

## Number Marking in Dagara and French: A Comparative Study<sup>1</sup>

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This paper examines how number is marked in Dagara (Mabia/ex-Gur, Niger-Congo) and French. It argues that number occupies a syntactic position in Dagara and French and that the difference between the two languages resides in the syntactic operation through which number is marked. Following previous studies, the paper mentions that the status of number in Dagara and French can be assumed to be similar to that in English and that the difference among the three languages is the operation involved in number marking and the syntactic position of number in the structure of nominal phrases. These differences are responsible for the morphological manifestation of number on all the constituents of a nominal phrase in French but on only one constituent in Dagara and English. Besides, the paper claims that the difference between Dagara and English in number marking is in the syntactic position of number and that this difference explains why the plural marker is always on nouns but not on adjectives in English. In contrast, nouns do not take the plural marker in the presence of an adjective in Dagara.

**Keywords:** Dagara, French, number marking, head movement, multiple Agree

### 1. Introduction

The purpose of this paper is to consider how number (singular/plural) is marked in Dagara (a Mabia (ex-Gur) language in the Niger-Congo language family spoken in Burkina Faso) and compare it to plural marking in French. Indeed, it is argued in the literature that nouns take a number marker in Dagara. However, when an adjective occurs in the nominal phrase, the number marker appears only on the adjective (Bodomo 1993; 1997<sup>2</sup>; Delplanque 1997; Grimm 2010 among others). These are illustrated in (1) and (2).

- (1) a. [Bi-e] be na be.  
child-SG exist AFF there.  
'There is a child there.'

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<sup>2</sup> Bodomo's and Grimm's work are on Dagaare, the dialect of Dagara spoken in Ghana.

- b. [Bi-biir] dīene na be.  
child-PL playing AFF there  
'There are children playing there.'
- c. [Bi vla] be na be.  
child good.SG exist AFF there.  
'There is a good child there.'
- d. [Bi viɛl] be na be.  
child good.PL exist AFF there.  
'There are good children there.'
- e. \*[Bi] be na be.  
child exist AFF there  
'There is a child there.'
- f. \*[Bi] dīene na be.  
child playing AFF there  
'There are children playing there.'
- g. \*[Bi-e vla] be na be.  
child-SG good.SG exist AFF there.  
'There is a good child there.'
- h. \*[Bi-biir viɛl] be na be.  
child-PL good.PL exist AFF there.  
'There are good children there.'
- (2) a. Ayuo dà na [naa pla ].  
Ayuo bought AFF cow white.SG  
'Ayuo bought a white cow.'
- b. Ayuo dà na [naa piɛl ].  
Ayuo bought AFF cow white.PL
- c. \*Ayuo dà na [naa-b pla ].  
Ayuo bought AFF cow-SG white.SG  
'Ayuo bought a white cow'
- d. \*Ayuo dà na [naa-b pil ].  
Ayuo bought AFF cow-SG white  
'Ayuo bought a white cow.'

In these sentences, let us focus on the bracketed phrases (i.e. subject noun phrase in (1a-h) and the object noun phrase in (2a-d)). In (1a-b), the subject consists of a nominal stem and a singular or plural marker. The plural or singular marker cannot be omitted as in (1e-f). (1e-f) are then ungrammatical because of the absence of a singular or plural marker on the nominal stem. However, when an adjective occurs in the nominal phrase, the number marker cannot occur on the nominal

stem. Rather, the adjective takes the number marker in lieu of the noun as shown in (1c-d) and (2a-b). Both a noun and an adjective cannot take a number marker simultaneously as in (1g-h) and (2c). Also, (2d) indicates that a noun cannot keep the number marker in the presence of an adjective. (1g-h) and (2c-d) are bad because of the presence of the number marker on the noun.

The data in (2) raise a question about how number is marked in Dagara, especially when we look at the corresponding data in French. Note that number<sup>3</sup> is manifested on both nouns and adjectives in French nominal phrases. Consider the examples in (3) and (4):

- (3) `
- a. Ayuo a acheté [une voiture blanche].  
Ayuo has bought DET.SG car.SG white.SG  
'Ayuo bought a white car.'
  - b. Ayuo a acheté [des voitures blanches].  
Ayuo has bought DET.PL. car.PL white.PL  
'Ayuo bought whites cars.'
- (4)
- a. \*Ayuo a acheté [des voiture blanches].  
Ayuo has bought DET.PL. car white.PL  
'Ayuo bought whites cars.'
  - b. \*Ayuo a acheté [des voitures blanche].  
Ayuo has bought DET.PL car.PL white  
'Ayuo bought whites cars.'

(3a-b) are well-formed sentences in French. In (3a), the object nominal phrase is in singular while in (3b) it is in plural. In (3b), both the noun and the adjective are marked for plural. On the other hand, (4a-b) are ungrammatical, especially in written French. In (4a), the adjective is marked and the noun is unmarked for plural. In (4b), the adjective is unmarked and the noun is marked for plural. The fact that only one constituent of the object nominal phrase (i.e. the adjective or the noun) is marked for plural explains the ungrammaticality of (4a-b). A plural marker must appear on all the constituents of a nominal phrase in written French (Riegel et al. 1994; Bouchard 2002; Cyrino and Espinal 2019).

Comparing the Dagara data in (2) to the French data in (3) and (4), a question arises as to how number is marked in the two languages. In other words, why does the number marker occur only on adjectives in Dagara but on both adjectives and nouns in French?

In this paper, I will argue that number occupies its own syntactic head position in both Dagara and French and that the operations involved in number marking in the two languages are different. More specifically, I will argue that singular/plural is marked by head movement in Dagara but through multiple Agree in French (Carstens 2001; Danon 2011). Accordingly, the manifestation of number on only adjectives in Dagara nominal phrases but on both adjectives and nouns in French nominal phrases is a result of the difference in the syntactic operations involved in number marking in the two languages.

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<sup>3</sup> Nouns in French are unmarked for singular and marked for plural. Thus, only the plural marker is morphologically realized on nouns and adjectives.

The remainder of the paper is organized as follows: section 2 will explain singular and plural marking in Dagara. Section 3 will review how plural is marked in French. In section 4, I will propose a syntactic analysis of number in Dagara and French. Section 5 concludes the paper.<sup>4</sup>

## 2. Number marking in Dagara

**2.1. Singular marking in Dagara.** Unlike many languages (e.g. French and English), singular is morphologically marked in Dagara. The main strategy of singular marking consists in adding a final vowel or consonant to the root. But some nouns mark their singular by vowel epenthization or vowel lengthening. These are illustrated below.

- (5) a. Tɪ nyé-n [DP bi-e].  
we saw-AFF child-SG  
'We saw a child.'
- b. Ayuo dà-n [DP di-o].  
Ayuo bought-AFF house-SG  
'Ayuo bought a house.'
- c. [DP Ni-r] be na be.  
person-SG exist AFF there  
'There is a person there.'
- d. Ba di na [DP zi-ɛ].  
they ate AFF sauce.SG  
'A dog has eaten the sauce.'
- e. M bɔɔɔ na [DP k-u-on].  
I want AFF water.SG  
'I want some water.'

As shown in (5a-e), nouns like *bi* 'child' or *di* 'house' mark their singular by taking a vowel while nouns like *ni* 'person' take a consonant as a way of encoding singularity. Also, some nouns mark singular by lengthening their vowel (e.g. *ba* 'dog') or by inserting an infix (i.e. *kon* 'water'). Note that number marking in Dagara is not rule-governed and the choice of the number marker is lexically determined. Although it is not clear yet why some stems take a final vowel while others take a final consonant as their singular marker, a few data are showing that vowel (-u) epenthization is used when a stem has a consonant vowel consonant (CVC) form. Consider the following words:

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<sup>4</sup> Note that the Dagara data used in this paper are from Dagara Wule, a dialect spoken mainly in Burkina Faso. The orthography follows that of *Lexique de la langue Dagara* [*lexicon of the Dagara language*] published by the National Sub-Committee for the Dagara Language in 2002. The National Sub-Committee for the Dagara Language (Sous-Commission Nationale du Dagara) was established in 1975 by the government of Upper-Volta to document all the dialects of the language spoken in the country. Note that Dagara Wule is different from the other dialects of the language phonologically (Some 2007). Also, some of the French data I consider as ungrammatical because of the absence/presence of the plural marker are acceptable in spoken French. This is due to the fact that the plural marker is not pronounced on nouns and some adjectives in the language. In this paper, I will focus on written French and indicate sentences containing a number-related mistake with an asterisk.

- (6) a. kon => k-u-on ‘water’
- b. sor => s-u-or ‘a knife’
- c. nor => n-u-or ‘a mouth’

The stems of these nouns (‘water’, ‘knife’, and ‘mouth’ in Dagara) are of the form CVC and take an infix (-u-) as their singular marker.

Also, there are nouns which are unmarked for singular. They include borrowed nouns and nouns denoting body parts, as shown in Table 2 and in the sentences in (7a-e).

**Table 2: Nouns that are unmarked for singular**

| Root   | Singular | Meaning     |
|--------|----------|-------------|
| Mobiil | Mobiil   | ‘a car’     |
| Tabal  | Tabal    | ‘a table’   |
| Noso   | Noso     | ‘a bicycle’ |
| Zu     | Zu       | ‘a head’    |
| Nu     | Nu       | ‘a hand’    |
| Gbiar  | Gbiar    | ‘a foot’    |

- (7) a. [DP Mobiil] wara na.  
car.SG coming AFF  
‘A car is approaching.’
- b. Pol dà-n [DP tabal].  
Paul bought-AFF table.SG  
‘Paul bought a table.’
- c. Ba zú na [DP noso] zãa.  
they stole AFF bicycle.SG yesterday  
‘They stole a bicycle yesterday.’
- d. [DP ʋ [DP zu]] t kpeɛn.  
his head.SG is big.SG  
‘His head is big.’
- e. [DP Nu boyen] nu ɔɔrɔ.  
hand.SG one FOC hurting  
‘It is one hand that hurts.’

