

The Presuppositional Approach to Φ -Features

Note by Uli Sauerland, ZAS, February 2018

I was asked to make the attached unpublished paper publicly available. I do so reluctantly for the following reason: The paper was accepted at a journal several years ago, but when I started revising it, I realized that a crucial background assumption of section 3 of the paper is incorrect (partially based on facts that one reviewer mentioned). Namely, the assumption that quantifier raising (QR) out of universally quantified DPs is impossible, I now think was wrong. Unfortunately I never found the time to revise the paper to be of a satisfactory quality for publication, and in the end, withdrew the paper.

This argument that QR out of definites is possible relates to the data in (22) of the attached paper. The acceptability of (22a) reported in the paper actually depends on whether monogamy of Bill and James is assumed, and the example is judged unacceptable in English unless at least one of the two is polygamous. This turns out to be a systematic pattern: The data in (1) are acceptable always assuming that at least for one individual part of the denotation of the *of*-phrase is related to a plurality of individuals by the relation denoted by the noun following the universal quantifier. But the examples in (2) are unacceptable if we assume a uniform one-to-one relation for the nouns *wife*, *mayor*, and *chief executive*.

- (1) a. Every daughter of Bill and James is pregnant.
b. Every resident of these cities has a bicycle. (= (22c))
c. Each executive of these companies knew about their crimes. (= (22b))
- (2) a. *Every wife of Bill and James is pregnant. (= (22a))
b. *Every mayor of these cities has a bicycle.
c. *Each chief executive of these companies knew about their crimes.

The contrast between (1) and (2) doesn't follow from the analysis presented in the paper. On the other hand, the contrast derives straightforwardly if the plural DP in the *of* phrase scopes out of the universally quantified DP. Consider the sketch of a representation of (2b) in (3), where \star denote a distributivity operator (e.g. Schwarzschild 1996):

- (3) [these cities] $\star \lambda_x$ [every mayor of x has a bicycle]

The oddness of (2b) then derives from the anti-uniqueness presupposition of *every* (e.g. Sauerland 2008) since (3) amounts to conjunction of statements such as in (4).

- (4) Every mayor of Berlin has a bicycle and every mayor of Tokyo has a bicycle and

Bibliography

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The Presuppositional Approach to Φ -Features*

Uli Sauerland

July 2009

The ϕ -features – person, number, and gender – connect morphology, syntax, and semantics in an interesting way. Assumptions about ϕ -features in one component of grammar almost always have repercussions for the other components of grammar. In this paper, I primarily develop a proposal for the semantics of ϕ -features, namely the *Presuppositional Approach*. But I also aim to develop an explicit syntactic and morphological analysis that is compatible with my semantic proposal.

One striking property of ϕ -features is that they often have multiple morphological exponents via agreement within the clause. For example, the plurality of the subject in (1) has three morphological exponents – the plurality of *these*, of *boys*, and of *like*.

*Acknowledgements will be supplied.

- (1) These_{PL} boys_{PL} have_{PL} a ball each.

Semantically not all the exponents of number have an effect on the phrase they attach to. For example, the verb in (2) applies distributively to individual boys, just like a singular verb would. Nevertheless plural agreement morphology is obligatory. A semantic account of ϕ -features therefore has to not only ask how they are interpreted, but also where they are interpreted. For English, it has been assumed since at least Bennett (1974) that number marking on the noun is interpreted.¹ That English most frequently marks number on the noun is one reason this assumption is popular. However, the link between overt morphology and semantic content cannot be as direct cross-linguistically: In Gungbe, plural marking is found not on the noun, but on the determiner as shown in (2), but the interpretation of plurality in Gungbe doesn't seem to be different from English.

- (2) GUNGBE (Aboh, 1998, 2)

távò xóxò dàxó éhè ló lɛ
table old big this the PL

'these big old tables'

¹As far as I know, only Eschenbach (1993) and myself (Sauerland, 2003) have not adopted this assumption

Two further questions are salient in the semantics of ϕ -features: Morphosyntactically ϕ -features exhibit a great deal of uniformity both across occurrences of an individual ϕ -feature and also as the grammatical class of ϕ -features (see Corbett 2006). Therefore, it is interesting to ask whether the same kind of uniformity is found with semantics:

1. Do ϕ -features form a semantic class?
2. Are individual ϕ -features interpreted uniformly?

Present work in semantics suggests that the answer to both questions should be negative. With respect to question 1, much work in semantics assumes that number and person need to receive semantically quite different accounts; the former as the *-operator (e.g. Schwarzschild 1996), the latter as a presupposition (e.g. Schlenker 2003). This would entail that ϕ -features do not form a semantic class. With respect to the second question; most work assumes that number on pronouns and nouns is interpreted quite differently, again one as a presupposition (Cooper 1979; Heim and Kratzer 1998a) and the other as a *-operator. This would entail that ϕ -features are not interpreted uniformly across different occurrences of the same feature. The simplest approach, however, would be to answer both questions positively – a uniform treatment of all interpreted occurrences of ϕ -features. Any divergence from such

a uniform account needs to be justified. The presuppositional approach I propose in this paper develops this uniform position as much as possible. As I will show, the uniform presuppositional approach is very successful and can extend to many phenomena not accurately described by other approaches.

In the following sections, I first develop the presuppositional approach in detail including an initial argument for the approach from coordinations. In sections 2 to 5, I present four further arguments for the presuppositional approach from split agreement phenomena, agreement with distributive quantifiers, the number interpretation of cumulative nouns, and the interaction of gender marking and superlatives. In the conclusion, I summarize the phenomena the approach captures only with additional syntactic mechanisms: bound pronouns, non-default resolution in coordination, and low coordination.

1 The Proposal and the Argument from Coordination

To introduce the proposal, I start with an example that motivates some of its central assumptions: DP-coordination. It is easy to see that coordinations carry ϕ -features on their own in addition to those of each conjunct. Consider the case illustrated in (3) from Czech. A third person singular noun phrase and a second person singular pronoun are coordinated and the verb exhibits

second person plural agreement.

