

# The Semantic Type of D

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The definite determiner *the* is typically interpreted functionally as type  $\langle\langle e, t \rangle, \langle e, t \rangle, t \rangle$ , with the domain of the function a set of individuals,  $\langle e, t \rangle$ , and the output of the function a generalized quantifier,  $\langle\langle e, t \rangle, t \rangle$ . I propose rather that *the* and strong quantifiers in  $D^0$  are better interpreted as being of the semantic type  $\langle\langle\langle e, t \rangle, t \rangle, \langle\langle e, t \rangle, t \rangle\rangle$ , a function that takes generalized quantifiers and yields generalized quantifiers. This view makes for a more consistent compositional semantics, and, if we accept DP as a definiteness phrase, provides for a common semantic type for argument nominals. By further incorporating the idea of phrase fusion, we can also account for the possibility of bare-plural arguments in English and their absence in French, although the absence of bare-plural preverbal subjects in Italian remains a problem.

## 1. Introduction

This paper explores the functional projections above NP and the nature of their heads. Based on distributional behavior of strong and weak quantifying determiners, I argue along the lines of Lyons (1999) that DP should be split into a higher definiteness phrase for strong quantifying determiners and a lower cardinality phrase for cardinals, indefinite articles and weak quantifying determiners. This change from the traditional DP, where at least *a* and *the* were both assumed to compete for the same  $D^0$  position, allows for a more precise compositional semantics and can help explain some well known problems about bare nouns. In section 2, I review the standard view of determiners and in section 3 I raise some questions about the standard view. Section 4 outlines a view of DP that puts strong quantifying determiners and weak quantifying determiners in separate syntactic positions. I consider in section 5 how the revised view of DP sheds some light on certain problems about bare nouns, particularly with the variation in their behavior between Romance and Germanic.

## 2. Standard theory of determiners

In one interpretation of the definite determiner (e.g. Heim and Kratzer 1998), *the* can be analyzed as a function from predicates to individuals. That is, *the* is an  $\langle\langle e, t \rangle, e \rangle$ -type function that takes as its domain  $\langle e, t \rangle$ -type nouns, or predicates, and yields  $e$ -type entities, according to the denotation in (1).

$$(1) \quad \llbracket \text{THE} \rrbracket = \lambda f: f \in D_{\langle e, t \rangle}, \exists! x \text{ such that } f(x) = 1$$

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But if we assume the DP hypothesis (e.g. Abney 1987) and want DP to be a generalized quantifier as the most useful and general interpretation (Barwise and Cooper 1981, Partee 1987, Mikkelsen 2005), then *the* becomes a function from a set to a set of sets. That is, *the* is of semantic type  $\langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle\rangle$  (Heim and Kratzer 1998, Chierchia and McConnell-Ginet 1990). That is, *the* is a function that takes predicates and produces generalized quantifiers. This is in accord with Bach's (1989) definition of a determiner (2).

- According to this view of DPs as generalized quantifiers, the (simplified) syntactic and semantic composition of (3a) is as in (3b).

- (3b)
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- ```
graph TD
    S["S <t>"] --- DP["DP <<e,t>, t>"]
    S --- VP["VP <e,t>"]
    DP --- D["D"]
    DP --- NP["NP"]
    D --- the["the"]
    NP --- iguana["iguana"]
    VP --- triangle["△"]
    triangle --- dozed["dozed"]
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- the iguana dozed

The reasoning behind the theory of generalized quantifiers is based on observations that quantified DPs don't behave the same as ordinary DPs. For example, (4a), which has the quantifier *everyone* as subject, has two possible readings. On one reading, (4b), the quantifier has wide scope and we get the reading that each hungry person ate two key lime pies. On the other reading, (4c), the enumerated object *two key lime pies* has wide scope and we get the reading that there were a total of two pies divvied up among everyone, each person getting only a sliver.

- In contrast, (5), which doesn't contain a quantified DP as subject, is not ambiguous.

- Similarly, entailments arising from the use of quantifiers are not the same as those arising in

statements with nonquantified DPs. For example, the consequent in (6a) follows from the antecedent, but in (6b) there is no such entailment.

- (6a) The herons flew away suddenly  $\supset$  The herons flew away
- (6b) No herons flew away suddenly  $\nRightarrow$  No herons flew away

An account of the different behavior of quantified and nonquantified DPs lies in giving the two species of nominals different semantic types, as argued in Barwise and Cooper (1981). They suggested that quantified DPs ('NPs' at the time) are of type  $\langle\langle e, t \rangle, t \rangle$ , a set of sets that qualifies the denotation of the predicate. Partee (1987) pointed out that in fact all DPs, even nonquantified ones, are capable of being interpreted as generalized quantifiers, thus making the type  $\langle\langle e, t \rangle, t \rangle$  a very general one. Viewing DPs as generalized quantifiers rather than entities captures the intuition that such quantified DPs are neither individuals nor sets of individuals. So a phrase such as *every conservative* is interpreted as denoting a collection of sets, as indicated in (7-8).

