

Agreement and DP-Internal Feature Distribution

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Abstract. An implicit assumption in most Minimalist work is that DP as a whole carries all the ϕ -features with which external heads agree. In this paper I argue that under this assumption and the assumption that only a node that is ϕ -complete can delete the ϕ -features of a node with which it agrees, Chomsky's (2000, 2001) model of feature valuation is incompatible with a large body of work on the DP-internal distribution of ϕ -features, according to which neither N nor D enter the derivation being ϕ -complete. I consider several possible solutions, and argue that this problem can most easily be avoided by adopting a feature sharing model of the operation Agree, as proposed by Frampton & Gutmann (2006) and Pesetsky & Torrego (2007). Finally, several implications for Chomsky's theory of abstract Case are also discussed.

1 Introduction

Studies into the syntax of natural language often make the implicit assumption that the DP level is a natural boundary between two domains, the clausal domain and the nominal one. Research on clausal syntax usually considers the internal structure of DPs to be irrelevant to the analysis of operations that take place at the clause level; and research on the internal structure of DPs usually does not involve considerations of processes that take place above the DP level.

One area where this kind of 'encapsulation' may be problematic is the analysis of agreement. On the one hand, agreement plays a central part in clausal syntax; and on the other hand, it involves ϕ -features that are marked on various heads within the DP, such as determiners, nouns, and adjectives. Two important questions that are often overlooked are whether subject-verb agreement and similar phenomena involve only the DP as a whole or its sub-elements as well, and how DP-internal feature composition interacts with DP-external agreement processes and with Case assignment.

This paper will focus on the analysis of agreement proposed in Chomsky 2000, 2001, and on how it relates to DP-internal feature composition. Specifically, we start by demonstrating an incompatibility between two dominant hypotheses in current literature: the hypothesis in Chomsky 2000, 2001 that Agree can only succeed if the goal is ϕ -complete; and the hypothesis that different ϕ -features originate on different heads within the extended projection of the noun. My goal is to point out what seems to be a real ‘bug’ in the current model of agreement, with the hope that raising this issue will lead to beneficial modifications to the framework. I will then discuss several possible approaches to solving this problem, and will argue that it can mostly be solved by adopting the feature-sharing approach to agreement proposed by Pesetsky & Torrego (2007) or the similar proposal by Frampton & Gutmann (2006).

The structure of this paper is as follows. In section 2 I review Chomsky’s analysis of agreement, in which a central role is assigned to the notion of ϕ -completeness. In section 3 I argue that this analysis is incompatible with the cartography of ϕ -features that arises out of a large number of studies into the syntax of noun phrases.¹ Section 4 is devoted to a discussion of some of the unwanted derivations involving ϕ -feature agreement that arise if neither the DP nor the NP carries a full set of interpretable ϕ -features. In section 5 I discuss some possible paths that can be taken to avoid this unwanted incompatibility, and argue that the problem can mostly be avoided by adopting another model of agreement that has been proposed in recent work in Minimalism. Finally, in section 6 we look at the related problem of Case valuation and discuss the position of Case features within the DP.

2 Agreement in Chomsky 2000, 2001

According to Chomsky (2000, 2001), the functional heads T and v enter the derivation with unvalued ϕ features, which are valued and deleted when they enter an Agree relation with a noun phrase that carries a full suite of valued ϕ -features. Consider for instance the following simple example:

- (1) She has arrived.

T enters the derivation with unvalued ϕ -features, and the pronoun enters the derivation with unvalued Case and with valued ϕ -features. At the stage in the derivation when the unvalued ϕ -features of T probe for the valued features of the pronoun, an Agree relation is established; this allows the ϕ -features of T to be valued and deleted; Case, in this framework, is ‘parasitic’ on ϕ -feature agreement, such that

¹I will use the term ‘noun phrase’ to refer informally to the (extended) projection of the noun; whenever the exact projection is relevant, I will use the node labels NP/DP etc.

the Case feature of *she* is valued as nominative as a ‘by product’ of agreement.

A central distinction in the framework of Chomsky 2000, 2001 is between nodes that are ϕ -complete and those that are not: only Agree that involves a complete set of ϕ -features can result in deletion of uninterpretable features of the probe. If a T/v head agrees with a node that is unspecified for some ϕ -features, this agreement cannot delete the ϕ -features of the functional head. *There*-type expletives, for instance, are assumed to be ϕ -incomplete, carrying only a person feature, and thus Agree between T/v and an expletive cannot value and delete the uninterpretable features of the functional head. This is essential for the derivation of familiar expletive-DP constructions of the following type to converge:

- (2) There remain/*remains several problems.

In this example, Agree between matrix T and the expletive does not delete the ϕ -features of T, because the expletive is ϕ -incomplete. This makes possible a subsequent Agree operation between T and *several problems*, which *is* ϕ -complete; at this stage, Agree deletes the uninterpretable ϕ -features of T, while valuing the DP’s Case feature.

This analysis seems to make the right predictions for a wide range of constructions. However, the derivation of (2) sketched above relies on an implicit assumption regarding the ϕ -features of the noun phrase. This assumption, which we may call *the DP encapsulation assumption*, is stated below:

The DP encapsulation assumption: In every non-expletive noun phrase, the highest head bearing ϕ -features is ϕ -complete.

What is essential here is that a *single* head within the DP carries a full set of interpretable (and hence, valued) ϕ -features. If this was not the case, the uninterpretable features of T could never be deleted, as T would never agree with a ϕ -complete head, and nearly any derivation would crash.