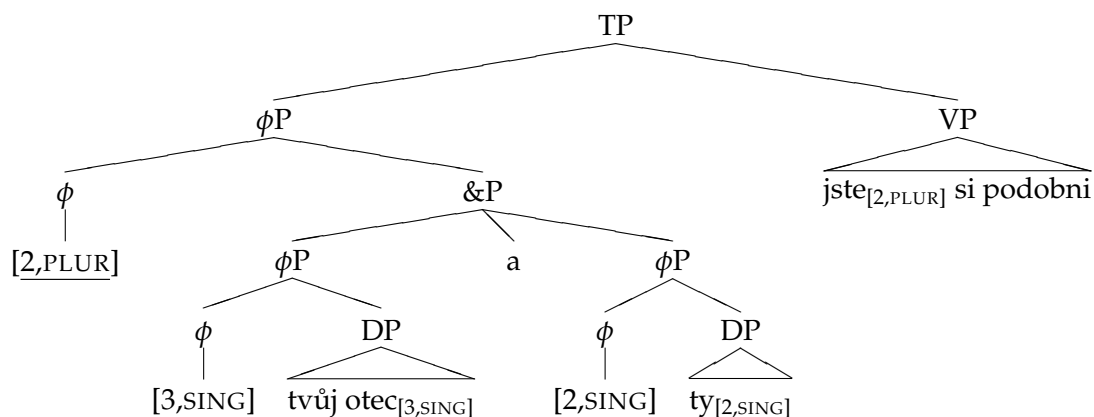
(3) (Corbett, 1991, 262)

tvůj otec a ty jste si podobni
 your father and you be.2PLUR self.DAT alike

‘Your father and you are alike.’

There are of course many ways one could account for this simple fact. But, it seems important that our semantic knowledge that “you and your father” denotes an entity that is second person plural should be involved here. Hence, I will not pursue an account that generally applies a syntactic feature calculus to determine the person features of the coordination from the coordinates (Dalrymple and Kaplan, 2000). Instead, I propose that the ϕ -features of the conjunction are semantically determined. The role of syntax is only to require the presence of ϕ -features, but it does not constrain their content. Specifically, the syntax of (3) requires the presence of a ϕ -feature bundle above the coordination. The content of the ϕ -feature bundle, however, is determined by the semantics. Since each conjunct may also have agreement within the conjunct, I assume specifically the following structure for (3) (Here and in the following, occurrences of ϕ -features that are interpreted are underlined.):

(4)



As shown in this structure, I propose that generally ϕ -feature bundles that are interpreted occupy separately projected syntactic heads of the category ϕ . My main proposal in (5) regulates the relation between ϕ -positions and the interpretation of ϕ -features. The part in the parenthesis, as I will argue below, follows from the position of ϕ above DP and standard assumptions about the interpretation mechanisms available.

- (5) ϕ -condition: Any ϕ -feature occurring in a ϕ -position must be interpreted (as a presupposition).

A further strengthening of my proposal (5) would be the additional condition in (6). (6) is actually without effect in many examples, since once ϕ -features are interpreted in the ϕ -position, they may also be interpreted redundantly in other positions with DP: for example, if in a definite like $[FEM] la_{FEM} femme_{FEM}$

the presupposition of femininity is satisfied by the referent, the NP argument of the definite can also be restricted to feminines. As the discussion in the following shows, (6) faces at least one exception: derivational gender morphology as discussed at the end of Section 5.

- (6) Extended ϕ -condition: Any ϕ -feature not occurring in a ϕ -position must not be interpreted (with one exception).

At this point, having separate heads allows a neat division between morphosyntax and semantics/pragmatics: morphosyntax determines the distribution of ϕ -heads, while the semantics determines their content. I give further arguments for the separate heads later in sections 3, 4, and 5:² The morpho-syntactic part of my analysis determines the distribution of ϕ heads, accounts for some exceptions, and underlies agreement of uninterpreted sets of these features, while the semantic-pragmatic part determines the content of the ϕ -heads in the general case.

Three general morphosyntactic assumptions I argue for are the following:

1. The morphology of a language determines which lexical items must

²A further use of ϕ -heads may be in the account of examples like (i), where a pronoun occurs together with a DP-coordination. We can account for this example as *we* actually realizing the content of the ϕ -head morphologically.

(i) We, my family and I, moved recently.

I believe this account can also be extended to noun phrases such as *he, my brother* and clitic doubling phenomena (Sportiche, 1996), but lack the space here to demonstrate this.

bear morphological ϕ -features. The morphology of English is such that nouns, some determiners, and verbs must all bear morphological ϕ -features.

2. Morphological ϕ -features must be licensed by agreement with a ϕ -head.
3. Morphological ϕ -feature always agree with the closest ϕ -head (cf. Chomsky (1995)).

Specifically agreement of the morphological ϕ -features of the verb targets the subject and morphological ϕ -features on nouns and determiners seek to agree with a ϕ -head within the extended projections of the noun.

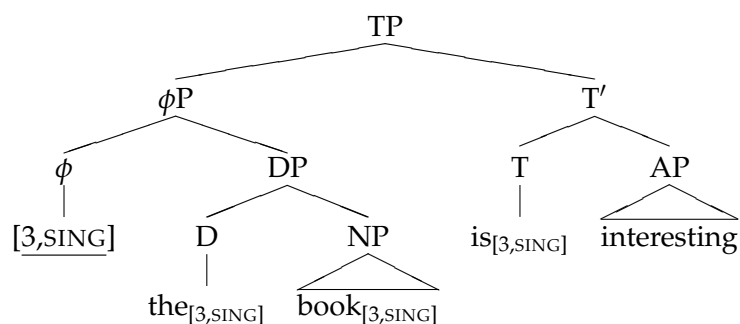
In examples with coordination like (3), the requirements of the two noun phrases and those of the verb must be satisfied by different ϕ -heads assuming that the coordinate structure constraint (Ross, 1968) blocks feature agreement between a phrase inside of a coordination and one outside of it. Therefore, the analysis of (6) requires three ϕ -heads: one for each nominal phrase and one for the verb to agree with.³

However, the agreement requirements of verb and noun need not always be satisfied by separate heads as (7) illustrates. The noun phrase *the book* and the copular verb *is* must bear ϕ -features in English. Hence, both require

³We address asymmetric coordination structures below.

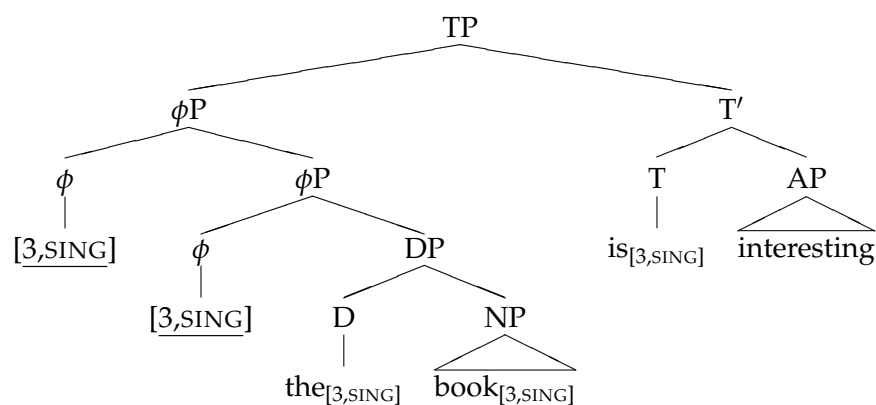
a ϕ -head to determine the value of their respective ϕ -features. The two requirements can be satisfied in two ways for (7): either with one ϕ -head or with two ϕ -heads. The natural way is to satisfy both requirements with the same ϕ -head as shown in the tree following (7).