- (7a) Every conservative wants cheap labor
- (7b) Every conservative hates government programs
- (7c) Every conservative loves defense spending

Thus, the denotation of *every conservative* is a collection of sets that include conservatives.

- (8a)  $\llbracket \text{EVERY CONSERVATIVE} \rrbracket = \mathcal{C} = \{C_1, C_2, C_3, \dots\}$
- (8b)  $C_1$  includes those who want cheap labor
- (8c)  $C_2$  includes those who hate government programs
- (8d)  $C_3$  includes those who love defense spending

### 3. Questions about the standard view of determiners

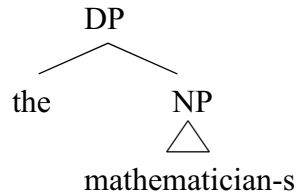
Determiners are assumed to take  $\langle e, t \rangle$ -type complements. And since determiners canonically take NPs, the standard view is that nouns, seen as properties or sets of individuals, are of type  $\langle e, t \rangle$ . But there are at least two related questions to raise about the view that nouns are predicates. First, is it the case that the complement of D is an NP? And second, is it true that NPs are predicates of type  $\langle e, t \rangle$ ? These questions are part of a long debate which I don't review here, but consider that the noun complements of determiners show a singular/plural distinction, as in (9).

- (9a) the mathematician
- (9b) the mathematicians

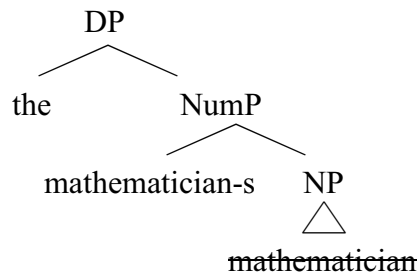
So, despite the apparent bareness of the noun itself in the singular *the mathematician* in (9a), it appears that it might be more than just an NP, particularly when paralleled with the obviously number-marked plural noun in (9b). If we accept Ritter's (1991, 1992, 1995) argument that the

singular/plural distinction is instantiated in the head of a number phrase (NumP), then *the mathematicians*, which is clearly marked for number, involves such a phrase. If *mathematicians* in (9b) is a NumP, then the syntactic structure of (9b) is not (10a), but (10b)<sup>2</sup>, where D's complement is a NumP.

(10a)



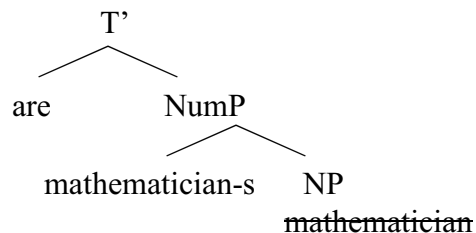
(10b)



Further, based on an assumption that form-meaning mappings are consistent, we might expect that a form like *mathematicians* is also a number phrase in copular predicate position, as in (11).

(11a) Vesna and Nicolo [are [<sub>NumP</sub> mathematicians]]

(11b)



That number phrases are predicates is elsewhere held (e.g. Dobrovie-Sorin et al. 2006, Farkas 2006). Now, if NumPs are predicates, NPs need not be. This view is accommodated in Baker (2003), where nouns are not predicates but rather of type e,<sup>3</sup> in Chierchia (1998) where nouns in some languages are held to be of type e, and Krifka (1995), where nouns can be interpreted as

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<sup>2</sup>For exposition, I assume that *mathematician* raises to get its plural morphology.

<sup>3</sup>Baker's (2003) analysis is that the predicate in copular constructions is not the noun or any noun projection within DP but rather a constituent higher in the verbal projection. Part of his evidence is that some languages, e.g. Edo, have particles that are used with nouns in copular constructions in the absence of a copular verb.

names of concepts.<sup>4</sup> Keep in mind, however, that what looks like the same form, a bare plural, can also be used, in English, as an argument.

(12) Mathematicians went to the demonstration

If in turn we consider the view that nouns must project to DP to be arguments (e.g. Longobardi 1994, Stowell 1991), then *mathematicians* in (12) must be a DP since it is a subject. This implies that *mathematicians* must project at least the structure in (13).

(13) [<sub>DP</sub> [<sub>NumP</sub> [<sub>NP</sub> ]]]

If we hold to the view that arguments must project to DP, we have a problem in accounting for what looks like a null D ( $\delta$ ), since no article appears, as in the structure in (14).

(14) [<sub>DP</sub>  $\delta$  [<sub>NumP</sub> mathematician-s [<sub>NP</sub> ~~mathematician~~ ]]]

A null-D subject is problematic, under one view of DP. As Longobardi (1994) argued, null D is possible in some Romance languages as long as it appears in a lexically governed, i.e. postverbal, position. So, in Italian, in the case of the bare-plural object *biscotti* in (15a),  $\delta$  can be hypothesized because it is lexically governed by the c-commanding verb *presto*. In contrast, in (15b)  $\delta$  is not permitted since it has no c-commanding lexical governor (Chierchia 1998, p356).