The DP encapsulation assumption is implicit in most of the literature on agreement within the Minimalist framework. Chomsky, for instance, abstracts away from this issue, noting that for expository purposes he takes N to be the relevant head of the nominal (Chomsky 2001, fn. 8). However, while the encapsulation assumption is relatively unproblematic when pronouns are considered (especially if one adopts the analysis of pronouns as ‘intransitive D’ heads, as proposed in Abney 1987), it is certainly not a trivial or ‘innocent’ assumption in the case of syntactically-complex noun phrases. In the next section I will argue that, under reasonably conservative assumptions about the syntax of noun phrases, and with a strict interpretation of Chomsky’s theory of feature valuation, the DP encapsulation assumption is false: no single head in a non-pronominal DP can be assumed to be ϕ -complete.

3 The DP-Internal Distribution of phi-features

Since the middle of the 1980s, ‘noun phrases’ have usually been considered to be extended projections in which various functional heads project a complex structure above the lexical NP level (Abney 1987; Valois 1991; Szabolcsi 1994; Bernstein 2001 and many others). In addition to the rather uncontroversial DP projection, many other proposals for additional functional projections have been made: NumP as the locus of grammatical number (Ritter 1991), GenP for gender (Piccolo 1991), as well as multiple agreement projections (Cinque 1994), to name a few of the more popular nominal functional projections.

While the main motivation for postulating multiple functional projections stems from the need to account for different word orders within a framework that assumes a uniform underlying structure, this has often also been associated with the hypothesis that different ϕ -features originate from different heads. Whereas in the GB framework it was possible to stipulate construction-specific movement rules that target specific functional projections, current Minimalism requires all syntactic movement to be triggered by the presence of features; hence, the possibility of movement into a functional projection with no features does not exist in this framework. Therefore, under this approach, any argument based on word order for the existence of DP-internal functional projections can also be seen as an argument for the presence of features on these projections. There is a vast amount of literature arguing for various types of DP-internal movement operations, and it is beyond the scope of this paper to survey this literature. Below we merely highlight some of the more direct pieces of evidence for the hypothesis that ϕ -features are distributed throughout the different functional projections within DP.

Ritter (1991) was perhaps the first to propose that, at least in some languages, number and gender features do not originate from the same head. While gender is specified for each noun as part of its lexical entry, number is not an inherent feature of nouns; see also Carstens 1991. Ritter’s head-movement analysis of Semitic construct state nominals depends on having at least one additional functional projection between NP and DP, and Ritter proposed that this intermediate projection is associated with grammatical number. Head movement from N to Num, under this analysis, allows the nominal head in Semitic to acquire a number feature while deriving the observed word order:²

- (3) $daltot_i$ $ha-bayit$ t_i $ha-yerukot$
 doors(FM.PL) the-house(MS.SG) the-green.FM.PL

²The derivation proposed by Ritter involves movement not only of the head noun but also of the genitive DP; this movement is not marked in example (3), as it is irrelevant to the current discussion. Note also that Ritter’s analysis, unlike much subsequent work, assumed a right-adjoined position for the adjective.

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‘the house’s green doors’

The structure of construct state nominals has later received many alternative analyses that do not necessarily make use of a functional projection associated specifically with number; but nevertheless, there seems to be independent empirical evidence that grammatical number is not necessarily a feature that originates from the noun. Perhaps the most direct evidence comes from languages that mark plurality by means of an independent word rather than by noun morphology (Dryer 1989, 2005). The following example, from Dryer 2005, illustrates this for Hawaiian:³

- (4) ‘elua a’u mau i’a
two my PL fish
‘my two fish’

Bernstein (1991, 2001) discusses data from Walloon that also supports a dissociation of number from the noun. In Walloon, there is no plural morphology on the noun. Plurality in this language is expressed by means of a plural determiner, as well as by means of a plural marker, *-ès* (feminine)/*-s* (masculine), which is found on prenominal adjectives. This is illustrated in the following example from Bernstein 2001:

- (5) dès vètès- ouh
some green.FM.PL door
‘some green doors’

Bernstein claims that in Walloon, unlike in many other languages, there is no N movement to Num (which might account, among other things, for the prenominal position of the adjective in Walloon, as opposed to the postnominal adjective in a language like Hebrew, as illustrated above); she further argues that the plural marker on the adjective (but not the one on the structurally-higher determiner) is the realization of the functional head Num.⁴ In the Minimalist framework, the fact that number morphology is present both on the determiner and on adjectives is straightforwardly analyzed as the result of number agreement with a goal which is lower than the position of adjectives; the question that this data still leaves open is whether this goal is N (which is not capable of realizing this feature morphologically in Walloon) or a higher functional projection.

³As pointed out by an anonymous reviewer, the plural marker in Hawaiian is optional, which raises the question whether a functional head like Num can be optional. Among the possible analyses that might be considered, it could be that a functional head not carrying a plural feature is still present and plays a role in distinguishing count from mass nouns; see for instance Borer 2005.

⁴Ritter (1993), building upon Bernstein’s analysis, further claims that the plural suffix in Walloon is the locus of the gender feature. Ritter argues that unlike some languages, such as Hebrew, where gender is a feature of N, in Romance gender is generated on Num.

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One language that might provide evidence in favor of the hypothesis that the source of the number feature is not N itself is Finnish. In Finnish, as in many other languages (see e.g., Ortmann 2000), if a noun phrase contains a numeral, the noun is (usually) singular. As the following example (from Brattico 2010) shows, this sort of noun phrase triggers singular agreement in Finnish:

- (6) kolme auto-a aja-a tiellä.
three car-PAR.SG drive-SG road
'Three cars drive on the road.'

However, as noted in Brattico (2010), if a demonstrative precedes the numeral, the demonstrative must be plural; the whole noun phrase, in this case, triggers plural agreement, despite having no plural morphology on the noun. This is illustrated in the following example from Brattico (2010):

- (7) Ne kaksi pien-tä auto-a seiso-ivat tiellä.
those.PL two.SG small-SG.PAR car-SG.PAR stand-PAST.3PL road.ADE
'Those two small cars stood at the road.'