*Mobiil* and *tabal* are borrowed from French while *noso* is borrowed from Dioula, a Mande language. The reason why these nouns are unmarked for singular may have to do with the source languages. Since singular is unmarked in French and Dioula, it may be that Dagara speakers keep

the patterns of words and follow the rules of the languages from which they borrow the words. As for the nouns denoting body parts, it is not known yet why they are unmarked for singular.<sup>5</sup>

Also note that nouns do not take a singular marker in the presence of an adjective in the nominal phrase in Dagara, as indicated earlier. Consider the following examples:

- (8) a. M zãa. dà-n [DP di pil-a] Waga.  
I yesterday bought-AFF house white-SG Ouagadougou
- b. \* M zãa. dà-n [DP di-**o** pil-**a**] Waga.  
I yesterday bought-AFF house-SG white-SG Ouagadougou
- c. \* M zãa. dà-n [DP di-**o** pil] Waga  
I yesterday bought-AFF house-SG white Ouagadougou  
'I bought a white house in Ouagadougou yesterday.'
- (9) a. [DP ba bil-e] zɔ-n kpè a be.  
dog little-SG run-AFF enter the there
- b. \*[DP ba-a bil-e] zɔ-n kpè a be.  
dog-SG little-SG ran-AFF enter the there
- c. \*[DP ba-a bil] zɔ-n kpè a be.  
dog-SG little ran-AFF enter the there  
'A little dog ran into there.'

In (8a) and (9a), the singular marker is only on *pil* 'white' and *bil* 'little', respectively. The singular marker cannot occur on *di* and *ba* 'dog' in the presence of *pil* 'white' and *bil* 'little', as indicated in (8b-c) and (9b-c).

**2.2. Plural marking in Dagara.** There are two types of plural markers in Dagara: a regular plural marker and irregular plural markers. Regular plural marking consists in adding *-ri* to the root form of a noun, as shown in (10).

- (10) a. Ayuo mèn-n [DP **di-ri**].  
Ayuo built-AFF house-PL  
'Ayuo has built houses.'
- b. [DP **Ba-ri**] zɔ-n kpè a be.  
dog-PL ran-AFF enter the there  
'Some dogs ran into there.'

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<sup>5</sup>Note that when borrowed nouns are accompanied by an adjective, the number marker appears on the adjective, as shown in (i).

(i) mobiil pila  
car white.SG  
'a white car'

- c. [DP A **kon-ni**] ba wa sɛr ɛ.  
the water-PL not came yet NEG.PART  
'They have not brought the water yet.'
- d. Tɪ nyù na [DP a **dan-ni ha**].  
we drank AFF the beer-PL all.  
'We drank all the beer.'

Note that *-ri* is subject to progressive assimilation to some nouns. That is, the initial consonant /t/ changes to /n/ depending on the ending of the stem. This is observed when the suffix is attached to *kon* and *dan* in (10c-d).

Irregular plural marking is found in cases like the following:

- (11) a. [DP Bi-biir] tù na [DP pɔbɔ].  
child-PL insulted AFF woman-PL  
'Some children insulted women.'
- b. Zã tɔ na [DP a bi-biir [NP too-bo]].  
John touched AFF the child-PL ear-PL  
'John touched the children's ears.'
- c. Tɪ mã zɪ-n tɪ puòr-ra [DP tɪ [NP san-minɛ]].  
we always sat-AFF and greet-AFF our father-PL  
'We always sit down and greet our fathers.'
- d. [DP Ni-bɛ] be-n be.  
person-PL exist-AFF there  
'There are people there.'

It is not clear why these nouns do not take *-ri* as their plural marker. Though some nouns take these irregular plural markers, most nouns take the regular plural marker (*-ri*).

Note that just like singular markers, plural markers do not appear on nouns in the presence of adjectives in nominal phrases. This is shown below.

- (12) a. [DP A doba bil-li] zɔ-n kpè a be.  
the pig little-PL run-AFF enter the there
- b. \*[DP A doba-ri bil-li] zɔ-n kpè a be.  
the pig-PL little-PL ran-AFF enter the there
- c. \*[DP A doba-ri bil] zɔ-n kpè a be.  
the pig-PL little ran-AFF enter the there  
'The little pigs ran into there.'
- (13) a. Tɪ nyù-n [DP kon tuo-ri] diyɛn.  
we drank-AFF water bitter-PL last-year
- b. \*Tɪ nyù-n [DP kon-ni tuo-ri] diyɛn.  
we drank-AFF water-PL bitter-PL last-year

- c. \*Tɪ nyò-n [DP kon-ni tuo] diyɛn.  
 we drank-AFF water-PL bitter last-year  
 ‘lit. We drank bitter waters last year.’

In (12a) and (13a), the plural marker for *doba* ‘pig’ and *kon* ‘water’ is *-ri*. Due to progressive assimilation, *-ri* becomes *-li* on the adjective ending in /l/, as shown in (12a). Both the noun and the adjective cannot take the plural marker simultaneously, as in (12b) and (13b). A plural marker cannot be on the noun in the presence of the adjective, as in (12c) and (13c). Note in passing that mass nouns can be pluralized in Dagara, as illustrated in (13a)<sup>6</sup>.

**2.3. Number on demonstratives.** Number is also manifested on demonstratives in Dagara. In fact, demonstratives agree in number with the noun they co-occur with. This is illustrated in (14) below.

- (14) a. [DP A bi-e ‘lan] wa na.  
 the child-SG that came AFF  
 ‘That child has come.’
- b. [DP A bi-biir bala] wa na.  
 the child-PL those came AFF  
 ‘Those children have come.’
- c. \*[DP A bi bala] wa na.  
 the child those came AFF  
 ‘Those children have come.’
- d. \*[DP A bi-biir ‘lan] wa na.  
 the child-PL that came AFF  
 ‘Those children have come.’

(14a-b) consist of a noun on which a singular or plural marker appears and a demonstrative which is marked for singular or plural. Demonstratives are different from adjectives in Dagara in that they do not take the number marker in lieu of nouns in a nominal phrase. Both the noun and the demonstrative are marked for number simultaneously. The number marker of a noun cannot be omitted in the presence of a demonstrative, as in (14c). Also, a plural noun cannot be modified by a demonstrative that is not marked for plural, as shown in (14d).

Note that demonstratives consist of two types in Dagara: singular demonstratives (*ɲan* ‘this’ and *lan* ‘that’) and plural demonstratives (*baɲan*, *aɲan* ‘these’ and *bala*, *ala* ‘those’). Plural demonstratives are also sub-divided into two: demonstratives modifying human denoting nouns and those modifying non-human denoting nouns. Demonstratives used with human denoting nouns are *baɲan* ‘these’ and *bala* ‘those’. Those occurring with non-human nouns are *aɲan* ‘these’ and *ala* ‘those’. Consider (15) and (16) for more illustrations:

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<sup>6</sup> The fact that mass nouns can also take a plural marker in Dagara raises questions about the hypothesis that plural marking is associated with countability in languages (Dimmendaal 2000; Ghomeshi 2003; Haspelmath 2013; Kramer 2016; Cyrino and Espinal 2019). I will be put aside the function of number marker in this paper.



- (15) a. [DP A bi-biir bala] yiele na.  
the child-PL those singing AFF  
‘Those children are singing.’
- b. \*[DP A bi-biir ala] yiele na.  
the child-PL those singing AFF  
‘Those children are singing.’
- (16) a. \*[DP A ba-ri bala] zo na.  
the dog-PL those ran-away AFF  
‘Those dogs have run away.’
- b. [DP A ba-ri ala] zo na.  
the dog-PL those ran-away AFF  
‘Those dogs have run away.’

(15a) and (16b) are well-formed sentences while (15b) and (16a) are not. In (15b), *bi-biir* is a human denoting noun and cannot be accompanied by *ala*, which only accompanies non-human nouns. Likewise, in (16a), a non-human noun is accompanied by a demonstrative which only modifies human nouns, which explains its badness. There is no human/non-human distinction when the demonstrative is in singular form. Consider (17a-b):

- (17) a. [DP A bi-e ηan] yiele na vla.  
the child-SG this singing AFF well  
‘This child is singing well.’
- b. [DP A ba-a ηan] wòwro na zuo.  
the dog-SG this barking AFF too-much  
‘this dog is barking too much.’

(17a-b) are felicitous. Here *ηan* can accompany both a human denoting noun and a non-human denoting noun. These examples indicate that there is an interaction between number and [+/- human] features in Dagara and that this interaction is only visible on demonstratives.

### 3. Number marking in French

As in many languages (e.g. English), nouns are inflected for number in French. Plural is morphologically marked while singular is unmarked. According to many authors, singular is the default number in French from which plural is formed (Riegel et al. 1994; Rowlett 2007). This is illustrated below.

- (18) a. [DP Un enfant] doit être poli.  
DET.SG child.SG must be polite  
‘A child must be polite.’
- b. [DP Des enfants] jouent dans la maison.  
DET.PL child.PL play in DET.SG house.SG  
‘Children are playing in the house.’

- (19) a. Jean a réparé [DP la voiture].  
 John has repaired DET.SG car.SG  
 ‘John has fixed the car.’
- b. Jean a réparé [DP les voitures].  
 John has repaired DET.PL car.PL  
 ‘John has fixed the cars.’