(15a) Ho [<sub>VP</sub> presto [<sub>DP</sub> biscotti ] con il mio latte] *Italian*

‘(I) had cookies with my milk’

(15b) \*<sub>[DP]</sub> Bambini [<sub>VP</sub> sono venuti da noi]]

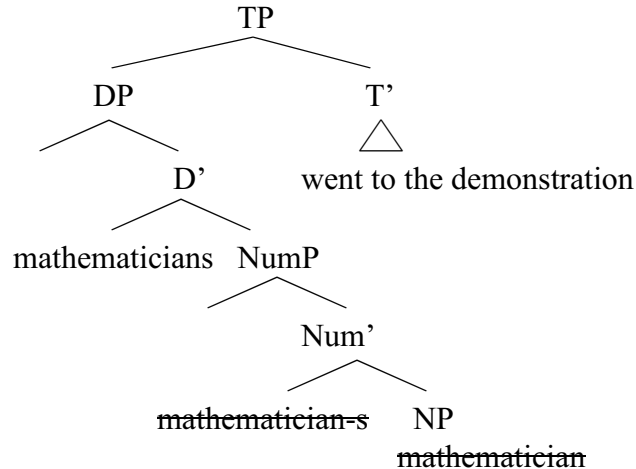
‘Kids came by us’

But as Longobardi notes, Germanic languages such as English do allow bare-plural subjects, so the question is how to account for them under Longobardi’s assumption that argumenthood entails DP. There are several ways to syntactically allow null-D subjects in English. First is Chierchia’s (1998) suggestion, based on Carlson’s (1977) analysis of bare plurals as kinds, that it may be the case that some languages do allow non-DP arguments. But by varying the denotation of nouns across languages we cede the view that syntax is universal, a view I hold here. Second, we could resort to a stipulation that, unlike in Romance, English null D is permitted even if the empty category is not lexically governed. This seems too stipulative and lacks any explanatory power. Third, we could assume that English, but not French or Italian, allows the bare-plural subject to raise to D, as in (16).

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<sup>4</sup>Also see the articles by Mathieu and Tonciulescu in this volume. I leave open the question of the semantic type of nouns. The important thing here is that by the time we have reached the level of NumP we do have a predicate.

(16)



But the raising possibility doesn't seem likely to be true given that it is Romance rather than Germanic that shows more evidence of head-raising. Verb raising has been argued by Pollock (1989) to occur in Romance but not Germanic in order to account for word-order differences between these two language groups with regard to the verb's position vis-a-vis adverbs and negative elements. As for N-raising in particular, Longobardi (1994) has argued for N-to-D raising of the noun in Italian, with the motivation of lexically filling  $D^0$ . This, says Longobardi, accounts for the grammaticality of (17a) and (17c) where  $D^0$  gets lexically filled but not (17b), where  $D^0$  is left empty. In (17a),  $D^0$  is filled by the definite article *il* while in (17c)  $D^0$  is filled by raising of the proper noun. In (17b), assuming that the possessive adjective doesn't move, it appears that nothing has been generated in or moved to the  $D^0$  slot left of *mio*.

- (17a) [<sub>DP</sub> *il* [<sub>NP</sub> *mio* Gianni]] *Italian*  
the my Gianni  
'my Gianni'  
(17b) \*<sub>[DP] \_\_\_\_ [<sub>NP</sub> *mio* Gianni]]  
(17c) [<sub>DP</sub> Gianni<sub>i</sub> [<sub>NP</sub> *mio* *t<sub>i</sub>*]]</sub>

Similarly resorting to N-movement within DP, Cinque (1994) argues for raising in Romance but not Germanic in order to account for the order noun-adjective in Romance and the adjective-noun order in Germanic. He assumes the underlying order of elements in DP is the same in both language groups, SNO, paralleling the basic argument order in clauses, SVO. He notes that of the sentences in (18), only (18b) is acceptable in Italian, where the thematic adjective *italiana* 'Italian' follows the noun *invasione* 'invasion' and the object *dell'Albania* 'of Albania' is final.


- (18a) \**l'italiana* *invasione* *dell'Albania* *Italian*  
the'Italian invasion of'Albania  
(18b) *l'invasione italiana* *dell'Albania*  
(18c) \**l'invasione* *dell'Albania italiana*

If thematic APs such as *italiana* 'Italian' are assumed to occupy the same slot as ordinary

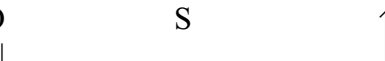
subjects, then the base order must be as in (19),

- (19)    l'italiana        invasione        dell'Albania  
         S                N                O

with head movement of the noun to the left, as in (20).

- (20)    [<sub>DP</sub> ... [<sub>NP</sub> AP                [<sub>N'</sub> N        complement ]]]  
                         l'italiana        invasione        dell'Albania  
                         S                N                O
- 

There are two reasons for (18a) and not (18b) to be the underlying order, according to Cinque. First, if head movement is involved, it must be obligatory leftward movement as in (20), which Cinque says is natural for head movement generally. Further, neither can (18c) be cited as the underlying order because that would entail rightward heavy shift, which is ordinarily optional. So the movement in (21) is ruled out.

