Interactions of gender and number agreement: Evidence from Bosnian/Croatian/Serbian*

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Abstract

Class II *split hybrid nouns* in Bosnian/Croatian/Serbian display two sets of interesting properties: they can bear both natural and grammatical gender, and which gender participates in agreement depends on the number of the noun. While in the singular they invariably trigger natural (masculine) agreement, alternation between masculine and (grammatical) feminine obtains in the plural. The problem for theories of such nouns comprises two challenges: the Agree mechanism needs to be able to operate on two kinds of gender, and the mechanism needs to allow gender agreement to interact with number. Previous accounts (e.g. Wechsler and Zlatić 2000) propose complex mapping between semantic, syntactic and class features, but ultimately cannot derive the obligatoriness of natural agreement in the singular and optionality in the plural in a unified way. A Minimalist account of such nouns has not yet been proposed, and the existing accounts of hybrid agreement cannot capture this particular pattern. I provide a Minimalist analysis of hybrid nouns' agreement combining the formal tools of feature hierarchies and relativised probing, deriving the obligatoriness of natural gender in the singular, and Cyclic Agree, with different orders of application of Agree operations, which derives plural alternations as intervention effects.

Keywords: gender, number, class, feature geometry, relativised probing, order of operations

1 Introduction and overview

The focus of this paper is gender on nouns in Bosnian/Croatian/Serbian (henceforth: BCS) and the corresponding agreement patterns the nouns trigger on their clausemate verbs. This language has a mixed-gender system, i.e. a system with both natural and grammatical gender. Interestingly, certain agreement patterns reveal that both kinds of gender can be found on the same noun, as a given noun may trigger grammatical gender agreement on its clausemate verb in some contexts and natural gender agreement in others. What is more curious is that this distinction is systematically conditioned by the number marking on the noun. An illustration of the phenomenon in BCS comes from the so-called *split hybrid nouns* (Corbett 2015), which bear natural masculine gender but they are grammatically feminine and both genders can be the target for

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Agree. In particular, while they consistently trigger masculine (natural gender) agreement in the singular, as shown in the example (1a), in the plural they can trigger either feminine (grammatical gender) agreement, as in (1b), or masculine, as illustrated in (1c).

(1) a. Moj novi komšij-**a** me je juče poseti-**o**.
my.NOM.MSG new.NOM.MSG neighbour-NOM.MSG me is yesterday visit.PRT-MSG
'My new neighbour visited me yesterday.'

b. Moj-**e** nov-**e** komšij-**e** su me juče posetil-**e**.
my-NOM.FPL new-NOM.FPL neighbour-NOM.FPL are me yesterday visit.PRT-FPL
'My new neighbours visited me yesterday.'

c. Moj-**i** nov-**i** komšij-**e** su me juče posetil-**i**.
my-NOM.MPL new-NOM.MPL neighbour-NOM.MPL are me yesterday visit.PRT-MPL
'My new neighbours visited me yesterday.'

BCS distinguishes between three genders – masculine, feminine and neuter. Nouns of a particular gender trigger corresponding agreement on the clausemate verb and nominal modifiers (realised with a single exponent for gender and number both on the noun and the target). The language has a mixed gender assignment system (cf. Corbett 1991:34). Natural gender is assigned to animate nouns in accordance with the biological gender of the referent (what Corbett 1991:8 terms 'semantic assignment'). Grammatical gender, on the other hand, has nothing to do with the biological gender of the referent and can thus be taken to have no semantic import whatsoever. It is assigned according to purely formal (morpho-syntactic) criteria, which, in this case, involves membership to an inflection class (cf. Corbett 1991:34). BCS distinguishes between three nominal inflection classes (Mrazović and Vukadinović 1990; Klajn 2005). The correlation between inflection class and the type of gender on the noun is such that all nouns belonging to Class I are either neuter, carrying the suffix *-o* or *-e*, or masculine, ending in *-∅*. Class II hosts nouns ending in *-a*, which are mostly feminine (both animate and inanimate), but also include a group of animate masculine nouns. Class III nouns end in *-∅* and all of them are feminine inanimate.

This paper focuses on nouns of Class II, as all the *split hybrid nouns* that show mixed agreement patterns in BCS belong to this class. This is considered to be the 'feminine class', since all its members have the property of being able to trigger feminine agreement on the clausemate verb, which in turn suggests that such agreement is a reflex of their grammatical feminine gender. Nouns from this group can in addition have different natural gender, thus if they denote a male referent, their natural gender will be masculine, as in (1). The agreement triggered by such nouns shows two primary properties. (i) Agreement can reflect either natural or grammatical gender on the noun, and (ii) the choice of biological vs. grammatical gender agreement is conditioned by differences in number marking on the noun. In particular, the verb consistently shows agreement for natural gender when the noun is singular. When the noun is plural, the gender agreement on the verb can alternate between natural and grammatical forms. This fact has not gone unnoticed even in traditional grammars (Stanojčić and Popović 1992; Stevanović 1989), as well as in some recent work, for instance Corbett (2010, 2015), but the formal literature so far (Corbett 1983, 2010; Wechsler and Zlatić 2000, 2003; Alsina and Arsenijević 2012a,b) has not managed to provide an explanation in terms of a concrete agreement mechanism that consistently derives the desired patterns. The patterns themselves raise important empirical and theoretical questions such as what enforces the obligatoriness of natural gender agreement in the singular, while allowing for alternations in the plural, and what the agreement patterns of these nouns reveal about the structure of nominals and agreement mechanisms in general in BCS, and languages with similar mixed gender assignment systems. The goal of this paper is to tackle these

issues by investigating the complex interplay of number and gender agreement in Class II nouns in BCS in detail.

The proposal I put forward in this paper starts with the idea that both natural and grammatical gender are encoded at different functional projections within the DP in BCS. Additionally, I utilise the feature geometry approach along the lines of Harley and Ritter (2002) to argue that natural gender is featurally more complex than grammatical gender, where complexity is expressed by decomposing gender into more atomic units organised in a feature hierarchy. I further propose that natural and grammatical gender are represented at different functional projections in syntax, with natural gender being lower in the structure, and argue that these structural positions in turn directly affect their availability as targets for Agree. Moreover, I propose that plural number is hosted by a functional projection which is located above the natural gender and below grammatical, and show that this intervening position is partly responsible for triggering the gender alternations in the plural on verbal agreement. Upon establishing the structural aspects, I develop a theory of ϕ-feature Agree that yields different agreement patterns, arguing that alternations in the plural are a result of a single underlying syntactic mechanism of agreement, which essentially involves cyclicity and intervention effects caused by plural number. Specifically, I assume that Agree can be made sensitive to the structure and complexity of gender features on a noun and that sensitivity can be formalised under the approach of relativised probing (Béjar and Rezac 2009; Preminger 2014). Thus, I propose that the gender probe can be relativised in such a way to as look for either natural or grammatical gender features and specifically in BCS, it prefers to target the more complex natural gender. This is what derives the obligatoriness of natural gender agreement in the singular. Finally, I take gender and number agreement to be two separate operations that can be carried out in different orders with respect to each other. The variable orders together with intervention by number phrase lead to the alternation between grammatical and natural gender agreement in the plural.

The paper is structured as follows. Section 2 gives an overview of different types of Class II nouns, outlining their agreement patterns. Section 3 briefly discusses previous accounts, pointing out why they cannot capture all the agreement facts. Subsequently, Section 4 outlines the basic assumptions regarding the structure of the DP in BCS, structure of gender features, relativised probing and ordering of operations, which provide the basic ingredients for the analysis and concrete derivations for all the patterns provided afterwards in 4.4. After a brief discussion of how the account fares with respect to the current literature on similar issues and possible extensions in Sections 5 – 6, Section 7 summarises and concludes.

2 Data

This section provides an overview of the different types of Class II nouns in BCS. Only Class II nouns will be under scrutiny in this paper, as subtypes of nouns belonging to this class show alternations between natural and grammatical gender agreement of the type presented in (1). What makes all these nouns similar, and identifiable as Class II nouns, is that they all bear grammatical feminine gender, and what makes them different from one another is the natural gender they are born with. It is this latter point and its ramifications that this section will be concerned with.

2.1 Nouns with Natural Masculine and Grammatical Feminine Gender

Split hybrid nouns such as *vladika* 'bishop', *vojvoda* 'duke', *gazda* 'landlord', *starešina* 'head, senior', *drvodelja* 'carpenter', *bekrija* 'tippler', *kolega* 'colleague', *komšija* 'neighbour', among others, will henceforth be referred to using the label 'nouns with natural masculine and grammatical feminine gender' (Stanojčić and Popović 1992:288,Stevanović 1989:130ff.). As they denote human animate male referents, such nouns are assigned natural masculine gender in BCS. But such nouns have a curious property, as noted above – they show additional gender variation along the number divide. For this particular group of nouns, this has the effect that in the singular, they always trigger masculine agreement – straightforwardly reflecting the natural gender on the noun – but in the plural, they can trigger either masculine or feminine agreement:[1]

(2) a. Moj-∅/*moj-**a** nov-**i**/*nov-**a** komšij-**a** me je juče
my-MSG/my-FSG new-MSG/new-FSG neighbour-MSG me is yesterday
poseti-**o**/*posetil-**a**.
visit.PRT-MSG/visit.PRT-FSG
'My new neighbour visited me yesterday.'

b. Moj-**e** nov-**e** komšij-**e** su me juče posetil-**e**.
my-FPL new-FPL neighbour-FPL are me yesterday visit.PRT-FPL
'My new neighbours visited me yesterday.'

c. Moj-**i** nov-**i** komšij-**e** su me juče posetil-**i**.
my-MPL new-MPL neighbour-MPL are me yesterday visit.PRT-MPL
'My new neighbours visited me yesterday.'