This already suggests that the number feature of the noun phrase as a whole depends in this case neither on the noun, nor on the numeral, but on higher parts of the noun phrase.⁵ This conclusion is strengthened by the pattern of number agreement on adjectives in Finnish in the presence of a numeral. Brattico (2010) notes that an adjective in Finnish may either precede or follow the numeral. Adjectives that come between the numeral and the noun are singular, as shown in (7) above; adjectives that come between the demonstrative and the numeral, on the other hand, show plural agreement:

- (8) ne pilaantune-et kaksi leipä-ä
those.PL rotten-ACC.PL two.SG bread-PAR.SG
'those two rotten breads' (from Brattico 2010)

Thus, number agreement on the adjective depends on its position relative to the numeral. Assuming that non-default number agreement on the adjective results from agreement with a number feature on a goal that is structurally lower than the position of the adjective, the generalization thus seems to be that a (plural) number feature is only available above the position of the numeral.⁶ The widely

⁵The contrast between (6) and (7) also shows that the agreement on the verb in (7) cannot simply be dismissed as 'semantic agreement', as the subject in both examples is semantically plural.

⁶The Finnish data also suggests that it is not the numeral itself that carries the plural feature; as shown in the gloss, the numeral itself is morphologically singular. This leads to many nontrivial questions regarding the number feature in Finnish that are beyond the scope of the current discussion, such as what happens when the numeral is morphologically marked as plural, an option that

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accepted hypothesis, which is supported by facts of this kind from a wide variety of languages, is that grammatical number is a feature of an intermediate functional projection between NP and DP.

The status of person features is less clear, but the claim that person is not a feature of N seems to have some empirical support. First, it seems problematic to assume that person is a feature of the noun itself, given the fact that the same noun could give rise to first, second, or third person DPs (see also Déchaine & Wiltschko 2002):

- (9) we/you/these linguists

Furthermore, in languages where person distinctions are finer than in the more familiar Indo-European languages, distinctions between different kinds of 3rd person (such as proximate versus obviative) are often encoded on demonstratives, which are plausibly of category D.

From a typological perspective, it has sometimes been noticed that DP-internal concord never involves person features (Lehmann 1988; Baker 2008).⁷ This would have been an unexpected morphological gap if person was an abstract feature of N or of a functional projection below DP. Baker (2008) notices, on the other hand, that many languages have person agreement on elements that select DP, such as the word *onke* ('all') in Zulu:

- (10) Thina s-onke si-fik-ile.
we 1P-all 1PS-arrive-PERF
'We have all arrived.'

The fact that such person agreement is not found on elements that come *below* the DP level follows straightforwardly from the hypothesis that person features are generated on the D head, together with the hypothesis that DP dominates NumP, NP and any functional projection associated with adjectives; under these assumptions, person features are not available as agreement goals for anything lower than the D. In what follows I will thus assume that person is a feature of D (see also Carstens 1993c,b,a).

The brief discussion above is obviously not meant to provide a complete and comprehensive overview of the literature on the cartography of ϕ -features; it should, however, make it clear that identifying all nominal ϕ -features with a single head is a problematic approach. It seems that despite the great amount of disagreement regarding the exact number and nature of functional categories within the noun

also exists in Finnish.

⁷This should not be confused with person agreement with possessors. In many languages, nouns or adjectives agree in person with the possessor, but never with the possessed DP in which they appear; see Baker 2008.

phrase, most studies on noun phrase structure since the early 1990s point toward a ‘distributed’ view of ϕ -features. I will therefore assume that ϕ -features are not all generated on the same head within the DP; specifically, neither N nor D enters the derivation with a full set of valued ϕ -features.⁸ For concreteness, I will assume that nouns enter the derivation with their inherent feature – gender – valued. As to number, I leave it open whether the number feature always enters the derivation being valued on a higher functional head, or whether in some cases it is a valued feature of the noun itself; to simplify the presentation, I will sometimes assume the latter option in the discussion that follows. Finally, person features will be taken to be features of the D head. This model – especially the version that assumes that number always enters the derivation valued on a functional head – thus parallels the situation in the verbal domain, where inflectional features have often been assumed to be associated with functional projections that dominate V rather than with the lexical head itself.

4 Agreement with N and with D

After having reviewed the hypothesis that the locus of the various interpretable ϕ -features is not a single head, let us consider some of the issues involved in implementing agreement in these features under standard Minimalist assumptions. This includes DP-internal agreement, or concord, as well as agreement with functional heads outside the DP.

Consider DP-internal concord first. Empirically, it is clear that the same ϕ -features often appear on more than one head within the same DP. To take one concrete example, definite articles and adjectives in French (as in many other languages) agree with the noun in gender and number:

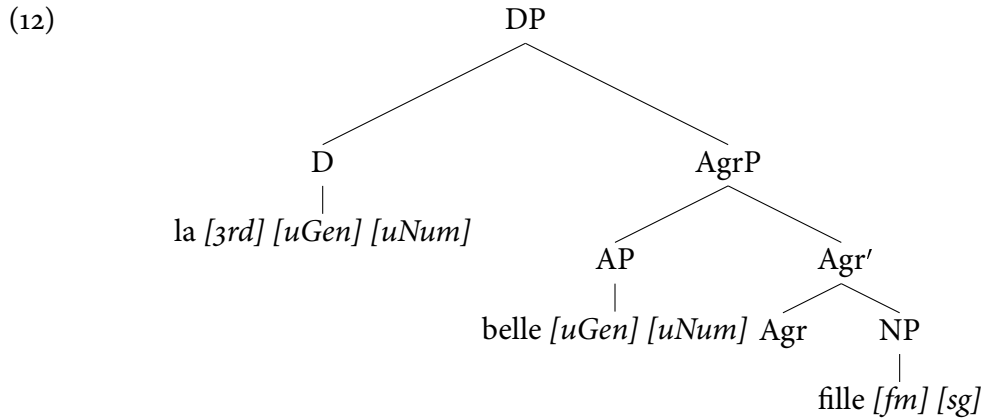
- (11) la belle fille
 the.FM.SG pretty.FM.SG girl.FM.SG
 ‘the pretty girl’

Let us consider the derivation of such a DP within the framework of Chomsky 2000, 2001. For simplicity, let us ignore additional functional projections and assume that the noun enters the derivation with valued gender and number features. These features on the article and on the adjective must therefore enter the derivation unvalued, as illustrated in (12), where the notation *uGen/uNum* is used for

⁸One alternative, assumed in some work within the cartographic approach, is that N carries all ϕ -features, in addition to the features distributed through the noun’s extended projection (see for instance Cardinaletti & Starke 1999). It is not clear to me to what extent this kind of analysis is compatible with the model of agreement in Chomsky 2000, 2001; as far as I can see, this raises essentially the same locality problems we discuss in section 4.