- (21)    [<sub>DP</sub> ... [<sub>NP</sub> [<sub>N'</sub> N        complement    AP ]  
                         l'nvasione dell'Albania    italiana  
                         N                O                S
- 

While there is thus evidence for N-to-D movement in Romance, Germanic, in contrast, doesn't have N-movement leftward past the N, so the underlying SNO order is the same as the surface order in Germanic.

- (22)    the Italian        invasion        of Albania  
         S                N                O

In addition, it would be more difficult to adduce head movement of the noun in Germanic, assuming that an adjoined adjective doesn't move, since the adjective always appears left of the noun, as in (22).

I have argued for the position that bare plurals are NumPs, which denote predicates. But since bare plurals can also be arguments in some languages and since we purportedly need DP syntactic status for arguments, we run into the problem of licensing what appears to be an empty D position. Given that it is Romance and not Germanic that shows independent evidence of N-raising within DP, the possibility of bare-plural subjects raising to D in English doesn't seem tenable.

#### 4. An alternative DP semantic and syntactic structure

To begin to answer the question of the syntactic position of bare plurals within DP, we

can ask whether all determiners occur in D. The data below partly parallel facts pointed to by Lyons (1999), among others. Starting at least with Milsark (1979), it has been noted that there are distributional and semantic differences between strong quantifying determiners and weak quantifying determiners. First, the meaning of strong determiners is like that of standard universal quantifiers in logic. So, minus agreement and distributional and agreement differences among the determiners, the examples in (23a,b,c) with the strong determiners *all*, *every* and *each* all boil down to the same meaning in (23d).

- (23a) All the green candidates voted no on the tree-pruning referendum
- (23b) Every green candidate voted no on the tree-pruning referendum
- (23c) Each green candidate voted no on the tree-pruning referendum
- (23d)  $\forall x, a\_green\_candidate(x) \Rightarrow x$  voted no

Other quantifying determiners like *many*, *some* and *few*, obviously do not have the semantic import of a universal quantifier.

Second, strong quantifying determiners generally compete with *the* for the D<sup>0</sup> position.<sup>5</sup>

- (24a) \*the each iguana / \*each the iguana
- (24b) \*the every iguana / \*every the iguana

In contrast, weak determiners can cooccur with *the*.

- (25a) the few iguanas
- (25b) the many iguanas

Also, strong quantifiers, like definite DPs, are subject to a definiteness effect.<sup>6</sup>

- (26a) \*There seems to be the pro-war candidate
- (26b) \*There seems to be every pro-war candidate

In contrast, weak quantifiers are not subject to the definiteness effect.

- (27a) There seem to be two pro-war candidates
- (27b) There seem to be many pro-war candidates.

Also, like *the* in (28a), at least some strong quantifying determiners can precede some

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<sup>5</sup>The exception is *all*, which, as is well known and not understood, can appear with *the*: *all the students*. I don't address this problem here.

<sup>6</sup>It may be pragmatics rather than syntax that is responsible for the definiteness effect. See Ward and Birner (1995), Keenan (2003), Zucchi (1995). The fact remains, however, that it is only definites and strong quantifiers that are subject to the effect.



weak quantifying determiners (28b).<sup>7</sup>

- (28a) the many senators / the few minimalists  
(28b) we few secular humanists / all too many yahoos

But no weak quantifying determiner can take a strong quantifying determiner complement.

- (29a) \*few we secular humanists / \*too many all yahoos  
(29b) \*few the secular humanists / \*too many the yahoos

Finally, weak quantifying determiners cannot occur with numerals (30).

- (30a) \*few three iguanas / \*three few iguanas  
(30b) \*many three iguanas / \*three many iguanas

This is in contrast to the possible cooccurrence of *the* and numerals, as in (31).

- (31) the three senators

Summarizing, *the* and strong quantifying determiners on one hand and weak quantifiers including numerals on the other are different beasts, syntactically and semantically. Strong quantifying determiners but not weak ones are subject to the definiteness effect; strong quantifying determiners but not weak ones have the semantic meaning of  $\forall$ ; strong quantifying determiners but not weak ones can occur with numerals; strong quantifying determiners but not weak ones are barred from appearing with *the*; and some strong quantifying determiners can precede some weak quantifying determiners.

The facts can be accommodated by hypothesizing two distinct heads for determiners within DP: a high one for *the* and strong quantifying determiners and a lower one for cardinals and other weak quantifying determiners. More specifically, Lyons (1999) has suggested breaking up the traditional DP into i) a higher definiteness phrase, and ii) a lower cardinality phrase (CardP), as in (32)

- (32) [<sub>DP</sub> [<sub>CardP</sub> ...]]

And since the complement of the head of CardP is a number phrase and the complement of Num is an NP, Lyons's definiteness phrase is structured as in (33).

- (33) [<sub>DP</sub> [<sub>CardP</sub> [<sub>NumP</sub> [<sub>NP</sub> ]]]]

A phrase like (34a), incorporating Borer (2005) therefore, has the structure of (34b).

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<sup>7</sup>Also see for example Longobardi (2001), Szabolcsi (1994), among others on *the* being higher than other determiners.

