation in this system of what we descriptively call a singular noun, (14) of what we call a plural noun. It will be important to keep this in mind in what follows, as the assumption is that there is internal structure to singular and plural nouns (and pronouns), despite the fact that we may tend to think of them in terms of single words—I thus refer to them below as singular or plural noun *phrases*. We obtain (15) and (16) as the denotation of NumberP in (13) and (14), respectively:

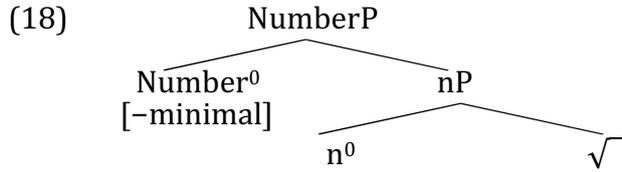
(15) $\llbracket \text{NumberP} \rrbracket = \llbracket +\text{atomic} \rrbracket(\llbracket \text{nP} \rrbracket) = \lambda x. \llbracket \text{nP} \rrbracket(x) \ \& \ \text{atom}(x) = \{a, b, c\}$ ((13))

(16) $\llbracket \text{NumberP} \rrbracket = \llbracket -\text{atomic} \rrbracket(\llbracket \text{nP} \rrbracket) = \lambda x. \llbracket \text{nP} \rrbracket(x) \ \& \ \neg \text{atom}(x) = \{ab, bc, ac, abc\}$ ((14))

The structure that gives rise to (16), i.e., to exclusive plural interpretations, contains a $[\text{-atomic}]$ feature. I will not question the resulting exclusive interpretation of the plural in (16) for now but will come back to it in section 3. In English, a $[\pm\text{atomic}]$ number system, $[\text{+atomic}]$ is not morphologically realized overtly, but $[\text{-atomic}]$ is, as *-s*.

$[\pm\text{Minimal}]$ is sensitive to elements with parts ($[\text{-minimal}]$) vs. elements without parts ($[\text{+minimal}]$) in its complement. Importantly, $[\pm\text{minimal}]$ is a relative notion: whether an individual counts as $[\text{+minimal}]$ or not depends on what else is in the set that $[\pm\text{minimal}]$ operates on. This property of $[\pm\text{minimal}]$ will play a crucial role in my account in section 2.2. For now, note that, in the case of (17), since the sister of Number^0 is nP and nP is as in (9), the results will be indistinguishable from (13)/(15) and (14)/(16), respectively:



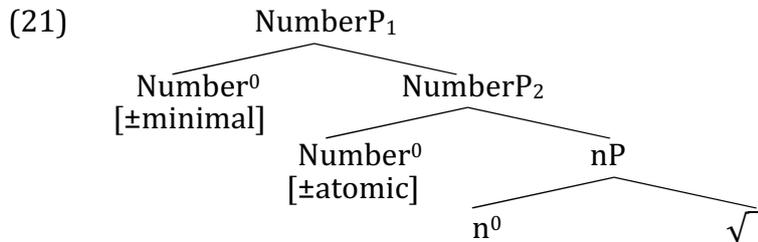


(19) $[[\text{NumberP}]] = [[+\text{minimal}]][[n\text{P}]] = \lambda x. [[n\text{P}]](x) \ \& \ \neg \exists y [[n\text{P}]](y) \ \& \ y \sqsubset x = \{a, b, c\}$ ((17))

(20) $[[\text{NumberP}]] = [[-\text{minimal}]][[n\text{P}]] = \lambda x. [[n\text{P}]](x) \ \& \ \exists y [[n\text{P}]](y) \ \& \ y \sqsubset x = \{ab, bc, ac, abc\}$ ((18))

The set of elements in $[[n\text{P}]]$ for which there isn't proper subparts in $[[n\text{P}]]$ is equivalent to the set of atoms in $[[n\text{P}]]$, and the set of elements in $[[n\text{P}]]$ for which there are proper subparts in $[[n\text{P}]]$ is equivalent to the set of non-atoms in $[[n\text{P}]]$. Thus, (17) may also be associated with what descriptively we can call singular noun phrases, and (18), with plural noun phrases. That is, what are descriptively singular-plural number system may in principle be analyzed as in (13)/(14) or as in (17)/(18).

However, it is *not* the case that $[\pm\text{minimal}]$ gives the same result as $[\pm\text{atomic}]$ in all cases. The derivation of systems that have a dual number value in Harbour (2011, 2014), based on Noyer (1992), involves the feature $[\pm\text{minimal}]$ combining with $[\pm\text{atomic}]$. Consider the syntax in (21) (I have numbered the two NumberPs for convenience), which represents the internal syntax of singular, dual and plural noun phrases in languages with a singular-dual-plural system, and the feature values in (22):



(22) a. $[[+\text{minimal}]]([[\text{+atomic}]]([n\text{P}])) =$ (singular)

$= \lambda x. [[n\text{P}]](x) \ \& \ \text{atom}(x) \ \& \ \neg \exists y \text{atom}(y) \ \& \ y \sqsubset x$

b. $[[+\text{minimal}]]([[\text{-atomic}]]([n\text{P}])) =$ (dual)

$= \lambda x. [[n\text{P}]](x) \ \& \ \neg \text{atom}(x) \ \& \ \neg \exists y \neg \text{atom}(y) \ \& \ y \sqsubset x$

c. $[[-\text{minimal}]]([[\text{-atomic}]]([n\text{P}])) =$ (plural)

$= \lambda x. [[n\text{P}]](x) \ \& \ \neg \text{atom}(x) \ \& \ \exists y \neg \text{atom}(y) \ \& \ y \sqsubset x$

d. $\#[\text{-minimal}]]([[\text{+atomic}]]([n\text{P}])) =$

$= \lambda x. [[n\text{P}]](x) \ \& \ \text{atom}(x) \ \& \ \exists y \text{atom}(y) \ \& \ y \sqsubset x$

The feature combination in (22)a gives rise to the singular, that in (22)b, to the dual, and that in (22)c, to the plural. Importantly, consider how the dual in (22)b is derived: $[\text{-atomic}]$ first eliminates the atoms from $n\text{P}$, and $[\text{+minimal}]$ then chooses, from the set of non-atoms so provided by NumberP_2 , all of those constituted of two atoms, since these are the individuals with no proper subparts in NumberP_2 . In (22)c, for plural, of the set of non-atoms provided by NumberP_2 , $[\text{-minimal}]$ chooses all of those constituted of three or more atoms, since these are the individuals with at least one proper subpart in NumberP_2 , correctly for plurals in languages that have a dual (see Martí 2019 for ample discussion of this point). Since nothing can satisfy (22)d (atoms do not have

proper subparts), (22)d does not give rise to a well-formed meaning, and thus, by assumption, to any number value. Thus, singular-dual-plural number systems constitute evidence for the existence of both [\pm atomic] and [\pm minimal] as separate features (see Nevins 2011 for recent arguments for this decompositional account of dual number).

Another argument for the postulation of a [\pm minimal] feature is concerned with number systems with a first person inclusive/exclusive distinction. Consider the ergative enclitic pronominal forms of Ilocano, an Austronesian language spoken in the Philippines, in Table 2 (Corbett 2000: 168, Rubino 1997: 55-6):

	singular	dual	plural
1ex	-ko	—	-mi
1in	—	-ta	-tayo
2	-mo	—	-yo
3	-na	—	-da

Table 2 Traditional analysis of Ilocano pronominal forms

Ilocano distinguishes two types of first person pronouns: exclusive (which exclude the addressee; ‘1ex’ in Table 2), and inclusive (which include the addressee; ‘1in’ in the table). That is, Ilocano is a language that has different types of *we*: for example, it uses *-mi* for cases where the addressee is excluded (‘we excluding you’), and *-tayo*, for those where it is included (‘we including you’). Interestingly, Ilocano has a third form *-ta* which is inclusive, so it includes the addressee, but it is only possible to use it to refer to the speaker-hearer dyad, that is, to a twosome—hence the label ‘dual’ in Table 2. However, the analysis in Table 2 misses an important generalization: if *-ta* is a dual form, it is a strange one, in that we expect a full paradigm, with dual versions of the pronoun system for first person exclusive, second person, and third person. Positing a traditional singular-dual-plural number system for Ilocano pronouns leaves the reason behind the empty cells in the table unexplained. However, positing a [\pm minimal] system for Ilocano (a minimal-augmented system in traditional terms), as in Table 3, obviates the need for such stipulative explanations:

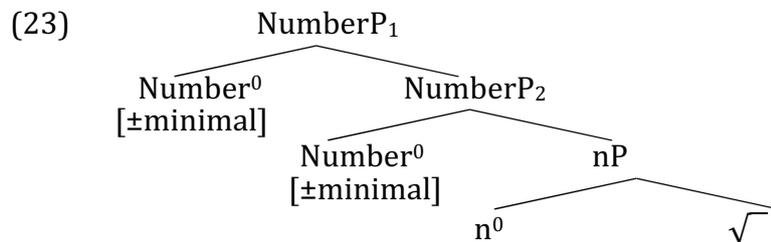
	minimal	augmented
1ex	-ko	-mi
1in	-ta	-tayo
2	-mo	-yo
3	-na	-da

Table 3 [\pm minimal] analysis of Ilocano pronominal forms

The minimal pronouns are the ones that are derived with the feature [$+$ minimal]—that the referent of *-ta* is a twosome follows naturally from this, as the speaker-hearer dyad is the most “minimal” individual that satisfies the requirements of the first person inclusive (recall: the first person inclusive has to include the speaker, because it is first person, and the addressee, because it is inclusive). That is, of the set of all individuals that satisfy the first person inclusive requirements, which will include speaker+hearer+other₁, speaker+hearer+other₁+other₂ and so on, in addition to speaker+hearer, speaker+hearer is the only individual without proper subparts. This obviates the need to postulate a rare dual that only has a first person inclusive form in this analysis. The augmented pronouns are the ones derived with the feature [$-$ minimal]. Notice that in the case of the first person inclusive, this has the effect that *-tayo* (‘we including you’) is concerned with triples (as it is predicted to pick, of those

individuals that satisfy the first person inclusive requirements, those which in addition have proper subparts, thus excluding the dyad speaker+hearer)—this is, in fact, empirically correct. Thus, there are languages for which an analysis as [\pm minimal] number systems, not as [\pm atomic] systems, is entirely justified.

At this point one might worry that, while there is evidence for the postulation of [\pm minimal], as we’ve seen, there isn’t actually evidence for [\pm atomic]. [\pm Minimal] is enough to derive minimal-augmented systems and singular-plural systems. And singular-dual-plural systems could be generated as long as [\pm minimal] can repeat, so there would be no need to appeal to [\pm atomic] to generate such systems:



- (24) a. [+minimal, +minimal] (singular)
 b. [+minimal, -minimal] (dual)
 c. [-minimal, -minimal] (plural)

Indeed, more complicated minimal-augmented number systems require [\pm minimal] to repeat. This is the case, for example, for the dative pronoun system of Rembarrnga, an Australian aboriginal language, in Table 4 (Corbett 2000: 166-167, McKay 1978, 1979). In Harbour’s (2011, 2014) analysis, Rembarrnga dative pronouns repeat [\pm minimal] to generate the number value unit augmented (“one more than minimal”, which is two for all persons except for first person inclusive, where it is three), as shown in (25):

	minimal	unit augmented	augmented
1ex	ngʉnʉ	yarrbbarrah	yarrʉ
1in	yʉkkʉ	ngakorrbarrah	ngakorʉ
2	kʉ	nakorrbarrah	nakorʉ
3	nawʉ,ngadʉ	barrbbarrah	barrʉ

Table 4 Rembarrnga dative pronouns

- (25) [+minimal] (minimal)
 [+minimal, -minimal] (unit augmented)
 [-minimal] (augmented)

Another example is number systems that include a trial number value, such as Larike, an Austronesian language of Indonesia (Corbett 2000: 21-22, Laidig and Laidig 1990), with the analysis in (26):

	singular	dual	trial	plural
1ex	aʔu	arua	aridu	ami
1in	–	itua	itidu	ite
2	ane	irua	iridu	imi
3	mane	matua	matidu	mati

Table 5 Larike pronouns

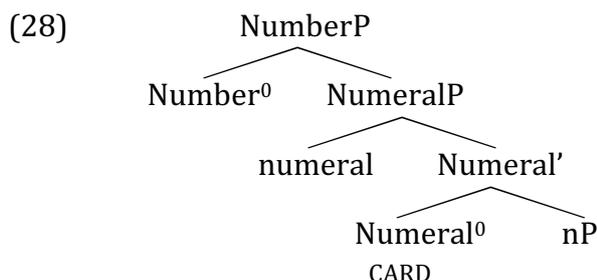
- (26) [+minimal, +atomic] (singular)
 [+minimal, -atomic] (dual)
 [-minimal, -atomic] (plural)
 [+minimal, -minimal, -atomic] (trial)

However, if we allow the plural in a system like that in (24) to be generated with a feature combination such as [-minimal, -minimal], or trial to be generated as [+minimal, -minimal, -minimal] as in (26), where the same value (negative) of the minimal feature repeats, nothing prevents the generation of many unattested exact number values, such as quadrals, quintals, sextals, and so on (see Corbett 2000: 26-30):

- (27) [+minimal, -minimal, -minimal, -minimal] (cuadral)
 [+minimal, -minimal, -minimal, -minimal, -minimal] (quinqual)
 [+minimal, -minimal, -minimal, -minimal, -minimal, -minimal] (sexal)

Such number values are unattested. To prevent them from being generated, feature repetition in Harbour's account is constrained so that it can only apply if the value of the feature is not the same (e.g., [+minimal, -minimal] is allowed, but [-minimal, -minimal] isn't). This entails that [\pm atomic] is necessary after all, since we'd lose an account of number systems with duals, or with duals and trials, without it. Returning to the main argument, then, both [\pm minimal] and [\pm atomic] are necessary.

My account of the patterns in Table 1 makes use of certain crucial assumptions from Scontras (2014) as well. Scontras assumes that number features in Number⁰ (in his case, [SG] and [PL]; see section 3) operate on constituents that contain the numeral, that is, on the NumeralP in (28) (NumP for Scontras; I've adapted his labels to Harbour's and my account here, but see section 3):



Like Harbour, he assumes that these features are ultimately responsible for the number morphology we see on noun phrases. In fact, which features are assumed to operate in Number⁰ in different languages plays a crucial role in his account, as well as in mine, as we will see below, in deriving the patterns in Table 1. Scontras also assumes that numerals denote numbers, of type <n>, following Hackl (2001), Krifka (1995), Rothstein (2011) and many others. They occupy the specifier position of NumeralP, a projection headed by Numeral⁰, occupied by the cardinality predicate CARD, and with nP as its syntactic argument.¹⁶ The semantics of CARD is as follows, also as in Hackl (2001) and others¹⁷, for '#' an atom-counting function:

¹⁶ Scontras argues that NumeralP (his NumP) is more generally MeasureP, and that units of measurement other than cardinality (e.g., for weight, volume, length...) are possible. He then provides a semantics for measure phrases (*two kilos of apples*). I put measure phrases aside here (cf. Acquaviva 2005, Rothstein 2017 for arguments that NumeralPs and MeasurePs are different). It is possible that my proposal in

$$(29) \quad \llbracket \text{CARD} \rrbracket = \lambda P \lambda n \lambda x. P(x) \ \& \ \#x = n$$

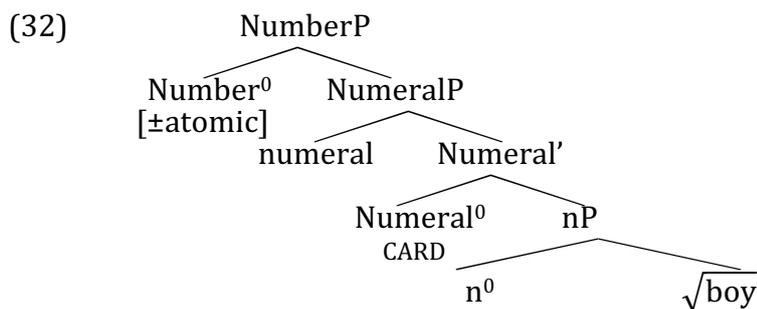
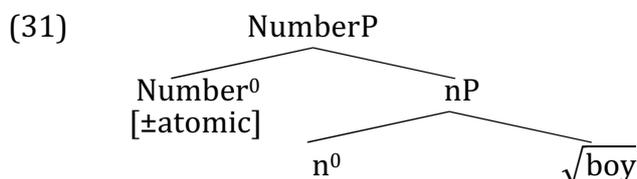
CARD takes a predicate P and a number n and returns the set of individuals in P each of which is constituted of exactly n atoms.