In the singular, these nouns agree according to their natural gender (2a). Natural gender may surface on plural agreement as well, as shown in (2c). However, the verb most often surfaces with

[1] In the examples to follow, for the sake of simplicity and possibility to focus primarily on verbal agreement, I abstract away from the interactions of verbal and adjectival agreement and provide only the examples where the adjective and the verb show the same gender agreement. Note that a mismatch is also possible:

(i) a. Moj-**e** nov-**e** komšij-**e** su me juče posetil-**i**.
my-FPL new-FPL neighbour-FPL are me yesterday visit.PRT-MPL
'My new neighbours visited me yesterday.'

b. *Moj-**i** nov-**i** komšij-**e** su me juče posetil-**e**.
my-MPL new-MPL neighbour-MPL are me yesterday visit.PRT-FPL
'My new neighbours visited me yesterday.'

The ungrammaticality of (ib) is in accordance with the Agreement Hierarchy, established initially by Corbett (1979) (and discussed in much of his subsequent work):

(ii) The Agreement Hierarchy:
attributive > predicate > relative pronoun > personal pronoun
'The possibility of syntactic agreement decreases monotonically from left to right. The further left the element on the hierarchy, the more likely syntactic agreement is to occur, the further right, the more likely semantic agreement.' (Corbett 1979:204)

In essence, there is a greater chance for the verb to show semantic agreement (natural gender), than the adjective (which prefers grammatical gender). Moreover, if the adjective (attributive) shows grammatical gender agreement, the verb can still show either grammatical or semantic agreement. But if the adjective agrees with semantic gender, it is impossible to go back to grammatical agreement, and the verb needs to agree only with the semantic features (i.e. show natural gender agreement, hence the ungrammaticality of (ib)). The Agreement Hierarchy has been extensively studied in some recent accounts (Steriopolo and Wiltschko 2010; Matushansky 2013; Landau to appear). I currently abstract away from this issue, focusing on verbal agreement only, and leaving the extension of the account to DP-internal agreement and the issue of agreement in accordance to the Agreement Hierarchy for further research.

feminine gender in the plural, as illustrated in (2b). I take this feminine gender to be a reflex of grammatical gender on the noun, since the nouns in question are biologically all masculine.

The interpretation of agreement markers on predicates and modifiers presents further evidence that the feminine gender on such nouns reflects a formal, grammatical property, and has nothing to do with the natural gender on the noun. Consider the following example with a plural Class II masculine noun.

(3) Komšije su stigle.
neighbours.MPL are arrive.PRT.FPL
'Neighbours arrived.'

The noun above can never refer to a group of female entities. Despite the feminine agreement, the noun can refer either to a group of masculine entities, or alternatively to a mixed group of referents. The feminine gender is thus strictly formal. The same plural noun can also trigger masculine agreement:

(4) Komšije su stigli.
neighbours.MPL are arrive.PRT.MPL
'Neighbours arrived.'

In contrast to (3), the example in (4) cannot be an instance of purely formal gender agreement because the noun must denote at least some male entities, i.e. it can denote an all-male or a mixed group. If a speaker wishes to refer to a group of female entities, the necessary noun is derived from the same root but has a slightly different form and it may never trigger masculine agreement:

(5) Komšinice su stigle/*stigli.
neighbours.FPL are arrive.PRT.FPL/arrive.PRT.MPL
'Neighbours arrived.'

The fact that masculine agreement cannot be used when all the referents are female in (4) is in line with the idea that this agreement reflects natural gender on the noun. It is less clear, though, why masculine agreement should nevertheless be possible when the referents involve a mixed group of male and female entities. However, the issue of agreement with a mixed group of referents, while fascinating, is beyond the scope of this paper and will be left aside for future research.

2.2 Nouns with Natural Feminine Gender

Nouns with natural feminine gender include those such as *majka* 'mother', *sestra* 'sister', etc. They denote animate female referents, so their morphosyntactic gender transparently reflects the biological one. They always trigger feminine agreement, both in the singular and in the plural. Masculine agreement with these nouns is impossible.

(6) a. Pametn-**a** devojčic-**a** je otišl-**a** u šetnju.
smart-FSG girl-FSG is go.PRT-FSG in walk
'A smart girl went for a walk.'
b. Pametn-**e** devojčic-**e** su otišl-**e** u šetnju.
smart-FPL girl-FPL are go.PRT-FPL in walk
'Smart girls went for a walk.'

Considering the fact that these nouns also have grammatical feminine gender by virtue of belonging to Class II, apart from the natural feminine, it is unclear from the surface representation which of the two genders agreement actually reflects. Based on the agreement with masculine nouns of the same group, and in order to arrive at their consistent treatment, I will assume at this point that these nouns also trigger natural gender in the singular and alternations between natural and grammatical gender in the plural.

2.3 Nouns with Variable Natural Gender and Grammatical Feminine Gender

A subtype of Class II nouns are gender variable, i.e. a noun may denote either a male or a female entity. Only the discourse context can disambiguate between the two genders. Such nouns include *budala* 'fool', *varalica* 'cheater', *kolovođa* 'leader in traditional dances', *mušterija* 'customer', *propalica* 'loser, failure', *pijanica* 'drunkard', *skitnica* 'wanderer, drifter', *sluga* 'servant', *sudija* 'judge' (Stanojčić and Popović 1992:288, Stevanović 1989:130ff.). In general, the gender of the noun is made known in the context, and the agreement in the singular always reflects the natural gender. The example (7a) below thus refers to a female customer, while (7b) refers to a male one.

(7) a. Naš-**a** redovn-**a** mušterija je dobil-**a** popust.
our-FSG regular-FSG customer.FSG is get.PRT-FSG discount
'Our regular (female) customer got a discount.'
b. Naš-∅ redovn-**i** mušterija je dobi-**o** popust.
our-MSG regular-MSG customer.MSG is get.PRT-MSG discount
'Our regular (male) customer got a discount.'

Yet, any noun from this group can show grammatical gender agreement even in the singular. This is reflected in consistent feminine agreement when it is irrelevant for the discussion whether the noun refers to a male or female entity, and the gender of the referent is therefore unknown. As illustrated in (8), a noun from this group, such as *budala* 'fool', obligatorily triggers feminine agreement when it indicates a non-specific individual and the speaker does not want to refer to their sex or it is simply unknown or irrelevant to the discussion.

(8) Neka budala je kucala na vrata.
some.FSG fool.FSG is knock.PRT.FSG on door
'Some fool was knocking at the door.'

In the sentence above, the noun can be interpreted as referring to either a female or male individual. Therefore, the agreement triggered under the noun (when the gender of the referent is actually unknown) is invariably feminine. This in turn suggests that such feminine agreement reflects grammatical, rather than natural gender.

As with nouns in Section 2.1, the same alternation between natural and (feminine) grammatical gender agreement is also evinced in the plural.

(9) a. Budale su malo popil-**e**/popil-**i**.
fools are a.little drink.PRT-FPL/drink.PRT-FPL
'Fools drank a little.'

If the noun above refers to a group of *female referents*, feminine agreement on the verb can be considered to be either agreement according to natural gender, or as formal agreement, according to the grammatical gender on the noun.[2] If the noun refers to a group of *male referents*, feminine agreement is clearly an instance of formal agreement. Masculine agreement can only be considered to be agreement according to natural gender. Finally, if the noun refers to a *mixed group* of referents, feminine signals formal agreement, whereas masculine will indicate natural gender agreement, since at least some referents are male.

2.4 Nouns with Grammatical Feminine Gender

Nouns such as *stolica* 'chair', *kuhinja* 'kitchen', etc. denote inanimate objects, thus they have no natural gender. Nevertheless, agreement triggered under these nouns both in the singular and in the plural is feminine (10). I take this to indicate that the gender on these nouns is grammatical.

(10) a. Drven-**a** stolic-**a** je stajal-**a** u kuhinji.
wooden-NOM.FSG chair-NOM.FSG is stand.PRT-FSG in kitchen
'A wooden chair was standing in the kitchen.'

b. Drven-**e** stolic-**e** su stajal-**e** u kuhinji.
wooden-NOM.FPL chair-NOM.FPL are stand.PRT-FPL in kitchen
'Wooden chairs were standing in the kitchen.'