- (34a) the three iguanas  
 (34b) [<sub>DP</sub> the [<sub>CardP</sub> three [<sub>NumP</sub> iguana-s [<sub>NP</sub> iguana ]]]]

and (35a) has the structure of (35b).

- (34a) an iguana  
 (34b) [<sub>CardP</sub> an [<sub>NumP</sub> an [<sub>NP</sub> iguana ]]]

Note in (34b) the absence of DP, which we return to shortly.

The structure of definiteness phrases and which determiners go where is summarized in (35),

- (35) [<sub>DP</sub> the/SQD [<sub>CardP</sub> a/#/WQD [<sub>NumP</sub> sing/pl [<sub>NP</sub> N ]]]]

where the highest phrase, DP, houses the definite article and strong quantifiers,. The indefinite article, numerals and weak quantifying determiners reside in Card<sup>0</sup>, the singular/plural distinction is made in the head of NumP, and the noun, as typically understood, is in NP.

While under this view the projections of weak quantifying determiners and strong quantifying determiners are in separate phrases and they behave in significantly different ways, I accept that both weak and strong quantifying determiners are of type  $\langle\langle e, t \rangle, \langle e, t \rangle, t \rangle$ . For weak quantifying determiners this is no problem, since they are argued to take predicates as their domain and yield generalized quantifiers. Assuming under the Lyons interpretation that they head CardP, the semantic composition must be as in (36).

- (36)
- $$\begin{array}{c}
 \text{CardP } \langle\langle e, t \rangle, t \rangle \\
 \swarrow \quad \searrow \\
 \text{Card}^0 \langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle \rangle \quad \text{NumP } \langle e, t \rangle
 \end{array}$$

But we do have a problem with strong quantifying determiners. Under the traditional view, since determiner phrases are interpreted as generalized quantifiers, *the* and strong quantifying determiners must be of the same type as weak quantifying determiners, taking predicates as their domain. But under the view being argued here, if strong quantifying determiners take CardP complements, and CardPs are of type  $\langle\langle e, t \rangle, t \rangle$ , then strong quantifying determiners don't take predicates as their domain. Instead, they must take generalized-quantifier complements. That is, strong quantifying determiners and *the* head a definiteness phrase and are of semantic type  $\langle\langle\langle e, t \rangle, t \rangle, \langle\langle e, t \rangle, t \rangle \rangle$ . An item in the head of DP therefore is a function from sets of sets to sets of sets. Thus, the composition must be as in (37).

- (37)
- $$\begin{array}{c}
 \text{DP } \langle\langle\langle e, t \rangle, t \rangle, t \rangle \\
 \swarrow \quad \searrow \\
 \text{D}^0 \langle\langle\langle e, t \rangle, t \rangle, \langle\langle e, t \rangle, t \rangle \rangle \quad \text{CardP } \langle\langle\langle e, t \rangle, t \rangle, t \rangle \\
 \quad \quad \quad \swarrow \quad \searrow \\
 \quad \quad \quad \text{Card}^0 \langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle \rangle \quad \text{NumP } \langle e, t \rangle
 \end{array}$$

Both DP and CardP are generalized quantifiers.  $D^0$  is similar to  $Card^0$  in that both yield generalized quantifiers but they differ in that  $D^0$  has a generalized quantifier as a complement while  $Card^0$  has a predicate as a complement.

On this view we are introducing a new semantic type, but this is permissible. As generally understood in type theory, new types are derivable according to (38).

(38) If  $\alpha$  is a type and  $\beta$  is a type, then  $\langle\alpha, \beta\rangle$  is a type.

This of course makes elements in  $D^0$  identity functions, modifiers in the sense that they don't change the semantic type of the input. Of course there are other functions that are not type-changers, such as negatives, of type  $\langle t, t \rangle$ , and adverbs, of type  $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$ .

Assuming (37) as the correct characterization of the highest functional projections above NP, I explore in the next section how it affects the interpretation of some of the problematic facts mentioned above about bare-plural arguments.

## 5. Ramifications of DP as a definiteness phrase

First, we can rephrase the problems about the internal structure of arguments when the head of CardP or DP is empty. Under a Longobardi-type DP syntax, we need to somehow license empty D. As we've seen, Longobardi uses a government approach, for example to license bare-plural arguments in postverbal position in Romance. Borer (2005) too has suggested a universal determiner phrase where DP is required for argumenthood. Her licensing differs in details from Longobardi's but the need to license empty D is the same. She suggests a general raising approach to fill the head of CardP (" $\#P$ " in her notation) or DP. But in some situations, she suggests, what is needed is not necessarily lexically filling D but binding it with an existential quantifier from outside the phrase, as in (39b).

(39a) ten boys

(39b)  $\exists^i [{}_{DP} \langle e^i \rangle_d [{}_{\#P} \text{ten} [{}_{CLP} \text{boy-s} [{}_{NP} \text{boy} ]]]^8$

In (39b), the D position can be left unfilled as long as the open variable  $\langle e^i \rangle_d$  is bound by the existential operator. While Borer's technology does seem to get the job done, what I propose in this paper is that we don't have to worry about  $D^0$  or the projection of DP and don't have to add indices in the course of the derivation. Instead of assuming that argumenthood entails DP per Borer (2005), Longobardi (1995), Stowell (1991) and others, we can suggest that there is no need to fill D in the case of nondefinite quantified nominals, including bare plurals. Given that both CardP and DP are generalized quantifiers, there is no semantic reason why they can't both serve as arguments. So rather than requiring that DP be projected for an argument, consider the argument licensing condition in (40).