(7) The book is interesting.



My analysis predicts, however, a second possible analysis for (7): namely, the use of two separate ϕ -heads as shown below. We will see evidence below that the both structures for (7) should be in principle allowed. The two-headed structure provides an account for cases of split agreement.⁴

⁴The assumption of two ϕ -heads as in (8) is evidently quite similar to the proposal that all noun phrases should bear two sets of ϕ -features (Wechsler and Zlatic 2003 and others), but my proposal does not preclude the structure with just one set of ϕ -features. Some further advantages of my proposal are discussed below.



This completes the morphosyntactic aspects of my proposal, though some details will still to be filled in below. At this point, however, I turn to the semantic part of the proposal. How is the feature content of ϕ -heads determined? I propose that the content should be determined by semantics and pragmatics. One reason for this is theoretical simplicity: In many cases the feature content of a ϕ -head correlates with semantic properties of the phrase as the plurality of coordinations. And if semantics determines the content of ϕ -heads in some cases, it is natural to try to extend that account to all cases. We need a semantics-pragmatics of features that predicts that only the feature bundles shown for (3) and (7) are possible in these positions. I propose that the concept of a presupposition is the right one to do this. Presuppositions are semantic conditions a sentence has to satisfy to be meaningful at all. I propose that generally the content of ϕ -head is interpreted as a presupposition. I first show how the account works and the argue for using the concept

of presupposition.

To understand the proposal, consider the feature [+PLUR] above the conjunction in (3).⁵ The [+PLUR] feature does not seem to contribute anything to the meaning of the sentence that is not already clear from the assertion that ‘your father and you are alike’; namely, that you and your father together form a plural entity.⁶ Singular agreement on the verb would not change the meaning of the sentence, but simply make the sentence ungrammatical. However, there is a class of DP coordinations that allows singular agreement on the verb as Farkas and Zec (1995) point out: if in a DP such as the two DPs coordinated refer to the same individual, the singular verb form *is* is required.

- (8) His lifelong companion and the editor of his autobiography is at his bedside.

[insert FIGURE 1 here]

This example confirms the presuppositional approach: In this case, the referent of the DP-coordination is a singular, atomic entity, not a plurality. The presupposition of the singular feature is specified formally in (9). Ac-

⁵In this paper, I only consider languages that have a SING/PLUR-number system. Harbour (2007) presents a proposal for richer systems of number marking that has much to recommend itself, but is not presuppositional. I have to leave it up to future work to find out whether Harbour’s work can be adopted to the presuppositional approach.

⁶In this paper, I assume a mereological ontology of plurals following Link (1983).

According to (9), the singular feature adds no new information, but only adds the presupposition that the complement of ϕ denotes an entity without atomic parts. This position is satisfied in the structure for (8) and also in either structure for (7) that is given above. Furthermore, the presupposition of SG is not satisfied in (6), and therefore the feature SG is blocked in this case.

$$(9) \quad \llbracket \text{SING} \rrbracket = id_{\{x \in D_e \mid \neg \exists a(\text{atom}(a) \wedge a \sqsubset x \wedge a \neq x)\}}$$

For the plural the account needs to be slightly more complex, because I assume that the plural is semantically less marked than the singular in English (van Eijck (1983); Hoeksema (1983), as well as Sauerland et al. (2005); Spector (2007); Zweig (2008) for recent discussion). Following these works, I assume that the plural is semantically unmarked and appears whenever the presupposition of the singular is not satisfied. In most circumstances this predicts that use of the plural presupposes that the individual denoted is not known to be an atom or mass. This predicts that the plural is licensed in the ϕ -head above coordination in (6), but not in (7) and (8).

The presuppositional semantics can be easily extended to person and gender. Following especially Noyer (1992), I assume that the two person features 1 and 2 are the two universal person features and that they presuppose that speaker or addressee be part of the individual denoted by the complement of

the ϕ -head (see also Heim (2008) for discussion).

- (10) a. $\llbracket \underline{1} \rrbracket = \text{id}_{\{x \mid \text{speaker} \cap x \neq \emptyset\}}$
 b. $\llbracket \underline{2} \rrbracket = \text{id}_{\{x \mid \text{addressee} \cap x \neq \emptyset\}}$

Initially it may seem surprising to assume a full person specification of all DPs even though persons other than 3rd Person must be expressed by means of a pronoun form in English even when a full nominal phrase is used. However, there is straightforward evidence for this: In English, examples like (11) show that *we* and *you* can also be used as definite determiners Postal (1972) for person marking on full definite DPs. Since further *the* cannot be used in the same contexts as (11), I assume that the English definite determiner must agree in person with the ϕ -head.

- (11) We linguists enjoyed the conference more than you philosophers.

Interestingly, Spanish does not have the determiner agreement of English: the plain definite determiner is used in examples like (11) across all persons, and verbal agreement is the only exponent of the person feature. The fact that verbal agreement in Spanish marks person just as in English is predicted if Spanish just like English has a fully specified ϕ -head above the definite determiner, and the difference between the two languages is only

that in English the determiner must agree in person with the ϕ -head while in Spanish it doesn't.

(12) (Natasha Pomino, p.c.)

- a. Los españoles somos muy
 the-MASC.PLUR Spanish-PLUR be-1.PLUR very
 orgullosos
 proud-MASC.PLUR
 'We Spaniards are very proud.'
- b. Los españoles sois muy
 the-MASC.PLUR Spanish-PLUR be-2.PLUR very
 orgullosos
 proud-MASC.PLUR
 'You Spaniards are very proud.'
- c. Los españoles son muy
 the-MASC.PLUR Spanish-PLUR be-3.PLUR very
 orgullosos
 proud-MASC.PLUR
 'The Spaniards are very proud.'

For gender, there is a great amount of cross-linguistic variation with the English gender system being rather rudimentary. One possible account of English pronominal gender is by means of the two features in (13), with the neuter analyzed as the featureless default gender. Gender in other languages may have different feature specifications, but relies on the same semantic mechanisms (see Sauerland 2008b for further discussion).