An additional group of nouns with grammatical feminine gender refer to animate referents, but denote, for example, members of a particular species, either male or female (see Arsenijević and Gračanin-Yuksek 2015). Such nouns include e.g. *roda* 'stork', *riba* 'fish', *žirafa* 'giraffe' etc., and nouns like *osoba* 'person', *beba* 'baby'. The evidence for the absence of natural gender on such nouns comes from the kind of agreement they trigger. They always consistently agree as feminine, even when the speaker wishes to indicate that the referent is male.

(11) a. Mušk-**a**/*mušk-**i** rod-**a** je letel-**a**/*lete-**o** iznad grada.
male-FSG/male-MSG stork-FSG is fly.PRT-FSG/fly.PRT-MSG above town
'A male stork was flying above the town.'

b. Muške-**e** rod-**e** su letel-**e** iznad grada.
male-FPL stork-FPL are fly.PRT-FPL above town
'Male storks were flying above the town.'

Based on their agreement properties, despite the animacy specification, in the analysis below these nouns will be taken to be marked as grammatically feminine.

[2] In case the plural noun of this kind referring to an all-female group triggers masculine agreement, this is then neither biological nor grammatical, but undoubtedly default agreement, as there is no masculine feature anywhere on the noun to refer to. Some of my informants reject the possibility of masculine agreement with an all-female group, whereas some find it acceptable or maybe degraded. This potentially points to a difference between individual grammars, where some speakers allow default as an option whereas others do not (see Marušič, Nevins and Badecker (2015:60) for a similar claim on default agreement in Slovenian). I leave this issue for further research, as the empirical details need to be determined more precisely.

2.5 Summary and Generalisations

Let us briefly summarise the types of nouns and their agreement patterns presented in Sections 2.1–2.4:

TYPE OF NOUN	SINGULAR AGREEMENT	PLURAL AGREEMENT
natural masculine (*vladika* 'bishop')	masculine (natural)	masculine (natural) / feminine (grammatical)
natural feminine (*majka* 'mother')	feminine (natural)	feminine (natural) / feminine (grammatical)
gender variable (*mušterija* 'customer')	masculine/feminine (natural) / feminine (grammatical)	masculine/feminine (natural) / feminine (grammatical)
grammatical feminine (*stolica* 'chair')	feminine (grammatical)	feminine (grammatical)

Table 1: Summary of gender agreement patterns with Class II nouns

The patterns above lead to three descriptive generalisations about gender features on Class II nouns. First, patterns of variation between natural and grammatical gender agreement with a single noun in 2.1–2.3 indicate that both natural and grammatical gender features can be present on a single noun. Second, based on the agreement they trigger, all the nouns from the class are grammatically feminine. There is no restriction on their natural gender – it can be feminine, masculine, variable, or undesrpecified. But what unifies all these nouns is the fact that their grammatical gender is feminine, specified as a function of their membership to Class II. And finally,agreement mechanisms in BCS seem to be able to operate on both kinds of gender. Thus, gender features on nouns must be sufficiently similar in structure for Agree to recognise them. The gender features also need to be sufficiently different for the Agree mechanisms to target natural gender in the singular and allow for alternations in the plural, meaning in turn that agreement for gender must also be sensitive to number information on the noun.

3 Background

Previous literature has dealt with nouns of dual gender in BCS mostly within the studies on agreement with hybrid nouns. In these accounts, such nouns were mostly observed in isolation and without detailed comparison with nouns of the same class. Even if they were considered within a larger system, additional stipulations had to be invoked to try and explain their agreement patterns. A Minimalist account that would capture such nouns through examining the structure of features and mechanisms of the Agree operation has, to my knowledge, not yet been proposed.

Corbett (1991, 2007, 2010, 2015) discusses nouns of dual gender in BCS, offering descriptive patterns and insightful observations on their agreement properties. Yet, apart from identifying such nouns as 'hybrids' in Corbett (2010:162-163) and stating that they may control both natural and grammatical gender agreement (termed 'semantic agreement' and 'syntactic agreement'), little is said about how these agreement properties could be formally explained.

Wechsler and Zlatić (2000, 2003, 2012) offer a formal HPSG account of the representation of features on nouns in BCS, together with agreement mechanisms. As a detailed evaluation of an HPSG analysis is beyond the scope of this paper, I abstract away from the technical considerations inherent to that framework, and focus here only on the points relevant for current purposes.

The analysis put forward by Wechsler and Zlatić (2000) has a constructive insight. It proposes that BCS has *feature-mapping constraints* that regulate formal gender assignment and argues that these determine a noun's grammatical gender on the basis of the declension class it belongs to. (For instance, Class II is a formal feature on a noun. As mapping constraints ensure that nouns of a particular class receive corresponding gender, nouns of Class II are assigned feminine gender, and this is the so-called *concord* gender.) Formal feature-mapping constraints can be overridden by constraints on semantic gender assignment. Semantic constraints can assign a different (natural) gender (here termed *index* gender) to an animate noun based on the referent's gender. This is the case with masculine and gender variable nouns of Class II – they receive masculine gender thanks to constraints on semantic feature assignment. Wechsler and Zlatić (2000) propose to deal with split hybrid nouns like *komšija* 'neighbour' in (1) above (masculine in the singular and alternates in the plural) by having the restrictions on gender assignment apply differently depending on the number environment. Semantic gender is assigned in the singular (hence the masculine agreement) and formal gender usually in the plural (hence the grammatical feminine agreement). In some dialects, however, it is possible that a noun be assigned natural gender even in the plural, and can therefore optionally trigger either natural or grammatical gender agreement depending on the gender assigned to it, which is the proposed explanation for the differences in agreement between singular and plural. This account, even though intuitively appealing on a general level, only derives optionality in the plural as a dialectal difference, ignoring the fact that it is a viable option in all dialects. It is also unclear why the rules of semantic assignment can override grammatical gender assignment only in some contexts, while operating consistently in others. The analysis thus ultimately suffers because it is not able to derive the obligatoriness of natural gender agreement in the singular and the alternation between grammatical and natural gender agreement in the plural in a systematic way. Nevertheless, see Landau (to appear) for a recent account on agreement with hybrid nouns based on Wechsler and Zlatić (2003) and the discussion on how it compares my account in Section 6.[3]

Some Minimalist accounts that touch upon gender features in BCS through dealing with different agreement phenomena include Bošković (2009) (dealing with conjunct agreement) and Arsenijević and Gračanin-Yuksek (2015) (dealing with agreement in relative clauses). Bošković (2009, 2011) claims that gender in BCS, as a grammatical feature assigned to nouns according to declension class, should be treated as a valued uninterpretable feature on a noun (following Pesetsky and Torrego 2007). Only those nouns that have gender assigned based on the biological gender of their referent should have gender as a valued interpretable feature. Under such an approach, it would have to be assumed that a noun such as the one with natural masculine and grammatical feminine gender has both an interpretable masculine and an uninterpretable feminine feature on the lexical entry and that the uninterpretable feature can be targeted only when the noun has plural number. Alternatively, it might be assumed that the uninterpretable feminine feature appears only in the context of plural number. But, since Bošković (2009) assumes that gender is assigned formally, the feminine feature should in principle always be present. What we would need in such an account is then either an assumption that uninterpretable feature assignment depends on number, or that the Agree mechanism always needs to target interpretable features in the singular and exceptionally targets either interpretable or uninterpretable gender in the plural. Since the author only focuses on regular nouns, it is unclear how agreement patterns of split hybrid nouns (nouns that agree as masculine in the singular and show alternations in the plural) or gender variable nouns (nouns that can be assigned either masculine or feminine

[3]See also Alsina and Arsenijević (2012a,b) for a detailed discussion on different types of features proposed in Wechsler and Zlatić (2000, 2003, 2012), as well as for an LFG account of agreement with hybrid nouns in BCS.

gender depending on the referent) would be captured. As it stands the account is unable to derive the fact that these nouns still belong to the same class as other feminine nouns and it has no way of explaining the assignment and location of two different gender features on the noun.

Regardless of the potential problematic issues of the account, I follow Bošković (2009) in claiming that the need to value unvalued features is what drives Agree, but, following Preminger (2014), I abandon the interpretable/uninterpretable feature distinction in favour of feature hierarchies, as a more useful tool in capturing certain agreement patterns. Arsenijević and Gračanin-Yuksek (2015), on the other hand, assume that the presence of two kinds of features is possible, but additional assumptions would have to be invoked to explain in what circumstances Agree targets each of them.

Previous approaches to nouns of dual gender in BSC thus fail to account for the structural location of gender features in the hierarchical structure of the nominal phrase, the position of number features with respect to gender features, as well as the obligatoriness of natural gender agreement in the singular and alternations in the plural. I provide an account that tackles these issues in a unified manner.

4 Analysis

In the sections that follow, I first introduce the theoretical tools for the analysis. Recall that the main empirical puzzle at hand involves three complementary issues: (i) How is a noun able to bear only grammatical gender in some cases and both genders in others? (ii) How is the verb able to distinguish between the two types of gender and target them differently according to the number environment? (iii) How should the systematic connection between gender and number agreement be derived such that natural gender is always targeted in the singular, while allowing alternations to appear only in the plural. I will offer a proposal on how to capture the assumption that two kinds of gender features can be present simultaneously on a noun. Subsequently, I develop a theory of Agree that can distinguish between the two types of gender features, systematically operating on them in a different way. Finally, I show how plural number, located between the two gender features, triggers intervention effects for Agree.