In (18a) and (19a) the subject and the object nominal phrases in brackets are in singular. These nominal phrases consist of singular determiners (indefinite and definite) and singular nouns. Unlike Dagara singular nouns, there is no morpheme on these nouns indicating singularity. In (18b) and (19b), on the other hand, the bracketed phrases are plural nominal phrases which consist of plural determiners (indefinite and definite, respectively) and plural nouns. The plurality of these nouns is marked by adding *-s* to the singular nouns (Bouchard 2002; Kwon and Zribi-Hertz 2004; Rowlett 2007; Cyrino and Espinal 2019).

Although a plural marker is compulsory on French plural nouns, some plural nouns lack it. Plural nouns that lack a plural marker include nouns that derive from verbs, adpositions, and adverbials, as shown in (20), (21), and (22).

- (20) a. J’ai obtenu [DP un laissez-passer] pour le Japon.  
 I have obtained DET.SG let-pass for DET.SG Japan  
 ‘I have obtained a laissez-passer for Japan.’
- b. Nous avons obtenu [DP des laissez-passer] pour le Japon.  
 we have obtained DET.PL let-pass for DET.SG Japan  
 ‘We have obtained some laissez-passer for Japan.’
- c. \*Nous avons obtenu [DP des laissez-passers] pour le Japon.  
 we have obtained DET.PL let-pass for DET.SG Japan  
 ‘We have obtained some laissez-passer for Japan.’
- (21) a. Cherchons [DP un bon-vivre] pour nos enfants.  
 let-us-look-for DET.SG good-live for our children.  
 ‘Let us look for a better way of living for our children.’
- b. Nous voulons promouvoir [DP des bons-vivre] dans le pays.  
 we want promote DET.PL good.PL-live in DET.SG country  
 ‘We want to promote better ways of living in the country.’
- c. \*Nous voulons promouvoir [DP des bons-vivres] dans le pays.  
 we want promote DET.PL good.PL-live.PL in DET.SG country  
 ‘We want to promote better ways of living in the country.’
- (22) a. [DP Un passe-partout] est une clef spéciale.  
 DET.SG pass-everywhere is a key special  
 ‘A master key is a special key.’
- b. [DP Des passe-partout] sont des clefs spéciales.  
 DET.PL pass-everywhere are DET.PL key.PL special.PL  
 ‘Master keys are special keys.’

- c. \*<sub>[DP Des passe-partouts]</sub> sont des clefs spéciales.  
 DET.PL pass-everywhere.PL are DET.PL key.PL special.PL  
 ‘Master keys are special keys.’

The bracketed noun in (20) consists of two verbs (i.e. combination of two verbs). In (21), the bracketed noun consists of an adjective and a verb. The one in (22) consists of a verb and an adverbial expression. (20a-b), (21a-b), and (22a-b) are grammatical in written French, while (20c), (21c), and (22c) are not. The ungrammaticality of these sentences is attributed to the fact that the verbal and adverbial expressions take the plural marker.

The number marking of adjectives, as shown in (21b), is assumed to involve concord (e.g. Bouchard 2002; Pomino and Stark 2016; Cyrino and Espinal 2019 among others). According to these authors, adjectives agree in number with the nouns they modify in French nominal phrases (Not only adjectives but determiners agree in number with nouns in French). This agreement is responsible for the presence of the plural marker on adjectives in French. Consider the following examples :

- (23) a. Il accuse <sub>[DP le petit enfant]</sub> de vol.  
 he accuse DET.SG small.SG child.SG of theft  
 ‘He accuses the small child of stealing.’
- b. Il accuse <sub>[DP les petits enfants]</sub> de vol.  
 he accuse DET.PL small.PL child.PL of theft  
 ‘He accuses the small children of stealing.’
- c. \*Il accuse <sub>[DP les petit enfants]</sub> de vol.  
 he accuse DET.PL small child.PL of theft  
 ‘He accuses the small children of stealing.’
- d. \*Il accuse <sub>[DP les petits enfant]</sub> de vol.  
 he accuse DET.PL small.PL child of theft  
 ‘He accuses the small children of stealing.’
- (24) a. <sub>[DP Le coffre fort]</sub> est noir.  
 DET.SG box.SG strong.SG is black.SG  
 ‘The strong box is black.’
- b. <sub>[DP Les coffres forts]</sub> sont noirs.  
 DET.PL box.PL strong.PL are black.PL  
 ‘The strong boxes are black.’
- c. \*<sub>[DP Les coffres fort]</sub> sont noirs.  
 DET.PL box.PL strong are black.PL  
 ‘The strong boxes are black.’
- d. \*<sub>[DP Les coffre forts]</sub> sont noirs.  
 DET.PL box strong.PL are black.PL  
 ‘The strong boxes are black.’

Note that both the nouns and the adjectives are marked for plural in (23b) and (24b). The omission of the plural marker on the adjectives, as in (23c) and (24c), or on the nouns, as in (23d) and (24b), is not acceptable in (written) French.

Based on the data shown above, one can assume that French and Dagara are similar in that they both have an overt plural marker, as illustrated in (25a-c) and (26a-c).

## (25) Dagara

- a. Bi-biir wara na.  
child-PL coming AFF  
'Children are coming.'
- b. Ayuo dà na di-ri.  
Ayuo bought AFF house-PL  
'Ayuo bought houses.'
- c. Tɪ be na bi-biir bala puori.  
we are AFF child-PL DEM.PL behind  
'We are behind the children.'

## (26) French

- a. Des enfant-s viennent.  
DET.PL child-PL come  
'Children are coming.'
- b. Ayuo a acheté des maison-s.  
Ayuo has bought DET.PL house-PL  
'Ayuo bought houses.'
- c. Nous sommes derrière ces enfant-s.  
we are behind DEM.PL child-PL  
'We are behind those children.'

In (25a-c), *-biir* and *-ri* are attached to *bi* 'child' and *di* 'house', respectively, to indicate plurality. Just like Dagara, French marks plural overtly by attaching *-s* to nouns. Also, demonstratives agree in number with the nouns they modify in Dagara and French, as shown in (25c) and (26c), respectively.

However, as shown in (27a-b) and (28), Dagara and French are different in that singular is also marked overtly in Dagara but not in French. In other words, while Dagara marks singularity by attaching a morpheme to the noun, French does not.

## (27) Dagara

- a. A bi-e wa na.  
DET child-SG came AFF
- b. \*A bi wa na.  
DET child came AFF  
'The child has come.'

(28) French

- a. L' enfant est venu.  
 DET.SG child.SG is come  
 'The child has come.'

(27a) and (28) indicate that while singular is unmarked in French, it is morphologically marked in Dagara. As mentioned earlier, and in (27b), the absence of a singular marker on a Dagara singular noun makes the sentence ungrammatical.

Also note that French has an overt indefinite determiner (*un/une* for singular and *des* for plural) and a definite determiner (*le/la* for singular nouns and *les* for plural nouns). These determiners agree in number (and gender) with the noun with which they are combined. In contrast, Dagara only has one overt element that can be considered as a definite determiner. Indeed, Dagara expresses indefiniteness through a zero determiner and definiteness with the article-like element *a*, as shown above. Unlike the French determiners, *a* does not agree in number with the noun it is combined with. These are further illustrated below.

(29) French

- |    |                          |                            |
|----|--------------------------|----------------------------|
| a. | Un enfant vient. =>      | L' enfant vient.           |
|    | INDEF.SG child.SG come   | DEF.SG child.SG come       |
|    | 'A child is coming.'     | 'The child is coming.'     |
| b. | Des enfants viennent. => | Les enfants viennent.      |
|    | INDEF.PL children come   | DEF.PL children come       |
|    | 'Child are coming.'      | 'The children are coming.' |

(30) Dagara

- |    |                           |                             |
|----|---------------------------|-----------------------------|
| a. | Bi-e wara na. =>          | A bi-e wara na.             |
|    | child.INDEF-SG coming AFF | DEF child.DEF-SG coming AFF |
|    | 'A child is coming.'      | 'The child is coming.'      |
| b. | Bi-biir wara na. =>       | A bi-biir wara na.          |
|    | child.INDEF-PL coming AFF | DEF child.DEF-PL coming AFF |
|    | 'Children are coming.'    | 'The children are coming.'  |

In French, *un* and *le (l')* are singular indefinite and definite determiners, respectively. They become *des* and *les*, respectively, when the nouns they accompany are in plural. This is shown in (29a-b). In contrast, I assume that *a* is a definite determiner in Dagara and that it does not agree in number with the noun it accompanies. In this paper, I will put aside discussions on the syntax and semantics of *a*.

Also, the data in (23a-d) and (24a-d) and those in (12a-c), repeated in (31a-c), suggest a contrast between French and Dagara in terms of number marking and the distribution of the number marker in the two languages.

- (31) a. [<sub>DP</sub> A ba bil-li] zɔ-n kpè a be.  
 the dog little-PL run-AFF enter the there
- b. \*[<sub>DP</sub> A ba-ri bil-li] zɔ-n kpè a be.  
 the dog-PL little-PL ran-AFF enter the there

- c. \*<sub>[DP A ba-ri bil]</sub> zɔ-n kpè a be.  
 the dog-PL little ran-AFF enter the there  
 ‘The little dogs ran into there.’

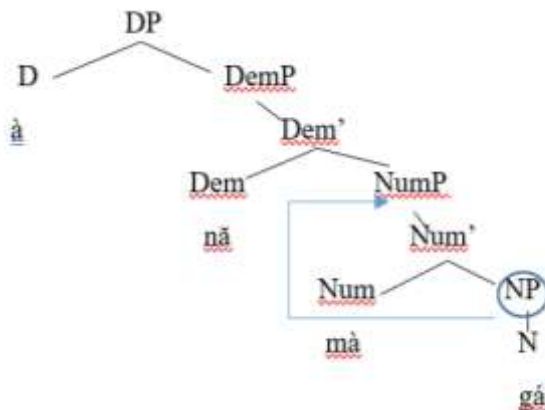
In French nominal phrases, nouns, adjectives and determiners are marked for number simultaneously. In contrast, only adjectives take the number marker in Dagara nominal phrases. This raises the question as to where the number marker is in the structure of nominal phrases and how number is marked in the two languages.