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unvalued gender and number features:⁹



Following Carstens (2000, 2001), we may assume that DP-internal concord does not require a specialized mechanism, and is the result of the same formal operations that give rise to other instances of agreement. Thus, the unvalued features of the adjective probe for the features of NP (or of the noun), and Agree values and deletes the features on the adjective.¹⁰ Similarly, the gender and number features on D are valued and deleted by Agree with the noun.¹¹ This leads to the observed DP-internal agreement pattern without requiring any special stipulation.

However, this derivation has a number of problematic outcomes. Putting aside the adjective, the resulting structure has the following ϕ -features on N and D:

N: interpretable gender and number

D: interpretable person; deleted uninterpretable gender and number

Now consider agreement of this DP with an external functional head, such as T or v. The T/v head would not be able to agree in gender and number with the DP, whose uninterpretable gender and number features have been deleted. Furthermore, it would not be able to agree in person with NP, which does not carry this feature. Thus, there is no ϕ -complete node that the T/v could agree with: gender and number features exist on NP, while person features exist only on DP. The

⁹Following Cinque (1994) and many others, the AP in (12) is positioned as a specifier of an agreement projection; the analysis in this paper should be equally compatible with other approaches to the position of adjectives.

¹⁰Here and throughout this paper, I will abstract away from the question whether the goal is a maximal projection or its head; for expository reasons, much of the discussion refers to the latter option.

¹¹We ignore at this point the question whether or not the noun is indeed active in the sense of having uninterpretable features of its own; we return to this in section 6.

situation would be even more problematic if number is interpretable on an intermediate functional projection and not on the noun; in that case, gender, number and person would be available on three distinct heads.

Furthermore, even if we put aside the issue of ϕ -completeness, intervention by the DP should block an Agree relation between T/v and NP: Even though the gender and number features of DP have been deleted, they are still visible until the end of the strong phase, and thus DP should block Agree with NP. This means that the only way, under this analysis, for T/v to value its gender and number features is by Agree with the deleted (and uninterpretable) features on D.¹² The possibility of ‘cyclic agreement’ has indeed been explored by various authors, most notably in the context of analyzing (seemingly) long-distance agreement; see for instance Legate 2005. In the next section we consider one way in which a similar idea might be implemented for the analysis of nominal agreement.

In conclusion, the assumption that the various ϕ -features of nominal phrases do not all enter the derivation as interpretable features of a single head poses a serious problem to the analysis of agreement in Chomsky 2000, 2001: if a T/v head must agree with a single nominal head that bears a full set of interpretable ϕ -features, neither N nor D seems to be a suitable candidate. The prediction is thus that every derivation in which a DP with internal structure occupies a subject or object position would crash, as the uninterpretable ϕ -features of T/v would fail to be deleted.

5 Possible Solutions

The discussion above should make it clear that once the DP encapsulation assumption is rejected, and DPs are not taken as ‘atomic’ elements but as complex structures in which not all ϕ -features enter the derivation as valued features of the same head, agreement theory as presented in Chomsky 2000, 2001 makes a series of wrong predictions. Intuitively, the problem seems to be that for clausal syntax to be able to treat a DP as a single entity, DP-internal syntax must have a way to ‘accumulate’ all nominal features in one node within the DP as the derivation proceeds; but this is not possible under Chomsky’s formulation of Agree, which creates a one-time relation between two features, rather than establishing a permanent link that would allow different levels of the DP to act as a single unit for the purposes of external agreement.

It is interesting to note that the Minimalist Program differs, in this respect, from other grammar formalisms in which features play a central role; contrast this with the LFG framework, for instance, where grammatical information from all

¹²See also Carstens 1993a, who similarly argues that DP-internal gender and number features should be blocked from DP-external agreement by the presence of D’s person features.

levels of the noun phrase can be ‘collected’ into a single shared feature structure (f-structure), regardless of the syntactic head on which each feature originates. The problems discussed in the preceding sections are therefore truly an incompatibility between two important hypotheses within the Minimalist framework. More specifically, the problem stems from the conflict between the ‘distributed’ nature of extended projections, which are hypothesized to be composed of multiple functional layers on top of the projection of the lexical head, on the one hand; and the ‘centralized’ view of agreement as expressed by the notion of ϕ -completeness and ‘all or nothing’ Agree.

In this section, I briefly discuss 3 possible paths that might be taken to resolve this conflict.

5.1 Abandon phi-completeness?

One possible solution would be to abandon the requirement for ϕ -completeness (at least as formulated in Chomsky’s works) as a condition for Agree to succeed. For this to be useful for our purposes, we would also have to abandon the view of agreement as an all-at-once operation, and assume instead that each of the different ϕ -features on T/v can act as a separate probe, with person, number, and gender each agreeing with a separate goal in the noun’s extended projection. These hypotheses are not new: Other arguments against ϕ -completeness have been made by, e.g., Carstens (2001); while arguments against an all-at-once conception of Agree have been made by Béjar (2003, 2008). Both authors point out various empirical problems with the standard formulation of Agree, which can be solved by weakening the theoretical role of the ϕ -feature ‘bundle’. While these authors formulate their proposals on the basis of facts about clausal agreement, the same proposals can provide an immediate solution to the problems that stem from DP-internal feature distribution.