4.1 The Structure of DP in BCS

4.1.1 Gender on nouns

In this section I propose a structural representation of the nominal phrase in BCS.[4] Adopting the framework of Distributed Morphology (Halle and Marantz 1993; Harley and Noyer 1999) and the view that syntactic computation operates on abstract bundles of morphosyntactic features, I further follow Kihm (2005); Lowenstamm (2008); Acquaviva (2009); Kramer (2014) in treating gender as a morphosyntactic feature supplied in the course of the derivation. In their view, gender features are located on the functional head *n* that merges with a category-free root (in the sense of Acquaviva 2009; Harley to appear). Additionally, gender features can also be present on the higher functional projection Gen(der)P. A novel component of the present approach is the idea that in BCS both projections are necessarily present on DP and host natural

[4] I follow Progovac (1998); Caruso (2012); Stanković (2014) in treating the BCS nominal phrase as a DP even though it is a language without articles (contra Bošković 2008). Importantly, nothing of what follows hinges on this, the analysis can easily be transposed into a system without a D-layer.

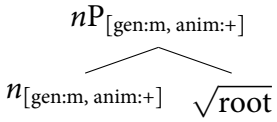
and grammatical gender respectively (see Pesetsky (2014); Acquaviva (2015); Panagiotidis (2015) and in particular Steriopolo and Wiltschko (2010); Matushansky (2013) for similar proposals on possible positions of two gender features in Russian, a discussion I return to in Section 6). I argue that the difference in hierarchical position of gender features is, in part, responsible for regulating the distinction between grammatical and natural gender patterns in verbal agreement.

Focusing on the gender specification of *n*P first, following Kramer (2014), I assume the following:

(12) Natural gender is a feature borne by the nominalising head.

The nominalizer combines with a category-free root to derive a noun and if, for instance, it bears masculine gender feature, the resulting noun will bear natural masculine gender.

(13) Nominalizer *n* + a category-free root (Halle and Marantz 1993; Harley and Noyer 1999)



I follow Acquaviva (2009, 2014) and Kramer (2009, 2014) who propose that a language has a limited number of nominalizers, each of them carrying certain features that they subsequently transmit to the noun. Each nominalizer can merge only with certain roots and the possible combinations of nominalizers and corresponding roots are regulated by licensing conditions. Moreover, assuming that *n* can introduce both gender and animacy features (13), if it contains both gender and animacy values, the noun it creates is interpreted as having natural gender (see Section 4.2 below for a more elaborate implementation of this assumption under the Harley and Ritter (2002) feature geometry approach to ϕ-feature structure).

I propose that BCS has three different nominalizers that build the four types of Class II nouns discussed in Section 2, all of which will be syncretically realised as the suffix *-a* in the nominative singular. The first nominalizer, n_m has a feature [gender:masculine, animacy:+] (henceforth [gen:m, anim:+]), the second, n_f, has a gender feature [gen:f, anim:+], and the third, $n_\varnothing$, has no gender features:

(14) a. $n_m + \sqrt{vladik-}$ 'bishop'... → natural masculine (cf. Section 2.1)
b. $n_f + \sqrt{majk-}$ 'mother'... → natural feminine (cf. Section 2.2)
c. $n_\varnothing + \sqrt{stolic-}$ 'chair'... → grammatical feminine (cf. Section 2.4)

Roots for gender variable nouns, which can carry different natural gender based on the gender of the referent, such as $\sqrt{budal-}$ 'fool', can be optionally licensed under n_m, n_f or $n_\varnothing$, where the final nominalizer derives nouns with only grammatical feminine, such as the one in example (8). Depending on the nominalizer the roots merge with, they will receive appropriate interpretation, yielding nouns with natural masculine, natural feminine or grammatical feminine gender, respectively. This approach has the advantage of explaining how a particular root can derive nouns with different features and avoids instead postulating multiple homonymous occurrences of the same noun in the lexicon.

I further propose that grammatical gender features are present on a higher functional projection, GenP (Bernstein 1993; Picallo 2008). GenP is projected above the *n*P. To capture the fact that all

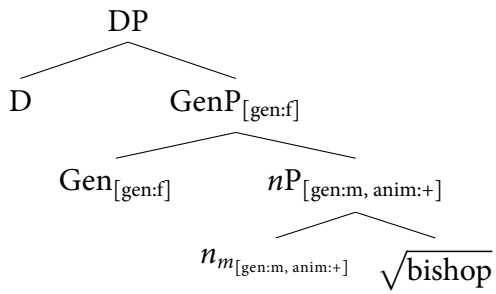
nouns of Class II are capable of triggering feminine agreement, I propose that there is a redundancy rule in the grammar of BCS that specifies these nouns as feminine by assigning grammatical gender to GenP on the basis of their declension class (a feature I assume to be present on *n*). Such a rule can be understood along the lines of redundancy rules in Chomsky (1965); Harris (1991), providing morphosyntactic gender information based on morphological class information.[5] Let us formulate the rule as follows:

(15) $\text{Gen}_{[gen:\square]} \rightarrow \text{Gen}_{[\text{gen:f}]}/\text{n}_{[\text{class II}]}$

The consequence of the current proposal is that there are two potential structural positions for gender features on BCS nouns, the lower *n*P hosting natural gender and the higher GenP hosting grammatical gender, the latter of which, in the case of Class II nouns in BCS, is specified as feminine. Let us then inspect the structure of each group of nouns in turn:

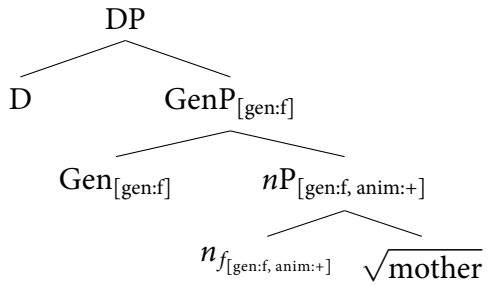
1. Nouns with natural masculine gender (such as *vladika* 'bishop') are derived by merging the nominalizer $n_{m[\text{gen:m, anim:+}]}$ with a certain set of roots that this nominalizer licenses. These nouns then have the [gen:m, anim:+] specification on *n*P, signalling a natural gender feature. The [gen:f] feature is provided on GenP via the redundancy rule in (15), yielding the following structure:

   (16) Nouns with natural masculine gender (cf. Section 2.1)



2. Nouns with natural feminine gender (such as *majka* 'mother') are derived by merging the nominalizer $n_{f[\text{gen:f, anim:+}]}$ with a certain set of roots that this nominalizer licenses. The grammatical gender feature [gen:f] is provided on the GenP.

   (17) Nouns with natural feminine gender (cf. Section 2.2)

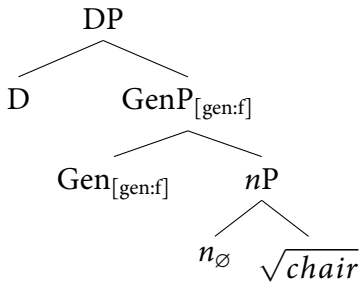


[5] See Wechsler and Zlatić (2000) for an HPSG implementation of this rule and Scheffler (2004) for a proposal of how to adapt it for BCS within a DM approach.

3. Gender variable nouns like *budala* 'fool' (cf. Section 2.3) can be structured as either (16), (17), or (18) below, depending on the nominalizer the root is merged with, respectively yielding nouns with natural masculine or natural feminine gender, depending on the referent, or nouns with only grammatical feminine gender, in the cases where gender of the referent is truly unknown or irrelevant (cf. (8)).

4. Nouns with grammatical feminine gender (such as *stolica* 'chair') are derived by merging the nominalizer $n_{\varnothing}$ with certain sets of roots that this nominalizer licenses. These nouns do not have gender specified on the *n*P.[6] Nouns that are purely grammatically feminine only have grammatical gender [gen:f] on GenP.

   (18) Grammatically feminine nouns (cf. Section 2.4)



4.1.2 Number on nouns

I assume that number on nouns in BCS is specified on the DP within the projection I will label as NumP (Picallo 1991; Bernstein 1993; Borer 2005; Acquaviva 2008; Harbour 2008). In the analysis below, NumP will be assumed to be projected only in case it specifies plural number, i.e. NumP is not projected if the noun is singular (Kratzer 2007). Singular number is therefore treated as the absence of number (see Ackema and Neeleman 2015 for a similar claim on singular number and Béjar and Rezac 2003; Anagnostopoulou 2005; Adger and Harbour 2007 for a similar treatment of third person features), i.e. singular number is supplied by default.[7] I further propose that NumP is projected above the *n*P. The fact that gender and number are realised on a single "fused" morpheme is captured by having number-marking be linearly adjacent to gender marking on the noun. However, the precise position of the Num head relative to the two types of gender bearing heads is unclear from the surface. Here, I propose that NumP, when present, is projected between *n*P and GenP, as shown in (19). This will be shown to play a crucial role in capturing the influence of nominal number marking on gender agreement.