2.2 Proposal

I propose that type 1 languages, such as English, are [\pm atomic] systems, that type 2 languages, such as Turkish, [\pm minimal] systems, and that type 3 languages, such as Western Armenian, have access to two number systems, a [\pm atomic] system and to a [\pm minimal] system. In what follows, I first show how the patterns in Table 1 are derived from the assumptions in section 2.1. I then comment on the plausibility of Turkish number being a [\pm minimal] system, and, finally, on the idea that a language may have two number systems at its disposal but deploy only one of them at any given time, which is a crucial aspect of my analysis of type 3 languages.

A type 1 language, such as English, is derived as follows. First, assume that [+atomic] spells out as \emptyset , and [-atomic], as $-s^{18}$. We then have (30) for the nP *boy*, (31) for singular and plural noun phrases with the root *boy*, and (32) for phrases with a numeral and with the same root:

$$(30) \quad \llbracket \llbracket \text{nP boy} \rrbracket \rrbracket = \{a, b, c, ab, bc, ac, abc\}$$



These assumptions give rise to the following results:

$$(33) \quad \begin{array}{ll} \text{a. } \llbracket \llbracket +\text{atomic} \rrbracket \llbracket \text{nP boy} \rrbracket \rrbracket = \lambda x. \llbracket \llbracket \text{nP boy} \rrbracket \rrbracket (x) \ \& \ \text{atom}(x) & \rightarrow \textit{boy} \\ \text{b. } \llbracket \llbracket -\text{atomic} \rrbracket \llbracket \text{nP boy} \rrbracket \rrbracket = \lambda x. \llbracket \llbracket \text{nP boy} \rrbracket \rrbracket (x) \ \& \ \neg \text{atom}(x) & \rightarrow \textit{boys} \\ \text{c. } \# \llbracket \llbracket +\text{atomic} \rrbracket \llbracket \text{two CARD} \llbracket \text{nP boy} \rrbracket \rrbracket \rrbracket & & \rightarrow \textit{two-boy} \end{array}$$

section 2.2 cannot maintain the generality regarding units of measurement that Scontras' account accomplishes, a matter I leave for future research.

¹⁷ (29) does not existentially quantify over individuals, which CARD is assumed to do in many accounts. Existential quantification can be carried out by a (silent) quantifier higher in the structure.

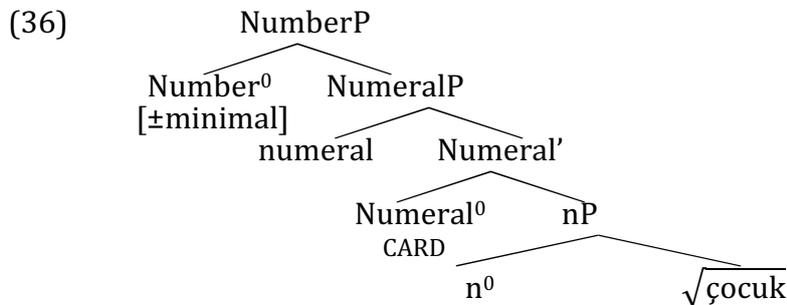
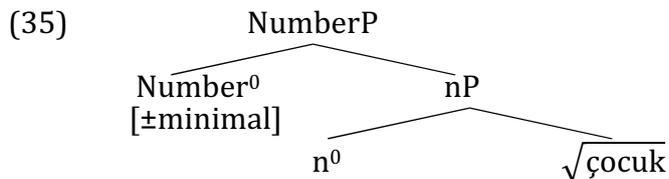
¹⁸ My proposal is compatible with languages that may actually have an overt singular morphological marker, of course. The spell out of [-atomic] with irregular plurals (e.g., *sheep*, *geese*, etc.) may be accomplished via other morphological processes, such as null affixation, root change, etc.

- d. $\llbracket[-\text{atomic}] [\text{two CARD } [_{\text{nP}} \text{ boy}]]\rrbracket = \lambda x. \llbracket[_{\text{nP}} \text{ boy}]\rrbracket(x) \ \& \ \text{card}(x) = 2 \quad \rightarrow \text{two boys}$
 e. $\llbracket[+\text{atomic}] [\text{one CARD } [_{\text{nP}} \text{ boy}]]\rrbracket = \lambda x. \llbracket[_{\text{nP}} \text{ boy}]\rrbracket(x) \ \& \ \text{card}(x) = 1 \quad \rightarrow \text{one boy}$
 f. $\# \llbracket[-\text{atomic}] [\text{one CARD } [_{\text{nP}} \text{ boy}]]\rrbracket \quad \rightarrow \text{one boys}$

(33)a is the only source for morphologically singular noun phrase *boy* and delivers the correct semantics for it. (33)b gives rise to the morphologically plural noun phrase *boys* and assigns it an exclusive plural semantics, which I return to in section 3. (33)c denotes the empty set and is thus, I assume, ill-formed (hence the hash tag). It is also the only source for *two boy*, so *two boy* is correctly predicted to be ungrammatical in English (hence the resulting phrase is crossed out in (33)c; what follows an arrow in (34), and (37) below, is always a phrase). (33)d, with $[-\text{atomic}]$ in Number^0 , is the only source for *two boys* and gives rise to its desired (at least) semantics. (33)e is the only well-formed source for *one boy*, and it, again, gives rise to the correct semantics. (33)f is empty and ill-formed, and the only possible source for *one boys*, which is thus predicted to be ungrammatical. Thus, we derive that in type 1 languages, all numerals greater than *one* appear in morphologically plural noun phrases, and the numeral *one* appears in morphologically singular noun phrases. Phrases without a numeral, such as *boy* and *boys*, are morphologically and semantically singular or plural noun phrases, respectively. Notice that the root $\sqrt{\text{boy}}$ and the nP *boy* are not numbered—nP is always number-neutral in this system ((30)). However, the noun phrase *boy* is numbered, as it contains a number feature, and thus a Number Phrase ((31), (33)a). It is because of the latter that we can say that in this analysis morphologically singular noun phrases like English *boy* are treated as semantically singular or $[\text{+atomic}]$ (likewise, morphologically plural noun phrases like *boys* are treated as semantically plural or $[-\text{atomic}]$).

Languages of type 2 are, instead, $[\pm\text{minimal}]$ systems. Assume that in Turkish, $[\text{+minimal}]$ spells out as \emptyset and $[-\text{minimal}]$ spells out as *-lar*. We thus have:

- (34) $\llbracket[_{\text{nP}} \text{ çocuk}]\rrbracket = \{a, b, c, ab, bc, ac, abc\}$



(37)

- a. $[[[+minimal] \text{ [}_{NP} \text{ çocuk}]]] = \lambda x. [[\text{[}_{NP} \text{ çocuk}]]](x) \ \& \ \neg \exists y \text{ [[}_{NP} \text{ çocuk}]](y) \ \& \ y < x$
→ *çocuk*
- b. $[[[-minimal] \text{ [}_{NP} \text{ çocuk}]]] = \lambda x. [[\text{[}_{NP} \text{ çocuk}]]](x) \ \& \ \exists y \text{ [[}_{NP} \text{ çocuk}]](y) \ \& \ y < x$
→ *çocuklar*
- c. $[[iki \text{ CARD [}_{NP} \text{ çocuk}]]] = \lambda x. [[\text{[}_{NP} \text{ çocuk}]]](x) \ \& \ \text{card}(x) = 2$
- d. $[[[+minimal] \text{ [iki CARD [}_{NP} \text{ çocuk}]]]] = \lambda x. [[iki \text{ CARD [}_{NP} \text{ çocuk}]]](x) \ \& \ \neg \exists y \text{ [[iki CARD [}_{NP} \text{ çocuk}]](y) \ \& \ y < x$
→ *iki çocuk*
- e. $\#[[-minimal] \text{ [iki CARD [}_{NP} \text{ çocuk}]]]$
→ ~~*iki çocuklar*~~
- f. $[[bir \text{ CARD [}_{NP} \text{ çocuk}]]] = \lambda x. [[\text{[}_{NP} \text{ çocuk}]]](x) \ \& \ \text{card}(x) = 1$
- g. $[[[+minimal] \text{ [bir CARD [}_{NP} \text{ çocuk}]]]] = \lambda x. [[bir \text{ CARD [}_{NP} \text{ çocuk}]]](x) \ \& \ \neg \exists y \text{ [[bir CARD [}_{NP} \text{ çocuk}]](y) \ \& \ y < x$
→ *bir çocuk*
- h. $\#[[-minimal] \text{ [bir CARD [}_{NP} \text{ çocuk}]]]$
→ ~~*bir çocuklar*~~

(37)a and (37)b correspond to the semantics and number marking of noun phrases without a numeral—they give rise to, descriptively speaking, a singular-plural number system. (37)b gives rise to an exclusive plural semantics, which I return to in section 3. The effects of $[\pm\text{minimal}]$ are more noticeable in (37)d, which denotes a set of boy individuals composed of exactly two atoms, these two-atom, plural boy individuals having no proper subparts in (37)c (which contains only plural boy individuals composed of exactly two atoms). (37)g denotes a set of boy individuals composed of exactly one atom, these atomic boy individuals having no proper subparts in (37)f (which contains only boy atoms). These are the only sources for the grammatical *iki çocuk* ‘two boys’ and *bir çocuk* ‘one boy’, respectively, which also result in the correct semantics. Crucially, no matter what numeral is present in the phrase, $[-\text{minimal}]$, which spells out as *-lar*, never gives rise to a well-formed result ((37)e and (37)h denote the empty set)—that is because $[-\text{minimal}]$ selects from its input P those individuals that have proper subparts in P, and there are no such subparts in $[[iki \text{ CARD çocuk}]]$, $[[bir \text{ CARD çocuk}]]$, etc. Thus, the correct pattern is generated for type 2 languages from the assumptions made above. The only difference in this account between languages of type 1 and languages of type 2 is in the number feature that appears in Number^0 —if that feature is $[\pm\text{minimal}]$, as opposed to $[\pm\text{atomic}]$, *one* and all numerals greater than *one* will only be able to appear in morphologically singular noun phrases. Notice, again, that the root, e.g., $\sqrt{\text{çocuk}}$, and the nP, *çocuk*, are not numbered. However, the noun phrase *çocuk* is. Thus, in this analysis, morphologically singular noun phrases like Turkish *çocuk* are treated as semantically singular or $[+\text{minimal}]$ (likewise, morphologically plural noun phrases like *çocuklar* are treated as semantically plural or $[-\text{minimal}]$).

Finally, languages of type 3 have at their disposal both a $[\pm\text{minimal}]$ number system and a $[\pm\text{atomic}]$ number system for Number^0 . In Western Armenian, $[+\text{minimal}]$ and $[+\text{atomic}]$ spell out as \emptyset , and $[-\text{minimal}]$ and $[-\text{atomic}]$ spell out as $-(n)er$. This entails, first of all, that there are two sources for a morphologically singular noun phrase like *dəgha*, both of them resulting in semantic singularity: either (33)a or (37)a. Likewise, there are two sources for the morphologically plural noun phrase *dəghaner*: either (33)b or (37)b—both of them give rise to an exclusive plural semantics.

$[\pm\text{Minimal}]$ and $[\pm\text{atomic}]$, however, do not combine in this system—this ensures that Western Armenian is correctly predicted not to have a dual (cf. discussion in section 2.1), but to give rise to the language type 2 ((37)) and the language type 1 ((33)) patterns with numerals. When $[\pm\text{atomic}]$ is chosen for Number^0 , the type 1 pattern

follows. Notice, in particular, that [+atomic] cannot be the feature involved in the generation of *yergu dāgha* ‘two boys’, since (33)d is ill-formed. However, a language like Western Armenian in this account may choose to use [±minimal] in Number⁰ instead, and (37)d, which uses [+minimal], results in the correct form and meaning for *yergu dāgha*. Likewise, [−minimal] cannot be the feature involved in the derivation of *yergu dāghaner* ‘two boys’, since (37)e uses this feature and is ill-formed. However, (33)e is also allowed in Western Armenian, and the correct form and meaning for *yergu dāghaner* results. Since both (33)g and (37)h are ill-formed, and since there is no other source for *meg dāghaner* ‘one boys’, *meg dāghaner* is predicted to be ungrammatical. *Meg dāgha* ‘one boy’ has two sources, (33)f and (37)g, both of which give rise to the correct semantics. In this account, then, languages of type 3 are a mix between types 1 and 2.

If this analysis is correct, then languages of type 2 are not [±atomic] systems but [±minimal] systems. The next question is whether there are other parts of the grammar of these languages where we can detect that [±minimal] is at work. One place to look, recalling now section 2.1, is in their pronoun system—if exclusive first person is distinguished from inclusive first person, then [±minimal] is being used in the language. Unfortunately, Turkish does not distinguish exclusive vs. inclusive first person in its pronoun system (see Kornfilt 1997: 281), where a simple singular vs. plural distinction is made. The pronoun data on its own is thus compatible with Turkish being either a [±atomic] system or a [±minimal] system. Other languages that I hypothesize to be of type 2, such as Finnish (Karlsson 1982: 74) or Hungarian (Tompá 1968: 61) do not distinguish exclusive vs. inclusive first person either, and neither do Western Armenian or Miya (Schuh 1998: 187), languages of type 3.

However, type 2 or type 3 languages with an inclusive vs. exclusive first person distinction do exist. For example, Itzaj Maya (Hofling 2000) is a candidate for a type 3 language. Itzaj Maya makes a distinction on several of its pronoun series between inclusive and exclusive first person, which in Harbour’s system requires the feature [±minimal]. We thus have evidence for [±minimal] in Itzaj Maya that is independent of the numeral+noun construction. In addition, this language makes an obligatory singular-plural distinction on its nouns (Hofling 2000: 118). Importantly, when nouns combine with numerals, they may or may not take plural marking (Hofling 2000: 227), as in Western Armenian. In my approach, this is because the noun system of Itzaj Maya has access to either [±minimal] or to [±atomic], making it a type 3 language (and the singular-plural distinction on nouns, whether effected via [±minimal] or [±atomic], has the same surface realization, again, as in my (and Scontras’, below) analysis of Western Armenian). Thus, we find evidence outside of the noun system for the feature [±minimal] in this language^{19, 20, 21}.

¹⁹ Spanish-based numerals are directly followed by the noun in Itzaj Maya, without mediation of classifiers, but native, non-Spanish-based numerals must be followed by a numeral classifier (Hofling 2000: 141). I put constructions that use numeral classifiers aside here, though the treatment of numerals as part of a complex NumeralP assumed here is compatible with analyses of numeral classifiers such as those in Bale and Coon (2014), Krifka (1995), Wilhelm (2008) and many others, where numeral classifiers introduce counting functions (cf. CARD).

²⁰ Harbour (2016: 141) argues that hortatives (e.g., *Let us go*) in some languages also require [±minimal]. There are in fact languages of the Turkic language family, though not Turkish itself, where it is possible to find evidence of [±minimal] in hortatives (Nevskaya 2005): in these languages, the speaker-hearer dyad is treated differently from other first person inclusives (see also Onambélé 2012 for other languages). Thanks to an anonymous reviewer for pointing this out.

In type 2 and type 3 languages with a distinction between inclusive and exclusive first person pronouns, then, the pronominal and nominal number systems both have access to the same feature, [\pm minimal].