(13) a. $\llbracket \text{FEM} \rrbracket = \text{id}_{\{x \mid \forall a \sqsubset x (\text{atom}(a) \rightarrow \text{female}(a))\}}$

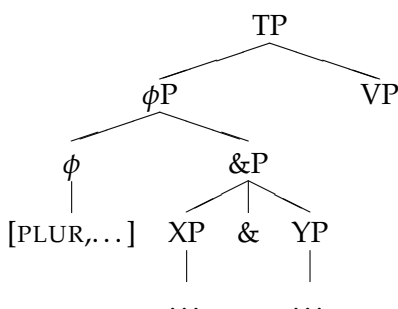
$$\text{b. } \llbracket \text{MASC} \rrbracket = \text{id}_{\{x \mid \forall a \sqsubset x (\text{atom}(a) \rightarrow \text{human}(a))\}}$$

Coordination of DPs as in (3) provides an initial argument for several aspects of my proposal. First of all, coordination shows that ϕ -features (namely, those of the coordination) can exist independently of any morphological exponent on the DP. There is, of course, a morphological exponent on the verb, but note that it does not seem possible to state the semantics of the feature PLUR of the verb. The only attempt to do this, due to Dowty and Jacobson (1989), does not deliver: They require that the argument of a plural verb must be a plurality; but, then morphologically plural verbs should not allow distributive readings of the kind illustrated in (14), where the verb phrase is true not of the plurality the subject denotes, but of each atomic part of it.⁷

(14) Your father and you each ate exactly one cookie.

Secondly, of the known semantic mechanisms only a presuppositional analysis is applicable in the coordination example. This becomes apparent, when we consider the configuration in which the ϕ -features of the coordination occur shown here:

⁷One could propose that verbal plurality is an independent morpheme with the meaning $\llbracket \text{PLUR} \rrbracket = \lambda f \lambda x. \exists a (\text{atom}(a) \wedge a \sqsubset x \wedge a \neq x) \wedge f(x)$. Then example (14) could be analyzed by applying PLUR to the verb phrase after the distributivity operator has applied. However, this proposal requires the stipulation that PLUR must always take scope over distributive operators and otherwise does not predict anything other than the presuppositional approach I defend. Therefore, I do not consider this type of analysis of verbal plurality any further.



Within the compositional semantics proposed by Heim and Kratzer (1998a), the verb phrase requires an argument of the type e of individual and the meaning of a coordination of two type e has been argued to denote an individual of type e (Schwarzschild, 1996). Then it follows that the ϕ -head must be of type $\langle e, e \rangle$. But, if we analysed PLUR as a property it would have type $\langle e, t \rangle$. And on the standard analysis, PLUR is the *-operator of type $\langle et, et \rangle$ mapping a singular predicate to a plural predicate. Neither of these analysis is suitable for PLUR in (14). Therefore, only the presuppositional analysis remains.⁸

High adjectives in languages like French further corroborate the approach agreement with coordinations advocated here (Jonathan Bobaljik, p.c.). In French, the postnominal adjective *intelligentes* must apply to both coordinates when it is marked for plurality. This follows from the structure shown below where the plural adjective must occur above the coordination to be able to

⁸Eschenbach (1993) also argues for a semantics of number on nouns that is not directly tied to the nominal plural morphology. However, her proposal is substantially different from mine and does not extend to coordinations nor some of the other data I consider below.

agree with the plural ϕ -head outside of coordination. In this position, the adjective must apply to both conjuncts.⁹

(15) (Emmanuel Chemla, p.c.)

L'homme et le garçon originaux dorment
 The man.SING and the.SING boy.SING creative-PLUR
 sleep-PLUR

'The creative man and the creative boy are sleeping.'

[insert FIGURE 2 here]

In the following sections, I present three further arguments for the presuppositional analysis. The arguments are each based on the analysis of specific facts in European languages. All three arguments directly argue for my proposal that ϕ -features are interpreted only in a position outside of DP, which is a key property of the presuppositional approach as I just argued. First, I show how the assumption of separate ϕ -head explains split agreement patterns and predicts a case of Corbett's 1983 agreement hierarchy. Then I show that the distribution of number marking on cumulative nouns requires the presuppositional analysis. And finally, I show further evidence that gen-

⁹A similar case in English are relative clauses like (i), which Link (1984) named *Hydras*.

(i) I know the man and the woman that talk with their child over there.

der and number features must be interpreted in a high position within the determiner phrase.

2 Hybrid Agreement as ϕ -Recursion

The second argument for the presuppositional approach is based on hybrid agreement. The phenomenon of hybrid agreement (also called split agreement) is widely discussed in the literature on ϕ -features (see especially, Wechsler and Zlatic (2003) and Corbett (2006)). One case of hybrid agreement in Russian is shown in (16): Though the noun *vrač* ('doctor') is grammatically male it can be used with feminine agreement on the verb when a female doctor is referred to.¹⁰

- (16) *vrač* *prišla* (Corbett, 1983, 31)
 doctor.MASC came_[FEM]
 'The female doctor came.'

Split agreement obviously requires two sets of ϕ -features. Wechsler and Zlatic (2003) have investigated the phenomenon in some detail and develop a syntactic analysis. They distinguish between two sets of ϕ -features, which they refer to as the *concord features* and the *index features* (see also Kathol 1999).

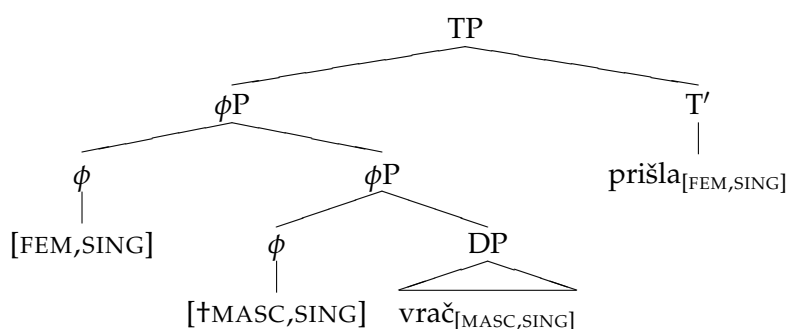
¹⁰There are many sociolinguistic facets to this phenomenon that I cannot go into (See Corbett (1983) and references therein.)

While the concord features are accessed by noun phrase internal agreement, the index features are accessed when agreement with the verb is established. Split agreement therefore arises when the concord and index features are different.

My proposal for hybrid agreement is to allow one ϕ -phrase to recursively embed another ϕ -phrase as already shown above in the discussion of (7). This allows multiple sets of ϕ -features to be associated with one noun phrase as already shown for example (7). There are two differences between my proposal and that of Wechsler and Zlatic (2003): For one, my proposal does not require all noun phrases to have two sets of agreement features, but they may have only one or also more than two. Secondly, the difference between the two feature sets is just terminological on the Wechsler and Zlatic (2003) proposal, but configurational on my proposal. This second claim of my proposal makes several predictions for hybrid agreement. In conjunction with the closeness requirement on agreement stated above, it predicts a natural asymmetry between the two sets of agreement features which links to the agreement hierarchy of Corbett (1983). Furthermore, my proposal allows semantic operators to apply between the inner and outer ϕ -head.