#### 4. A syntactic analysis of number in Dagara and French

**4.1. A syntactic analysis of number markers in Dagara.** According to many studies (e.g. Ritter 1991; 1992; Cinque 1993; 1994; 2005; Kramer 2012; 2016; Carstens 2001; Kwon and Zribi-Hertz 2004; Hiraiwa et al. 2017), a number marker is a functional head in the structure of nominal phrases. The projection of number markers, dubbed as NumP (Number Phrase) in the literature, is said to be above NP (noun phrase) and below DP (determiner phrase) (e.g. Ritter 1991; Cinque 1994; Alexiadou 2001; 2011; Kramer 2016). Following these assumptions, Bodomo and Hiraiwa (2004; 2010) and Hiraiwa et al. (2017), among others mention that number markers occupy a syntactic head position and appear between NP and DemP (demonstrative phrase) in the structure of nominal phrases in Dagaare, the dialect of Dagara spoken in Ghana. Consider (32) for the illustration of their claim:

- (32) a. à gá-mà nã  
 D book-PL Dem  
 ‘those books’

b. DP-Structure



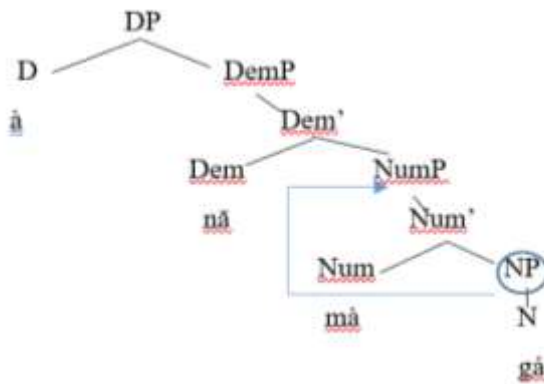
(cf. Bodomo and Hiraiwa 2010: 960 for details)

(32a) is a nominal phrase in Dagaare. According to Bodomo and Hiraiwa, (32b) is the initial structure for (32a). In this structure, the plural marker *mà* is higher than the noun (N) but lower than the demonstrative (Dem) and the determiner (D). Note that the projection of Num is said to provide a landing site for NP movement in the literature (Ritter 1991; 1992; Cinque 1993; 1994;

2005; Radford 2004; Alexiadou 2001; 2005; 2011). Accordingly, Bodomo and Hiraiwa assume that NP moves to the specifier position of Num in Dagaare nominal phrases<sup>7</sup>.

In what follows, I provide evidence in support of the claim that number is a distinct head in the structure of a nominal phrase and claim that it triggers head movement within the nominal domain in Dagara. In other words, nouns are marked for number through head movement in Dagara, as in (33).

(33)



In (33), the number marker *-ri*, is the functional head which projects Number Phrase (NumP) (also see Bodomo 2004; Bodomo and Hiraiwa 2004; 2010). According to many studies (e.g. Chomsky 1995; 2000; 2001; Carstens 2000; 2001; Alexiadou 2001; Danon 2011), functional heads have uninterpretable and unvalued features that need to be checked by LF. Following this claim, I assume that in Dagara, Num and N have an unvalued number and a valued feature, respectively. The unvalued number feature on Num needs to be checked by the valued feature of N in overt syntax. Then, N moves to Num, as shown in (33), for the number feature checking.

Evidence for the assumption that number is a functional head in Dagara comes from the fact that both singular and plural nouns need a number marker to be interpreted (Bodomo 1997; Grimm 2010). Consider the following nominal phrases in Dagara:

- (34) a. a bi-e                      b. a bi-biir                      c. \*a bi  
       the child-SG                      the child-PL                      the child  
       ‘The child’                      ‘The children’                      ‘The child’/ ‘the children’

In (34), *bi* is a stem and takes either a singular or plural marker. The omission of the number marker (unless there is an adjective in the nominal phrase), as in (34c), is not acceptable. I claim that the fact that a number marker (singular or plural) is always compulsory on Dagara nouns (in the absence of an adjective) can be taken as a piece of evidence that number is a distinct functional head.

Another piece of evidence that number is a distinct head comes from the observation that number does not always appear on nouns in Dagara (Bodomo 1993; 1997; Delplanque 1997). Note that when an adjective occurs in a nominal phrase, it takes the number marker in place of the noun

<sup>7</sup> Bodomo (2004) and Bodomo and Hiraiwa (2010) also assume that NumP moves to specifier position of Dem, which explains why demonstratives are post-nominal in Dagaare nominal phrases, as shown in (32a).

in Dagara. That is, a noun and an adjective cannot take a number marker simultaneously in a nominal phrase, as shown in (12a-c) repeated in (31) and (35) below.

- (35) a. a ba bil-li                      b. \*a ba-ri bil-li                      c. \*a ba-ri bil  
           the dog little-PL                      the dog-PL little-PL                      the dog-PL little  
           ‘The little dogs’

In (35a), a plural marker appears only on the adjective *bil* ‘little’. The occurrence of the plural marker on both the noun and the adjective, as in (35b), is not acceptable. Also, the plural marker cannot appear only on the noun, as in (35c). This indicates that number is a functional head. If number were always a feature on nouns, we could not account for the fact that nouns do not take it in the presence of adjectives<sup>8</sup>.

Besides, the data in (35) provide evidence for the claim that number is marked via head movement in Dagara. Indeed, according to the lexical feature system hypothesis and the universal hierarchy hypothesis, adjectives have a [+N] feature and are higher than nouns in the structure of nominal phrases (Chomsky 1970; Hawkins 1983; Miyagawa 1987; Cinque 1993; 1994; 2005 among others). Following these hypotheses, I claim that the occurrence of the number marker on adjectives in phrases like (35a) has to do with the lexical features and position of adjectives in the structure of nominal phrases. Since adjectives have a [+N] feature (in the sense of Chomsky 1970; Miyagawa 1987) and are higher than nouns in the structure of nominal phrases (Hawkins 1983; Cinque 1993; 1994; 2005), they become a potential candidate for head movement to Num, a functional head which attracts the nearest head with a nominal feature. Thus, when an adjective and a noun co-occur in a nominal phrase, the head of the adjective phrase, which has a [+N] feature and is closer to Num, moves to Num for the number feature checking in Dagara. This is illustrated in (36).

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<sup>8</sup> As mentioned by a reviewer, the fact that number marking goes on the adjectives instead of the noun in Dagara is reminiscent of the nominal phrases in the Scandinavian languages, where in the presence of an adjective the definiteness marking (i.e. the article) goes on the adjective and not the noun. The same phenomenon is also observed in Bulgarian, as shown in shown in Alexiadou et al. (2007).

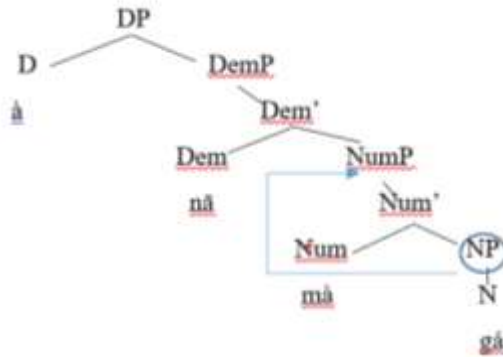
(i) Bulgarian (Alexiadou et al. 2007 : 72)

- a. goljamo-to momče  
    big-the boy  
 b. momce-te  
    boys-the

In Bulgarian, adjectives take the definiteness marker in lieu of nouns. The fact that adjectives take the definiteness marker in lieu of the noun is taken to indicate that adjectives are independent syntactic heads in the structure of nominal phrases and that the definiteness feature is checked through movement in Bulgarian (see Alexiadou et al. 2007).



(36)

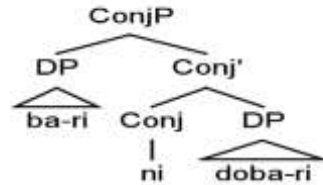


(36) indicates that adjectives block N-movement in Dagara nominal phrases (i.e. N cannot move to Num in the presence of an adjective). In fact, N-movement in (36) would violate the Head Movement Constraint (HMC) (Matushansky 2006, Radford 2004, among others). This explains why a noun does not take a number marker in the presence of an adjective in Dagara nominal phrases. Thus, (35c) is ruled out by the Head Movement Constraint. As for (35b), it violates the inclusiveness condition (an unwanted number head is added). Note that if nouns were marked for number via movement of NP, as assumed by Bodomo and Hiraiwa, (35c) (i.e. *\*ba-ri bil*) should be acceptable. That is, nouns should be able to take a number marker in the presence of an adjective. Since the intervention of an adjective does not block NP movement, NP in (36) could move to the specifier position of Num, where it could enter a feature-sharing relation with the head of NumP. Such operations would predict the unacceptable phrase in (35c) to be grammatical. I then assume that the ungrammaticality of (35c) suggests that what moves in Dagara nominal phrases to pick up the number marker is not NP, but is rather N or Adj.

Additional supporting evidence for the claim that number is marked in Dagara via head movement comes from the coordination of adjectives in the language. While two nouns can be coordinated in Dagara, two adjectives cannot. This is shown in (37a-d).