The final issue to address is the idea that a language would be able to use either [\pm atomic] or [\pm minimal], but not both at the same time. This is distinct from the claim that a language may be a [\pm atomic, \pm minimal] system; with the latter, as we saw in section 2.1, a singular-dual-plural system is generated. The claim for languages of type 3 above is different: it is that each of [+atomic], [+minimal], [-atomic], and [-minimal], on their own, is a possible number value. The question is whether this claim is sensible within Harbour's theory. There two issues to consider: (a) whether a language's number system could, in principle, have access to number features separately (e.g., [\pm atomic] and [\pm minimal]), and (b) if so, how these features would be deployed in such a language. Addressing the first issue, let us notice that, in fact, Harbour's theory already assumes (a), for good empirical reasons: languages with different number distinctions in different domains (e.g., pronouns vs. nouns) do exist.

For example, in Imeré (see Biggs 1975, Clark 1975, 1998, 2002/2011 and Martí, to appear), pronouns, as well as nouns inflected with the affectionate prefix series, distinguish singular, dual and plural (these domains require, featurally, [\pm atomic] and [\pm minimal] in Harbour's theory), but nouns inflected with a different prefix series distinguish singular, paucal and plural (featurally, this requires [\pm atomic] and [\pm additive]; paucal is a number value that expresses something similar to what English *a few* does). Thus, different classes (pronouns vs. nouns), and different subclasses within nouns, have access to different sets of number features.

This suggests that the innovation needed for languages of type 3 is concerned, then, only with (b), in that, in at least some of the languages we know of, distinctions are made in one domain that are different from distinctions made in another, but for the language type 3 account above to work, two separate sets of distinctions apply in the same domain (nouns).

Interestingly, going back to Miya, mentioned in the introduction, Schuh (1989: 175, 1998: 198) shows that Miya animate and inanimate nouns in numeral+noun combinations behave differently. Consider the plurals in Table 6:

singular	plural	translation
kúnkul	kúnkulálàw	<i>cap</i>
kàm	kàmàmáw	<i>house</i>
dəm	dəmàmàw	<i>tree</i>
dlərkiy	dlərkaw	<i>chicken</i>
'ám	təvàm	<i>woman</i>
áfúw	cùw	<i>goat</i>

Table 6 Miya pluralization

Other nouns, such as *dlərkiy* 'chicken' follow a separate pattern, and nouns such as *'ám* 'woman' and *áfúw* 'goat' have irregular plurals. When combined with numerals greater

²¹ A prediction that my account makes and that remains to be confirmed is that there should be languages just like Western Armenian or Itzaj Maya but in which [-atomic] and [-minimal] (or [+atomic] and [+minimal]) are not spelled out via the same morpheme. On the surface, this would look like Western Armenian or Itzaj Maya except that the plural morpheme of nouns in the numeral+noun construction (which spells out [-atomic]) would be one of two plural morphemes (one for [-atomic], one for [-minimal]) that are used more generally in the language.

than 1, animate noun phrases, a class which includes all humans, most domestic animals and fowl, and some large wild animals, cannot be morphologically singular. Thus, we have:

- (38) *Miya*
- | | | |
|----------------------------|---------|----------------------------------|
| a. təvəm/*ám | tsər | (cf. <i>ám wútə</i> ‘one woman’) |
| woman.PL/woman.SG | two | |
| ‘Two women’ | | |
| b. dlərkaw/*dlərkiy | fəðə | |
| chicken.PL/chicken.SG | four | |
| ‘Four chickens’ | | |
| c. cùwàwáw/*áfuw | dəbítím | |
| goat.PL/goat.SG | ten | |
| ‘Ten goats’ | | |

This is the language type 1 pattern. For inanimate nouns, however, both morphologically singular and plural noun phrases are possible:

- (39) *Miya*
- | | | |
|---------------------------|--------|--|
| a. zəkìyáyàw/zəkìy | vàatlə | |
| stone.PL/stone.SG | five | |
| ‘Five stones’ | | |
| b. kàmámáw/kàm | máahà | |
| house.PL/house.SG | six | |
| ‘Six houses’ | | |
| c. kusámámàw/kùsàm | vàatlə | |
| mouse.PL/mouse.SG | five | |
| ‘Five mice’ | | |

Thus, for inanimate nouns, *Miya* follows the Western Armenian pattern. In our terms, this entails that only [\pm atomic] is generated in Number⁰ in animate noun phrases, whereas for another subset of nouns, the inanimate ones, either [\pm atomic] or [\pm minimal] is possible. Thus, we have a language where, overall, the number system has both [\pm atomic] and [\pm minimal] at its disposal, but these features are deployed differently for different nouns. According to this analysis, *Miya* is a mix of the patterns in language types 1 and 2, but a different mix for inanimate vs. animate nouns.

To summarize. I have proposed an analysis of the patterns in Table 1 which relies on two crucial assumptions: one is that Harbour’s [\pm atomic] and [\pm minimal] may be features in Number⁰ in the numeral+noun construction; the second is that, in that construction, number features operate on phrases that contain the numeral.

3 Scontras (2014)

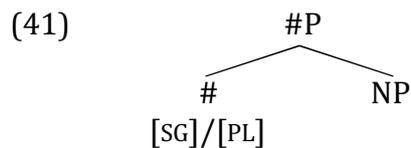
The proposal I have made in section 2.2. is based in Scontras’ own account of the same data. However, by combining Scontras’ structure for the numeral+noun construction and his ideas about number features in English vs. Turkish with Harbour’s number features, as I have done above, a more principled account of the patterns in Table 1 ensues. I also show below that combining these ingredients from Harbour and Scontras

requires us to make certain assumptions about the proper analysis of inclusive plurals—in that, I follow Martí (2017, 2019).

Scontras proposes two number features for a language like English: [SG], which triggers singular form and agreement, and [PL], which triggers plural form and agreement. Whereas [SG] comes with a singularity presupposition, [PL] is presupposition-less (from Sauerland 2003); both are identity functions:

$$(40) \begin{aligned} \llbracket [SG] \rrbracket &= \lambda P: \forall x \in P [\#x=1]. P \\ \llbracket [PL] \rrbracket &= \lambda P. P \end{aligned}$$

For Scontras, these features project a #P (NumberP in Harbour’s and my system). For a numeral-less noun phrase, we have (NP is nP in Harbour’s and my system):



Given Heim’s (1991) Maximize Presupposition, it follows that, if the presuppositions of [SG] are met, then [SG] is used; otherwise, [PL] is used.

Additionally, he assumes that an NP like *boy* denotes a set of atoms. In addition, using Link’s (1983) *-operator, we can also construct the NP *boy, the set of atoms and non-atoms that are boys:

$$(42) \begin{aligned} \llbracket [boy] \rrbracket &= \{a, b, c\} \\ \llbracket [*boy] \rrbracket &= \{a, b, c, ab, bc, ac, abc\} \end{aligned}$$

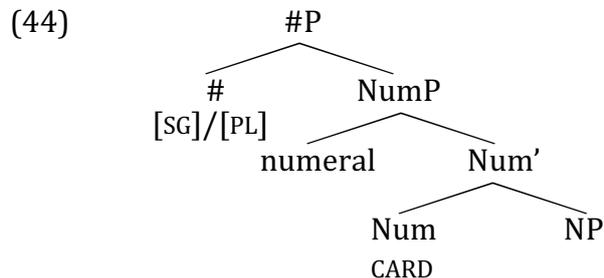
Consider now the four possible combinations of noun semantics and number features in a language of type 1 that arise for Scontras:

$$(43) \begin{array}{ll} \text{a. } \llbracket [SG] [_{NP} boy] \rrbracket = \llbracket \llbracket [_{NP} boy] \rrbracket \rrbracket = \{a, b, c\} & \rightarrow boy \\ \text{b. } \# \llbracket [SG] [_{NP} *boy] \rrbracket & \rightarrow \textit{boy} \\ \text{c. } \# \llbracket [PL] [_{NP} boy] \rrbracket = \llbracket \llbracket [_{NP} boy] \rrbracket \rrbracket = \{a, b, c\} & \rightarrow \textit{boys} \\ \text{d. } \llbracket [PL] [_{NP} *boy] \rrbracket = \llbracket \llbracket [_{NP} *boy] \rrbracket \rrbracket = \{a, b, c, ab, ac, bc, abc\} & \rightarrow \textit{boys} \end{array}$$

When combined with [SG], only [_{NP} boy], (43)a, gives rise to a well-formed meaning for the noun phrase *boy*. In (43)a, the presupposition of [SG] that every member of the denotation of its input be individuals constituted of exactly one atom, or atomic, is satisfied and the meaning of the whole is the same as the meaning of [_{NP} boy], thus giving rise to the correct semantics. In (43)b, on the other hand, $\llbracket \llbracket [_{NP} *boy] \rrbracket \rrbracket$ contains both atoms and non-atoms, and so the presupposition of the feature is not met and the result is a presupposition failure. Even though (43)b would have yielded the noun phrase *boy*, it does not yield a well-formed meaning for it. (43)a does, which also yields the noun phrase *boy*. The feature [PL], being presupposition-less, gives a well-formed result whether it combines with $\llbracket \llbracket [_{NP} boy] \rrbracket \rrbracket$ or $\llbracket \llbracket [_{NP} *boy] \rrbracket \rrbracket$, as shown in (43)c and (43)d, but (43)c is disfavored by Maximize Presupposition, as (43)a delivers the same result but uses an item with a presupposition, the feature [SG]. Thus, (43)a is realized as the noun phrase *boy*, because of [SG] and the (atomic) semantics of [_{NP} boy] in (42). (43)d is

realized as the noun phrase *boys*, because of [PL] and the (inclusive) semantics of [_{NP} *boy].

Recall Scontras' assumptions about numerals (section 2.1): they give rise to a syntax, in (44), in which number features scope above numerals, with CARD as in (45) (as before, see (29)):



(45) $[[\text{CARD}]] = \lambda P \lambda n \lambda x. P(x) \ \& \ \#x = n$

The reason why in Scontras' system, *two boys* is possible but *two boy* isn't in a type 1 language is as follows. First, CARD may combine with either $[[[\text{NP} \text{ boy}]]]$ or $[[[\text{NP} * \text{boy}]]]$:

(46)

- a. $[[\text{CARD} [\text{NP} \text{ boy}]]] = \lambda n \lambda x. [[[\text{NP} \text{ boy}]]](x) \ \& \ \#x = n$
- b. $[[\text{CARD} [\text{NP} * \text{boy}]]] = \lambda n \lambda x. [[[\text{NP} * \text{boy}]]](x) \ \& \ \#x = n$

Either (46)a or (46)b may then combine with the numeral, though the result is not well-formed for (46)a (there are no members in $[[[\text{NP} \text{ boy}]]]$ constituted of exactly 2 atoms, that is, (47)a denotes the empty set):

(47)

- a. $\#[[\text{two CARD} [\text{NP} \text{ boy}]]]$
- b. $[[[\text{two CARD} [\text{NP} * \text{boy}]]]] = \lambda x. [[[\text{NP} * \text{boy}]]](x) \ \& \ \#x = 2$

There are then two possibilities to consider: either (47)b combines with [SG], as in (48)a, or it combines with [PL], as in (48)b:

(48)

- a. $\#[[\text{SG} [\text{two CARD} [\text{NP} * \text{boy}]]]] \rightarrow \textit{two boy}$
- b. $[[[\text{PL} [\text{two CARD} [\text{NP} * \text{boy}]]]] = \lambda x. [[[\text{NP} * \text{boy}]]](x) \ \& \ \#x = 2 \rightarrow \textit{two boys}$

(48)a is a presupposition failure, and hence so is *two boy*, because there are no members in the denotation of its input (in (47)b) constituted of exactly 1 atom. Only (48)b is well-formed, which correctly gives rise to *two boys* and to its correct semantics. For *one*, Scontras appeals to an additional Economy Principle, in (49):

(49) Given two expressions that are denotationally equivalent and where one expression is more complex than the other, choose the simpler expression

(50) provides the two possibilities we have for NumP at this point:

(50)

- a. $\llbracket \text{one CARD } [_{NP} \text{ boy}] \rrbracket = \lambda x. \llbracket [_{NP} \text{ boy}] \rrbracket(x) \ \& \ \#x = 1$
b. $\llbracket \text{one CARD } [_{NP} * \text{boy}] \rrbracket = \lambda x. \llbracket [_{NP} * \text{boy}] \rrbracket(x) \ \& \ \#x = 1$

We then have the following four possibilities for #P:

(51)

- a. $\llbracket \text{SG } [\text{one CARD } [_{NP} \text{ boy}]] \rrbracket = \lambda x. \llbracket [_{NP} \text{ boy}] \rrbracket(x) \ \& \ \#x = 1$ \rightarrow *one boy*
b. $\# \llbracket \text{SG } [\text{one CARD } [_{NP} * \text{boy}]] \rrbracket = \lambda x. \llbracket [_{NP} * \text{boy}] \rrbracket(x) \ \& \ \#x = 1$ \rightarrow ~~*one boy*~~
c. $\# \llbracket \text{PL } [\text{one CARD } [_{NP} \text{ boy}]] \rrbracket = \lambda x. \llbracket [_{NP} \text{ boy}] \rrbracket(x) \ \& \ \#x = 1$ \rightarrow ~~*one boy*~~
d. $\# \llbracket \text{PL } [\text{one CARD } [_{NP} * \text{boy}]] \rrbracket = \lambda x. \llbracket [_{NP} * \text{boy}] \rrbracket(x) \ \& \ \#x = 1$ \rightarrow *one boys*

In (51)a, the presuppositions of [SG] are satisfied by the denotation of its input, a set of atoms. This means that it, and not (51)c, is chosen, and *one boy* results (with the correct semantics), not *one boys*. (51)b and (51)d are ruled out by the Economy Principle in (49), since they are denotationally equivalent to (51)a but are more complex (since $\llbracket [_{NP} * \text{boy}] \rrbracket$ is used, and that is more complex than $\llbracket [_{NP} \text{ boy}] \rrbracket$). Because there is at least one successful derivation for *one boy* ((51)a, not (51)b), *one boy* is predicted to be grammatical in English, or, more generally, in languages of type 1, correctly.

For languages of type 2, such as Turkish, Scontras also assumes (42), and the same syntax as above. There is a crucial difference, however, in that in Turkish, [SG] is stipulated to be sensitive to relative atomicity, as opposed to English [SG]. Being sensitive to relative atomicity, or P-atomicity, means that what counts as an atom for a predicate P is relative to what is in P—for any P, the relative atoms of P are those members of P which have no parts in P:

(52) $\text{card}_{P\text{-atom}}(x)$ is defined only when $P(x)=1$.