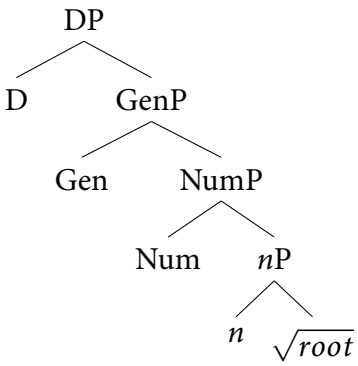
[6] We could, theoretically, also take into account the fact that some nouns with grammatical feminine gender also have animacy features (as noted in (11) for nouns like *roda* 'stork', denoting, for instance, animal species). In that case, an additional nominalizer $n_{a\varnothing[\text{anim:+}]}$ could be postulated. Nouns derived by this nominalizer would have animacy feature on *n*P and grammatical feminine gender supplied at GenP, yielding the following structure:

(i) $[_{\text{DP}}\ \text{D}\ [_{\text{GenP}_{[\text{gen:f}]}}\ \text{Gen}_{[\text{gen:f}]}\ [_{n\text{P}_{[\text{anim:+}]}}\ n_{a\varnothing_{[\text{anim:+}]}}\ [_{\sqrt{\text{stork}}}\ ]]]]$

Since in the analysis below these nouns behave exactly the same as nouns with only grammatical gender on the GenP, I abstract away from this possibility and treat these nouns as having only grammatical gender.

[7] This can also follow from the fact that number marking in BCS is a strictly two-way system with just singular and plural values.

(19) Structure of DP in BCS



This structure in (19) additionally captures the intuition that number and natural gender denote concepts that are in some sense closer to the concept introduced by the root, and this is modelled by having natural gender directly select for the root (cf. Kramer 2014). Grammatical gender, a functional feature provided higher in the structure is a reflection of a grammatical process whereby all nouns belonging to a particular class are assigned the corresponding grammatical feature. This straightforwardly captures the correlation between class and grammatical gender features in this language.

4.2 Feature Hierarchies, Relativised Probing and the Mechanics of Agree

Having laid out the proposal for the structure of DP, let us now turn to the assumptions about the internal structure of ϕ-features and the mechanism of Agree. I will account for the BCS Class II gender agreement patterns by a combining aspects of two formal models of feature structure and agreement. Using a feature-geometric gender system, I propose that natural and grammatical gender are internally distinguished, with the former being more complex than the latter. Subsequently, using the relativised probing model of Béjar (2003); Preminger (2014), I propose that the gender-probing head can be made sensitive to these structural differences between the two kinds of gender. Additionally, I treat gender and number agreement as distinct operations whose interactions, in combination with relativised probing, yield the given patterns.

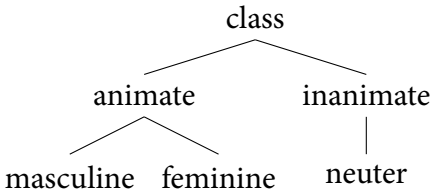
4.2.1 Feature geometric approach to ϕ-features

I adopt the *feature geometry* approach to ϕ-features, proposed originally by Harley and Ritter (2002) (and later adopted by McGinnis (2005); Béjar and Rezac (2009); Preminger (2011, 2014), among others).[8] The underlying idea is that person, number and gender features are in a hierarchical entailment relationship with respect to one another. A certain type of feature increases in complexity or markedness depending on how many nodes in the hierarchy it contains.

Most of the accounts adopting the feature geometry approach so far have primarily dealt with the representation of person and number features. As for class and gender, Harley and Ritter (2002) propose that they belong to the same part of the hierarchy, with the category 'class' further branching as illustrated in (20):

[8] Nothing should change in the analysis if a feature decomposition approach (Georgi 2012, 2013; Nevins 2007), a version of feature geometry, is adopted instead. For the relativised probing approach adopted in this account, it is important to show that the natural gender of the nominal is morphosyntactically 'heavier', i.e. more complex than grammatical gender, in that it also carries animacy specification.

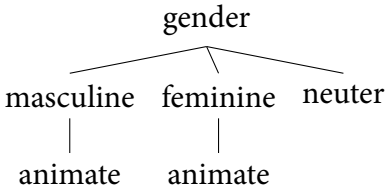
(20) Harley and Ritter (2002) hierarchy of class and gender



The gender and class feature hierarchy is not discussed in great detail and Harley and Ritter (2002:514) admit that the internal structure and organisation of this part of the hierarchy would have to vary across languages, due to the great variation languages display in gender and class features in general.

I adopt Harley and Ritter's general intuition that masculine and feminine gender include animacy specification in their structure, while neuter gender is inanimate, but propose an adaptation of the hierarchy to capture gender in BCS (and possibly languages with the same mixed gender system). Firstly, I propose that the category 'class' be re-interpreted as gender in BCS. Since class is not a morphosyntactic feature reflected in agreement in BCS, but a morphological property classifying nouns into groups according to the inflection markers they surface with, I assume that it does not participate in syntactic agreement directly. Instead, morphological class features in BCS are connected to gender features via redundancy rules (cf. (15)). Moreover, the Harley and Ritter hierarchy as it stands in (20) implies that being masculine or feminine entails being animate. We have seen in Section 2 that in BCS this is not the case, as inanimate nouns can also have masculine or feminine gender. I therefore propose that gender is the more general category, dominating the animacy node in the hierarchy. I further assume that all nominals in BCS contain the gender node, but those that have natural gender also contain the additional 'animate' node below it. The advantage of this way of modelling gender hierarchy is that differences between natural and grammatical gender fall out of their internal feature structures. In particular, natural gender is more complex than grammatical gender, since it contains an animacy node in addition to a gender node. In the modified version of the Harley and Ritter (2002) hierarchy, I replace the *class* node with the general *gender* node. Gender can take three values – *masculine*, *feminine* and *neuter*. Masculine and feminine gender features contain an additional *animate* node. This series of adaptations yields the following modified geometry:

(21) Modified hierarchy for gender



The structure in (21) shows that what I have so far been calling "natural gender" is in fact just a featural composite, consisting of gender and animacy features. "Grammatical gender", on the other hand, is less marked in the geometry and consists of the gender feature alone.[9] The advantage of this approach to gender features is that it straightforwardly captures the similarities between natural and grammatical gender – they are both a type of gender. At the same time, it

[9] See Hammerly (2015) for a more elaborate treatment of gender features in Romance languages.

is also able to derive the differences between them by treating the natural gender as containing an additional animacy feature, yielding, within the feature geometry model, a hierarchical entailment relationship between the two, as in (21). Schematically, the two types of gender will be represented as follows:

(22) Natural gender:
$$\begin{bmatrix} \text{gen:m/f} \\ \text{anim:+} \end{bmatrix}$$

(23) Grammatical gender:
$$\begin{bmatrix} \text{gen:m/f/n} \end{bmatrix}$$

Having formalised the distinction of two kinds of gender, let us now turn to formalising the preference of the gender probe towards the more complex, natural gender features.

4.2.2 Relativised probing

Relativised probing is the approach put forward in the work of Béjar (2003); Béjar and Rezac (2003, 2009), and applied and extended in Georgi (2012, 2013); Nevins (2007, 2011); Preminger (2014); Deal (to appear), among others, to model agreement phenomena where the probe in the Agree relation has a preference for certain types of features. I adopt this approach to account for the preference of the gender probe in BCS for targeting natural gender on nouns.

The foundational idea is that Agree (as defined in Chomsky 2000, 2001) is the operation which makes sure that the unvalued uninterpretable features of the probe are valued by **matching** features on the **closest** c-commanding goal in a local relationship. Following Béjar (2003); Béjar and Rezac (2009); Preminger (2014) in assuming that features can be represented with varying degrees of complexity (cf. Harley and Ritter (2002) feature hierarchy) both on the probe and on the goal, it is predicted that the probe will look for features of corresponding complexity on the goal and that those features need to be equally specified. In Béjar (2003), it is assumed that the goal needs to have at least the same feature structure as the probe, i.e. the goal needs to entail the feature specification of the probe. If the goal does not have all the features the probe needs, Agree does not result in valuation, which triggers a second cycle of Agree. Béjar (2003) assumes further that in the second cycle the probe's features are diminished, with the result that it can now be valued by a goal with a different level of featural complexity.

Relativised probing has consequences for locality and Minimality (Béjar 2003; Béjar and Rezac 2009; Georgi 2012, 2013; Nevins 2007, 2011; Preminger 2014). If the probe is specified in such a way that it can only be valued by a certain type of ϕ-feature, it is able to skip certain XPs that do not bear the corresponding features and continue its search until it finds the features of the right type and complexity. Preminger (2014:62) illustrates this point based on relativised probing for plural number. In a situation where there are two DPs in probe's search space, where the higher one is singular and the lower one is plural, the probe can skip the higher DP and not agree with it, continuing to look further down its search domain until it targets the lower plural DP. In other words, a DP counts as a potential goal for a probe only if it bears the right kind of feature specification for the Agree relation. If it does not, it cannot value the features on the probe, nor can it serve as an intervener between the probe and its eventual goal in the search domain, by which defective intervention is disallowed in the system. As pointed out in Béjar (2003) and Preminger (2014), this is reminiscent of the Relativized Minimality idea of intervention developed in Rizzi (1990).