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<sup>8</sup>CLP is a classifier phrase, which encompasses both numeral classifiers and plural morphology. For Borer, CLP is required for nouns to get count denotations, a detail which need not concern us here. In this paper, we can consider Borer's CLP to be equivalent to Ritter's NumP.

(40) Arguments must generalized quantifiers. Either DP or CardP can be an argument.

This allows for *ten boys* to have instead of the structure in (39b) the structure in (41). No binding of the D position is required because there is no D position.<sup>9</sup>

(41) [<sub>CardP</sub> *ten* [<sub>NumP</sub> *boy-s* [<sub>NP</sub> ~~*boy*~~ ]]]

This also provides a compositional semantics that accounts for the supposition that some languages seem to allow projections less than DP to serve as arguments, as suggested in Carlson (1977) and Chierchia (1998).

This makes Romance and Germanic more alike than has been assumed, although differences remain. For example, the theory of DP as outlined in section 4 allows for both French and English to have CardP arguments, as long as Card<sup>0</sup> is filled. And this is the case with indefinites.

(42a) [<sub>CardP</sub> *Some iguanas*] ate our tulips.

(42b) [<sub>CardP</sub> *Des iguanes*]      ont mangé      nos tulipes      *French*  
           *some iguanas*      have eaten      our tulips  
           ‘Some iguanas ate our tulips’

(42c) [<sub>CardP</sub> *Beaucoup de français*] aiment    pas    le vin  
           *a lot*      of French    like    Neg    the wine  
           ‘A lot of French don’t like wine’

(42d) [<sub>CardP</sub> *Trois chats*] chantent  
           *three cats*    sing.3P  
           ‘Three cats are singing’

The difference between French and English comes back to the fact that in the latter but not the former bare-plural arguments are licit. So the question is how English manages to fill Card<sup>0</sup>. To start, I will assume that in both languages number must be visible as a PF condition. We have seen that a raising analysis is unlikely for English. That is, we cannot fill the head of CardP as in (43).

(43a) *Iguanas ate our tulips*

(43b) [<sub>CardP</sub> *iguanas* [<sub>NumP</sub> ~~*iguana-s*~~ [<sub>NP</sub> ~~*iguana*~~ ]]]

But we can achieve the same result by allowing NumP and CardP to fuse in English. Bobaljik’s (1995) idea, in the verbal domain, is that languages vary in whether they project tense and agreement as single or separate heads. In distributed morphology, morphological operations are capable of fusing the features of several nodes into a single node. (Halle and Marantz 1994,

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<sup>9</sup>For a view where NumPs are also permitted as arguments, at least in internal subject position, see Dobrovic-Sorin et al. 2006. Allowing NumP arguments entails dividing arguments into quantified and nonquantified types, whereas my proposal links all arguments as being quantified.

p277). Fusion is held to be a postsyntactic operation at the PF interface where sister terminal nodes are collapsed into one (Kandybowicz 1007, p86).

For example, Bobaljik points out that whereas Icelandic (44a) can simply add a person morpheme onto a tense morpheme, English (44b) can only add one or the other (from Bobaljik 1995, p25).

(44a) Icelandic *kasta* ‘to throw’

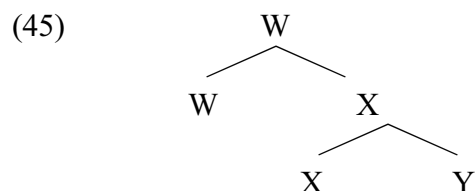
|      | <u>present</u> | <u>past</u> |
|------|----------------|-------------|
| 1 sg | kasta          | kastaði     |
| 2 sg | kast-r         | kastaði-r   |
| 3 sg | kast-r         | kastaði     |
| 1 pl | köst-um        | köstuðu-m   |
| 2 pl | kast-ið        | köstuðu-ð   |
| 3 pl | kasta          | köst-ðu     |

(44b) English *tremble*

|      | <u>present</u> | <u>past</u> |
|------|----------------|-------------|
| 1 sg | tremble        | tremble-d   |
| 2 sg | tremble        | tremble-d   |
| 3 sg | tremble-s      | tremble-d   |
| 1 pl | tremble        | tremble-d   |
| 2 pl | tremble        | tremble-d   |
| 3 pl | tremble        | tremble-d   |

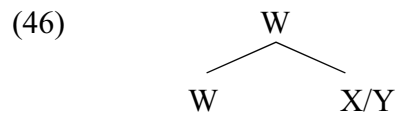
So in Icelandic, for example, the second person singular morpheme *-r* can be suffixed to the past morpheme *-ði* to give *kastaði-r* ‘you (pl) threw’. But as the English paradigm shows, we can have a person marker or a tense marker but not both. This suggests that tense and person are competing for the same position in English while they happily cooccur in separate positions in Icelandic. In terms of DM, in Icelandic there are two nodes for the morphemes of agreement and tense to be inserted, whereas in English there is only one.