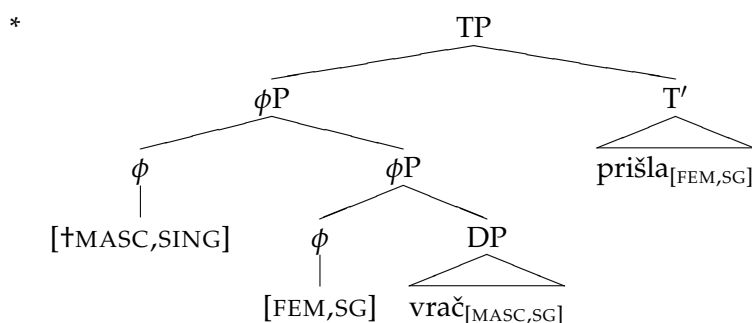
Consider first the analysis of (16) using ϕ -recursion in (17). I assume that grammatical gender is triggered when the noun bears a gender feature in

the lexicon. This grammatical gender feature must be licensed by a matching gender feature in a ϕ -head whenever the noun is used within a syntactic structure. When such a noun is used with a referent that has a different natural gender than the grammatical gender of the noun, the conflict between the two gender specifications should leave the noun unusable. I assume, however, that languages can also make use of semantically empty ϕ -features in ϕ -heads in such circumstances. I mark such degenerate ϕ -features with the † sign in the following. In the structure for (16), the lower ϕ -head contains a †MASC-feature, but the higher one a contentful FEM-feature.



In the above structure, †MASC in the lower ϕ -head has no interpretation, and only serves to license the MASC feature that is part of the lexical entry of *vrač*. Note that the structure where the positions of the two ϕ -heads is exchanged is predicted to not be licensed because in this structure the noun *vrač* ('doctor') doesn't agree with the closest ϕ -head. This closeness requirement on agreement is a special case of the *Minimal Link Condition* (Chomsky 1995

and others) or a similar syntactic condition.



In this way, my proposal predicts the following generalization, which is a special case of Corbett's (1983) agreement hierarchy:¹¹

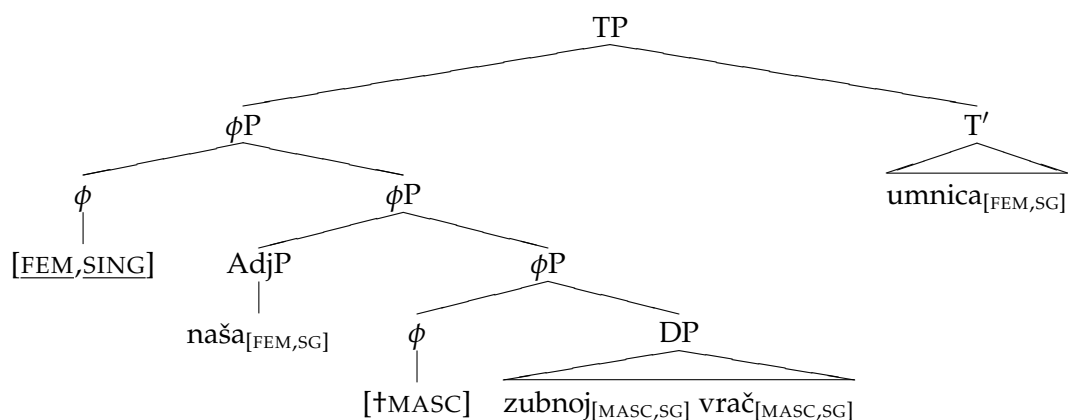
- (17) If DP-internal adjectives and the verb display different agreement, the adjective agrees with the grammatical gender, and the verb with the natural gender of the DP.

The switch from grammatical gender to natural gender can also occur within the nominal phrase as shown in (18) (taken from Matushansky 2009). This follows from the presuppositional analysis if we analyze *naša* ('our') as a DP external phrase similar to the adjective in French (15) that applies to both members of a coordination. In the proposed structure below, *naša* must occupy a position between the two ϕ -heads.¹²

¹¹The other cases of Corbett's hierarchy are beyond the scope of this paper.

¹²In this structure for (18), I assume that only the uninterpretable feature \dagger MASC occupies the lower ϕ -head. Therefore, no problem of interpretive type arises.

- (18) Naša zubnoj vrač umnica.
 our-FEM.SG dental-MASC.SG doctor.MASC clever.person
 ‘Our dentist is very clever.’

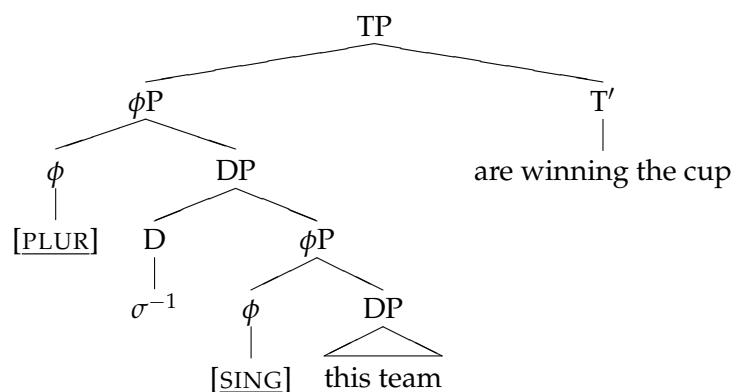


A further well-known case of hybrid agreement occurs with number marking British English dialects. For example, in (19) the subject form is singular, but the verb shows plural agreement (Sauerland and Elbourne, 2000).

- (19) This team are winning the cup.

Revising the analysis offered in Sauerland and Elbourne (2000), I assume that (19) too involves ϕ -recursion. However, a semantic operation, σ^{-1} , must apply between the two ϕ -heads in this case. σ^{-1} is the inverse of the operation of group formation σ in the Link (1983) proposal. σ^{-1} maps a group individual to the plurality consisting of the members of the group, thereby mapping

a singular individual to a plurality. I assume that σ^{-1} must be able to apply between the two ϕ -heads as shown in the following:



Because σ^{-1} maps singular atoms to pluralities, the number marking in the two ϕ -heads must be as given in this structure. This predicts that singular number is licensed within the DP, but not at the verbal level. The analysis supports my proposal that ϕ -heads are independent syntactic heads, since only my analysis straightforwardly predicts that operators could apply between the two ϕ -heads.¹³

¹³As I point out in (Sauerland, 2004), the analysis predicts that indefinites that exhibit hybrid agreement have the syntactic distribution of definites because the operator σ^{-1} is definite. This predicts some of the facts discussed by Sauerland and Elbourne (2000); for instance, the ungrammaticality of examples like (i):

(i) *There are a Northern team winning the FA cup.