4.2.3 Applying the models to BCS data

The model of Agree I develop offers a theoretical account of three general empirical observations established so far. Recall that BCS nouns can bear two kinds of gender features, i.e. natural and grammatical gender, and since they both participate in agreement, they have to be sufficiently similar, but also sufficiently different to trigger different agreement effects. I have modelled this observation by analysing natural gender as being more complex than grammatical gender under the feature-hierarchy approach. Furthermore, the additional observation that gender agreement distinguishes between natural and grammatical gender on the noun can be theoretically modelled by making Agree be sensitive to the complexity of the noun's feature set within the relativised probing model. Combining the two observations, I propose that the probe may be specified to search either for natural gender (more complex) or grammatical gender (less complex). The final observation, namely that natural and grammatical gender agreement are sensitive to the number features on the noun will be modelled based on the assumption that NumP intervenes between the two gender features. I exploit this assumption to model the connection between the plural number marking on the noun and gender agreement as a form of an intervention effect on Agree.

Bearing in mind the gender feature structure proposed in (22)–(23), assume now that the gender probe can also vary in complexity, which means that it can seek to be valued by (or be relativised with respect to) features of different complexity, for instance only natural, only grammatical, or either gender. This assumption would have a cross-linguistic consequence in that the locus of parametric variation between languages can lie in the complexity of the probe, which would be relativised towards different gender features in different languages. Assume further that in BCS, gender probe is always relativised towards natural gender, which can schematically be illustrated as follows (I will use the notation [∗F:□∗] introduced in Heck and Müller (2007) to denote an unvalued probe feature):

(24) $\begin{bmatrix} *\text{gen:}\square* \\ *\text{anim:}\square* \end{bmatrix}$

Recall that nouns of Class II in BCS can have natural masculine, natural feminine, variable natural gender, or only grammatical gender. Let us take agreement with nouns with natural masculine gender as an example. Assuming the structure in (16), repeated here in (25), their *n*P has the features [gen:m[anim:+]], whereas the GenP has only [gen:f].

(25) $[_{\text{DP}}\ \text{D}\ [_{\text{GenP[gen:f]}}\ \text{Gen}_{\text{[gen:f]}}\ [_{n\text{P[gen:m, anim:+]}}\ n_{m\text{[gen:m, anim:+]}}\ \sqrt{\text{bishop}}\ ]]]$

I assume that matching followed by valuation of unvalued features is a necessary condition for successful Agree. Since the probe is specified as [∗gen:□[anim:□]∗] (the bracketed notation is a shorthand for the hierarchically structured probe in (25)), and the *n*P has values for both features, Agree results in valuation of both the probe's features by *n*P rather than by GenP, as in (26)-(27). During the first cycle of Agree, the probe is able to search past GenP, which is the closer potential goal with gender features, because GenP does not have all the features of the probe. When targeting the *n*P, the goal and the probe match in all the features, which is a necessary precondition for valuation on the first cycle (see Preminger (2014:62) for the same proposal on probing for plural number). Valuation is carried out successfully at this point, so there is no need for the second cycle of Agree.

(26) Agree with GenP (no valuation):

PROBE	GOAL: GenP	AGREE
∗gen:□∗	[gen:f]	×
∗anim:□∗		

(27) Successful Agree for natural gender:

PROBE	GOAL: *n*P	AGREE
∗gen:□∗	[gen:m]	✓
∗anim:□∗	[anim:+]	✓

In case the probe does not find natural gender on *n*P (e.g. with nouns with only grammatical feminine gender), a new cycle of Agree is initiated. The probe's features are reduced up to the root node [∗gen:□∗] (see Béjar 2003:82), leading the probe to look only for gender features, disregarding animacy. As a consequence, GenP, as the closest goal with the corresponding feature, is able to value the probe's features on the second cycle, resulting in valuing the probe with grammatical gender features:

(28) Agree with *n*P (no valuation):

PROBE	GOAL: *n*P	AGREE
∗gen:□∗	∅	×
∗anim:□∗		×

(29) Successful Agree with GenP:

PROBE	GOAL: GenP	AGREE
∗gen:□∗	[gen:f]	✓

Note that I follow Béjar (2003:67) in assuming that the goal essentially needs to entail all the probe's features, i.e. it needs to be equally complex as the probe in order for valuation to succeed. If the goal is less specified than the probe, valuation will inevitably fail. This is what triggers the reduction of the probe's features and another cycle of Agree. This excludes the situation in which the [∗gen:□∗] feature of the probe is valued by GenP, whereas [∗anim:□∗] is valued by *n*P. Valuation consists in copying the entire feature hierarchy fragment from the goal onto the probe, where the goal needs to value all the probe's features at once, excluding thereby the possibility of partial valuation between the probe and the goal.

4.2.4 Modelling number intervention – separate probing and order of operations

I assume that probing for number and gender features is performed separately by means of two independent Agree operations (henceforth: Number Agree and Gender Agree) (see Anagnostopoulou (2003); Béjar (2003); Chomsky (2000); Laka (1993); Marušič et al. (2015); Preminger (2014) for various applications of this proposal). I follow Béjar and Rezac (2009) in locating both probes for number and gender on the same head (contra Preminger (2014:34), who locates the probes on two different heads). I assume that the order of application of Agree operations is underspecified (Müller 2009; Georgi 2014; Assmann et al. 2015; Keine 2010; Hein 2015). This essentially yields two orders for a given probe: one where probing for number is ordered prior to probing for gender and the other where gender probing is ordered before number probing.

Focusing on gender and number and their interaction,[10] I assume that the operation-triggering features are ordered on a stack and this order determines probe feature discharge. Thus in (30), gender agreement is carried out before number agreement as the gender feature is the first one on the stack to be discharged, whereas in (31) the order is reverse.

(30) Gender Agree > Number Agree

$$\left[\begin{array}{c}\left[\begin{array}{c}*\text{gen} : \square * \\ *\text{anim} : \square *\end{array}\right] \\ [*\# : \square *]\end{array}\right]$$

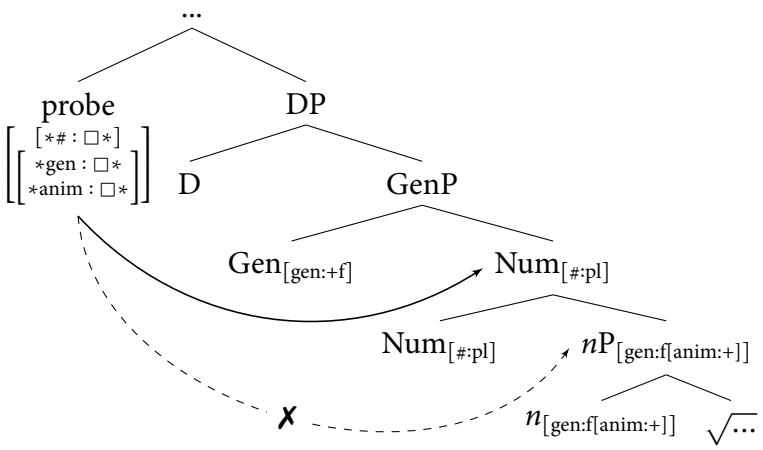
(31) Number Agree > Gender Agree

$$\left[\begin{array}{c}[*\# : \square *] \\ \left[\begin{array}{c}*\text{gen} : \square * \\ *\text{anim} : \square *\end{array}\right]\end{array}\right]$$

[10] Since person agreement is orthogonal to the current discussion, it will be disregarded in what follows.

An additional assumption I make is that after an Agree operation has been carried out, the phrase projected by the head bearing the goal feature and all syntactic objects dominated by the phrase, become inaccessible for further Agree operations. In other words, once the Agree operation with the highest priority has applied, the next Agree operation needs to minimise its search domain and target the structure that is higher than the goal that was targeted by the first Agree operation. This can be seen as a locality constraint parallel to constraints on movement such as *Shortest Move* (Richards 2001) or *Approach the Probe Principle* (Branigan 2012, 2013). These principles apply in case a head triggers more than one Move operation. After the first Move operation has been carried out, thereby creating a specifier as a landing site for the moved element, the element that is affected by the second Move needs to land as close as possible to the movement-triggering head. I assume that Agree principles mirror Move locality principles. Assuming that Agree operations seek to locate a matching goal as close as possible, the first operation needs to do what is best, i.e. be carried out fully, and the subsequent Agree operations on the same probing-head need to target elements that are closer to the probe than the already targeted XP. Consider an illustration:

(32)



As (32) shows, this constraint has the effect that an Agree operation which targets NumP renders that NumP, which has now provided the probe with values for its unvalued features, and all the phrases dominated by it, inaccessible for further Agree operations. This has the crucial consequence that, if Agree for gender is ordered after Agree for number on the probe (cf. (31)), gender Agree will not be able to target *n*P because number Agree will have blocked the access to the *n*P below it.