The theoretical price for dropping the requirement for ϕ -completeness would be the loss of Chomsky’s account of the difference between expletive and non-expletive DPs with respect to agreement, Case and movement, as well as his analysis of infinitival clauses in terms of ‘defective T’. Further revisions to the theory of abstract Case would also be required as a consequence of assuming a separate Agree operation for each feature, as structural Case can no longer be assumed under this view to be a side-effect of Agree involving a complete set of ϕ -features (if this kind of Agree never occurs); we return to this issue in section 6. Nevertheless, given that the authors cited above, and others, have made explicit proposals for modifying the Minimalist model in a way that eliminates the requirement that all ϕ -features enter a single Agree relation all at once, it seems that this approach to solving the conflict is worth further consideration.

5.2 Abandon ‘Distributed Noun Phrases’?

The second option for resolving the conflict would be to abandon the ‘distributed’ view of the noun phrase. While logically possible, the theoretical price for this option seems to be extremely high, as nearly all research on the syntax of noun phrases within the Principles & Parameters framework in the last 2 decades has been carried out under the hypothesis that the traditional “noun phrase” has a rich internal structure that goes far beyond what was assumed by earlier analyses. In fact, it is hard to imagine what many modern analyses of noun phrase structure could even look like without an inventory of functional projections, with different features associated with different heads. Thus, perhaps the only reasonable question that should be considered at this point is whether there is a way to maintain the idea that nominals are indeed complex structures with multiple functional projections, while divorcing this assumption from the question of how the different ϕ -features all end up being visible to external agreeing heads; in other words, the question is whether features can somehow be ‘collected’ at the top of the extended nominal projection in a way that will give substantial content to the intuition behind the encapsulation assumption. Below I propose one way in which this goal might be achieved.

5.3 Agreement as Feature Sharing

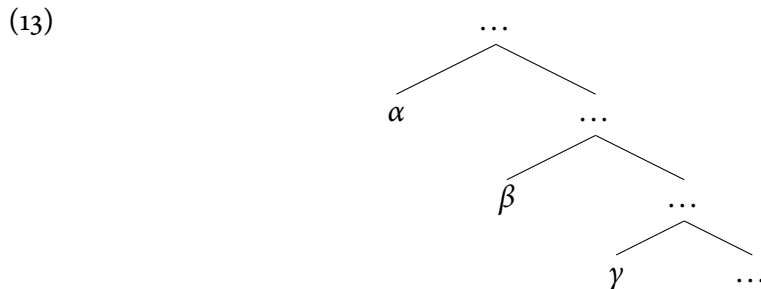
Two recent proposals within the Minimalist framework have questioned the assumption that Agree creates a ‘transient’ link between the two agreeing nodes. Frampton & Gutmann (2006), as well as Pesetsky & Torrego (2007), argue for a view of Agree as a *feature sharing* operation, which unifies two feature OCCURRENCES into two INSTANCES of one shared formal object. Below I will discuss Frampton & Gutmann’s (henceforth FG) and Pesetsky & Torrego’s (henceforth PT) proposals, and show that they can provide the basis for solving the problems discussed above for Chomsky’s analysis of agreement, without abandoning the hypothesis of a rich functional structure below the DP level.¹³

According to FG and PT, the Agree operation matches an unvalued feature of a probe with a feature of a c-commanded goal, and links them as two instances of a *single* formal object.¹⁴ Unlike the Agree operation of Chomsky 2000, 2001, the goal in these models does not necessarily need to carry a *valued* feature; Agree between

¹³ Beyond arguing for a modified view of the Agree operation, both Frampton & Gutmann (2006) and Pesetsky & Torrego (2007) propose revisions to Case theory, which involve separating Case from ϕ -feature agreement. In this paper I will not adopt either of these authors’ analyses of Case, but only the logically independent feature sharing mechanisms proposed in these works.

¹⁴ More precisely, it is both the feature type (person, number, Case etc) and the value that is shared.

two unvalued features is allowed, as long as some subsequent application of Agree would eventually supply the shared feature with a value. Consider, for instance, the following schematic representation:



Suppose that both β and γ enter the derivation with unvalued occurrences of the same feature, while α carries a valued occurrence. Agree between β and γ , followed by Agree between α and β (which might be preceded by movement of β), would result in a single shared feature with 3 instances; the feature on γ , in this derivation, is valued even though γ itself is not involved in an Agree relation with a node carrying a valued occurrence. This kind of derivation is argued by FG to account, for instance, for participle agreement in languages like Icelandic, in sentences having the following schematic structure:

(14) We expect them(ACC.PL) to-have been seen(ACC.PL).

For our purposes, the crucial part of FG's analysis of such structures is that the participle first agrees with the pronoun, and hence subsequent agreement between the matrix *v* and the pronoun gives rise to Case assignment not only to the pronoun, but also to the participle with which the pronoun is 'linked'.

Similarly, if γ enters the derivation with a valued feature, this feature can be shared first with β , and then, indirectly, with α , after α probes for β 's feature which at this point is shared with γ . Below we will see that this kind of analysis can provide the means to solve the problems with the DP encapsulation assumption.

Another innovation of PT's proposal is the claim that feature valuation is independent of feature interpretability. PT argue that a head that enters the derivation with an unvalued feature could eventually have the feature interpreted on it. The computational system is simply required to value all unvalued features, without 'caring' about their interpretability. Interpretability, in this view, is determined outside the computational system proper, with the central interface condition being that each feature be interpreted somewhere.¹⁵ This means that the goal in an

¹⁵ The immediate question is what happens with Case features, if they do not delete and must also be interpreted. PT argue that 'Case' is actually tense, and hence it is interpretable on the functional head with which a DP agrees. See also Svenonius 2006 for a discussion of the question whether

Agree operation does not necessarily carry interpretable (instances of) features; this assumption will play a role in the analysis below in allowing the DP to act as a ϕ -complete goal.