3 Number Interpretation with Cumulative Nouns

The third argument for the presuppositional analysis is based on the interaction of cumulative interpretation of nouns and number morphology. A cumulative interpretation of a relation R obtains when R is judged to hold between two pluralities X and Y by virtue of R relating each individual in X to an individual in Y and also each individual in Y being related to an individual in X . For example, (20) is judged true in case the one of the women wanted to marry one of the men and the other woman the other man. In this case, the binary predicate ' $\lambda x \lambda y . x$ wanted to marry y ' expresses the relation that is interpreted cumulatively.

(20) The two women wanted to marry the two men. (Beck and Sauerland, 2000, 356)

Following Beck and Sauerland (2000), I assume that the cumulative interpretation is derived by application of the operator $**$ to a binary predicate.¹⁴

Beck (2000) observes that nouns can also be interpreted cumulatively as in the following examples, where the cumulative interpretation is most plausible one. Considering (21a) in detail, note that pluralizing the the predicate

¹³An earlier version of the argument presented in this section can be found in (Sauerland, 2003).

¹⁴The $**$ operator is defined as closure under pairwise mereological sum formation of a binary relation R : $**R = \{\langle x_1 \oplus x_2, y_1 \oplus y_2 \rangle \mid \langle x_1, y_1 \rangle, \langle x_2, y_2 \rangle \in R\}$.

wife of Bill and James would predict the unlikely interpretation referring to common wives of the two men.¹⁵

- (21)
- a. The wives of Bill and James are pregnant.
 - b. The daughters of the defense players are cheering.
 - c. The residents of these cities decorated their houses.

The salient, cumulative interpretation of (21a) can be derived by applying the ***-operator to the binary predicate *wife*. The result of cumulation is a binary predicate that is true of pairs of pluralities and in particular of the pair of the plurality of Bill and James and the plurality consisting of all their daughters.

The argument for the presuppositional analysis of number derives from the contrast in number marking between cumulative definites as in (21) and the cumulative nouns occurring with *every* in (22).

- (22)
- a. Every wife of Bill and James is pregnant.
 - b. Each executive of these companies knew about their crimes.
 - c. Every resident of these cities has a bicycle.

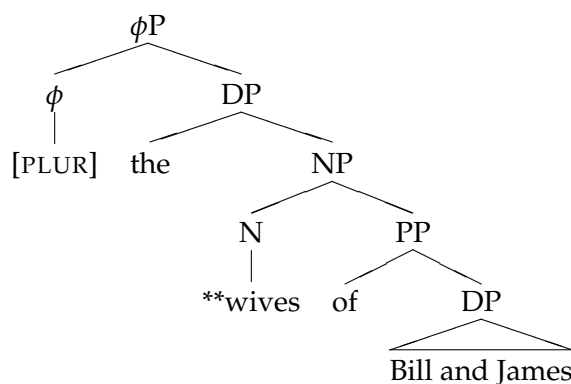
Since the cumulative nouns *wives*, *daughters*, and *residents* in (21) must all be plural, Beck (2000) suggests that an occurrence of the ***-operator in the noun

¹⁵Though implausible for the examples (21), this interpretation is readily available in examples such as *The children of Mary and her second husband get along with those from Mary's first marriage*.

phrase leads to morphological plurality of the noun. However, the examples in (22) require the nouns *wife*, *executive*, and *resident* to be singular, but nevertheless allow a cumulative interpretation of the nouns. While (22a) does not sound completely natural,¹⁶ (22b) and (22c) are fully acceptable. Furthermore, all examples in (22) are completely ungrammatical when the singular noun is replaced by a plural form. This shows that the standard account of nominal plurality – the proposal that *-s* corresponds to a semantic pluralization operator – cannot explain why cumulated nouns under a definite must be plural.

The presuppositional account, however, can explain the contrast between (21) and (22). On the presuppositional account, plural morphology on the noun in the definite description indicates that the referent of the definite description is plural. The structure of the definite description is the following:

¹⁶One reason for this is that Bill and James are naturally assumed to have only one wife each, and therefore the example violates the anti-duality presupposition of *every* (Sauerland, 2008a). Examples like *Every ear of mine is cold.* are unnatural for the same reason.



On the presuppositional analysis, the cumulativity operator ** doesn't directly correspond to the number morphology of the noun, but rather plural marking on *wives* is licensed by agreement with the ϕ -head. The singular form *wife* cannot occur in (21) because the ϕ -head must contain the feature PLUR as long as Bill and James have different wives.

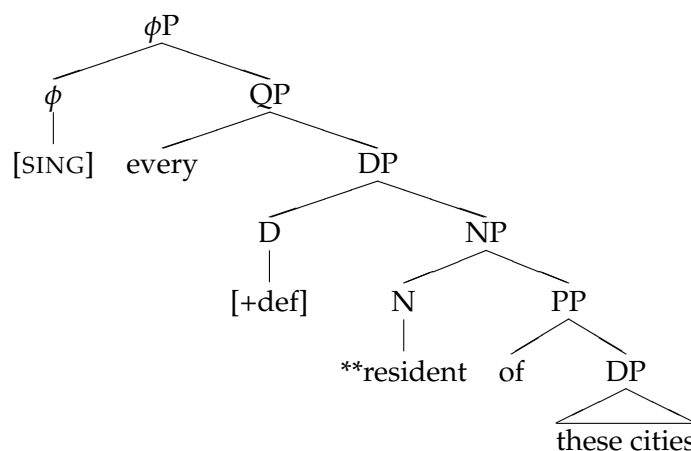
Now consider the presuppositional analysis of the examples with distributive quantification in (22) where the cumulative noun is marked with singular agreement. I adopt the analysis of nominal universal quantifiers that Matthewson (2001) argues for; namely, the assumption that universal quantifier *every* is of category Q and takes as its complement a definite DP.¹⁷ For concreteness, I assume that Matthewson's definite DP is headed by a silent element [+DEF] in English.¹⁸ On this basis, the structure of *every resident of*

¹⁷This analysis may also help explain why in German the universal quantifier *jeder* is similar to a compound of to the quantificational particle *je* the definite determiner *der*. Note however that some of the inflectional endings of universal and definite differ: e.g. the nominative, singular, feminine of the universal is *jede* vs. *die* for the definite.