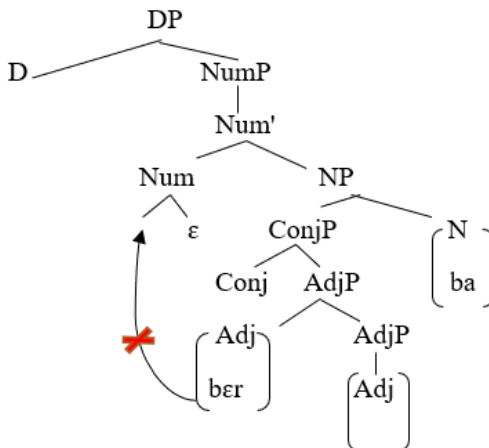
- (37) a. Ayuo dà-n [DP ba-ri ni doba-ri].  
Ayuo bought-AFF dog-PL and pig-PL  
'Ayuo bought dogs and pigs.'
- b. \*Ayuo dà-n [DP ba sɔl ni bɛr-ɛ].  
Ayuo bought-AFF dog black and big-PL  
'Ayuo bought big and black dogs.'
- c. Ayuo dà-n [DP ba sɔl bɛrɛ].  
Ayuo bought-AFF dog black big.PL  
'Ayuo bought big black dogs.'
- d. \*Ayuo dà-na [DP ba sɔɔ bɛr].  
Ayuo bought-AFF dog black.PL big  
'Ayuo bought big black dogs.'

e.

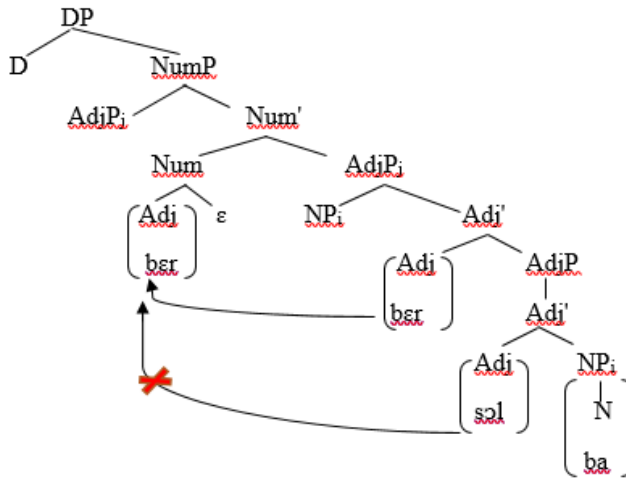


(37a, c) are grammatical sentences while (37b, d) are not. In (37a), *bari ni dobari* is an instance of the coordination of two noun phrases in the language. For (37a), I assume the structure in (37e). In (37b), two adjectives (i.e. *sol* 'black' and *berε* 'big') are coordinated but the sentence is ungrammatical. The coordination of *sol* and *berε* is responsible for the ungrammaticality of the sentence. In (37c), the coordinator *ni* 'and' and the number marker on the adjective that immediately follows the noun are omitted. Here, the two adjectives are not coordinated. The omission of the coordinator *ni* and the number marker on the adjective that immediately follows the noun *ba* 'dog' makes (37c) grammatical. In (37d), the coordinator *ni* and the number marker on the last adjective are omitted but the sentence is still ungrammatical. Assuming the coordinate structure to be an island for any movement (Ross 1967 and related studies), I claim that (37b) is ruled out by the Coordinate Structure Constraint. That is, I assume that the ungrammaticality of (37b) indicates that *ber* 'big' moves out of the coordinate structure to pick up the number marker  $-\epsilon$  and that this movement violates the Coordinate Structure Constraint. As for the badness of (37d), it indicates that the last adjective is closer to Num than the adjective that immediately follows the noun and the noun itself in the structure of the nominal phrase, as shown in (38). Thus, the coordination of adjectives in Dagara provides us with additional evidence that number is not a feature on nouns and adjectives. It is a functional head that attracts the nearest head with a nominal feature.

(38) a.



b.



As shown in (38a), *ber* ‘big’, being closer to Num, moves to Num to pick the number marker  $-\epsilon$ . Since ConjP (the coordinate structure) is an island for movement, movement of *ber* ‘big’ to Num is ruled out by the Coordinate Structure Constraint. This explains why (37b) is unacceptable. On the other hand, the bracketed phrase in (37c), for which I assume the structure in (38b), does not have a coordinate structure. That is, the adjective phrase is not a coordinate structure. Then, the higher adjective (i.e. *ber* ‘big’) moves to Num to pick up the number marker  $-\epsilon$ . This movement is licit, which explains why (37c) is felicitous. In (37d), *sol* ‘black’ moves to pick up the number marker. Movement of *sol* ‘black’ is ruled out by the Head Movement Constraint. Besides, in the bracketed nominal phrase in (37c), whose structure is shown in (38b), I assume that the higher AdjP moves to the specifier position of Num after NP moves to its specifier position and that these movements derive the surface word order of the nominal phrase.

Note that adjectives can be coordinated in French and English, unlike in Dagara. Consider the following French sentences and their English translations:

- (39) a. Jean a acheté des [belles et longues] tables.  
 John has bought DET.PL beautiful.PL and long.PL table.PL  
 ‘John has bought [long and beautiful] tables.’
- b. J’ai vu des murs [blancs et lisses]. (Knittel 2009: 30)  
 I have seen DET.PL wall.PL white.PL and smooth.PL  
 ‘I have seen a [white and smooth] wall.’

Although the bracketed phrases in (39a-b) are coordinated adjective phrases, the sentences are still grammatical. I assume that the possibility of coordinating two adjectives in French indicates that none of the adjectives undergo movement out of the structure of the coordinated AdjP. As for English, I assume that the position of AdjP with regard to Num has to do with the possibility of coordinating two adjectives. I will return to these assumptions later.

Also note that the definite article in Dagara does not take a number marker at all, unlike its French counterpart. I assume that the absence of a number marker on the definite article *a* has to do with the position of Num in the structure of nominal phrases and the inability of NumP to move to

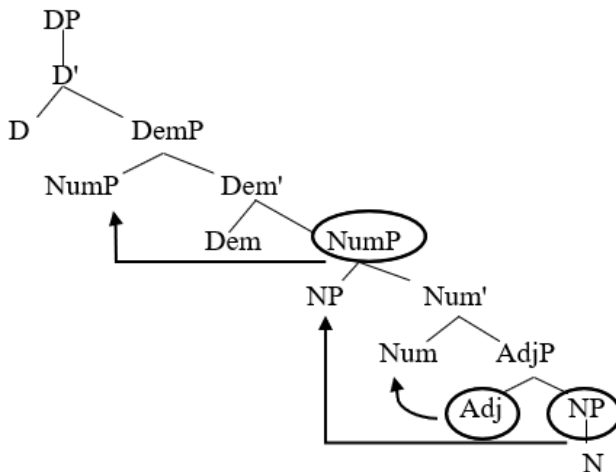
the specifier position of D. As shown in (36), D is higher than Num in the structure of Dagara nominal phrases. Then, since D is higher than Num, it cannot pick up the number marker by head movement. Besides, I assume that NumP cannot move to the specifier position of D, where it can share its number feature with D. The reason for assuming that NumP does not move to the specifier position of D comes from the ungrammaticality of (40a-b).

- (40) a. \*Bi-e a wa na.  
 child.DEF-SG the came AFF  
 ‘The child has come.’
- b. \*Bi-biir a wa na.  
 child.DEF-PL the came AFF  
 ‘The children has come.’

(40a-b) are ungrammatical sentences in Dagara. Their ungrammaticality is attributed to the fact that *a* is post-nominal. I take this to indicate that NP or any phrase containing NP (i.e. NumP) does not undergo movement to the specifier position D.

Also, I assume that unlike the determiner *a*, demonstratives host NumP in their specifier position in Dagara. Following Cinque (2005, 2010), Bodomo (2004), and Bodomo and Hiraiwa (2010), I argue that demonstratives are base-generated in a prenominal position in Dagara and that the post-nominal position they occupy in overt syntax is the result of movement of NumP, as shown in (41c).

- (41) a. [<sub>DP</sub> A bi-biir baŋan] yiele na vla.  
 the child-PL this singing AFF well  
 ‘These children are singing well.’
- b. [<sub>DP</sub> A ba-a ŋan] wɔɔro na zvo.  
 the dog-SG this barking AFF too-much  
 ‘This dog is barking too much.’
- c.



Let us consider the subject DP in (41a-b). In (41a), the DP consists of the determiner *a*, a plural noun, and a plural demonstrative. Likewise, the DP in (41b) consists of the determiner *a*, a singular noun, and a singular demonstrative. For the DP in (41a-b), I assume the structure in (41c). As indicated in this structure, there are at least three kinds of movement to derive the surface word order of these nominal phrases. (i) Adj<sup>9</sup> moves to Num to pick up the number marker. (ii) NP moves to the specifier position of Num, where it enters a singular or plural feature sharing relation with Num. This movement is responsible for the post-nominal position of adjectives in the language. In the absence of Adj, N, instead of NP, moves to Num by head movement. (iii) NumP moves to the specifier position of Dem, where it enters a number feature sharing relation with Dem. Movement of NumP to the specifier position of Dem is responsible for the post-nominal position of Dagara demonstratives and the presence of number feature on them<sup>10</sup>, as in (41a-b).

**4.2. A syntactic analysis of number in French.** The question of where number occurs and how it is marked in nominal phrases in French has gained a lot of attention in the literature in French syntax for many years. On the one hand, many authors claim that number (i.e. the plural marker) is a syntactic head which has a phrasal projection in the structure of nominal phrase (Cinque 1993; 1994; Carstens 2001; Alexiadou 2001; 2005; 2011; Radford 2004; Kwon and Zribi-Hertz 2004; Deprez 2005; Wiltchko 2008). On the other hand, some authors assume that the plural marker on French nouns is an adjunct to D and occurs on the other constituents of the nominal phrase through concord (see Bouchard 2002; Cyrino and Espinal 2019). According to the latter authors, the claim that Num is adjoined to D is based on the observation that the plural marker is always unpronounced on nouns in spoken French. For example, in (42a), while the plural marker is pronounced on the determiner, it is unpronounced on the noun.