If a language maps its functional morphemes to syntactic heads one-to-one, then all morphemes are spelled out separately. But if a vocabulary item has more than one functional feature, then the nodes where the separate features would ordinarily go must fuse. Consider the abstract structure in (45), where X and Y express features of separate nodes (from Bobaljik 1995, p33).

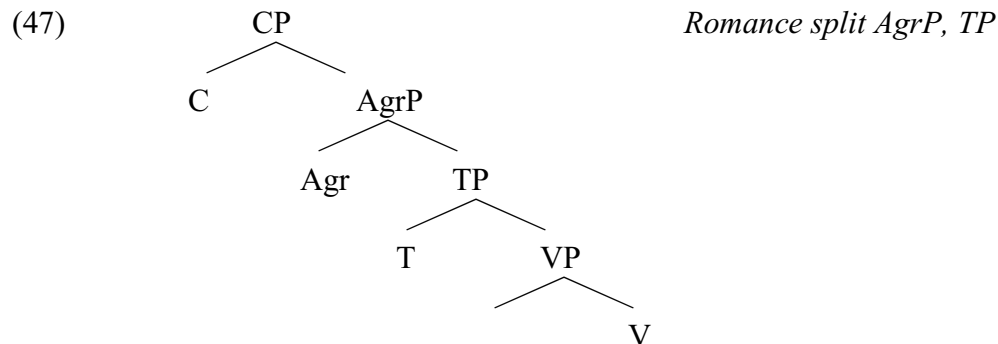


In (45), the relevant morphemes are inserted separately into X and Y. But if there is a morpheme

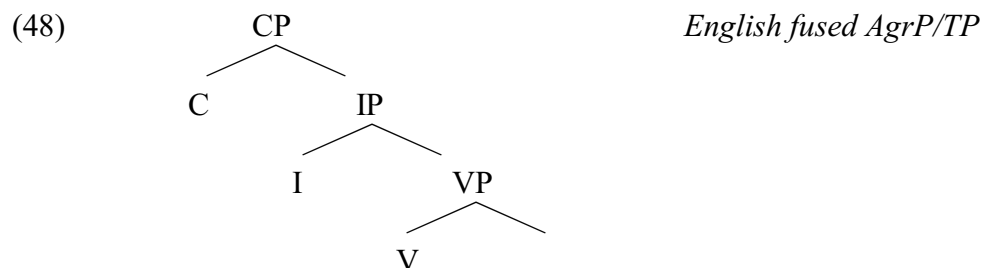
that expresses the features in both X and Y, then the result is (46), (from Bobaljik 1995, p34).



As a more concrete example, consider the difference between Romance, where an Agr morpheme can appear separate from a tense morpheme, in (47).



In (47), there are separate positions for Agr and T. But in English, as suggested in the Icelandic/English contrast above, Agr and T must appear together, fused, here as  $I^0$  in (48).



The difference for Bobaljik is in what he calls the Free Agr Parameter. Further, besides accounting for the presence of two positions, Agr and T, in some languages but only one position in other languages, the availability of extra Agr positions, AgrS and AgrO, also has another motivation, playing out in where arguments can raise for checking purposes as well.

Munn and Schmitt (2005) and Schmitt and Munn (2002) have applied Bobaljik's ideas of fused versus separate verbal phrases to the nominal domain to account for bare singulars in Brazilian Portuguese. They note that bare singulars are widely available in Brazilian Portuguese, in episodic (49a), generic (49b) and kind (49c) contexts (Schmitt and Munn 2002, p186-187).

- (49a) Ele comprou computadores/computador *Brazilian Portuguese*  
 'He bought he bought computers/{a computer/computers}'

- (49b) Criança lê revistinha  
 child read.3S comic book  
 ‘Children read comic books’
- (49c) No ano 2030 gavião-real vai estar extinto  
 in.the year 2030 royal hawk will be extinct  
 ‘In 2030, royal hawks will be extinct’

They then argue that bare singulars are neither singulars nor disguised plurals. For example, both the bare singular and the bare plural allow durative readings (50a) but not terminative readings (50b) (from Schmitt and Munn 2002, p208).

- (50a) Eu escrevi carta/cartas por duas horas *Brazilian Portuguese*  
 I wrote letter/letters for two hours
- (50b) #Eu escrevi carta/cartas em duas horas  
 I wrote letter/letters in two hours

The ordinary singular is contrastive because it does allow a terminative reading.

- (51) Eu escrevi uma carta em duas horas *Brazilian Portuguese*  
 I wrote a letter in two hours

So a bare singular isn’t an ordinary singular. Nor is it an unmarked plural, they argue. For example, a bare singular can antecede either a singular or plural pronoun (Schmitt and Munn 2002, p207).

- (52) Eu vi criança na sala *Brazilian Portuguese*  
 I saw child in.the room  
 E **ela** estava / **elas** estavam ouvindo  
 And she was / they were listening  
 ‘I saw a child/children in the room. And she was/they were listening.’