¹⁸Matthewson shows that the head of the DP is not silent in the language St'át'imcets.

these cities is the following:

(23)

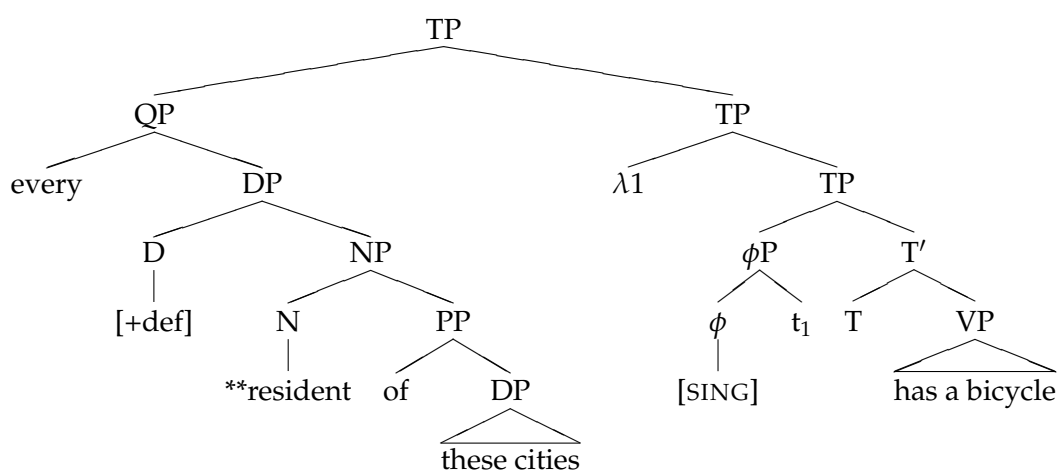


The definite DP in this structure denotes the same plural individual that *the residents of these cities* denotes – the entity consisting of all the individuals that are a resident of at least one of the cities under discussion. The universal quantifier *every*, Matthewson argues to be of the semantic type $\langle e, \langle e, t \rangle \rangle$. It assigns to a plurality X the universal generalized quantifier that holds of a property P if all atomic parts x of X satisfy property P .

The structure in (23) still raises a compositionality problem: a generalized quantifier of type $\langle \langle e, t \rangle, t \rangle$ cannot be the argument of the ϕ -head of type $\langle e, e \rangle$ directly. However, this compositionality problem can be resolved by quantifier raising just like other cases of type mismatch (Heim and Kratzer, 1998b). The resulting structure shown below is interpretable. Only the presupposi-

tion of singular number in ϕ can be satisfied since the trace of the distributive quantifier only refers to singular individuals.

(24)



In sum, the presuppositional analysis of ϕ -features combined with Matthewson's analysis of quantificational DPs predicts straightforwardly the distribution of number with cumulative nouns in English. Matthewson's account suggests that there could be cross-linguistic variation with respect to the placement of the ϕ -head in QP: DP is semantically of type e and therefore ϕ could take DP as its argument. This prediction is borne out: In St'át'imcets the noun phrase in a distributive universal quantifier must be marked plural (Matthewson, 2001).

4 Gender above Superlatives

The fourth and final argument for the presuppositional analysis was first brought up by Yatsushiro and Sauerland (2006) to my knowledge. We noted there that the feminine gender cannot be interpreted within the scope of the superlative *beliebteste* ('most popular') in German examples such as (25) because there had only been one female chancellor at the time.¹⁹

- (25) Merkel ist die beliebteste Kanzler-in aller Zeiten
 Merkel is the most popular chancellor-FEM of all times
 'Merkel is the most popular chancellor of all times.'

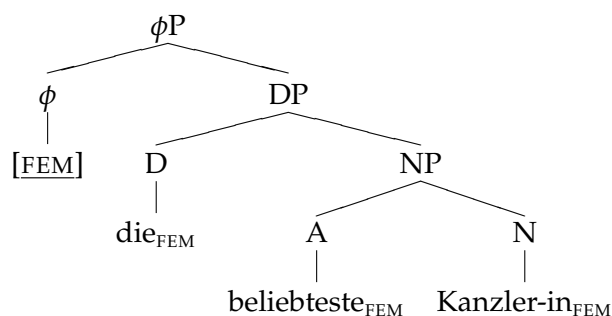
The wide scope interpretation of the feminine is also possible with the adjective *einzig* ('only') in (26a) and the ordinal in (26b): (26a) could be true by virtue of a male pupil also having solved the problem, and (26b) is true because of Merkel's seven male predecessors.

- (26) a. Tanja war nicht die einzige Schülerin, die die Aufgabe lösen
 Tanja is not the only pupil-FEM who the problem solve
 konnte.
 could
 'Tanja is the only pupil who could solve the problem.'

¹⁹Examples similar (25) can be found in several German newspapers from January 2006. The following quote from 2008 shows an awareness of the ambiguity of the example between a reading with high and low gender: *zuletzt war sie immerhin noch die beliebteste Kanzlerin, die Deutschland je hatte. Kein Wunder, mögen da die Beinhaarzähler der Geschlechtergerechtigkeit anführen, sie sei auch die einzige.* ('Recently, she was still the most popular chancellor, that Germany ever had. Small wonder, may the accountants [literally: leg-hair-counters] of gender equality object, since she is also the only one.', Die Welt 3.1.2008)

- b. Merkel wurde als achte Kanzlerin der BRD vereidigt.
 Merkel was as eight chancellor-FEM the FRG inaugurated
 ‘Merkel was inaugurated as the eight chancellor of the Federal
 Republic of Germany.’

Gender marking on *Schülerin* (‘pupil-FEM’) and *Kanzlerin* (‘chancellor-FEM’) in (25) and (26) must be interpreted in a position outside of NP for the observed readings. The presuppositional analysis predicts this to be possible. Specifically, the interpretation in (26) only follows from the structure in (27) when the feature FEM in the ϕ -head is interpreted.



In (26), the superlative *beliebteste Kanzlerin* (‘most popular chancellor’) is gender-neutral since none of the FEM-features within DP is interpreted, and happens to be true of a female, Angela Merkel. For this reason, the ϕ -head must contain the gender feature FEM – the individual Angela Merkel does not satisfy the presupposition of any other gender feature.

As noted already in footnote 19, the examples in (25) and (26) also allow an interpretation where gender is interpreted within NP. Such an interpreta-

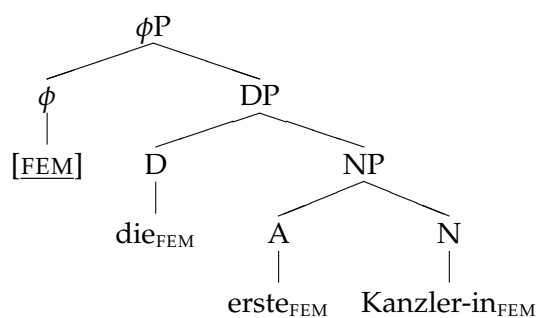
tion is directly attested in (27), where it is the only true interpretation.