- (42) a. [Des élèves] jouent dans la maison.  
 DET.PL student.PL play in DET.SG house.SG  
 ‘Students are playing in the house.’
- b. [dez elev]  
 ‘students’

The bracketed phrase in (42a) is a French plural nominal phrase consisting of a plural determiner and a plural noun. For the aforementioned authors, the fact the plural marker is pronounced on determiners but silent on nouns, as shown in (42b), evidences that number is attached only to determiners in French.

The fact that *-s* is pronounced on determiners but not on nouns in French, as in (42), is attributed to *liaison* (Bouchard 2002; Pomino and Stark 2016; Cyrino and Espinal 2019). *Liaison* is the pronunciation of a silent word-final consonant that immediately precedes a word with an initial

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<sup>9</sup> Note that adjectives are always post-nominal in the underlying structure of nominal phrases in Dagara. Following Cinque (2010), they could be assumed to derive from a relative clause source and have a stage-level (temporary) interpretation. Their post-nominal position would also be assumed to be the result of phrasal movement (also see Cinque 2005, Alexiadou et al. 2007). In this paper, I adopt the assumption that the post-nominal position of adjectives is the result of phrase movement (NP movement in the case of Dagara). As for the interpretation of adjectives, I will put it aside in this paper.

<sup>10</sup> The presence of number feature on demonstratives in Dagara could also be explained by assuming that demonstratives enter the derivation with a number feature that is based on the selected head of NumP. However, assuming NumP to undergo movement to [Spec, Dem], I claim that the number feature is checked through a specifier head relation.

vowel (Pomino and Stark 2016). For example, in (43a), *liaison* is realized between the D and the noun, but not between the noun and the adjective.

(43) a. Des élèves intelligents (sont recherchés).

DET.PL student.PL intelligent.PL are demanded  
‘Intelligent students are in demand.’

b. [dezelev ɛ̃teliʒɑ̃]  
‘intelligent students’

In (43a), the determiner *des* is pronounced along with the noun *élèves* ‘students’. The final *-s* of *des* is realized as /z/ when it is pronounced with the noun. The final *-s* of the noun *élèves* and the adjective *intelligents*, on the other hand, are silent, as shown in (43b). According to the authors mentioned above, *liaison* indicates that the plural marker is always attached to determiners rather than nouns and adjectives in French.

However, there are data indicating that the plural marker is not always pronounced on plural determiners in French. Consider the following examples:

(44) a. Des petits garçons (sont faciles à gérer).  
DET.PL little.PL boy.PL are easy to deal-with  
‘Little boys are easy to deal with.’

b. [de pəti ɡarsɔ̃]

(45) a. Les grands hommes (ne mentent jamais).  
DET.PL big.PL man.PL PART.NEG lie never  
‘The great men never lie.’

b. [le ɡrɑ̃zɔm]

(44) and (45) are plural nominal phrases in French. In (44), the plural marker *-s* is unpronounced on the determiner as well as on the adjective and the noun. In (45), on the other hand, the plural marker is silent on the determiner and the noun but is pronounced on the adjective. The plural marker is pronounced on the adjective in (45) because of *liaison*. The data in (44) suggest that the plural marker can be silent on all the constituents of a nominal phrase in French. Accordingly, I assume that determiners, nouns, and adjectives are marked for number through the same process in French. More specifically, I claim that, in French nominal phrases, number (i.e. the plural marker) is a syntactic head which is immediately dominated by D (Cinque 1993; 1994; Alexiadou 2001; Kwon and Zribi-Hertz 2004; Radford 2004; Wiltchko 2008 among others), and that the morphological manifestation of plurality on determiners, nouns, and adjectives is the result of multiple agreement (also known as concord), a syntactic operation which derives from Agree (Carstens 2001; Danon 2011).

There are many reasons for assuming that number holds its own projection in the structure of a nominal phrase in French. First, the fact that the plural marker can be silent on D but pronounced on an adjective or the noun in French, as mentioned above and repeated in (46a-b), (47a-b), and (48a-b), indicates that number is not just a feature on D, Adj, or N but an independent functional head.

- (46) a. Des élèves intelligents (sont recherchés).  
 DET.PL student.PL intelligent.PL are demanded  
 ‘Intelligent students are in demand.’
- b. [dezelev ɛ̃teliʒã]  
 ‘intelligent students’
- (47) a. Des petits garçons (sont faciles à gérer).  
 DET.PL little.PL boy.PL are easy to deal-with  
 ‘Little boys are easy to deal with.’
- b. [de pəti ɡarsɔ̃]
- (48) a. Des grands hommes (ne mentent jamais).  
 DET.PL big.PL man.PL NEG.PART lie never  
 ‘The great men never lie.’
- b. [de ɡrãzɔm]
- (49) a. Des personnes âgées (sont venues).  
 DET.PL person.PL elderly.PL are come  
 ‘Elderly people have come.’
- b. [de pɛʁsɔnzɑʒe]

As mentioned above, while plural marker is pronounced on the determiner in (46a), it is unpronounced on the adjective and the noun. In (47a), the plural marker is silent on the determiner, the adjective, and the noun. In (48a), while the plural is pronounced on the adjective, it is unpronounced on the determiner and the noun. In (49a), the plural marker is pronounced on the noun and unpronounced on the determiner and the adjective. Note that the fact that the plural marker is pronounced on only the determiner of nominal phrases like (46a) in French is argued to be one piece of evidence that number is encoded on D and should be analyzed as an adjunct to D (see Bouchard 2002; Cyrino and Espinal 2019). However, (48a) and (49a) indicate that number can also be pronounced on adjectives and nouns in French. Then, I assume that determiners, nouns, and adjectives are marked for number through the same mechanism (i.e through Agree between the head of NumP and D, Adj and N). The fact that the plural marker is sometimes pronounced on some elements of the nominal phrase is the result of a phonetic constraint (i.e. *liaison*) that does not tell us much about the base position of number in French.

The second reason for claiming that number occupies a head position in the structure of French nominal phrases is in line with the cartographic studies. According to "the one property, one feature, one head" hypothesis, assumed in cartography, "each morpho-syntactic feature corresponds to an independent syntactic head with a specific slot in the functional hierarchy (Kayne 2005:15, Cinque and Rizzi 2008: 44, Cinque 2006, Rizzi and Cinque 2016, among others). Following this assumption, I assume that number should be assigned an independent syntactic head in the structure of French nominal phrases since it provides semantic specifications for nouns and can affect the phonetic form of the entire nominal phrase. Note that though the plural marker can be unpronounced on nouns and adjectives, it changes the form of some nouns and adjectives in French. Consider the following examples:

- (50) a. un oeil => des yeux  
 DET.SG eye.SG DET.PL eye.PL  
 ‘an eye’ ‘eyes’
- b. le ciel => les cieux  
 DET.SG sky.SG DET.PL sky.PL  
 ‘the sky’ ‘the skies’
- c. un cheval familial => des chevaux familiaux.  
 DET.SG horse.SG familial.SG DET.PL horse.PL familial.PL  
 ‘a familial horse’ ‘familial horses’

As shown in (50a-c), number determines the phonetic form of many nouns and adjectives in French. Then, if it were a feature on D not on N and Adj, it would not be able to decide the phonetic form of nouns and adjectives in the language.

Also note that the plural marker changes the grammatical gender of some French nouns as well. This is illustrated below.

- (51) a. le premier amour  
 DET.MASC.SG first.MASC.SG love.MASC.SG  
 ‘The first love’
- b. les premières amours  
 DET.FEM.PL first.FEM.PL love.FEM.PL  
 ‘The first loves’
- c. \*les premiers amours  
 DET.MASC.PL first.MASC.PL love.MASC.PL  
 ‘The first loves are the most interesting.’
- (52) a. un petit orgue  
 DET.MASC.SG small.MASC.SG organ.MASC.SG  
 ‘An organ’
- b. des petites orgues  
 DET.FEM.PL small.FEM.PL organ.FEM.PL  
 ‘Small organs’
- c. \*des petit orgues.  
 DET.MASC.PL small.MASC.PL organ.MASC.PL  
 ‘Small organs’

(51a-b) and (52a-b) are felicitous while (51c) and (52c) are not. In (51a) and (52a), *amour* ‘love’ and *orgue* ‘organ’ are singular and masculine nouns. Their grammatical gender changes into feminine when they are in plural, as shown in (51b) and (52b). Since adjectives agree in number and gender with the noun they modify, *premier* ‘first’ in (51a) and *petit* ‘small’ in (52a) become feminine adjectives when *amour* and *orgue* change their grammatical gender into feminine. The ungrammaticality of (51c) and (52c) is then attributed to the fact that masculine adjectives modify feminine nouns.



Besides, the gender of nouns like *gens* ‘people’ is determined by their position in the nominal phrase. On the other hand, the singular counterpart of *gens* (i.e. *personne* ‘person’) is always feminine. This is shown in (53a-d) and (54a-d).