When defined, $\text{card}_{P\text{-atom}}(x) = \{y \in P: y \leq x \ \& \ \neg \exists z \in P \ z < y\}$

The cardinality of the set that contains those relative atoms is what Turkish [SG] is sensitive to. The number features assumed for Turkish are in (53), with $[_{SG_T}]$ being the singular number feature (I'll speak of $[_{SG_E}]$ from now on for English [SG]), and with [PL] still presupposition-less:

(53) $\llbracket [_{SG_T}] \rrbracket = \lambda P: \forall x \in P [\text{card}_{P\text{-atom}}(x)=1].P$
 $\llbracket [_{PL}] \rrbracket = \lambda P.P$

For numeral-less phrases, this system gives rise to the following:

(54)

- a. $\llbracket [_{SG_T} \text{ } [_{NP} \text{ } \text{çocuk}]] \rrbracket = \llbracket [_{NP} \text{ } \text{çocuk}]] \rrbracket = \{a, b, c\}$ \rightarrow *çocuk*
b. $\# \llbracket [_{SG_T} \text{ } [_{NP} * \text{çocuk}]] \rrbracket$ \rightarrow ~~*çocuk*~~
c. $\# \llbracket [_{PL} \text{ } [_{NP} \text{ } \text{çocuk}]] \rrbracket$ \rightarrow ~~*çocuklar*~~
d. $\llbracket [_{PL} \text{ } [_{NP} * \text{çocuk}]] \rrbracket = \llbracket [_{NP} * \text{çocuk}]] \rrbracket = \{a, b, c, ab, bc, ac, abc\}$ \rightarrow *çocuklar*

In (54)a, the presupposition of $[_{SG_T}]$ is satisfied, since $\llbracket [_{NP} \text{ } \text{çocuk}]] \rrbracket$ denotes a set of individuals that have no parts that are also in $\llbracket [_{NP} \text{ } \text{çocuk}]] \rrbracket$. This is not true in the case of (54)b, which is thus a presupposition failure—it is not the case that all members of the sister of $[_{SG_T}]$ are P-atoms, since the set contains plural individuals and their parts. (54)a

is correctly realized as the noun phrase *çocuk* and gives rise to the desired, singular semantics. Both (54)c and (54)d satisfy the requirements of [PL], since this feature imposes no requirements. (54)c, however, expresses the same meaning as (54)a, and (54)a is presuppositional while (54)c is not, so (54)c is not selected. (54)d is correctly realized as the noun phrase *çocuklar* ‘boys’ and gives rise to the desired, inclusive semantics. For phrases with a numeral, we have:

(55)

- a. $\llbracket \text{CARD } [_{\text{NP}} \text{çocuk}] \rrbracket = \lambda n \lambda x. \llbracket [_{\text{NP}} \text{çocuk}] \rrbracket (x) \ \& \ \#x = n$
 b. $\llbracket \text{CARD } [_{\text{NP}} * \text{çocuk}] \rrbracket = \lambda n \lambda x. \llbracket [_{\text{NP}} * \text{çocuk}] \rrbracket (x) \ \& \ \#x = n$

(56)

- a. $\# \llbracket \text{iki CARD } [_{\text{NP}} \text{çocuk}] \rrbracket$
 b. $\llbracket \text{iki CARD } [_{\text{NP}} * \text{çocuk}] \rrbracket = \lambda x. \llbracket [_{\text{NP}} * \text{çocuk}] \rrbracket (x) \ \& \ \#x = 2$

Maximize Presupposition chooses (57)a over (57)b, as (57)a is presuppositional and its presuppositions are satisfied, giving rise to *iki çocuk* ‘two boys’ with the correct semantics:

(57)

- a. $\llbracket \text{SGT } [\text{iki CARD } [_{\text{NP}} * \text{çocuk}]] \rrbracket = \lambda x. \llbracket [_{\text{NP}} * \text{çocuk}] \rrbracket (x) \ \& \ \#x = 2 \quad \rightarrow \textit{iki çocuk}$
 b. $\llbracket \text{PL } [\text{iki CARD } [_{\text{NP}} * \text{çocuk}]] \rrbracket = \lambda x. \llbracket [_{\text{NP}} * \text{çocuk}] \rrbracket (x) \ \& \ \#x = 2 \quad \rightarrow \textit{iki çocuklar}$

Maximize Presupposition chooses (58)a over (58)c; (58)b and (58)d are not selected because there is a less complex expression for each one, (58)a and (58)c, respectively, as per the Economy Principle in (49). The correct realization and meaning result:

(58)

- a. $\llbracket \text{SGT } [\text{bir CARD } [_{\text{NP}} \text{çocuk}]] \rrbracket = \lambda x. \llbracket [_{\text{NP}} \text{çocuk}] \rrbracket (x) \ \& \ \#x = 1 \quad \rightarrow \textit{bir çocuk}$
 b. $\# \llbracket \text{SGT } [\text{bir CARD } [_{\text{NP}} * \text{çocuk}]] \rrbracket = \lambda x. \llbracket [_{\text{NP}} * \text{çocuk}] \rrbracket (x) \ \& \ \#x = 1 \quad \rightarrow \textit{bir çocuk}$
 c. $\# \llbracket \text{PL } [\text{bir CARD } [_{\text{NP}} \text{çocuk}]] \rrbracket = \lambda x. \llbracket [_{\text{NP}} \text{çocuk}] \rrbracket (x) \ \& \ \#x = 1 \quad \rightarrow \textit{bir çocuklar}$
 d. $\# \llbracket \text{PL } [\text{bir CARD } [_{\text{NP}} * \text{çocuk}]] \rrbracket = \lambda x. \llbracket [_{\text{NP}} * \text{çocuk}] \rrbracket (x) \ \& \ \#x = 1 \quad \rightarrow \textit{bir çocuklar}$

The account of Turkish *bir* ‘one’ and English *one* combinations is the same, even if $\llbracket \text{SGT} \rrbracket \neq \llbracket \text{SGE} \rrbracket$, since with respect to a set of atoms, absolute atomicity and relative atomicity yield the same result (cf. (51) and (58)). Given $\llbracket \text{SGT} \rrbracket$, twosomes count as atomic for Turkish *iki* ‘two’ (threesomes for *üç* ‘three’, etc.), so nouns are morphologically singular with all numerals ((57)). They do not count as atomic for $\llbracket \text{SGE} \rrbracket$.

It is obvious that Scontras’ account for languages of types 1 and 2 forms the basis of my analysis in section 2.2. The same is true for his account of language type 3: the singular feature in this language is ambiguous between $\llbracket \text{SGT} \rrbracket$ and $\llbracket \text{SGE} \rrbracket$. Western Armenian *meg* ‘one’ surfaces in morphologically singular noun phrases because both (51) and (58) yield the same result. When $\llbracket \text{SGT} \rrbracket$ is used with *yergu* ‘two’, etc., a morphologically singular noun phrase results ((57)). When, instead, $\llbracket \text{SGE} \rrbracket$ is used, a morphologically plural noun phrase results ((48)). $\llbracket \text{SGT} \rrbracket$ and $\llbracket \text{SGE} \rrbracket$ do not compete with each other in Western Armenian, since they are both equally presuppositional. The correct semantics is produced.

To summarize. Scontras proposes a uniform syntax and semantics for all numerals, and for noun phrases, across the three language types. For Scontras, the crucial

difference arises in the semantics of the feature [SG], which can vary from one language to another. This is what is responsible for the variation we observe in Table 1, both in his and in my account.

Notice that the sensitivity of [SG_T] to relative atomicity serves no purpose in Scontras' account other than to derive the Turkish and Western Armenian patterns—the feature [SG_T] is thus stipulated in this analysis. Ideally, however, there would be independent reasons for adopting it. In the proposal in section 2.2, on the other hand, Harbour's (2011, 2014) [+minimal] feature is motivated independently, in that it serves various purposes other than deriving the patterns in Table 1, and, as we saw in section 2.2, has the same effect as Scontras' [SG_T]. Seeing [SG_T] as Harbour's [+minimal], we derive the patterns in Table 1 in precisely the principled way that is lacking in Scontras' account. Recall that in the proposal in section 2.2, numerals in type 2 languages appear in the noun phrases that they do because the theory of grammar assigns those languages a [±minimal] number system.

To see how [+minimal] achieves the same result as Scontras' [SG_T], consider (57)a again, in (59)b, where [SG_T] applies to (56)a, in (59)a, and compare it to the result of applying [+minimal] to (56)a, in (59)c:

(59)

- a. $\llbracket \text{iki CARD } [_{NP} \text{ *}\zeta\text{ocuk}] \rrbracket = \lambda x. \llbracket [_{NP} \text{ *}\zeta\text{ocuk}] \rrbracket(x) \ \& \ \#x = 2$
- b. $\llbracket \text{SG}_T \text{ [iki CARD } [_{NP} \text{ *}\zeta\text{ocuk}] \rrbracket = \lambda x. \llbracket [_{NP} \text{ *}\zeta\text{ocuk}] \rrbracket(x) \ \& \ \#x = 2$
- c. $\llbracket \text{ [+minimal] [iki CARD } [_{NP} \text{ *}\zeta\text{ocuk}] \rrbracket = \lambda x. \llbracket [_{NP} \text{ *}\zeta\text{ocuk}] \rrbracket(x) \ \& \ \#x = 2$

[SG_T] checks that the set P denoted by its argument contains only plural boy individuals with no subparts in P. P contains only plural boy individuals each of which is constituted of exactly 2 atoms, and nothing else, as in (59)a, which indeed satisfies [SG_T]. Thus, NumberP in (59)a, with Scontras' [SG_T], is a set of plural boy individuals each of which is constituted of exactly 2 atoms. [+Minimal] is not presuppositional, but it still has the effect that NumberP denotes a set of plural boy individuals each of which is constituted of exactly 2 atoms. In other words, we can replace [SG_T] with [+minimal]. Doing so diminishes the cost of Scontras' analysis substantially: while we still have to state that Turkish uses [+minimal] where English uses [+atomic], the fact that [+minimal] is used simply follows from Harbour's system. The amount of variation we expect on the numeral-noun construction is now principally constrained.

However, this result can only be achieved if languages of type 2 are [±minimal] systems—in Harbour's system, if [+minimal] is active in a language, then so is [−minimal]. Important questions arise now. What happens with [−minimal] in Scontras' analysis, given that there is no difference between [+minimal] and [−minimal] in presuppositional terms? And what about [PL]? More generally, the question is: how are plurals, and numeral+noun combinations, derived if languages of type 2 are [±minimal] systems?

As it turns out, there is a basic incompatibility between Sauerland's (2003) view of plurality (and hence Scontras') and Harbour (2011, 2014): Martí (2017, 2019) shows that embedding a view of plurality like Sauerland's in Harbour's system makes the wrong predictions about the cross-linguistic typology of plurality.

Her argument is as follows. First, as is well known (see Farkas and de Swart 2010, Grimm 2012, Ivlieva 2013, Kiparsky and Tonhauser 2012, Krifka 1989, 1995, Lasersohn 1998, 2011, Martí 2017, 2019, Mayr 2015, Sauerland 2003, Sauerland, Anderssen and Yatsushiro 2005, Spector 2007, Yatsushiro, Sauerland and Alexiadou 2017, Zweig 2009),

plural noun phrases in English give rise to either exclusive or inclusive readings. The plurals in (60) are interpreted inclusively: e.g., according to (60)a, Lina harvested neither one nor more tomatoes. Denotationally, this means that $[[[\text{NumberP tomatoes}]]]$ should include both singular and plural tomato individuals:

(60)

- a. Lina didn't harvest **tomatoes**
- b. No **students** came to the party
- c. I don't have **children**
- d. Do you have **children**?

In upward-entailing (non-question) contexts, on the other hand, these same phrases are usually interpreted exclusively. If (61)a is true, for example, Lina needs to have harvested more than one tomato:

(61)

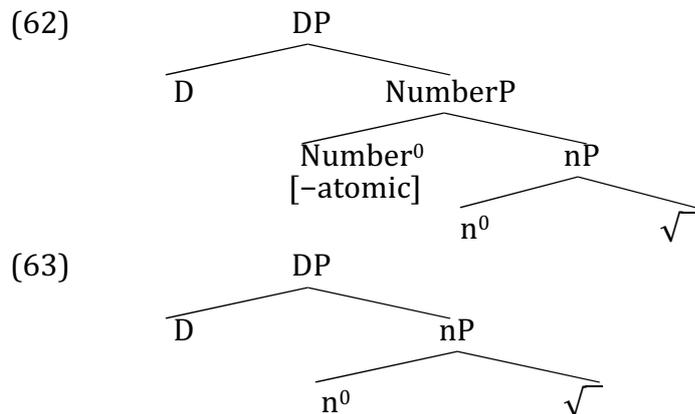
- a. Lina harvested **tomatoes**
- b. **Students** came to the party
- c. I have **children**

Two main types of accounts of the distribution of exclusive and inclusive plurals in languages like English have been pursued. In the first type, plural noun phrases are ambiguous between exclusive and inclusive readings (Farkas and de Swart 2010, Grimm 2012, Martí 2017, 2019). According to the second type, plural noun phrases are unambiguously inclusive and exclusive readings arise only pragmatically (via implicature, as in Spector 2007, or via Maximize Presupposition, as in Sauerland 2003 and others; note that these principles are sensitive to the monotonic properties of the environment the plural noun phrase finds itself in). I refer to the second type of account as the inclusive-only view of plurality.

As Martí explains, inclusive-only accounts of plurality amount, in Harbour's terms, to the postulation of number systems that deploy [+atomic] (or, if wanted, a presuppositional version of it) to the exclusion of [-atomic]. [+Atomic]-only languages are languages with singular noun phrases and with inclusive plural noun phrases in downward-entailing questions and questions, like English. Given Sauerland's pragmatics, based on Maximize Presupposition, exclusive plurals arise via implicature, as explained above. However, if a number system can deploy [+atomic] without also deploying [-atomic], then it follows that such a number system cannot use [-atomic] elsewhere within the same system. But Harbour and others argue that [-atomic] is used to derive dual number, as we saw earlier. An inclusive-only view of plurality, combined with Harbour's approach to number, predicts that languages with dual number should not have inclusive plurals. This is contrary to fact: Martí shows that languages with both duals and inclusive plurals exist. Either the inclusive-only view of plurality, or Harbour's theory of number, has to be abandoned.

A solution considered by Martí consists in embedding an ambiguity account of plurality within Harbour's system, using Farkas and de Swart's (2010) Strongest Meaning Hypothesis to explain the distribution of exclusive and inclusive plural noun phrases. The availability of inclusive plural noun phrases is due in this proposal to the possibility of not projecting NumberP (that is, having no number features operating on nP). Languages like English realize noun phrases where NumberP is not projected as

morphologically plural noun phrases. This then derives the number neutrality associated with inclusive plural noun phrases in the right contexts. That is, the availability of exclusive plural noun phrases is due to [-atomic] ((62)), and the availability of inclusive plural noun phrases is due to the absence of NumberP ((63)):



The distribution of the two is regulated by the Strongest Meaning Hypothesis.

Such a solution being the only one that is compatible with Harbour’s theory²², and hence with the reduction of Scontras’ [SGT] to Harbour’s [+minimal] I proposed above, a language like English must be a [±atomic] language with the possibility of not projecting NumberP. But this means that [PL] in English cannot be Scontras’ [PL]—we cannot maintain an account of plurality that doesn’t contain something like [-atomic]. This is the main theoretical motivation for the alternative account of the cross-linguistic patterns in Table 1 I proposed in section 2.2.

In that account, whether a language has inclusive plural noun phrases or not is unrelated to which pattern the language chooses for the noun+numeral construction—since we have no evidence that these two sets of facts are related, the null hypothesis is that the account of the latter should not rely on the former. To integrate Martí’s account of inclusive and exclusive plurality in the account in section 2.2., all we need to say is that, if a language has inclusive plural noun phrases, then it tolerates the absence of NumberP in numeral-less noun phrases and realizes them morphologically as plural.²³ This will be the case for languages of type 2 as well—if they have inclusive plural noun phrases, then they tolerate the absence of NumberP in numeral-less noun phrases; when NumberP is present, exclusive plural noun phrases are generated thanks to [-minimal]²⁴.

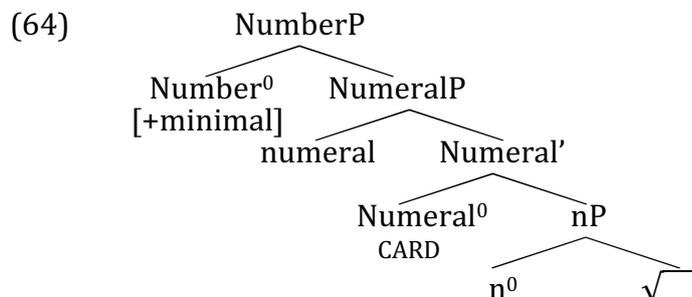
²² Martí considers other possibilities, but they come very close to postulating the [-atomic] feature.

²³ Notice that if it is the mere absence of NumberP that prompts the choice of plural forms in these languages, the wrong predictions are made for numeral phrases such as *one boys*: this combination is ungrammatical, but it is predicted to be grammatical under this assumption—[[one CARD [n_P boy]]], without NumberP but with NumeralP, would be assigned the spell out *one boys*, with the same meaning as *one boy*. Given that Martí is not concerned with the account of numerals, understanding her statement in such a way that it doesn’t apply to phrases with a numeral does not affect her analysis of inclusive plurals.