- (27) Merkel ist die erste Kanzlerin
 Merkel is the first chancellor-FEM
 ‘Merkel is the first female chancellor.’

To account for the NP-internal interpretation of FEM in (27), I assume that the FEM-feature of the noun *Kanzlerin* can optionally be interpreted as well. Specifically, I propose that the ending *-in* has the two lexical entries in (28):

- (28) a. $-in_{FEM}$: without meaning
 b. $-in_{\underline{FEM}}$: denotes the property of being female

Using the lexical entry in (28b), the following structure for (27) derives the interpretation where FEM is interpreted within the scope of the ordinal.



The FEM-feature in the ϕ still can receive the presuppositional interpretation in this structure. Therefore, examples like (27) present no problem for core of the presuppositional analysis. Derivational gender morphology,

however, constitutes an exception to the stronger claim (6), that ϕ -features can only be interpreted in the ϕ -position.

5 Conclusions

I presented four arguments for the presuppositional analysis of ϕ -features of DPs. All four arguments support the core claim of this account; namely, that ϕ -features are interpreted in a position high up in the structure of nominal phrases. Specifically, the individual arguments impose the following constraints on the position of interpreted ϕ -features: their position can be higher than DP-coordination (section 1), higher than a second set of ϕ -features (section 2), higher than determiners (sections 4), and higher than superlative adjectives, ordinals, and adjectival *only* (section 5). All four constraints are satisfied if ϕ -features are always interpreted in a position higher than the determiner. My main proposal has been exactly that: ϕ -features must be interpreted in the ϕ -position outside of DP. Furthermore, I have shown that ϕ -features within DP need not be interpreted in a DP-internal position except for derivational gender morphology as discussed in Section 5.

Agreement and the distribution of ϕ -features is a very rich domain of facts and no approach presently can claim to cover all the facts. The presuppositional proposal is no exception and therefore remains still a program that

needs to be evaluated as to whether it can be extended beyond the domains covered in the preceding five sections. Two phenomena that are challenging for any account of the semantics of ϕ -features and likely will play a role for evaluating the presuppositional program in the future are ϕ -features of bound pronouns, and examples of low coordination – the phenomena are illustrated in (29) and (30). First consider bound pronouns. Bound pronouns can bear ϕ -features that apparently cannot be interpreted as presuppositions on their referent. The bound plural pronoun *they* provides a clear example of this – in the verification of (29), the embedded clause can only be evaluated for singular referents otherwise the sentence would be judged false (cf. Heim et al. 1991).²⁰

(29) The teenagers each think that **they** are the only person on earth

At present, the presuppositional approach can say the same thing as other approaches (Heim, 2008; Kratzer, 2009): the ϕ -features of bound pronouns are at least in part determined or licensed by a syntactic mechanism and are not interpreted in the ϕ -position. Therefore, ϕ -features on bound pronouns constitute the only case where the features in the ϕ -position are not interpreted.

²⁰For person features on bound pronouns, the same point has been made (Kratzer 1998 and others).

The second challenging phenomenon are examples with coordination of two singular NPs sharing one determiner can trigger either plural (30a) or singular (30b) agreement on the verb ((30a) and (30b) are from King and Dalrymple 2004, 75). Heycock and Zamparelli (2005) propose the terms *split* and *joint* for these two readings.

- (30) a. This boy and girl are eating pizza. (*split reading*)
b. The vice-president and president-elect is eating pizza. (*joint reading*)

The presuppositional approach straightforwardly explains the difference in verbal number agreement between the two readings: The subject in (31a) has plural reference, while that in (31b) does not. Therefore, a high ϕ -head is predicted to contain the respective number features in both examples. The number feature of the determiner, however, remain to be accounted for. It is here that King and Dalrymple (2004) and Heycock and Zamparelli (2005) note considerable cross-linguistic variation and propose a novel, NP-internal interpretation of plurality. The full discussion of these facts within the presuppositional approach is beyond the scope of this paper.

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FIGURE 1

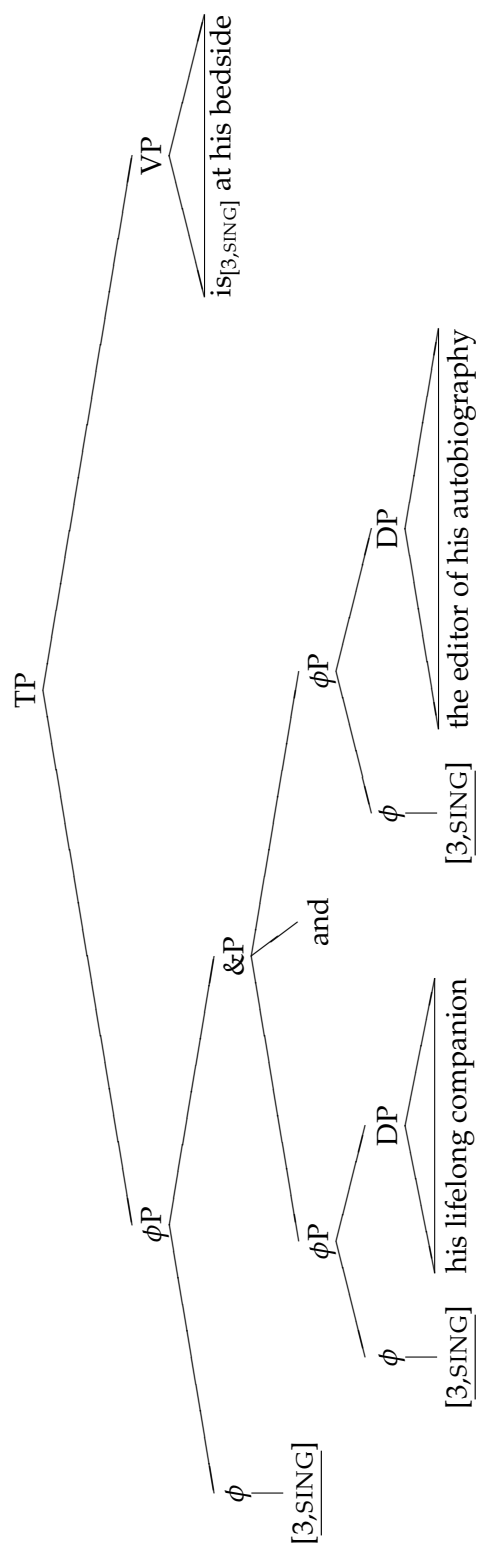


FIGURE 2