5.3.1 Feature Sharing and phi-features

With the FG/PT view of Agree as feature sharing, DP-internal distribution of ϕ -features becomes much less problematic in the context of clausal agreement. Assume, as before, that D enters the derivation with unvalued gender and number features, and with a valued person feature. D would then probe for the ϕ -features of lower projections: NP for gender, and either NP or NumP for number. Unlike the system of Chomsky 2000, 2001, these features on D would *not* delete at this stage; they will continue to exist as instances of shared ϕ -features. Thus, at the DP level we would have the following features, where sharing is indicated by coindexation:

N: valued gender_{*i*} and number_{*j*}

D: valued person_{*k*}, gender_{*i*} and number_{*j*}

Most importantly, at this point DP has a *complete* set of ϕ -features. This allows for the derivation to proceed essentially as proposed in Chomsky 2000, 2001, except for the fact that Agree does not lead to feature deletion.

Consider for instance the derivation of the following French sentence:

- (15) La fille a parlé.
 the.FM.SG girl.FM.SG has.3.SG spoken
 ‘The girl spoke.’

Putting aside Move operations, the two relevant steps in the derivation are:

1. The unvalued gender and number features of the D *la* probe for those of the N *fille*; following Agree, the valued gender and number features have two instances each, on D and on N.
2. The unvalued ϕ -features of the T *a* probe for those of the D *la*.

In step 2 of this derivation, T probes for the features of D, which is *at this point* ϕ -complete: Following step 1, the ϕ -features of D are all valued – not as a result of being interpretable (as the gender and number features are not interpretable on D), but simply as a result of being instances of shared, valued features. The features of the T head then also become part of shared feature ‘chains’: T, D, and N all share a single gender and a single number feature; T and D share a single person feature.

Case is interpretable or not.

Finally, interface conditions, such as the lexical category of each head, determine where each of these features should be interpreted: person on D, number on N (or Num), and gender on N.

The only stipulation needed for this analysis to work is that D has to carry ϕ -features even in languages like English, where articles do not inflect for gender or number. This is not unreasonable; the fact that English uses an indefinite article only for singulars, for instance, could be taken as evidence for the existence of a number feature on the article in English. Thus, languages such as French simply show a richer inflectional paradigm in the article system, but articles can be assumed to cross-linguistically carry abstract ϕ -features.

A feature-sharing derivation along these lines thus allows for something similar to the DP encapsulation assumption to be maintained: even though ϕ -features originate on different heads in the noun phrase, they are all ‘collected’ at the DP level. What makes this possible, under PT’s approach, is the assumption that the computational system does not distinguish between interpretable and uninterpretable features, and that features that enter the derivation unvalued are not deleted after Agree takes place. This enables all the features of D to be active after the DP-internal agreement operations take place, regardless of whether these features will be interpreted on D or elsewhere.

5.3.2 Potential Problems

While the feature sharing analysis sketched above seems to provide a very simple (and independently motivated) solution to the problems to which this paper is devoted, it nevertheless does raise several new problems. Below I briefly discuss two of these.

One issue with this approach is that, while it allows us to maintain the requirement for ϕ -completeness at the level of DP-T/v agreement, it seems to reintroduce the same problem at the level of DP-internal agreement. As the sample derivations above make clear, for this kind of analysis to work we must assume that elements like adjectives can agree with the noun in gender and number, without agreeing in person; such agreement is obviously successful, as it values the adjective’s features. It is therefore clear that the feature sharing analysis can only allow us to maintain a weak version of the ϕ -completeness hypothesis: what constitutes a complete set of ϕ -features must be relativized to the category of the probe or to the unvalued features that it carries. Specifically, I propose the following:

- (16) **Relativized ϕ -completeness:** An Agree operation leads to feature sharing iff the goal matches all the unvalued ϕ -features of the probe.

Under this hypothesis, Agree between an adjective and a noun can be successful because the adjectival probe has no unvalued person; Agree between T and N, on

the other hand, cannot be successful, because of T's unvalued person feature.^{16 17}

Note also that some sort of relativized ϕ -completeness seems to be unavoidable if concord is to be analyzed as an instance of Agree, regardless of the specific nature of the feature sharing mechanism; it seems unreasonable to assume, for instance, that adjectives must agree in person in order to agree in gender and number, given that no evidence for such agreement exists, not just in English but also in many other typologically unrelated languages. An additional benefit of relativized ϕ -completeness is that it would make it easier to account for cross linguistic differences in the inventory of relevant ϕ -features; thus, for instance, as noted by Carstens (2001), gender is systematically missing from subject agreement in Indo-European languages (while it is nevertheless part of subject agreement in many other languages); similarly, while definiteness agreement (in addition to gender and number agreement) is obligatory between nouns and attributive adjectives in Hebrew and Arabic, it would be somewhat odd to assume that definiteness is part of the universal set of ϕ -features required for ϕ -completeness (Danon 2010).

It therefore seems that the fact that DP-internal agreement does not involve all the ϕ -features involved in clausal agreement is not really a problem for the feature sharing analysis, but rather an important empirical fact that has not yet received proper attention in the literature dealing with the formalization of agreement in Minimalism. The proposal for relativized ϕ -completeness given above attempts to deal with this fact, and at the same time it removes from the syntax the stipulation of which particular features are relevant to agreement and pushes the problem into the lexicon, where the feature composition of particular lexical items is determined.