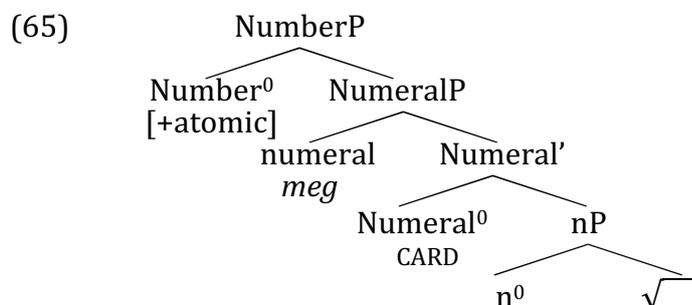
²⁴ The question arises as to whether Turkish or Western Armenian have inclusive and exclusive plurals, like English. Görgülü (2012) argues that Turkish plural nouns do not give rise to inclusive readings. On the other hand, Sağ (2016: 10, 2017) and Renans *et al.* (2017) argue that they do. According to Bale *et al.* (2011), Bale and Khanjian (2014), Western Armenian only has exclusive plurals. I am not able to settle these matters at this point. However, as we’ve seen, my proposal in section 2.2 works whether type 2 or type 3 languages have inclusive plurals or not.

Thus, my account in section 2.2 takes from Scontras' the crucial idea that number features operate on phrases that contain the numeral, and that this is responsible for the morphological number marking we see on noun phrases in the numeral+noun construction. Importantly, however, my account does not stipulate a special feature for languages of types 2 and 3: the feature that derives these patterns is Harbour's [\pm minimal]. Because Harbour's [\pm minimal] is justified independently, as it is the feature that derives, among others, minimal-augmented and singular-dual-plural number systems, the work that [\pm minimal] does here is costless. Whereas Scontras' account relies on an inclusive-only semantics for plurals, with associated pragmatic principles like Maximize Presupposition to derive exclusive plurals, my account relies on the features [-minimal] and [-atomic] to derive exclusive plurals, and, following Martí (2017, 2019), on the absence of NumberP, plus a pragmatic principle like the Strongest Meaning Hypothesis, to derive inclusive plurals.

Both accounts postulate a uniform semantics for numerals (as numbers, type <n>), as well as a uniform semantics for the noun phrases involved in the numeral+noun construction, across languages. About the latter, note that the two accounts take the number of the noun phrase of Turkish numeral+noun phrases to be always singular ([SG_T] in Scontras' account, [+minimal] in mine; according to my account, they should thus be more appropriately called minimal, but I stick to the label 'singular' here). Thus, in my account, all Turkish numeral+noun phrases, and all Western Armenian numeral+noun phrases without *-ner*, contain the NumberP in (64):



Western Armenian additionally allows the possibility in (65) for those cases where the numeral is *meg* 'one':



This empirical point is worth making because in the first account proposed for the data in Table 1, that in Bale, Gagnon and Khanjian (2011a), these noun phrases are postulated to be number neutral, not singular. Bale, Gagnon and Khanjian also take the semantics of numerals not to be uniform cross-linguistically. I argue below that both of these assumptions are problematic.

4 Bale, Gagnon and Khanjian (2011a)

4.1 The account

For Bale, Gagnon and Khanjian (2011a), there are two possible denotations for numerals: the subsective semantics in (66), and the intersective semantics in (67):²⁵

$$(66) \llbracket \text{two}_s \rrbracket = \lambda P_{pl}. \lambda x. x \in P_{pl} \ \& \ |\{y: y < x \ \& \ \text{atom}(y)\}| = 2$$

$$(67) \llbracket \text{two}_i \rrbracket = \lambda x. |\{y: y < x \ \& \ \text{atom}(y)\}| = 2$$

In (66), the input argument to the numeral is constrained to be only sets containing both atoms and non-atoms. The numeral counts the atoms that constitute proper parts of the members of the input argument. In an intersective semantics like (67), the numeral is a cardinality predicate. Similar remarks can be made for the numeral *one* (though Bale, Gagnon and Khanjian do not discuss it), with the difference that the constraint subsective *one* imposes on its argument is that it be a set of atoms (P_{sg}):²⁶

$$(68) \llbracket \text{one}_s \rrbracket = \lambda P_{sg}. \lambda x. x \in P_{sg} \ \& \ |\{y: y \leq x \ \& \ \text{atom}(y)\}| = 1$$

$$(69) \llbracket \text{one}_i \rrbracket = \lambda x. |\{y: y \leq x \ \& \ \text{atom}(y)\}| = 1$$

For a language like English, morphologically singular noun phrases are assumed to denote sets of atoms and numerals are taken to be uniformly subsective. Assuming a universe with just three boys, we have:

$$(70) \llbracket [N \ \text{boy}] \rrbracket = \{a, b, c\}$$

$$(71) \llbracket [N \ \text{boys}] \rrbracket = \{a, b, c, ab, bc, ac, abc\}$$

Bale, Gagnon and Khanjian are not precise about the syntax that they assume for noun phrases or the numeral+noun construction, but what is crucial for us here is that numerals in their account directly combine with (70) and (71), and no number features are postulated. Structures that are compatible with these assumptions are in (73) and (73):

²⁵ A predicate P is of type pl iff $\forall x, y \in P \ x+y \in P$. (66) and (67) are simplified versions of Bale, Gagnon and Khanjian's numeral semantics. Their official semantics is in (i) and (ii), with auxiliary definitions in (iii) and (iv) (though a definition for part is never provided):

(i) $\llbracket \text{two}_s \rrbracket = \lambda P_{pl}. \{x: x \in P_{pl} \ \& \ \exists Y (Y \in \text{part}(x) \ \& \ |Y| = 2 \ \& \ \forall z (z \in Y \rightarrow z \in \text{min}(P_{pl})))\}$

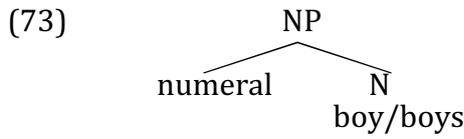
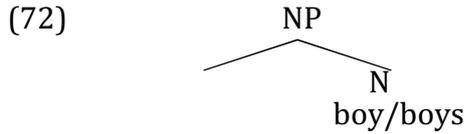
(ii) $\llbracket \text{two}_i \rrbracket = \{x: \exists Y (Y \in \text{part}(x) \ \& \ |Y| = 2 \ \& \ \forall z (z \in Y \rightarrow \text{atom}(z)))\}$

(iii) $\text{min}(P)$ is defined iff $\forall x, y ((x, y \in P \ \& \ \neg \exists z (z \in P \ \& \ (z < y \vee z < x))) \rightarrow x \wedge y = 0)$. When defined $\text{min}(P) = \{x: x \in P \ \& \ \neg \exists z (z < x)\}$

(iv) $\text{atom}(x) = 1$ iff $x \in D \ \& \ \neg \exists z (z \in D \ \& \ z < x)$

Their min and atom foreshadow the notions of minimality and atomicity that are crucial in Scontras' and my account, though in their case they are part of the semantics of numerals, not of number features, and as such they don't produce the same effects.

²⁶ A predicate P is of type sg iff $\forall x, y \in P \ x+y \notin P$. All numeral denotations in this paper derive *at least* readings. I assume *exactly* readings are derived by implicature, as in Horn (1972) and much subsequent literature, an analysis which has not, of course, remained unchallenged. An ambiguity approach like that in Geurts (2006) is also compatible with the proposal here. Cf. Kennedy (2015) and references cited there.



Thus, we have, for English:

- (74)
- | | | |
|----|--|--|
| a. | $\llbracket \text{two}_S \llbracket \text{N boys} \rrbracket \rrbracket = \lambda x. x \in \llbracket \llbracket \text{N boys} \rrbracket \rrbracket \ \& \ \{y: y < x \ \& \ \text{atom}(y)\} = 2$ | \rightarrow <i>two boys</i> |
| b. | $\# \llbracket \text{two}_S \llbracket \text{N boy} \rrbracket \rrbracket$ | \rightarrow <i>two boy</i> |
| c. | $\llbracket \text{one}_S \llbracket \text{N boy} \rrbracket \rrbracket = \lambda x. x \in \llbracket \llbracket \text{N boy} \rrbracket \rrbracket \ \& \ \{y: y \leq x \ \& \ \text{atom}(y)\} = 1$ | \rightarrow <i>one boy</i> |
| d. | $\# \llbracket \text{one}_S \llbracket \text{N boys} \rrbracket \rrbracket$ | \rightarrow <i>one boys</i> |

Two boy ((74)b) is predicted to be impossible in English because *two_S* cannot combine with the N *boy*: *two_S* requires its input to denote a set of atoms and non-atoms, and the N *boy* does not denote such a set ((70)). *Two_S*, on the other hand, can combine with a morphologically plural N like *boys* ((74)a) because the set of atoms and non-atoms that the N *boys* denotes ((71)) does satisfy that requirement. *One_S* cannot combine with *boys* ((74)d) because *one_S* requires its input to denote a set of atoms, and *boys* does not denote such a set. *Boy* does, however, which is why *one boy* ((74)c) is grammatical. Turkish, on the other hand, uses a subsecutive semantics for any numeral greater than 1, an intersective semantics for 1, and a different semantics for morphologically singular and plural nouns:

(75) $\llbracket \llbracket \text{N çocuk} \rrbracket \rrbracket = \{a, b, c, ab, bc, ac, abc\}$

(76) $\llbracket \llbracket \text{N çocuklar} \rrbracket \rrbracket = \{ab, bc, ac, abc\}$

- (77)
- | | | |
|----|--|--|
| a. | $\llbracket \text{iki}_S \llbracket \text{N çocuk} \rrbracket \rrbracket = \lambda x. x \in \llbracket \llbracket \text{N çocuk} \rrbracket \rrbracket \ \& \ \{y: y < x \ \& \ \text{atom}(y)\} = 2$ | \rightarrow <i>iki çocuk</i> |
| b. | $\# \llbracket \text{iki}_S \llbracket \text{N çocuklar} \rrbracket \rrbracket$ | \rightarrow <i>iki-çocuklar</i> |
| c. | $\llbracket \text{bir}_I \llbracket \text{N çocuk} \rrbracket \rrbracket = \lambda x. \{y: y \leq x \ \& \ \text{atom}(y)\} = 1 \ \& \ \llbracket \llbracket \text{N çocuk} \rrbracket \rrbracket (x)$ | \rightarrow <i>bir çocuk</i> |
| d. | $\# \llbracket \text{bir}_I \llbracket \text{N çocuklar} \rrbracket \rrbracket$ | \rightarrow <i>bir-çocuklar</i> |

Given (75), a subsecutive semantics for numerals greater than 1 gives a different result from English. The combination of such numerals with morphologically singular nouns is predicted to be grammatical, and with the desired semantics, as in (77)a (for *iki* ‘two’). Their combination with morphologically plural nouns, (77)b, is correctly predicted to be ungrammatical—such numerals require their input to denote a set of atoms and non-atoms, and (75) does not denote such a set. Using *bir_S* ‘one_S’, however, would wrongly predict that this numeral cannot combine with morphologically singular nouns, as (75) does not denote a set of atoms. Thus, *bir_I* ‘one_I’ is used instead, and the rest of the Turkish pattern is predicted, (77)c/(77)d. As for Western Armenian, its noun semantics is proposed to be like that in Turkish, but its numerals are always intersective:

(78)

- a. $\llbracket \text{yergu}_I \llbracket_N \text{dəgha} \rrbracket \rrbracket = \lambda x. |\{y: y < x \ \& \ \text{atom}(y)\}| = 2 \ \& \ \llbracket \llbracket_N \text{dəgha} \rrbracket \rrbracket (x) \rightarrow \text{yergu dəgha}$
b. $\llbracket \text{yergu}_I \llbracket_N \text{dəghaner} \rrbracket \rrbracket = \lambda x. |\{y: y < x \ \& \ \text{atom}(y)\}| = 2 \ \& \ \llbracket \llbracket_N \text{dəghaner} \rrbracket \rrbracket (x)$
 $\rightarrow \text{yergu dəghaner}$
c. $\llbracket \text{meg}_I \llbracket_N \text{dəgha} \rrbracket \rrbracket = \lambda x. |\{y: y \leq x \ \& \ \text{atom}(y)\}| = 1 \ \& \ \llbracket \llbracket_N \text{dəgha} \rrbracket \rrbracket (x) \rightarrow \text{meg dəgha}$
d. $\# \llbracket \text{meg}_I \llbracket_N \text{dəghaner} \rrbracket \rrbracket \rightarrow \text{meg-dəghaner}$

The intersective numeral semantics of *yergu* ‘two’ does not impose constraints on the denotation of the noun it combines with, so both (78)a, *yergu dəgha* ‘two boy’, and (78)b, *yergu dəghaner* ‘two boys’, are grammatical and have the desired semantics. However, *meg* ‘one’ cannot combine with a noun that denotes a set of non-atoms, as a set of non-atoms intersected with a set of individuals constituted exactly of 1 atom is empty. Hence, the only restriction we observe in Western Armenian is that *meg* cannot combine with morphologically plural nouns ((78)d).

Thus, according to Bale, Gagnon and Khanjian, N varies in its denotation from one language to another (English vs. Turkish/Western Armenian morphologically singular nouns, for example), as does the semantics of numerals (subsective in English/Turkish, intersective in Western Armenian) and the semantics of numerals within the same language (numerals greater than one vs. *bir* ‘one’ in Turkish).

However, there is no independent empirical evidence that the semantics of numerals should vary in this way across the three language types (or more generally)—the null hypothesis here is that it is the same across languages, which is what is assumed in both Scontras’ and my account. On this count, Bale, Gagnon and Khanjian’s proposal is quite unappealing.

Whether the semantics of N should vary from one language to another is also an empirical question, and here Bale, Gagnon and Khanjian do provide an empirical argument that morphologically singular Ns in Turkish and Western Armenian are number-neutral, based on their semantic behavior when used as bare noun phrases (i.e., without a numeral, a D, a quantifier, etc.). It is to this argument that we turn below. I show that Bale, Gagnon and Khanjian’s assumptions about Turkish and Western Armenian morphologically singular Ns are not empirically justified.

For comparison, recall that morphologically singular bare noun phrases in my and Scontras’ account are semantically singular in the three types of languages (because they use [SG]/[SG_T] in Scontras’ account, [+atomic]/[+minimal] in mine). Recall numerals/CARD always combine with number-neutral nPs in my account, but in this account number is a property of full noun phrases, not of subparts of them, such as nPs—what is descriptively known as bare nouns or bare noun phrases are not nPs but at least NumberPs, and possibly DPs.

4.2 The semantics of morphologically singular noun phrases in Turkish and Western Armenian

Bale, Gagnon and Khanjian (2011a) assume that morphologically singular Ns in the numeral+noun construction in Turkish and Western Armenian are semantically number-neutral because they give rise to a number-neutral semantics when used as bare noun phrases, without the numeral. Following Sağ (2016, 2017) and Martí (2017), however, I argue that the latter assumption is wrong. I show below that Turkish morphologically singular bare nouns are number-neutral only when incorporated, that is, in non-argumental positions. Crucially, morphologically singular bare noun phrases

are semantically singular in non-incorporated, argumental positions—and there are no reasons to think that incorporation is involved in the numeral+noun construction. I also argue that in Western Armenian, morphologically singular bare noun phrases are either singular count noun phrases or naturally atomic mass noun phrases (in the sense of Bale and Barner 2009, Landman 2011, Rothstein 2010a, b, among others), but that, crucially, numerals appear in the former, not the latter. Thus, in addition to the theoretical shortcomings of this proposal, discussed above in section 4.1, there are empirical shortcomings in this account as well.