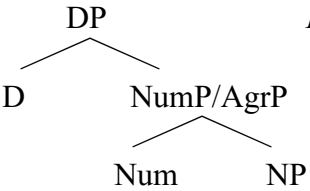
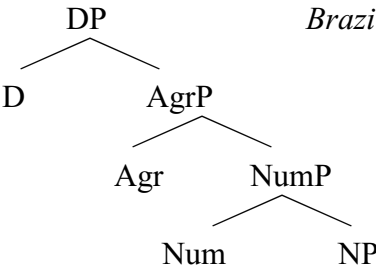
But bare plurals can only antecede plurals.

- (53) Eu vi crianças na sala *Brazilian Portuguese*  
 I saw children in.the room  
 E **\*ela** estava / **elas** estavam ouvindo  
 And she was / they were listening

Further, while bare plurals license the adjective *diferente* ‘different’ (54a), bare singulars cannot (54b) (Schmitt and Munn 2002, p207).

- (54a) Eles escreveram          livros diferentes / um livro diferente          *Brazilian Portuguese*  
 they wrote                  books different / a book different  
 ‘They wrote different books / a different book’
- (54b) \*Eles escreveram          livro diferente  
 they wrote                  book different

Their conclusion is that Brazilian Portuguese bare singulars are neither ordinary singulars nor bare plurals. Schmitt and Munn claim that such bare singulars simply lack number.<sup>10</sup> They do propose some licensing conditions, but their main point is that bare singulars can occur. The reason bare singulars are allowed in Brazilian Portuguese but not English, they say, is because Brazilian Portuguese has split agreement and number projections while English has a fused agreement/number projection. English number must appear, but since number is separable from Agr in Brazilian Portuguese one can in principle appear without the other. The proposed structures are in (55a) for English and (55b) for Brazilian Portuguese.

- (55a)  *English fused NumP/AgrP*
- (55b)  *Brazilian Portuguese split AgrP and NumP*

I accept in principle the intuition in the argument presented in Munn and Schmitt (2005) and Schmitt and Munn (2002) that phrases may or may not be fused, depending on the morphosyntax of the language.

So for the bare plural in English, I suggest that the fusion of NumP and CardP results in the structure in (56).

- (56) [<sub>CardP/NumP</sub> iguanas] ate our tulips

Another way to look at this is to say that for an ordinary existential bare plural, if (57a,b) are paraphrases, *some* is not required in English.

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<sup>10</sup>Interestingly, as part of their analysis, Schmitt and Munn (2002) show that Brazilian Portuguese does not fit into any of Chierchia's three Nominal Mapping Parameter language types.



- (57a) Some iguanas ate our tulips  
 (57b) Iguanas ate our tulips

The French data fall out from this analysis. Plural in French is ordinarily not pronounced on the noun, leading to the possibility that number spells out on determiners, unlike in English.

- (58) Des iguanes *French*  
 some.PL iguanas

Since number must spell out in French, and since it does so on a determiner, a determiner, either in CardP or DP, is required in French (59a) and bare plurals are ruled out (59b).

- (59a) [<sub>CardP/NumP</sub> des [<sub>NP</sub> iguanes]]  
 (59b) \*[<sub>CardP/NumP</sub> ∅ [<sub>NP</sub> iguanes]]

But since number spells out on nouns in English, bare plurals are permitted, assuming the fusion analysis, as in (56).

While the French facts follow from the picture of DP being presented here, the Italian facts do not, at least not so transparently. Recall that Italian permits bare plural objects, as in (15a). This fact can be accommodated by the present analysis by assuming that, since plural spells out on nouns in Italian as in English, NumP and CardP might fuse if the determiner in Card<sup>0</sup> is not overt. But then we would also expect the same to be possible for Italian preverbal subjects, contrary to fact. I do not provide a solution here but let's look briefly at what a solution might look like. Suppose that subjects in Italian require an overt determiner. Then Card<sup>0</sup> must be filled for nondefinites and D<sup>0</sup> must be filled for definites. While determiners like *some* are optional in English, as in (57) above, they are apparently obligatory in Italian. This stipulation remains to be more fully explored. The possibility of bare-plural Italian objects is less problematic if we accept that they remain in VP and are existentially closed (Diesing 1992).

## 6. Conclusions

I have argued for a nonstandard interpretation of the functional type of *the* and strong quantifying determiners in the syntactic position D<sup>0</sup> and argued further for two determiner phrases, DP for definites and CardP for nondefinites. Positing *the* and strong quantifying determiners as type <<<e,t>, t>, <<e,t>, t>> and lower determiners as <<e,t>, <<e,t>, t>> makes for a more coherent interpretation of definite determiners and strong quantifying determiners in contrast to weak determiners among the set of functional projections in DP. Assuming two separate phrases for determiners makes Germanic and Romance more similar than has been assumed with regard to the possibility of argument types. Adding the possibility of fused phrases to the reinterpreted DP also can help explain the possibility of bare-plural arguments in English and their absence in French. The absence of bare-plural subjects in Italian requires further research.

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