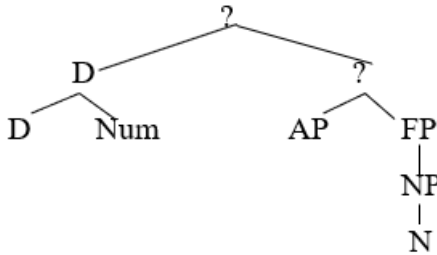
- (53) a. Des bonnes gens sont rares aujourd’hui.  
 DET.FEM.PL good.FEM.PL person.FEM.PL are rare.FEM.PL today  
 ‘Good people are rare today.’
- b. Des gens instruits sont recherchés.  
 DET.MASC.PL person.MASC.PL well-educated.MASC.PL are demanded  
 ‘Well-educated people are in demand.’
- c. \*Des bons gens sont rares aujourd’hui.  
 DET.MASC.PL good.MASC.PL person.MASC.PL are rare.MASC.PL today  
 ‘Good people are rare today.’
- d. \*Des gens instruites sont recherchées  
 DET.FEM.PL person.FEM.PL well-educated.FEM.PL are demanded
- (54) a. Je cherche une bonne personne.  
 I look-for DET.FEM.SG good.FEM.SG person.FEM.SG  
 ‘I am looking for a good person.’
- b. Je cherche une personne instruite.  
 I look-for DET.FEM.SG person.FEM.SG well-educated.FEM.SG  
 ‘I am looking for a well-educated person.’
- c. \*Je cherche un bon personne.  
 I look-for DET.MASC.SG good.MASC.SG person.MASC.SG  
 ‘I am looking for a good person.’
- d. \*Je cherche un personne instruit.  
 I look-for DET.MASC.SG person.MASC.SG well-educated.MASC.SG  
 ‘I am looking for a well-educated person.’

As shown in (53a-b), *gens* ‘people’ is feminine when it precedes an adjective and masculine when it follows an adjective. In contrast, the singular counterpart of *gens* (i.e. *personne*) is feminine and does not change its grammatical gender when it follows or precedes an adjective. This indicates that the plural marker has the ability to change the grammatical gender of some nouns in a certain position within the nominal structure in French (I will put aside the interaction between number and gender in this paper). I claim that the complex nature of number in French (e.g. it can change the form and the grammatical gender of nouns) suggests that it occupies a syntactic head in the structure of nominal phrases. As mentioned above, if number were an adjunct to D in French, it would not be able to determine the form and the grammatical gender of some nouns.

Another reason for considering number as a syntactic head in French is based on Chomsky (2013, 2015) and related studies. Following Rizzi’s (2016: 110) assumption that “an element drawn from the lexicon is head, everything else is a phrase”, I claim that if number is adjoined to D, there will be a problem labeling the nominal phrase. According to Chomsky (2013, 2015), Rizzi (2016), and subsequent studies, a node is labeled by a syntactic head. Hence D labels the nominal phrase in

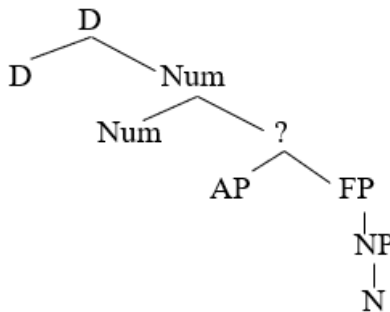
French as DP. In line with this assumption, I claim that if the plural marker is adjoined to D in French, D becomes a phrase and cannot label the node as DP. This is shown in (55).

(55)



As shown here, the adjunction of number to D makes D a phrase and incapable of labeling the phrase. However, if number is considered as a syntactic head holding its own projection, this problem does not arise as D can label the phrase as DP, as shown in (56).

(56)



When D, as a head, is merged with NumP, the node is labeled as D (i.e. DP), according to the labeling theory (see Chomsky 2013, 2015). Likewise, when Num, as a head, is merged with a phrase, it assigns the label Num (i.e. NumP) to the node. Thus, the assumption that number is adjoined to D in French poses a problem to the labeling theory.

In addition, Cinque (2010:91) argues that "adjectives enter the structure of DPs in two different ways: Either as direct phrasal specifiers of dedicated functional heads of the extended projection of the noun or as predicates of reduced relative clauses, merged above the functional projections hosting the former type of adjectives". I assume that this assumption also poses a problem for the labeling theory. If adjectives enter the structure of nominal phrases as phrases and are merged in the specifier position of functional projections, those functional projections cannot be labeled, as shown in (55) and (56). A phrase-phrase merger causes a problem of labeling (Cf. Chomsky 2013, 2015). However, if adjectives<sup>11</sup> are heads, the A-FP merger in (55) and (56) is labeled as AP without any complication. Accordingly, the analysis of number and adjectives as

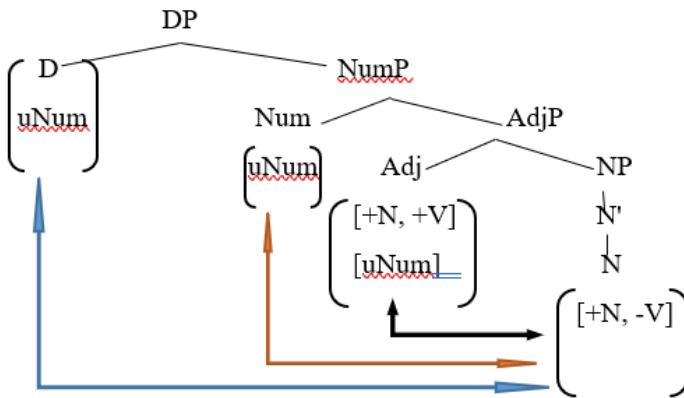
<sup>11</sup> Following Cinque (2005, 2010) and Alexiadou et al. (2007), I assume that the French prenominal adjectives are base-generated as heads while the post-nominal ones are predicates of reduced clauses, as shown in (ia-b).

- (i) a. [DP D [NumP Num [AdjP Adj [NP N]]]] => for prenominal adjectives  
 b. [DP D[CP [DP]<sub>j</sub> C<sub>j</sub> ... [AdjP ]]] => for post-nominal adjectives (also see Alexiadou et al. 2007:388)

independent syntactic heads in the structure of nominal phrases in French is superior to the analysis that considers number as an adjunct to D and adjectives as a phrase in the specifier of a functional projection.

Now let us consider how determiners, adjectives, and nouns check the number feature in French. As mentioned earlier, number features are assumed to be interpretable for nouns and uninterpretable and unvalued for functional categories (cf. Chomsky 1995; 2000; 2001; Carstens 2000; 2001; Danon 2011). The uninterpretable and unvalued number features on the functional categories must be valued by LF, for the purpose of full interpretation. Then, the features on D, Num, and Adj are presumably uninterpretable and unvalued in French and must be checked by LF, for the purpose of full interpretation. Accordingly, those uninterpretable and unvalued features of D, Num, and Adj *probe* for interpretable and valued features of a *goal* simultaneously. Since nouns have interpretable and valued features, the number features of D, Num, and Adj match with those of nouns and a multiple agreement relation (i.e. “a many-to-one agreement relation” (in the sense of Carstens 2001: 148)) is established between them (i.e. between the agreeing categories of D, Num, and Adj and the agreed category of N). These are illustrated in (57a).

(57) a



b. des bons enfants  
 DET.PL good.PL child.PL  
 ‘good children’

The structure in (57a) accommodates the nominal phrase in (57b). Here, the number features of D, Num, and Adj *probe* for those of N simultaneously. When the match is successful, D, Num, and Adj check their unvalued number features by entering a feature-sharing relation with N. The multiple agreement operation, as indicated in (57a), is then an instance of feature-sharing relation between the agreeing heads of DP, NumP, AdjP and the agreed head of NP in French (Carstens 2001; Danon 2011).

Regarding the case in which the plural marker does not occur on nouns, as shown above, repeated in (58a), I assume that the agreement relation in those nominal phrases is among D, Num, and an empty noun<sup>12</sup>.

<sup>12</sup> The empty noun, as it is assumed here, is comparable to the elliptical noun in nominal phrases as in (i).

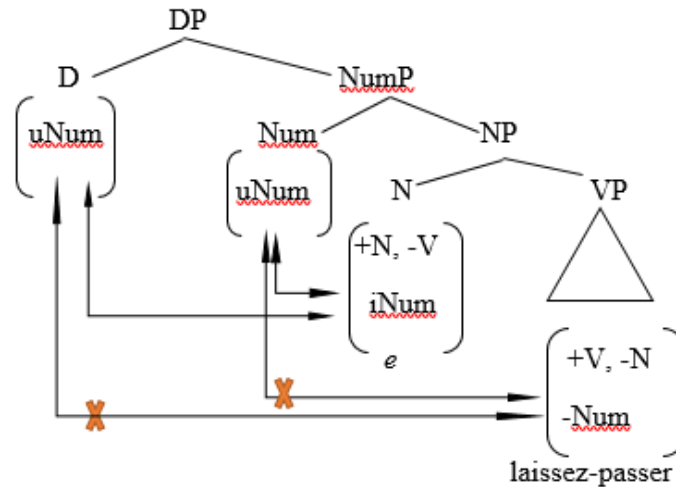
(i) They want to feed the poor *e*.  
 ‘They want to feed the poor ~~people~~.’

- (58) a. des laissez-passer  
 DET.PL let-pass  
 ‘laissez-passer’  
 ‘free passes’

b. [DP des [NumP [NP e [VP laissez-passer]]]]

(58a) consists of a plural determiner and a verb phrase. As shown in (58b), I assume that there is an empty N-head in (58a) taking the verb phrase as its complement (Coene 2001; Panagiotidis 2003). As noted by Panagiotidis (2003), empty nouns are also listed in the lexicon, which means that they have the same features as overt nouns. Then, the uninterpretable and unvalued number features of D and Num match with the interpretable and valued features of the empty noun (not of the verbs) when searching for a matching *goal*. For (58), I assume the structure in (59).

(59)



In (59), there is an agreement relation between D and N (the empty noun, marked as *e*) and between Num and N. However, there is no agreement relation between D and VP (*laissez-passer*) as well as between Num and the VP. The lack of agreement between the agreeing heads (D and Num) and VP is related to the fact that the verbs do not have nominal and number features. Since determiners do not agree in number with verbs, as indicated in (59), the plural marker cannot occur on the verbs in (58a).