The final assumption on the nature of Agree concerns the cases in which the probe cannot find a goal at all. In the system above, the gender probe is always granted a 'second chance' in case it does not manage to find appropriate features. Yet, since the NumP is assumed to be projected only if it hosts plural number features, and the [∗#:□∗] probe always needs to be discharged by an Agree operation, it may well happen that it does not find appropriate features and Agree does not result in valuation. Here, I follow Preminger (2014) in claiming that if there is a probe whose presence requires initiating an Agree operation, that Agree operation can fail without necessarily resulting in a derivation crash. Agree is obligatory in the sense that it needs to be carried out in appropriate circumstances once it is triggered, but it can apply vacuously if it does not find an appropriate goal. In the case at hand, if the [∗#:□∗] probe does not find a phrase that

contains number features, since it cannot be further diminished and trigger second-cycle Agree, the number feature of the probe will be supplied as singular by default.[11]

4.3 Summary of Assumptions

Before proceeding to derivations of the patterns of agreement with BCS Class II nouns, below I provide a brief overview of theoretical tools needed for the derivations, in the form of a summary of main theoretical assumptions:

1. **Structure of DP:** Number and gender are valued features on DPs, represented on separate projections. *n*P contains natural gender features (if present on a noun) (Kramer 2014), NumP is projected above *n*P and hosts plural number features (Picallo 1991; Bernstein 1993; Borer 2005; Kratzer 2007; Acquaviva 2008; Harbour 2008), GenP is projected above it and with class II nouns it is always specified as [gen:f] based on the redundancy rule in (15). Natural gender is a featural composite consisting of values [gen:f/m[anim:+]] in a hierarchical relationship (cf. Harley and Ritter 2002). It is thus featurally more complex than grammatical gender, including an additional animacy specification.

2. **Relativised probing:** The gender probe in BCS is relativised (cf. Béjar 2003; Béjar and Rezac 2009; Georgi 2012, 2013; Nevins 2007, 2011; Preminger 2014) to look for natural gender features. It is specified as [$*$gen:□[anim:□]$*$].

3. **Cyclic Agree:** If the probe does not find a single element that contains all the corresponding valued gender features, Agree cannot result in valuation. This triggers the second cycle of Agree in which the probe gets reduced to the root node and only looks for [$*$gen:□$*$] features (Béjar 2003; Béjar and Rezac 2009; Preminger 2014).

4. **Order of operations on the same head:** Agree operations triggered by a single head are ordered, but the precise order of such operations is underspecified. As a result, Gender Agree can precede or follow Number Agree (Müller 2009; Georgi 2014; Assmann et al. 2015).

5. **Locality:** Once Agree has targeted an XP, it renders it and all the phrases it dominates, inaccessible for further Agree operations. This is an opacity phenomenon.

6. **Failed Agree:** Agree is obligatorily triggered in appropriate circumstances, but its failure to find an appropriate goal does not lead to a crash, but to default valuation of the features in question (Preminger 2014).

4.4 Deriving the Patterns

This section implements the assumptions outlined above in order to derive the patterns of agreement with BCS Class II nouns in turn. Recall that the patterns we want to derive are the following:

[11] Similarly, Gender Agree can eventually fail, but only if there is no gender feature at all to be targeted and the probe still needs the value. Such situation arises in impersonal constructions.

(i) Grmelo je. / Svanulo je.
thunder.PRT.NSG is. / dawn.PRT.NSG is
'There was thunder. It dawned.'

I assume default gender agreement to arise as a result of the failure of the probe to find gender features on the goal. In the cases at hand, such a situation usually does not arise as all the nouns under discussion have gender features that can potentially be targeted.

TYPE OF NOUN	SINGULAR AGREEMENT	PLURAL AGREEMENT
natural masculine (*vladika* 'bishop')	masculine (natural)	masculine (natural) / feminine (grammatical)
natural feminine (*majka* 'mother')	feminine (natural)	feminine (natural) / feminine (grammatical)
gender variable (*mušterija* 'customer')	masculine/feminine (natural) / feminine (grammatical)	masculine/feminine (natural) / feminine (grammatical)
grammatical feminine (*stolica* 'chair')	feminine (grammatical)	feminine (grammatical)

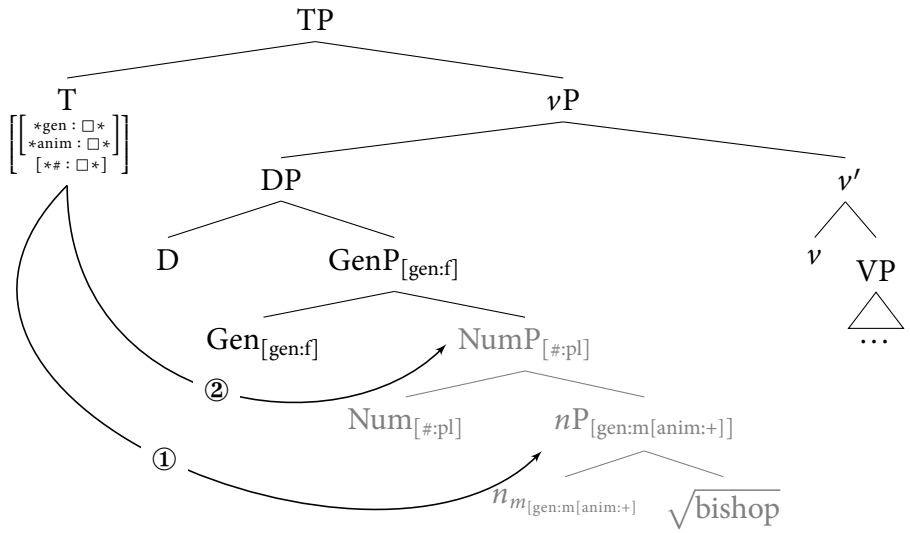
Table 2: Summary of gender agreement patterns with Class II nouns

4.4.1 Nouns with natural masculine gender

The results of the two orderings of Agree operations are reflected in the optionality between masculine and feminine in the plural with the group of masculine Class II nouns (cf. Section 2.1). In this section I show that the order of operations [∗gen:□[anim:□]∗] > [∗#:□∗] will yield natural gender agreement, while the reverse order of operations will result in Number Agree blocking or bleeding the subsequent Gender Agree, resulting in grammatical feminine agreement.

Recall that natural gender on these nouns is specified as [gen:m[anim:+]] on their *n*P, reflecting the fact that these nouns denote male entities, while GenP is specified as [gen:f], reflecting the grammatical gender. The order in which Gender Agree precedes Number Agree can be formalised such that [∗gen:□[anim:□]∗] probe is discharged before the [∗#:□∗] probe. Since the *n*P contains both gender and animacy features, valuation of the probe with natural gender will be successful. The subsequent Number Agree will also be successful as it applies to a domain dominating *n*P (phrases that are rendered opaque after being affected by an Agree operation will be indicated in grey). Consider the derivation where Gender Agree precedes Number Agree:

(33) **Natural masculine gender:** [∗gen:□[anim:□]∗] > [∗#:□∗]



Agreement process:

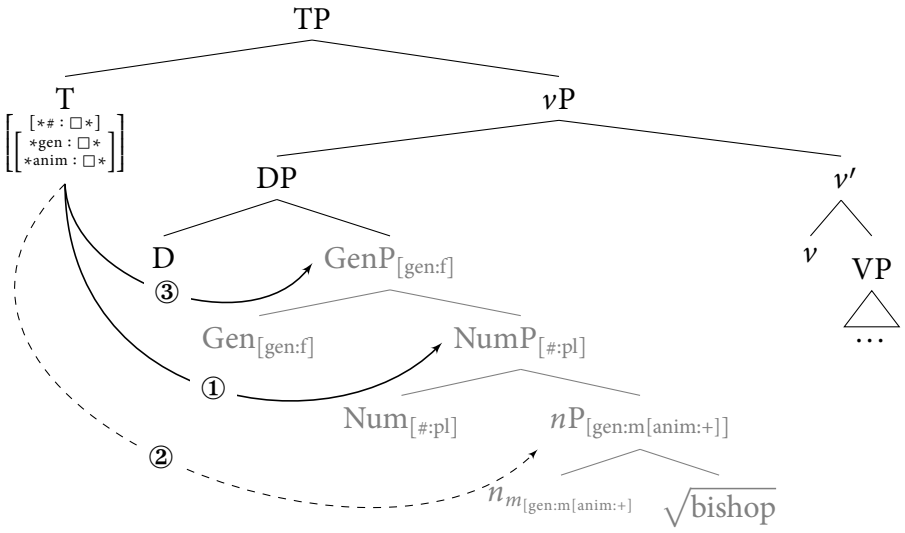
① Agree (T[∗gen:□[anim:□]∗], *n*P[gen:m[anim:+]]) ⇒ T[gen:m[anim:+]]

② Agree (T[∗#:□∗], NumP[#:pl]) ⇒ T[#:pl]

After the [∗gen:□[anim:□]∗] probe has been successfully discharged and natural gender features of T valued by the *n*P, Number Agree is carried out, supplying the [#:pl] feature on T, with the whole process resulting in natural masculine agreement on the probe.