4.2.1 Turkish singular noun phrase semantics

Morphologically singular bare noun phrases in Turkish are usually taken to be number neutral semantically (Acquaviva 2005, Bale, Gagnon and Khanjian 2011a, Bliss 2004, Corbett 2000, Göksel and Kerslake 2005, Görgülü 2012, Walter 2014). Consider the following examples, often discussed in this literature:

(79) *Turkish*

Kitap al-dı-m
book buy-PAST-1SG
'I bought a book/books'

(80) *Turkish*

Ali-yi **arı** sok-tu
Ali-ACC bee sting-PAST
'Bees stung Ali'/'Ali got bee-stung'

(81) *Turkish*

Çocuk gel-miş
child come-EVID
'There was one or more children coming'

In (79)-(81), the highlighted noun phrases receive a number neutral interpretation, as can be seen from the translations. One reason why that might be is that, as hypothesized in Bale, Gagnon and Khanjian, the noun phrases in these sentences have a number neutral denotation. However, as discussed in Cabredo Hofherr (to appear a, and references cited there), number neutrality can have sources other than noun phrase semantics. In particular, Sağ (2016, 2017), and Martí (2017) after her, shows that the number neutrality observed in (79)-(81) is attested only in incorporation contexts, when morphologically singular noun phrases appear in non-argument position. This being so, it is likely that the source of the number neutrality we observe in (79)-(81) is due to the semantics of incorporation (see Carlson 2006 and Dayal 2015 for overviews on the semantics of incorporation). In turn, this calls into question a number-neutral semantics for N in the numeral+noun construction in Turkish.

Let us go through the details of the argument. Knecht (1986), Kornfilt (1995, 2003) and Mithun (1984) argue that Turkish has noun incorporation.²⁷ Lack of incorporation

²⁷ Öztürk (2009), on the basis of developments in Massam (2001) (for Niauean; for Hindi, see Dayal 2011), argues that the more appropriate description is that Turkish has noun pseudo-incorporation (of both themes and agents), given that the relationship between the noun and the verb is less constrained in

in Turkish is recognizable from Case marking, syntactic position and intonation, as argued for Öztürk (2009) (also Kan 2010). Importantly, as Sağ and Martí note, when incorporation does not occur, i.e., when the noun phrases in question are forced into argument positions, morphologically singular bare noun phrases in Turkish are no longer number neutral. For example, consider (82), a minimal pair for (79) (note that Turkish has no definite article):

- (82) *Turkish*
Kitab-ı al-dı-m
 book-ACC buy-PAST-1SG
 ‘I bought the book’

Accusative Case marking in Turkish induces definiteness effects, as is well known (Enç 1991, von Heusinger and Kornfilt 2005, among others). Adding it to (79), with the result in (82), has two effects, not one: the expected definiteness of the noun, and, more importantly for us, its unambiguous singular interpretation—the speaker bought one and only one book. The latter effect is fully expected if noun incorporation in Turkish is blocked when the noun is Case marked. Lack of adjacency between the noun and the verb also blocks incorporation, and, again, a singular interpretation is the only possible interpretation in that case, as the minimal pair (80)/(83) shows—in (83), one and only one bee stung Ali:

- (83) *Turkish*
Arı Ali-yi sok-tu
 bee Ali-ACC sting-PAST
 ‘The bee stung Ali’

If the noun-verb connection is disrupted by other means, such as by a pause ((84)), or via stress on the verb ((85)), the singular interpretation arises again (cf. (80) and (81), where stress is on *çocuk*, respectively):

- (84) *Turkish*
 Ali-yi **arı** [] sok-tu
 Ali-ACC bee sting-PAST
 ‘The bee stung Ali’

- (85) *Turkish*
Çocuk gel-miş
 child come-EVID
 ‘The child came’

Thus, when the conditions for incorporation are not met, as in (82)-(85), singular (definite) interpretations arise in Turkish, which suggests that the number neutrality of examples in (79)-(81) is not due to the semantics of N, but to the semantics of incorporation.

Turkish than in languages traditionally considered to have incorporation. This difference doesn’t play a role in my argument below, so I will continue speaking of Turkish incorporation.

Note that the above singular interpretations cannot be a direct effect of Case, the syntactic position of the noun phrase or intonation, since plural noun phrases, as shown by Ketrez (2003), get semantically plural readings in these cases. Consider (86), with Accusative Case marking on the noun and with stress on the verb. The noun phrase is interpreted as plural, not singular:

- (86) *Turkish*
 Ayşe **kitap-lar-ı** oku-du
 Ayşe book-PL-ACC read-PAST
 'Ayşe read the books'

Regarding morphologically plural noun phrases in Turkish, Ketrez (2003) notes that, in addition to its function as a marker of standard plurality, exemplified in (86) and accounted for in the proposals above, *-lar* can give rise to plurality of events and plurality of kinds readings. These interpretations arise in examples such as (87), where there is no Case marker and where stress is on *-lar* (cf. (86)):

- (87) *Turkish*
 Ayşe **kitap-lar** oku-du
 Ayşe book-PL read-PAST
 'Ayşe engaged in multiple events of book-reading', or
 'Ayşe read different types of books'

That the plural marker can give rise to these different readings might call into question the idea that the Turkish number system is a singular-plural (minimal/augmented in my analysis in section 2.2) number system. It's important to note that plurality of events or plurality of types readings cannot be the source of plurality of individual readings, since the plurality of individuals reading is available in (86), but the other two aren't. As matters stand, it is reasonable to think that *-lar* can lead to a number of distinct readings, one of which is the plurality of individuals reading, and that only Case marking/definiteness can bring about that reading. In other words, an account of individual plurality is necessary that is independent of event and kind plurality.²⁸

The discussion above establishes that there is a semantic distinction in Turkish between morphologically singular bare noun phrases in argument positions vs. noun phrases in non-argument positions²⁹. The next question is whether nouns in the numeral+noun construction in Turkish are incorporated or not. To maintain Bale, Gagnon and Khanjian's hypothesis that numerals combine with number-neutral Ns in this construction, it would have to be the case that such nouns incorporate into the numeral. The main problem with this proposal is that, as it currently stands, it would serve no purpose other than to facilitate the analysis of Turkish envisaged by these authors. We know that numerals may be syntactic heads, taking the noun (or a projection of the noun) as complement (Borer 2005, Cardinaletti and Giusti 2006, Danon 2012, Giusti 1997, Ionin and Matushansky 2006, Longobardi 2001, Shlonsky 2004, Danon 2012), or phrases, which function as specifiers (Cinque 2005, Corver and Zwarts 2006, Danon 2012, Franks 1994, Giusti 1997, 2002, Kayne 2010, among others), and

²⁸ Turkish *-lar* can also be a marker of associative plurality (Lewis 1967, Sebüktekin 1971, Göksel and Kerslake 2005, Görgülü 2011). Görgülü (2011) argues that this is a separate use. Cf. also footnote 9.

²⁹ One could think that, in addition, incorporated nouns don't project as much syntactic structure as non-incorporated ones. I do not investigate this matter further here.

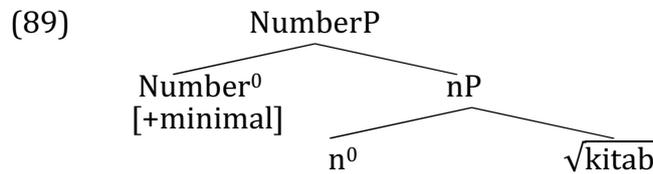
there are other distinctions and patterns that the rich literature on numerals and the numeral+noun construction recognizes, but there isn't one that would independently justify an incorporation relationship between numerals and nouns.³⁰

Importantly, if Turkish morphologically singular bare noun phrases are in fact not number neutral semantically, the account of Turkish defended in Bale, Gagnon and Khanjian is no longer empirically justified, a point made also in Sağ (2016, 2017). The analysis for *bir çocuk*/**çocuklar* need not change: *bir* 'one' can still be intersective, and the desired pattern and semantics are derived. However, the subsective denotation of *iki* no longer combines with that of the N *çocuk* in (88), since it is no longer the case that the denotation of its input argument contains both atoms and non-atoms:

$$(88) \llbracket [N \text{ çocuk}] \rrbracket = \{a, b, c\}$$

An intersective semantics also would not work, since (67) does not felicitously combine with (88).³¹

The evidence just presented suggests that the treatment of un-incorporated, morphologically singular bare noun phrases in my account in section 2.2 (and in Scontras' account as well) is correct. To repeat that account: I've proposed that a noun phrase like *kitab-ı* 'book' in (82) is analyzed as containing (89) as part of its structure, that is, as a semantically singular noun phrase (ignoring the precise location/analysis of Case and other matters irrelevant for our purposes):



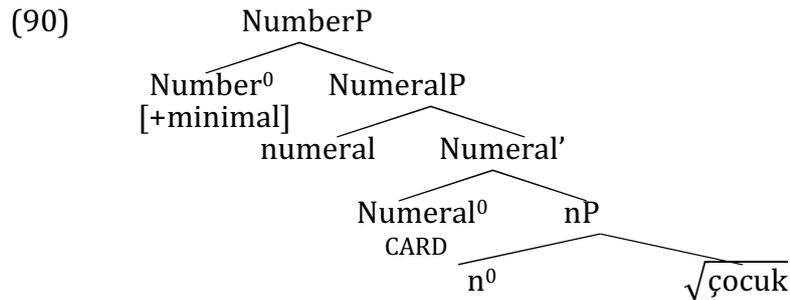
³⁰ The only remaining facts which still point to a number neutral semantics for morphologically singular noun phrases in these languages is their predicative uses, which are possible in both Turkish and Western Armenian (see Bale, Gagnon and Khanjian 2011a). One question is, of course, whether predicative positions are argumental positions, an issue I cannot address here (see Williams 1983 and much subsequent literature). Given the evidence in the text, an analysis involving a distributivity operator seems more plausible, which Bale, Gagnon and Khanjian do not exclude (p. 588, ft. 5).

³¹ Sağ (2016, 2017) argues that what is needed is the privative numeral semantics of Ionin and Matushansky (2006), where numerals combine with noun denotations containing only atoms to return sets of plural individuals, as in (i), with auxiliary definitions in (ii) and (iii) (cf. Higginbotham 1981: 110; Gillon 1984; Verkuyl & van der Does 1991; Schwarzschild 1994):

- (i) $\llbracket \text{twoP} \rrbracket = \lambda P_{\text{et.}\lambda X. \exists \text{Set } \Pi(S)(x) \ \& \ |S|=2 \ \& \ \forall s \in S \ P(s)$
- (ii) $\Pi(S)(x) = 1$ iff S is a cover of x , and $\forall z, y \in S \ [z=y \vee \neg \exists a \ [a \leq z \ \& \ a \leq y]]$
- (iii) A set of individuals C is a cover of a plural individual X iff X is the sum of all members of C ($X = \sqcup C$)

S is a partition (Π) of an entity x if it is a cover of x and its cells don't overlap (so that no element is counted more than once). Applying *twoP* to a set of atoms returns a set of twosomes each of which is composed of exactly two non-overlapping atoms. One could use such a privative interpretation for just numerals greater than 1, or for all numerals (the latter option would mean that all numerals in Turkish have a uniform interpretation). Either way, this undermines much of the motivation for Bale, Gagnon and Khanjian's argument that numerals cannot have privative interpretations, which forms the basis of their attempt to provide an alternative semantics to Ionin and Matushansky's for Turkish numerals. But, more importantly, it is unclear what the range of variation in numeral meanings there can be, and, thus, ultimately, whether the typology in Table 1 can now be predicted in a principled way.

And I've proposed that [+minimal] is also present in noun phrases that contain a numeral (cf. (36), (37)d and (37)g):



4.2.2 Western Armenian singular noun semantics

Western Armenian morphologically singular bare noun phrases are plausibly analyzed as naturally atomic mass (in the sense of Bale and Barner 2009, Landman 2011, Rothstein 2010a, b, among others) in examples such as (91)-(92)³²:

- (91) *Western Armenian*
 Maro-n **tuz** g-ude
 Maro-DEF fig IMP-eat.3SG
 'Maro eats one or more figs'

- (92) *Western Armenian*
 Տեղան-ե-ն **ճիճ** ing-av
 table-ABL-DEF bottle fall.AOR-3SG
 'From the table one or more bottles fell'

A naturally atomic mass interpretation is a number-neutral interpretation, as shown in more detail below, which would be compatible with Bale, Gagnon and Khanjian (2011a) and with the interpretation of these examples. However, I argue below that this cannot be how they are interpreted in the numeral+noun construction.

Given our discussion about noun incorporation in Turkish in the previous section, note first that Western Armenian does not have noun incorporation, following Sigler (1997), so that cannot be the source of the number-neutral interpretations of (91)-(92). Mohanan (1995), in her discussion of Hindi incorporation, shows that Hindi incorporated objects are interpreted differently from their non-incorporated counterparts. Consider the ambiguous (93) (Mohanan 1995: 91):

- (93) *Hindi*
 Mohan ch̥uṭṭiyō-me **vækyum** **kliinar** bectaa t̥haa
 Mohan.NOM holidays-in vacuum cleaner.NOM sell.HAB be.PAST
 'Mohan was selling vacuum cleaners during the holidays' or
 'Mohan was doing vacuum-cleaner-selling during the holidays'

In the first reading in (93), the object *vækyum kliinar* 'vacuum cleaner' is not incorporated and is a regular syntactic object. The second reading arises from

³² All Western Armenian examples are from Sigler (1997) and have been further corroborated by Hossep Dolatian.

incorporation of the noun into the verb. Only the latter is compatible with the continuation in (94):

(94) *Hindi*

Usne do mahine-me ek b^hii vāk̄yũm kliinar nahîi beci
 He.ERG two month-in one even vacuum cleaner.NOM NEG sell
 'He didn't even sell one vacuum cleaner in two months'

Parallel examples in Western Armenian show that the bare noun phrases of interest here do not incorporate. (96) sounds contradictory as a continuation for (95):³³

(95) *Western Armenian*

Yerp Ani-n Beirut gə-pənage-r **kork** gə-dʒaxe-r
 when Ani-DEF Beirut IMP-live-PAST.3SG carpet IMP-sell-PAST.3SG
 'When Ani lived in Beirut she sold carpets'
 #'When Ani lived in Beirut she did carpet-selling'

(96) *Western Armenian*

...# payc ayn yerek dar-va əntack.i.n nuynisg meg had
 but that three year-GEN during not.even one class
 kork čə-dʒaxe-c
 carpet NEG-sell-AOR.3SG
 'But she didn't sell a single carpet in those three years'

A more plausible explanation for the number-neutral interpretations in (91)-(92) is that morphologically singular noun phrases like *fif* 'bottle' or *tuz* 'fig' are mass, as argued by Bale and Khanjian (2008) and Sigler (1997), more specifically, as mass nouns with naturally atomic parts, like *luggage*, *furniture*, or *mail* in English (Bale and Barner 2009, Landman 2011, Rothstein 2010a, b, among others; for Sigler, they are typical mass nouns like English *water*). If the bare noun phrases in (91)-(92) can be interpreted as naturally atomic mass, then their number-neutral interpretation can be the same type of interpretation of nouns like *furniture* or *luggage*:

(97) I bought **furniture** for the living room

(98) I carried **luggage** up the stairs

According to (97), I bought one or more pieces of furniture, and according to (98), I carried one or more pieces of luggage upstairs. These noun phrases indeed allow for a cumulative interpretation in Western Armenian, as suggested by the following example, which makes them compatible with a mass denotation (cf. Link 1983):

³³ The equivalent examples from Turkish behave like those in Hindi, as expected. (i) is well-formed:

(i) *Turkish*

Anu Beirut-ta yaşa-r-ken **halı** sat-ar-dı.
 Anu Beirut-LOC live-AOR-when carpet sell-AOR-PAST
 Fakat Anu o üç yıl boyunca tek bir halı satmadı.
 But Anu it three year during single one carpet even
 'When Anu lived in Beirut, she did carpet-selling. But she didn't sell a single carpet in those three years.'