**4.3. Summary and further issues.** Although the status of number and its location in the structure of a nominal phrase are the same in both Dagara and French, the process through which nouns are marked for singular/plural differs in the two languages. Nouns are marked for number through head movement in Dagara. In contrast, number is manifested on nouns through agreement in French. Also, while the Head Movement Constraint prevents nouns from moving to Num in the presence of an adjective in the Dagara nominal phrase, such a predicament does not exist in French. Rather, a

multiple Agree relation is always established between D, Num, Adj, and N in French allowing both a noun and an adjective to be marked for number simultaneously in a nominal phrase. The absence of the plural marker on some French plural nouns, especially those deriving from verbal or adverbial expressions is caused by feature mismatching.

Also note that N or Adj moves to Num but does not reach D, the higher functional head in Dagara nominal phrases (cf. Bodomo 2004; Bodomo and Hiraiwa 2010 among others). As a result of this, D is not marked for number in Dagara<sup>13</sup>. In contrast, though Num is also below D, a functional head in French (see Bouchard 2002; Cyrino and Espinal 2019, *etc.*), both Num and D enter an Agree relation with N. The Agree relation between D, Num and N is responsible for the occurrence of number on D in French.

One thing that should also be mentioned is that, under the present analysis, the status of number is similar in French, Dagara, and English (see Ghomeshi 2003; Wiltschko 2008, among others for the status of number in English). These languages are only different in the syntactic operation through which number is marked on nouns (especially for French and English) and in the location of Num in the structure of nominal phrases (for Dagara and English).

Indeed, number is argued to occupy a syntactic head position, located just above NP, in English (Ritter 1991; Alexiadou 2001; 2011; Ghomeshi 2003; Wiltschko 2008, *etc.*). One of the reasons for this assumption is the fact that the plural marker is compulsory to express plurality in English (see Wiltschko 2008). The plural marker cannot be omitted in an English plural nominal phrase, as in (60b).

- (60) a. The smart boys (are always in demand).
- b. \* The smarts boys (are always in demand).
- c. \* The smarts boy (are always in demand).

(60a) is well-formed while (60b-c) are ungrammatical in English. In (60a), the plural marker appears on only a noun. On the other hand, in (60b), a noun and an adjective are marked for plural simultaneously, but the phrase is ungrammatical. In (60c), an adjective is marked for plural while the noun is not. The occurrence of the plural marker on the adjective makes the phrase ungrammatical in English. Adjectives do not take a plural marker in English.

The second reason for assuming that number is an independent syntactic head in English comes from the fact plural marking triggers agreement in the language. According to Wiltschko (2008), when a noun is marked for plural in English, the other elements within the nominal phrase must also be marked for plural, as shown below.

- (61) a. Those boys can sing.           \* This boys can sing.
- b. \* These boy can sing.        This boy can sing.

(Cf. Wiltschko 2008: 643)

Wiltschko (2008) explains the data in (61a-b) by assuming that demonstratives occupy the head of DP, a functional head with an unvalued number feature that needs to be checked. For D to check its unvalued number feature, it searches for a matching goal with a valued number feature. For Wiltschko, the head of Number Phrase with a valued number feature becomes the matching goal for D. Accordingly, the unvalued number feature on D is valued by the valued number feature on the head of Number Phrase through Agree. The role of the noun, on the other hand, is to indicate which number (i.e. singular or plural) is associated with the head of Number Phrase. If plural is

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<sup>13</sup> Bodomo (2004), Bodomo and Hiraiwa (2010), *etc.* assume that NumP moves to the specifier position of DemP. This movement may be responsible for the number marking of demonstratives in Dagara.

associated with the head of Number Phrase, English nouns indicate it by taking –s and D must agree in plural with the head of Number Phrase. Following this assumption, the ungrammaticality of the sentences in (61a-b) can be seen as resulting from the number feature mismatching.

Although Wiltschko's (2008) account for number marking in English seems appealing, I do not consider it in this paper. The main reason for not considering Wiltschko's analysis of number marking in English in this paper comes from the data in (62a-e).

- (62)
- a. The boys are singing.
  - b. \*Thes boys are singing.
  - c. Those smart boys are singing.
  - d. \*Those smarts boys are singing.

Since *the* is also the head of DP, one could assume that it is associated with an unvalued number feature that must be valued by a valued number feature on the head of Number Phrase. Also, since *boys* indicates that the number that is associated with the head of Number Phrase is plural, one would expect D to agree in plural with the head of Number Phrase and *the* to take the plural marker -s. But since *the* does not take the plural marker at all, there is a question that needs to be answered if one wants to adopt Wiltschko's analysis. The question that is raised here is why some instances of D (e.g. demonstrative) *spell out* their number feature while others (i.e. *the*) do not. Also, what prevents Agree from applying between adjectives and the head of Number Phrase in English. If Agree were at work in English nominal phrases, the number marker on adjectives should be *spelled out*, just like in French, and (62d) should be grammatical.

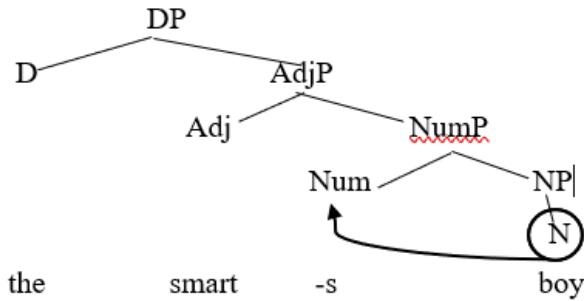
In this paper, I will argue that number is marked in English in the same way as in Dagara and that the fact the determiner *the* and adjectives do not take a plural marker in English has to with the position of NumP in the structure of English nominal phrases. Consider the following sentences:

- (63) English
- a. The boys are singing.
  - b. The smart boys are singing.
  - c. Those smart boys are singing.
- (64) Dagara
- a. A bi-biir yiele na.  
the children singing AFF  
'The children are singing.'
  - b. A bi viel yiele na.  
the child good.PL singing AFF  
'The good children are singing.'
  - c. A bi viel bala yiele na.  
the child good.PL those singing AFF  
'Those good children are singing.'

As shown in (63a-c) and (64a-c), in Dagara and English nominal phrases, nouns and adjectives do not take the plural marker simultaneously (unlike in French). As shown here, the plural

marker appears on only the noun in English and the adjective in Dagara. Also, demonstratives agree in number with the noun they modify in the two languages while the definite article does not. This indicates that plural is marked in the two languages through the same mechanism. Following Borer (2005)<sup>14</sup>, Mathieu (2013), and Mathieu and Zareikar (2015), I assume that number is marked in English through head movement, as in Dagara, as shown in (65).

(65)



If we assume NumP to be lower than AdjP and higher than NP, and plural to be marked by head movement in English, as shown in (65), the fact that adjectives and the determiner *the* never take a plural marker in English is easily explained. As for the presence of the plural feature on demonstratives, it may be that the English demonstratives enter the derivation with a number feature that is based on the selected number head and additional information (i.e. distal or proximal referentiality). Also note that following the cartographic approach to phrase structure, one can assume that demonstratives are distinct functional head in the structure of nominal phrases in English (The syntax of demonstratives in Dagara, English, and French need to be carefully investigated in future work).

Given this analysis, English is different from French in the syntactic operation through which number is marked and from Dagara in the location of Num within the nominal domain. Number is not manifested on adjectives and determiners in English because it is lower than Adj and D and movement of N stops there. Both in English and Dagara, head movement to D is not possible due to two main reasons: (1) There is a functional head (Adj for English and Dem for Dagara) just above Num blocking movement of N or Adj to D. (2) D is already filled in in the two languages, which also prevents movement of N or Adj to reach there. Thus, English is different from French in the operation involved in number marking (head movement vs multiple Agree) and from Dagara in the syntactic position of Num (below Adj vs above Adj).

<sup>14</sup> Borer (2005) claims that the function of plural is to divide and classify. According to Borer, nouns enter the derivation as neutral root (i.e. not as count or mass) and get the number feature through head movement. She argues that plural is distributed along many functional heads (e.g. the head of Number Phrase, division head, *n*) and that N moves to division head (also referred to as Cl<sup>o</sup>). Since the purpose of this paper is to account for how number is marked in these languages and not for the function of plural, I do not consider all the functional heads assumed in Borer (2005).

## 5. Conclusion

The present paper has examined how number is marked in Dagara and French, and proposed a syntactic analysis of number markers in the two languages. Unlike what is assumed in Bouchard (2002) and Cyrino and Espinal (2019), this paper has argued that number occupies a syntactic head in Dagara and French. The difference between the two languages resides in the syntactic operation through which number is marked (head movement for Dagara and multiple Agree for French). Furthermore, the paper argues that the status of number in Dagara and French is similar to that in English and that the difference among the three languages is the operation involved in number marking and the syntactic position of Num in the structure of nominal phrases. While number is marked through head movement in Dagara and English, it is marked by multiple Agree in French. This difference is responsible for the morphological manifestation of number on all the constituents of a nominal phrase in French but on only one constituent in Dagara and English. In addition, the paper claims that the difference between Dagara and English in number marking is in the syntactic position of Num. While NumP is located above AdjP in Dagara, it is below AdjP in English. This difference in the syntactic position that Num occupies in the two languages explains why the plural marker is always on nouns but not on adjectives in English. In contrast, nouns do not take the plural marker in the presence of an adjective in Dagara.

## Abbreviations

AFF= affirmative marker

A/Adj= adjective

AdjP= adjective phrase

D/DET= determiner

DEF= definite,

Dem= demonstrative

DemP= demonstrative phrase

DP= determiner phrase

FEM= feminine

FOC= focus marker

INDEF= indefinite

MASC= masculine

NP= noun phrase

NumP= number phrase

PL= plural



SG= singular

VP= verb phrase

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