Another problem for the feature sharing analysis has to do with explaining the lack of DP-internal person agreement. Under Chomsky's definition of Agree, this fact follows directly from the assumption that person is interpretable only at the DP level, which entails that if another person feature existed lower within the noun phrase, it would be uninterpretable and there would be no way to delete it by Agree with a valued feature on a c-commanded goal. This kind of explanation might not work under PT's redefinition of Agree, in which interpretability is not directly encoded in the syntactic representation. PT's version of Agree still maintains the assumption that it is the unvalued feature that probes into its c-command domain, and therefore, if elements such as adjectives entered the derivation with unvalued person features, they would not be able to probe for the person feature of D. Nevertheless, the question is whether a person feature on Adj (or on N itself) could

¹⁶Past participle agreement with passive subjects can probably also be analyzed under this system as successful Agree, where the unvalued features of the participial probe are gender and number (and Case), but not person. We return to the issue of Case in section 6.

¹⁷One new problem opened by this hypothesis is that it predicts, probably incorrectly, the possibility of successful agreement between 'defective T' and expletives. Discussing this issue is beyond the scope of this paper.

agree with person on D as a ‘free rider’ when D probes for valued gender and number features, thus making person on Adj/N a possibility that is not systematically blocked by the grammar of agreement.

There is, however, a simple solution that emerges from the Relativized ϕ -completeness hypothesis proposed above: If the goal must match all the unvalued ϕ -features of the probe for Agree to be successful, then a person feature on Adj would prevent the adjective from agreeing in gender and number with a lower node that lacks person. This means that the only option that still remains to be ruled out is for *all* active heads in the extended projection of the noun, including N itself, to enter the derivation with an unvalued person feature, which will eventually be valued by D; this option does not seem to be ruled out by Relativized ϕ -completeness alone, as having person on all heads will not lead to a situation in which the goal lacks a feature present on the probe (assuming, as in PT’s model, that Agree is possible even if a feature of the goal is unvalued). We return to this possibility in the following section.

6 The Status of Case

So far we have concentrated on one aspect of the DP-encapsulation problem – the issue of agreement. Another closely related issue is the status of Case. Under the dominant view in current Minimalism, Case features are valued as a ‘by-product’ of Agree between a DP and a ϕ -complete probe. In light of the discussion of agreement above, the compatibility of this model of Case with other parts of the framework should be reevaluated. Specifically, we should consider the question to what extent this model is compatible with the different solutions to the agreement problem discussed above; this relies, in part, on determining where exactly within the noun phrase Case features are located.

Let us first briefly look at the possibility, discussed in section 5.1, that Agree does *not* require a ϕ -complete goal in order to value the probe’s features, and that T or v agree in each of their ϕ -features separately. Under this analysis, there is a certain amount of vagueness in the hypothesis that Case is valued as a result of successful Agree with T/v: If we assume that these probes enter *several* Agree relations (one per feature), then we must decide which of these agreements, if any, is responsible for Case valuation. This issue cannot be separated from the question of where exactly in the noun phrase Case features are located; it might be that some of these Agree operations do not value Case simply because some of the goals (DP, NumP and NP) have no Case feature to value.

Under the general notion of Case as a licensing feature of the noun’s extended projection, the most natural hypothesis is that it is the DP projection that carries a

Case feature.¹⁸ If only DP carries a Case feature (as argued, for instance, in Danon 2006), and the only ϕ -feature systematically associated with D is person, then the obvious hypothesis to consider is that Case is valued as a result of person agreement. But, as discussed in detail in Carstens 2001, this hypothesis runs into both theory-internal difficulties and empirical ones. At the theory-internal level, associating Case with person agreement alone is incompatible with the hypothesis that infinitival ‘defective T’ bears only a person feature, and hence cannot value Case; and with Chomsky’s analysis of Case on participles in languages like Icelandic, which is claimed to be the result of Agree in number/gender, with no person agreement. At the empirical level, Carstens notes the existence of overt person agreement on multiple heads in Bantu complex tenses, which means that not every person agreement operation leads to a DP’s Case feature being valued and the DP becoming inactive; see Carstens 2001 for further discussion. The same problems apply if we assume that a DP’s Case feature is valued as a result of *any* successful Agree, not necessarily in person, in which the DP is the goal.

The intermediate conclusion is thus that if we abandoned the hypothesis that only a ϕ -complete goal can value the features of a probe and assumed that T/v agree separately for each of their features, then we could no longer assume that Case valuation is an automatic by-product of Agree. Stipulating that Case is valued on DP when this DP enters an Agree relation with T/v, regardless of how many features are involved, means that infinitival T cannot be claimed to lack the ability to value a DP’s Case due to such T’s lack of number and gender features; for one possible revision of Case Theory that indeed makes this claim, see Carstens 2001. For the purposes of the present paper, it is sufficient to note that there are thus non-trivial consequences to Case Theory if we choose to solve the agreement problem by abandoning the hypothesis of ‘all at once’ Agree.

Let us now consider the alternative: assume that we adopt some variation on the feature sharing analysis discussed in section 5.3. This, as we saw, allows us to maintain the idea that DP does, eventually, carry a full suite of ϕ -features; as a result, it seems that no modifications are needed to Case Theory: Case can still be assumed to be valued as a result of Agree between T/v and a ϕ -complete DP, where the fact that DP becomes ϕ -complete only as a result of DP-internal feature sharing makes no difference with respect to Case.¹⁹

¹⁸I ignore here the possibility of an additional functional projection, KP, dominating DP and being associated specifically with Case (Bittner & Hale 1996). If we assumed the existence of a KP for every noun phrase bearing a Case feature, that would pose a direct challenge to the hypothesis that Case is a reflex of Agree, as K would then carry a Case feature, but no ϕ -features. If we took the approach of Bittner & Hale 1996 and assumed that KP is present only in non-nominative arguments, it is not clear how the Minimalist model of Case and agreement would apply to objects. A detailed discussion of all the consequences of this hypothesis is beyond the scope of this paper.