(99) Maro-n **ator** kənets, jes **ator** kənets-i, menk
 Maro-DEF chair buy.PAST, I chair buy.PAST-1SG, we
ator kənets-ink
 chair buy.PAST-1PL
 ‘Maro bought a chair, I bought a chair, we bought a chair’

It seems quite plausible, then, that the number neutral semantics we observe in examples (91)-(92) is due to the systematic availability of naturally atomic mass denotations for morphologically singular noun phrases in Western Armenian.

The important question for us is whether noun phrases with numerals in Western Armenian are also interpreted as naturally atomic mass—my account in section 2.2 (and Scontras’) takes them to be [+minimal]/[+atomic] noun phrases, so semantically singular, which is not compatible with a naturally atomic mass interpretation.

Sigler (1997) argues that they indeed are mass nouns in the numeral+noun construction. Her argument, and my reasons for questioning it, are as follows. Recall that Western Armenian allows both options in (6), repeated as (100), for numerals greater than one:

(100) *Western Armenian*
 Yergu **dəgha/dəgha-ner**
 two boy.SG/boy-PL
 ‘Two boys’

Donabédian (1993) and Sigler (1997) argue that there is a difference in interpretation between the singular form and the plural form in such constructions. With *yergu dəgha*, “the speaker is not interested in the individual [boys], but in the number and type of person”, whereas with *yergu dəghaner*, “the speaker is interested in the [boys] individually” (Sigler 1997: 41, 146-150). Consider the following examples (due to Hossep Dolatian, p.c.) (cf. Sigler’s 1997: 148-50 own examples):

(101) *Western Armenian*
 John: Ajsor jad martiggə kal-en gor ajs poyots-i-n
 today many people INDIC walk-3PL.PRES PROG this street-DAT-DEF
 metʃ
 in
 ‘A lot of people are walking on this street today’
 Bill: Ajo dzifd es ajsor yergu **aytʃig** ants-av
 yes right be.2SG today two girl pass.by-PAST.3SG
 ‘Yes, that’s true. Two girls passed by today’
 Bill: Ajo dzifd es ajsor yergu **aytʃig-ner** ants-an
 yes right be.2SG today two girl-PL pass.by-PAST.3PL
 ‘Yes, that’s true. Two girls passed by today’

(102) *Western Armenian*
 Teacher: Afagerd-ner, ov koytsa-v xəntsor-əs
 student-PL who steal.PAST-3SG apple-1SG.POSS
 ‘Students, who stole my apple?’

Student: #Jes desa ov ərav yergu **aytfig** xəntsor-ə koyts-av
 I see.PAST who did two girl apple-DEF steal-PAST.3SG
 'I saw who did it. Two girls stole the apple'

Student: Jes desa ov ərav yergu **aytfig-ner** xəntsor-ə
 I see.PAST who did two girl-PL apple-DEF
 koyts-an
 steal-PAST.3PL
 'I saw who did it. Two girls stole the apple'

When in the context number is relevant, as in (101), either expression is appropriate. When in the context it is identity that is relevant, not number, as in (102), the singular form of the noun is infelicitous, whereas the plural form is felicitous. The plural form of the noun in this construction is thus compatible with both types of context, whereas the singular form is compatible only with the counting context. This difference between the morphologically singular and plural forms is not associated *per se* with the plural suffix, as no such effect obtains in (103) or (104):

(103) *Western Armenian*

Yereg kifer **sarsur-ner** ga-i-n xohanoc-i-n meč
 Yesterday night cockroach-PL exist.PAST.3PL kitchen-GEN-DEF under
 'Last night there were cockroaches in the kitchen'

(104) *Western Armenian*

ՅՈՒՅՈՎ-ի-ն **lezvaked-ner** masnagce-c-an
 meeting-DAT-DEF linguist-PL participate-AOR-3PL
 'Linguists participated in the meeting'

For Sigler (cf. Donabédian), the difference exemplified in (101) and (102) follows from morphologically singular nouns being (typical) mass in the numeral+noun construction, and from the morphologically plural noun being count. *Dagha* in (100), being (typical) mass, does not allow differentiation among different subparts of the boy-mass. Being count, *daghaner* does allow such differentiation, which entails identification.

Whatever its merits, we cannot maintain this analysis in the face of the contrast, commonly noted in the literature, between typical mass nouns like *water* and naturally atomic mass nouns like *luggage* in English, or *menino* in Brazilian Portuguese. *Dagha* in (100), if mass, is naturally atomic mass, with clear differentiation between different subparts of the boy-mass, constituted by boy-atoms (cf. Bale and Barner 2009, Bale and Khanjian 2008, Rothstein 2010a, b, among others). But, more importantly, neither typical mass nor naturally atomic mass nouns can combine directly with numerals, in English or in other languages (cf. English **three water*, **three luggage*; Brazilian Portuguese **tres menino*, *tres meninos*, Cilene Rodrigues, p.c.). I haven't been able to find clear cases of naturally atomic mass nouns like English *luggage* in Western Armenian, but typical mass nouns do not combine directly with numerals (cf. (106)) (Khanjian 2012):

(105) *Western Armenian*

*Jerek **kini/vosgi/alujr**
 three wine/gold/flour

- (106) *Western Armenian*
 Hisun gram **alujr**
 fifty gram flour
 'Fifty grams of flour'

We must then assume that the Western Armenian morphologically singular nouns in (100) appear there in a second, count denotation, and that the difference illustrated in (101)/(102) is due to something other than a potential mass/non-mass contrast. This second, count denotation is actually likely to be systematically available for morphologically singular nouns, as when a definite article, which Western Armenian does have, is added to our earlier examples, only a semantically singular interpretation arises:

- (107) *Western Armenian*
 Maro-n **tuz-ə** g-ude
 Maro-DEF fig-DEF IMP-eat.3SG
 'Maro eats the fig'

- (108) *Western Armenian*
 Sevan-e-n **ʃif-ə** ing-av
 table-ABL-DEF bottle-DEF fall.AOR-3SG
 'From the table the bottle fell'

It is possible to show that this interpretation is not due to the definite article itself, since the definite article gives rise to plural interpretations with plural marked nouns:

- (109) *Western Armenian*
Pix-er-ə pax-a-n
 Elephant-PL-DEF escape-AOR-3PL
 'The elephants escaped'

- (110) *Western Armenian*
 Maro-n **tuz-er-ə** g-ude
 Maro-DEF fig-PL-DEF IMP-eat.3SG
 'Maro eats the figs'

A possibility worth pursuing for the contrast between (101)/(102) is one in which the introduction of an identifiability component is done by a different item within the noun phrase, such as a (silent) determiner or a quantifier. This would not be too surprising, as we know from other languages that quantifiers can indeed be sensitive to such distinctions (Russian uses *koe-wh* as an indefinite determiner to require the speaker to be able to identify the referent; cf. Martí and Ionin 2019 and references cited there).³⁴

³⁴ Western Armenian has a classifier, *had*, as shown in Bale and Khanjian (2008) and Sigler (2003) (cf. also Borer 2005, Khanjian 2012). This classifier can appear (and, for some speakers, is preferred) in (100):

- (i) *Western Armenian*
 Yergu (had) dəgha/dəgha-ner
 two CLASS boy.SG/boy-PL
 'Two boys'

Going back to my account in section 2.2, my proposal there is that Western Armenian uses either (111) or (112) as part of the structure of morphologically singular bare count noun phrases, and (113) or (114) as part of the structure for noun phrases with a numeral like *yergu* ‘two’ (recall that, since [-atomic] in Western Armenian is assumed to be spelled out as *-ner*, (114) gives rise to *yergu dægħa-ner* ‘two boys’):

- (111)
- ```

 NumberP
 / \
 Number0 nP
 [+atomic] / \
 n0 √dægħa

```
- (112)
- ```

      NumberP
     /      \
  Number0   nP
 [+minimal] /  \
            n0  √dægħa
  
```
- (113)
- ```

 NumberP
 / \
 Number0 NumeralP
 [+minimal] / \
 numeral Numeral'
 yergu / \
 Numeral0 nP
 CARD / \
 n0 √dægħa

```
- (114)
- ```

      NumberP
     /      \
  Number0   NumeralP
 [-atomic] /  \
            numeral Numeral'
            yergu  /  \
                  Numeral0 nP
                  CARD  /  \
                       n0  √dægħa
  
```

These proposals are compatible with the evidence we have reviewed in this section.

Summarizing now the arguments in section 4.2, Bale, Gagnon and Khanjian (2011a) propose that the differences in Table 1 follow in part from morphologically singular bare noun phrases in English being semantically singular while semantically number neutral in Turkish and Western Armenian. I have argued, however, that morphologically singular bare noun phrases in argument position are interpreted as morphologically singular only, as assumed in my account in section 2.2. In Western Armenian, morphologically singular nouns may be naturally atomic mass nouns, but under such an interpretation nouns cannot be counted, so that interpretation cannot serve as an argument to a numeral. Bale, Gagnon and Khanjian’s assumptions are thus not only theoretically unappealing, but empirically unsubstantiated as well.

For some, but not all, speakers, *had* is impossible with morphologically plural nouns. *Had* cannot occur with mass nouns. Turkish is also claimed to have an optional classifier; see Sağ (2016, 2017).

5 Conclusion

In this paper I have argued for an analysis of the cross-linguistic patterns in Table 1 based on the system in Scontras (2014), but with the following developments: (a) a single, number-neutral semantics for nP for all languages, as in Harbour (2011, 2014), (b) a non-arbitrary appeal to [SG_T] in the form of Harbour’s [+minimal], so that what was expressed as a stipulation before is now derived from the theory of number, and (c) a Harbour-compatible understanding of inclusive and exclusive plurality, facilitated by the adoption of Marti’s (2017, 2019) proposal. My account achieves this while maintaining the appeal of Scontras’ system, including his uniform interpretation for numerals across languages, and the correct treatment of bare noun phrases in Turkish and Western Armenian, which was shown to be problematic for Bale, Gagnon and Khanjian (2011a). I hypothesized type 1 languages to be [±atomic] number systems (what descriptively we call singular-plural systems), type 2 languages to be [±minimal] number systems (what descriptively we can call minimal-augmented systems), and type 3 languages to have both [±atomic] and [±minimal] number systems:

	[±atomic]	[±minimal]	[±atomic] or [±minimal]
<i>One N</i>	morphologically singular noun phrase	morphologically singular noun phrase	morphologically singular noun phrase
<i>Two, etc. N</i>	morphologically plural noun phrase	morphologically singular noun phrase	morphologically singular or plural noun phrase
Example languages	English, Spanish, German	Hungarian, Turkish, Finnish	Western Armenian, Miya, Itzaj Maya

Table 7 The three language types, according to their number system

Thus, the only element of variation in this approach is the type(s) of grammatical number system each language type has access to—and grammatical number systems are regulated by the principles of Harbour’s theory of number. In the account presented here, numerals greater than *one* appear in morphologically plural noun phrases in English because the members of a set of non-atoms are not atoms, and such a set can thus be characterized by [−atomic] (which spells out as *-s* in English). Such numerals, on the other hand, appear in morphologically singular noun phrases in Turkish because individuals in a set of non-atoms also count as having no subparts in the set, and such a set can thus be characterized by [+minimal] (which spells out as \emptyset in Turkish). The individuals in a set of atoms, on the other hand, are both atoms ([+atomic]) and have no subparts in the set ([+minimal]), so the difference between Turkish and English is obliterated in the single case of the numeral *one*, correctly, something which follows the logic of Harbour (2011, 2014). From the perspective of Harbour (2011, 2014, 2016), the paper demonstrates that the numeral+noun construction is another domain where [±atomic] and [±minimal] may be teased apart. From the perspective of Scontras (2014), the paper demonstrates that the structure of the explanation of the patterns in Table 1 requires neither an inclusive-only view of plurality nor the stipulation of a number feature like [SG_T].

References

- Acquaviva, Paolo. 2005. The Morphosemantics of Transnumeral Nouns. In G. Booij, E. Guevara, A. Ralli, S. SgROI & S. Scalise (eds.), *Morphology and Linguistic Typology, Online Proceedings of the Fourth Mediterranean Morphology Meeting (MMM4)*, University of Bologna, <http://morbo.lingue.unibo.it/mmm/>
- Bale, Alan and David Barner. 2009. The Interpretation of Functional Heads: Using Comparatives to Explore the Mass/Count Distinction. *Journal of Semantics* 26, 217-252
- Bale, Alan and Jessica Coon. 2014. Classifiers are for Numerals, not for Nouns: Consequences for the Mass/Count Distinction. *Linguistic Inquiry* 45, 695-707
- Bale, Alan, Michaël Gagnon and Hrayr Khanjian. 2011a. Cross-linguistic Representations of Numerals and Number Marking. *SALT* 20, 582-598
- Bale, Alan, Michaël Gagnon, and Hrayr Khanjian. 2011b. On the Relationship between Morphological and Semantic Markedness: The Case of Plural Morphology. *Morphology* 21: 197-221.
- Bale, Alan and Hrayr Khanjian. 2008. Classifiers and Number Marking. *Proceedings of the 18th Semantics and Linguistic Theory Conference*
- Bale, Alan and Hrayr Khanjian. 2014. Syntactic Complexity and Competition: the Singular-Plural Distinction in Western Armenian. *Linguistic Inquiry* 45: 1-26
- Biggs, Bruce G. 1975. *A Mele-Fila vocabulary*. Te Reo Monographs. Auckland: Linguistic Society of New Zealand.
- Bliss, Heather. 2004. The Semantics of the Bare Noun in Turkish. In Ilana Mezhevich and Michael B. Dobrovolsky (eds.) *Calgary Papers in Linguistics* 25, 1-65.
- Borer, Hagit. 2005. *Structuring Sense: In Name Only*. Oxford University Press.
- Cabredo Hofherr, Patricia. To appear a. Nominal Number Morphology. In Patricia Cabredo Hofherr and Jenny Doetjes (eds.) *Handbook of Grammatical Number*, Oxford University Press
- Cabredo Hofherr, Patricia. To appear b. Verbal Number. In Patricia Cabredo Hofherr and Jenny Doetjes (eds.) *Handbook of Grammatical Number*, Oxford University Press
- Cardinaletti, Anna and Giuliana Giusti. 2006. The Syntax of Quantified Phrases and Quantitative Clitics. In Martin Everaert and Henk van Riemsdijk (eds.) *The Blackwell Companion to Syntax*, vol. 5. Blackwell, Oxford, pp. 23-93
- Carlson, Gregory. 2006. The Meaningful Bounds of Incorporation. In Svetlana Vogeleer & Liliane Tasmowski (eds.) *Non-definiteness and Plurality*. John Benjamins, Amsterdam. 35-50.
- Chierchia, Gennaro. 1998. Reference to Kinds across Languages. *Natural Language Semantics* 6, 339-405
- Cinque, Guglielmo. 2005. Deriving Greenberg's Universal 20 and its Exceptions. *Linguistic Inquiry* 36, 315-332
- Clark, Ross. 1975. Mele notes. *Auckland University Working Papers in Anthropology, Archaeology, Linguistics, and Maori Studies* 40.
- Clark, Ross. 1998. *A dictionary of the Mele language (Atara Imere)*, Vanuatu. Pacific Linguistics, The Australian National University. DOI:10.15144/PL-C149.
- Clark, Ross. 2002/2011. Ifira-Mele. In John Lynch, Malcolm Ross and Terry Crowley (eds.) *The Oceanic Languages*, Routledge, 681-693.
- Corbett, Greville. 2000. *Number*. Cambridge, UK: Cambridge University Press.
- Corver, Norbert and Joost Zwarts. 2006. Prepositional Numerals. *Lingua* 116, 811-835
- Danon, Gabi. 2012. Two Structures for Numeral-Noun Constructions. *Lingua* 122, 1282-1307.