¹⁹It should be noted, however, that both PT and FG explicitly reject the idea that ϕ -completeness

One remaining issue with this analysis, however, is that, under the hypothesis that goals are active only if they bear at least one unvalued feature, it is still not clear from the discussion in section 5.3.1 what makes the feature-bearing projections below DP active; if Case is only a feature of DP, then NP is predicted to be inactive throughout the derivation, as it seems to enter the derivation with only valued features (gender, and possibly number). Therefore, assuming this notion of activity, the unavoidable conclusion is that N also enters the derivation bearing some unvalued feature. Unless there is some independent reason for stipulating the existence of a totally new feature, it seems that the null hypothesis is that a Case feature is present not only on D, but also on N.

With an abstract Case feature on N, in addition to the one on D, the derivation under the feature sharing approach proceeds just as discussed in section 5.3.1. When D agrees with N in gender/number, it also agrees with it in Case, and therefore the two (unvalued) Case features become two instances of a shared feature; subsequently, both instances would be valued simultaneously by Agree with T/v. This derivation is essentially the same as in the analysis proposed in Frampton & Gutmann 2006 for Case on participles in Icelandic, as discussed in section 5.3.

Can this kind of analysis be supported empirically, in addition to the abstract theoretical reasoning just given? The obvious thing that comes to mind is case morphology. If case morphology is the realization of abstract Case features, this analysis makes the prediction that case morphology should be present on both N and D. This is indeed true for some languages, such as Modern Greek, in which case is marked on articles, adjectives and nouns, as illustrated in (17) below (from Alexiadou 2001):

- (17) ton amerikanid-on ginek-on
 the.FM.PL.GEN American.FM.PL.GEN woman.FM.PL.GEN
 ‘the American woman (genitive)’

But taking this kind of case concord as evidence for multiple Case features within a single DP is problematic in two respects. First, many languages mark case on only one element per noun phrase, and hence the Greek example given above cannot be taken as representative of case morphology in general. Second, as argued by many authors, it is not at all obvious that morphological case is a straightforward spellout of abstract Case features (Landau 2006; Marantz 2000; Sigurðsson 1991), and even if it is – the DP-internal distribution of case morphology might depend

is directly relevant to Case. The goal of the present discussion, on the other hand, is not to argue against ϕ -completeness, but simply to point out the potential inconsistencies and contradictions that might arise from the use of this notion. My claim in this part is that there is no inherent incompatibility between the feature sharing model and the model of Case valuation as a consequence of ϕ -complete agreement.

not only on syntactic factors, but also on post-syntactic morphological processes (Schütze 2001). To this we might add the observation that not only structural, but also lexical (inherent) case, is morphologically marked on nouns in many languages; this makes it difficult to directly attribute case morphology to abstract Case features that are valued as a consequence of Agree; see for instance the discussion in Schütze 1997, 2001. In light of this, I leave the issue of empirical evidence for the existence of Case features on both N and D as an open question.

Finally, we should note that there is an alternative hypothesis, raised for independent reasons at the end of section 5.3.2, regarding the unvalued feature that the current analysis predicts to be present on N: Is it possible that this feature is not Case but person?

In terms of making N active, this option is virtually identical to the option of having a Case feature on N: if only D enters the derivation with a valued person feature, N (as well as other functional heads carrying unvalued person) would be active until it agrees with D; person would then be valued when D probes for number/gender features. This, however, brings back the question of why there is no *overt* person agreement within the DP; from this perspective, there does seem to be an advantage to the hypothesis that Case, and not person, is the relevant feature on N. But given the fact that DP-internal modification of (non 3rd person) pronouns is a somewhat rare and marked option, and given the overwhelming tendency for 3rd person to be morphologically unmarked, lack of morphological person distinctions on DP-internal elements might not be such a suprising fact. We therefore leave it as an open question whether N is active due to a Case feature or due to a person feature, noting that both options seem to be possible from the point of view of narrow syntax, but that there are some unresolved issues regarding morphological realization under either of these analyses.

In summary, we saw that the distributed view of the DP-internal feature arrangement, coupled with Chomsky's model of feature valuation, leads to problems not only in the area of Minimalist agreement theory, but also in the area of Case Theory; in this section I tried to show that the problems for Case Theory can most easily be solved by adopting the feature sharing approach discussed in the previous section as a possible solution to the agreement problem. An important consequence of this analysis is that it makes the prediction that either Case or person features should be present on both N and D: the feature on N is required for DP-internal Agree, while the feature on D is required for clausal syntax. We therefore end up with a model in which Case or person, as well as number and gender, are all present on multiple heads within the extended projection of the noun.

7 Conclusion

The formal and explicit nature of the theory of agreement and Case as presented in Chomsky 2000, 2001 makes it crucial to consider the exact feature composition of each head that participates in a derivation. The goal of this paper was to argue that abstracting away from the internal feature composition of DPs, by means of the simplifying assumption that DP carries a full set of valued ϕ -features, hides an important incompatibility between Chomsky's model of agreement and a large and important body of work regarding the internal feature composition of DPs.

This incompatibility can be resolved by adopting one of two possible revisions to the Minimalist model of agreement: either, by abandoning the hypothesis that ϕ -completeness of the goal is a necessary condition for Agree to value the features of the probe, which would make it possible to assume that each of the features on T/v agrees with a different goal; or, by revising the mechanism of agreement such that feature instances are linked, rather than deleted, once Agree has taken place, as in the feature sharing models suggested by several authors for reasons independent of the ones discussed in this paper. In section 6 I tried to show that adopting the feature sharing approach also allows us to maintain the theory of Case proposed in Chomsky 2000, 2001, whereas choosing to drop the DP-encapsulation hypothesis and assume that each feature agrees separately requires significant modifications to Case Theory as well. The feature sharing view of Agree thus proves to be a highly desirable modification to the model of syntax presented in Chomsky 2000, 2001, which saves it from being incompatible with the majority of recent literature on the syntax of noun phrases.

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