- Dayal, Veneeta. 2011. Pseudo Incorporation in Hindi. *Natural Language and Linguistic Theory* 29: 123-167
- Dayal, Vaneeta. 2015. Incorporation: Morpho-Syntactic vs. Semantic Considerations, in Olga Borik and Berit Gehrke (eds.) *The Syntax and Semantics of Incorporation*, *Syntax and Semantics* 40
- Dede, Müserref. 1986. Definiteness and Referentiality: Verbal Sentences. In Dan Slobin and Karl Zimmer (eds.), *Studies in Turkish Linguistics*. Amsterdam: John Benjamins Publishing Company. 147–164.
- Donabédian, Anaïd. 1993. Le Pluriel en Arménien Moderne. *Faits de Langues* 2, 179-188
- Enç, Murvet. 1991. Semantics of Specificity. *Linguistic Inquiry* 22, 1–25.
- Farkas, Donka and Henriëtte de Swart. 2003. *The Semantics of Incorporation*. Stanford: CSLI Publications
- Farkas, Donka and Henriëtte de Swart. 2010. The Semantics and Pragmatics of Plurals. *Semantics and Pragmatics* 3: 1–54.
- Franks, Steven. 1994. Parametric Properties of Numeral Phrases in Slavic. *Natural Language & Linguistic Theory* 12, 597-674.
- Franks, Steven. 1995. *Parameters of Slavic Morphosyntax*, Oxford University Press.
- van Geenhoven, Veerle. 1998. *Semantic Incorporation and Indefinite Descriptions*. Stanford: CSLI Publications.
- Geurts, Bart. 2006. Take ‘five’: the Meaning and Use of a Number Word. In Svetlana Vogeleer & Liliane Tasmowski (eds.) *Non-definiteness and Plurality*. John Benjamins, Amsterdam. 311-329.
- Gillon, Brendan. 1984. *The Logical Form of Quantification and Plurality in Natural Language*. PhD dissertation, MIT.
- Giusti, Giuliana, 1997. The Categorical Status of Determiners. In Liliana Haegeman (ed.) *The New Comparative Syntax*. Longman. 95-123.
- Giusti, Giuliana. 2002. The Functional Structure of Noun Phrases: a Bare Phrase Structure Approach. In Guglielmo Cinque (ed.) *Functional Structure in DP and IP*. Oxford University Press, Oxford. 54-90.
- Göksel, Ash and Celia Kerslake. 2005. *Turkish: a Comprehensive Grammar*. Routledge.
- Görgülü, Emrah. 2011. Plural Marking in Turkish: Additive or Associative? *Working Papers of the Linguistics Circle of the University of Victoria* 21: 70-80.
- Görgülü, Emrah. 2012. *Semantics of Nouns and the Specification of Number in Turkish*, PhD dissertation, Simon Fraser University
- Grimm, Scott. 2012. Plurality is Distinct from Number-Neutrality. *Proceedings of NELS* 41
- Hackl, Martin. 2001. *Comparative Quantifiers*. PhD dissertation, MIT.
- Harbour, Daniel. 2011. Descriptive and Explanatory Markedness. *Morphology* 21: 223-245
- Harbour, Daniel. 2014. Paucity, Abundance and the Theory of Number. *Language* 90, 158-229.
- Heim, Irene. 1991. Artikel und Definitheit. In Arnim von Stechow and Dieter Wunderlich (eds.) *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*, 487–535. Berlin: de Gruyter.
- von Heusinger, Klaus and Katlin Kornfilt. 2005. The Case of the Direct Object in Turkish: Semantics, Syntax and Morphology. *Turkic Languages* 9, 3-44.
- Higginbotham, James. 1981. Reciprocal Interpretations. *Journal of Linguistic Research* 1, 97-117.
- Horn, Laurence. 1972. *On the Semantic Properties of Logical Operators in English*. PhD

- dissertation, University of California Los Angeles
- Hurfurd, J.R., 2003. The Interaction between Numerals and Nouns. In: Plank, F. (ed.), *Noun Phrase Structure in the Languages of Europe. Empirical Approaches to Language Typology/Eurotyp*. Mouton de Gruyter. 561-620
- Ionin, Tanya and Ora Matushansky. 2006. The Composition of Complex Cardinals. *Journal of Semantics* 23: 315-360
- Kan, Seda. 2010. *Number Marking and Turkish Noun Phrases*, ms., University of Massachusetts, Amherst
- Karlsson, Fred. 1982. *Finnische Grammatik*. Hamburg: Helmut Buske
- Kayne, Richard. 2010. A Note on the Syntax of Numerical Bases. In *Comparisons and Contrasts*, Oxford University Press, Oxford. 57-72.
- Kennedy, Chris. 2015. A de-Fregean Semantics (and neo-Gricean Pragmatics) for Modified and Unmodified Numerals. *Semantics and Pragmatics* 8, 1-44.
- Ketrez, Nihan. 2003. *-lar*-marked Nominals and Three Types of Plurality in Turkish. *Chicago Linguistics Society* 39, 176-193
- Khanjian, Hrayr. 2012. Quantification in Western Armenian. Edward Keenan and D. Paperno (eds.), *Handbook of Quantifiers in Natural Language, Studies in Linguistics and Philosophy* 90, 845-890.
- Kiparsky, Paul and Judith Tonhauser. 2012. Semantics of Inflection. In Claudia Maienborn, Klaus von Heusinger and Paul Portner (eds.), *Handbook of Semantics, 2070–2097*. Berlin: de Gruyter.
- Knecht, Laura. 1986. *Subject and Object in Turkish*. Ph.D. dissertation, MIT.
- Krifka, Manfred. 1989. Nominal Reference, Temporal Constitution and Quantification in Event Semantics. In Renate Bartsch, Johan van Benthem & Peter van Emde Boas (eds.), *Semantics and Contextual Expression*, Dordrecht
- Krifka, Manfred. 1995. Common Nouns: a Contrastive Analysis of Chinese and English. In Greg Carlson and Jeffrey Pelletier (eds.) *The Generic Book*, Chicago: Chicago University Press, 398-411
- Krifka, Manfred. 2004. Bare NPs: Kind-referring, Indefinites, Both or Neither? *SALT* 13
- Kornfilt, Jaklin. 1997. *Turkish*. Routledge.
- Landman, Fred. 2011. Count nouns, mass nouns, neat nouns, mess nouns. In *The Baltic International Yearbook of Cognition, Logic and Communication: Formal semantics and Pragmatics. Discourse, Context and Models*, vol. 6, ed. B.H. Partee, M. Glanzberg, and J. Skilters, 1–67. Manhattan, KS: New Prairie Press.
- Laserson, Peter. 1995. Plurality, Conjunction, and Events. *Studies in Linguistics and Philosophy* 55, Springer
- Laserson, Peter. 2011. Mass Nouns and Plurals. In Klaus von Heusinger, Claudia Maienborn and Paul Portner (eds.), *Semantics: An International Handbook of Natural Language Meaning*, vol. 2, 1131-1153. *De Gruyter*.
- Lewis, Geoffrey. 1967. *Turkish Grammar*. OUP.
- Link, Godehard. 1983. The Logical Analysis of Plural and Mass Terms: a Lattice-Theoretical Approach. In Rainer Bäuerle, Christoph Schwarze & Arnim von Stechow (eds.), *Meaning, Use and Interpretation of Language*, 302-323. Berlin: de Gruyter.
- Lipkind, William. 1945. *Winnebago Grammar*. New York: King's Crown Press
- Longobardi, Giuseppe. 2001. The Structure of DPs: some Principles, Parameters and Problems. In Martin Baltin and Chris Collins (eds.) *The Handbook of Contemporary Syntactic Theory*. Blackwell, Oxford. 562-603
- Martí, Luisa. 2017. [\pm Atomic]. Talk presented at the 27th Colloquium in Generative Grammar, Universidad de Alcalá, Spain.

- Martí, Luisa. 2019. Inclusive plurals and the theory of number. *Linguistic Inquiry*, Early Access, https://doi.org/10.1162/ling_a_00330
- Martí, Luisa. To appear. Number in Imere. In Paolo Acquaviva and Michael Daniel (eds.) *The Typology of Number*, *Comparative Handbooks in Linguistics*, De Gruyter Mouton
- Martí, Luisa and Tania Ionin. 2019. Wide Scope Indefinites in Russian: an Experimental Investigation. *Glossa: A Journal of General Linguistics*, 4, 1, 4.
- Massam, Diane. 2001. Pseudo Incorporation in Niuean. *Natural Language and Linguistic Theory* 19: 153-197
- Mithun, Marianne. 1984: The Evolution of Noun Incorporation. *Language*, 60, 847-94.
- Mithun, Marianne. 1986: On the Nature of Noun Incorporation. *Language*, 62, 32-7.
- Mittendorf, Ingo and Lousie Sadler. 2005. Numerals, Nouns and Number in Welsh NPs. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG05 Conference*, CSLI Publications. Stanford, California.
- Nakanishi, Kimiko and Satoshi Tomioka. 2004. Japanese Plurals are Exceptional. *Journal of East Asian Linguistics* 13: 113-140
- Nelson, Diane and Ida Toivonen. 2000. Counting and the Grammar: Case and Numerals in Inari Sami. In Diane Nelson and P. Foulkes (eds) *Leeds Working Papers in Linguistics* 8, 179-192.
- Nevins, Andrew. 2011. Marked Targets vs. Marked Triggers and Impoverishment of the Dual. *Linguistic Inquiry* 42, 413-444
- Nevskaya, Irina. 2005. Inclusive and exclusive in Turkic languages, in Elena Filimonova (ed.) *Clusivity: Typology and case studies of the inclusive-exclusive distinction*, 341-358, John Benjamins, Amsterdam/Philadelphia
- Noyer, Rolf. 1992. Features, positions and affixes in autonomous morphological structure. PhD dissertation, MIT
- Onambélé, Christophe. 2012. *Vers une grammaire minimaliste de certains aspects syntaxiques de la langue ewondo*, Ph.D. dissertation, Université Paris 8
- Öztürk, Balkız. 2009. Incorporating Agents. *Lingua* 119: 334-358
- Partee, Barbara. 1987. Noun Phrase Interpretation and Type-Shifting Principles. In Jeroen Groenendijk, Dick de Jongh & Martin Stokhof (eds.), *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*, 115-143. Dordrecht: Foris
- Pereltsvaig, Asya. 2006. Passing by Cardinals: In support of Head Movement in Nominals. In James E. Lavine, Steven Franks, and Hana Filip (eds.) *Formal Approaches to Slavic Linguistics 14: The Princeton Meeting*. Ann Arbor, MI: Michigan Slavic Publications. 277-292
- Pires de Oliveira, Roberta and Susan Rothstein. 2011. Bare Singular Noun Phrases are Mass in Brazilian Portuguese. *Lingua* 121: 2153-2175
- Renans, Agata, George Tsoulas, Raffaella Folli, Nihan Ketrez, Lyn Tieu, Hanna de Vries, and Jacopo Romoli. 2017. Turkish Plural Nouns are Number-Neutral: Experimental Data, *Proceedings of the 21st Amsterdam Colloquium*, 365-374.
- Rijkhoff, Jan. 2002. *The Noun Phrase*, *Oxford Studies in Typology and Linguistic Theory*, Oxford University Press.
- Rothstein, Susan. 2010a. Counting and the Mass-Count Distinction. *Journal of Semantics* 27: 343-397.
- Rothstein, Susan. 2010b. Bare Noun Semantics, Kind Interpretations and the Universal Grinder. *Bare Nominals and Genericity Conference*, Paris.
- Rothstein, Susan. 2011. Counting, Measuring and the Semantics of Classifiers. In Barbara Partee, Michael Glanzberg, and Jurgis Škilters (eds.) *The Baltic International*

- Yearbook of Cognition, Logic and Communication, vol. 6. Formal Semantics and Pragmatics: Discourse, Context and Models. 1–42. Manhattan, KS: New Prairie.
- Rothstein, Susan. 2017. *Semantics for Counting and Measuring*. Cambridge University Press
- Sadler, Louisa. 2000. Noun phrase structure in Welsh. In Miriam Butt & Tracy Holloway King (eds.) *Argument Realization*. Stanford: CSLI Publications. 73-110
- Sağ, Yağmur. 2016. On the Semantics of Classifiers: a New Perspective from an Optional Classifier Language, Turkish. <http://ling.auf.net/lingbuzz/002999>
- Sağ, Yağmur. 2017. The Semantics of Numeral Constructions in Turkish. *Sinn und Bedeutung* 22.
- Sauerland, Uli. 2003. A New Semantics for Number. In Rob Young & Yuping Zhou (eds.), *Proceedings of the 13th Semantics and Linguistic Theory Conference*, 258–275. Ithaca, N.Y: Cornell University CLC-Publications.
- Sauerland, Uli, Jan Anderssen and Kazuko Yatsushiro. 2005. The Plural is Semantically Unmarked. In Stefan Kepser and Marga Reis (eds.), *Linguistic Evidence*, 409–30. de Gruyter.
- Sharvy. 1980. A More General Theory of Definite Descriptions, *The Philosophical Review* 89, 607–624.
- Schuh, Rusell. 1989. Number and Gender in Miya. In Zygmunt Frajzyngier (ed.) *Current Progress in Chadic Linguistics: Proceedings of the International Symposium on Chadic Linguistics*, 171-181. Amsterdam: John Benjamins
- Schuh, Rusell. 1998. *A Grammar of Miya*. University of California Press.
- Schwarzschild, Roger. 1994. Plurals, Presuppositions, and the Sources of Distributivity. *Natural Language Semantics* 2, 201-248
- Schwarzschild, Roger. 1996. *Pluralities*. Dordrecht: Kluwer Academic Publishers.
- Scontras, Greg. 2014. *The Semantics of Measurement*. PhD dissertation, Harvard University
- Sebüktekin, Hikmet. 1971. *Turkish-English Contrastive Analysis*. Mouton: The Hague, Paris
- Shlonsky, Ur. 2004. The Form of Semitic Noun Phrases. *Lingua* 114, 1465-1526.
- Sigler, Michele. 1997. *Specificity and Agreement in Standard Western Armenian*, PhD dissertation, MIT.
- Sigler, Michele. 2003. A Note on the Classifier in Western Armenian: *had*. *Annual of Armenian Linguistics* 22-23, 41-53.
- Spector, Benjamin. 2007. Aspects of the Pragmatics of Plural Morphology: on Higher-Order Implicatures. In Uli Sauerland & Penka Stateva (eds.), *Presuppositions and Implicatures in Compositional Semantics*, 243–281.
- Sharvy, Richard. 1980. A More General Theory of Definite Descriptions. *The Philosophical Review* 89: 607-624
- Tompa, József. 1968. *Ungarische Grammatik*. The Hague: Mouton
- Underhill, Robert. 1979. *Turkish Grammar*. MIT Press
- Verkuyl, H. J. and J. van der Does. 1991. The Semantics of Plural Noun Phrases'. In J. van der Does & J. van Eyck (eds.) *Quantifiers, Logic, and Language*. CSLI. Stanford. 337-374.
- Walter, Micah. 2014. *Morphosyntax and Semantic Type of NPs in Turkish*. BA dissertation, Haverford College
- Wilhelm, Andrea. 2008. Bare Nouns and Number in Dëne Sųłiné. *Natural Language Semantics* 16, 39-68

- Williams, Edwin. 1983. Syntactic and semantic categories. *Linguistics and Philosophy* 6, 423-446.
- Yatsushiro, Kazuko, Uli Sauerland & Artemis Alexiadou. 2017. The Unmarkedness of Plural: Crosslinguistic Data. In Maria LaMendola & Jennifer Scott, *BUCLD 41: Proceedings of the 41st annual Boston University Conference on Language Development*, 753-765. Somerville, USA: Cascadilla.
- Zweig, Eytan. 2006. Nouns and Adjectives in Numeral NPs. In L. Bateman and C. Ussery (eds.) *Proceedings of NELS 35. GLSA Publications*, Amherst, MA. 663-675.
- Zweig, Eytan. 2009. Number-Neutral Bare Plurals and the Multiplicity Implicature. *Linguistics and Philosophy* 32: 353-407.