Consider now how the reverse order of application of the two operations yields grammatical feminine agreement in the plural. Ordering number probe before gender probe on the stack as in (34) leads to targeting the NumP first. The subsequent Gender Agree can only target phrases higher in the structure, so the only option will be to agree with GenP and value the probe with grammatical feminine gender.

(34) **Grammatical feminine gender:** [∗#:□∗] > [∗gen:□[anim:□]∗]



Agreement process:

① Agree (T[∗#:□∗], NumP[#:pl]) ⇒ T[#:pl]

② Agree (T[∗gen:□[anim:□]∗], nP[gen:m[anim:+]]) ⇒ fail

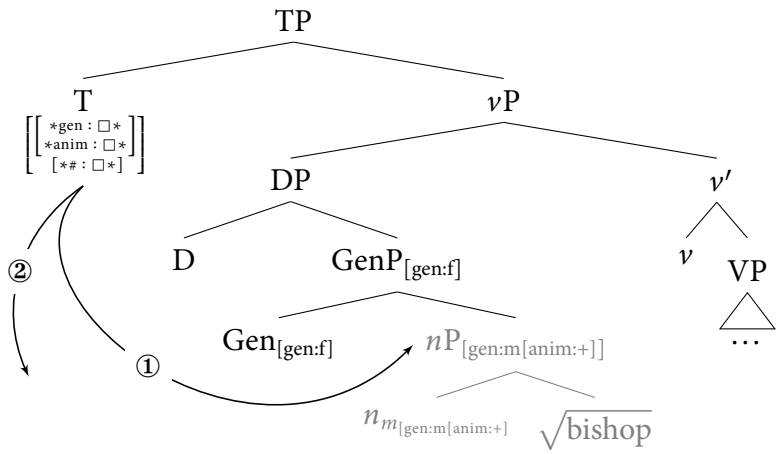
③ Agree (T[∗gen:□∗], GenP[gen:f]) ⇒ T[gen:f]

After discharging the [∗#:□∗] probe, the NumP which provides the value for this probe is rendered opaque for further Agree operations (recall Assumption 5). Any subsequent Agree operation has to apply to a phrase dominating NumP. This is why Gender Agree cannot target the lower *n*P and consequently cannot reach the natural gender feature value. Gender Agree therefore fails to find a target, which initiates the second cycle of Agree. In this cycle, the gender probe is reduced in such a way to look only for a [∗gen:□∗] feature. Such a feature is accessible on GenP, which provides T with the value grammatical feminine.

As for the singular, recall that NumP is assumed not to be projected in this case (Assumption 1). Under the current order of operations, [∗gen:□[anim:□]∗] will be discharged first and the

probe will be valued by the natural gender feature of the *n*P. The subsequent [∗#:□∗] probe will not find a goal as there is no number feature on DP. Number Agree thus fails (cf. Assumption 6 on failed Agree) and the number feature of the probe is valued as singular by default.

(35) Singular agreement: [∗gen:□[anim:□]∗] > [∗#:□∗]



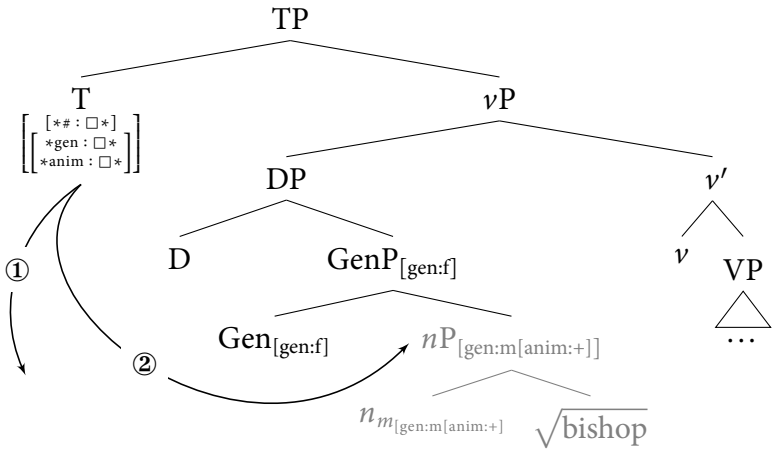
Agreement process:

① Agree (T[∗gen:□[anim:□]∗], *n*P[gen:m[anim:+]]) ⇒ T[gen:m[anim:+]]

② Agree (T[∗#:□∗]) ⇒ fail, no NumP

The result of this process is that the gender probe on T will always be valued by natural gender, as there is no NumP to act as intervener to gender agreement. This is the desired result since, as we have seen, such nouns invariably trigger natural masculine agreement in the singular. This is confirmed by the opposite order of operations. Since NumP is not projected in the singular, the [∗#:□∗] probe, when discharged, will not find a corresponding valued feature on DP. This Agree operation fails and the unvalued number feature is valued as singular by default. None of the phrases on DP is affected by Number Agree, so the subsequent [∗gen:□[anim:□]∗] probe can reach *n*P and the natural masculine gender feature on it. The derivation will thus have the same result as the one in (35), with the only difference being the order of probing.

(36) Singular agreement: [∗#:□∗] > [∗gen:□[anim:□]∗]



Agreement process:

① Agree (T[∗#:□∗]) ⇒ fail, no NumP

② Agree (T[∗gen:□[anim:□]∗], *n*P[gen:m[anim:+]]) ⇒ T[gen:m[anim:+]]

This ensures that the gender probe on T will always be valued by natural gender in the singular, where it is assumed that there is no NumP to act as intervener to gender agreement with the *n*P.

To sum up, the alternation in gender agreement with this group of nouns provides evidence that Number Agree and Gender Agree interact in syntax and their different orderings yield different results. When Gender Agree is ordered first, natural gender will result because there is nothing to prevent the probe from targeting the *n*P. If the order is reverse, Number Agree will bleed (natural) Gender Agree by targeting the NumP first, leaving grammatical gender agreement as the only option. Moreover, in the singular, natural gender agreement is in fact the only option – without the NumP, there is nothing to bleed natural gender agreement.

4.4.2 Nouns with natural feminine gender

Recall that nouns with natural feminine gender (cf. Section 2.2) have the features [gen:f[anim:+]] on their *n*P, and [gen:f] on the GenP, as a reflection of belonging to Class II. As with the previous group, when Gender Agree precedes Number Agree, the [∗gen:□[anim:□]∗] probe will be discharged before the [∗#:□∗] probe. Since the *n*P contains both gender and animacy features, valuation of the probe with natural gender will be successful. The subsequent Number Agree will also be successful as it applies to a domain dominating *n*P, which is still accessible for probing, parallel to the situation in the previous section, derived in (33).

The reverse order of Agree operations leads to grammatical gender agreement, but the surface result is the same with these nouns, as both gender features are feminine. The process is the same as in (34) above: Number Agree, the first in the order of application, provides the value for the unvalued number feature on T. This forces the next Agree operation to apply to a higher domain, where it does not find natural gender features. As a result, another cycle of Gender Agree is triggered, where the reduced [∗gen:□∗] feature of T is valued by GenP.

In case of singular nouns, given that NumP is not projected, Number Agree will not find an appropriate goal, resulting in vacuous application of Number Agree, just like in (35)–(36) above. The singular feature will be provided on T by default, while the result of gender agreement will always be natural feminine gender valued by the features of the *n*P.

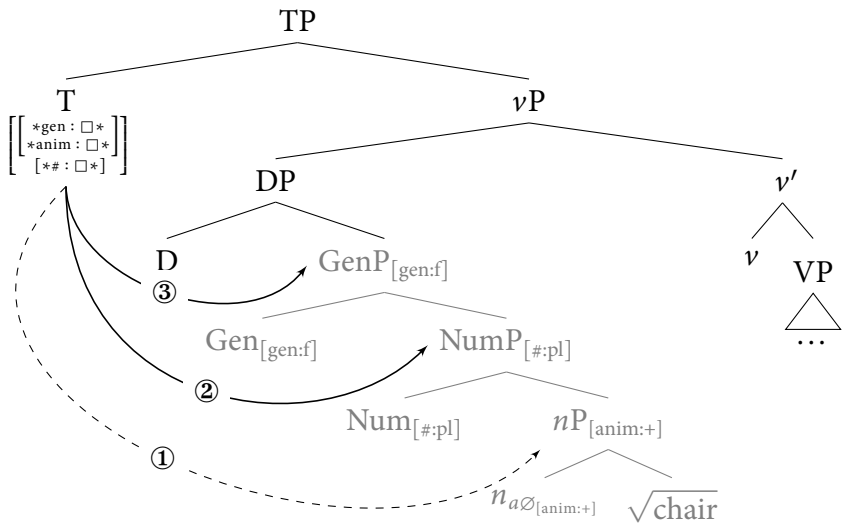
With these two agreement strategies for nouns with natural feminine gender, the same result is achieved on the surface, i.e. valuing the gender feature of T either as [gen:f[anim:+]] or [gen:f] will require insertion of a feminine exponent. Consequently both strategies result in feminine agreement, one reflecting feminine natural gender and the other feminine grammatical gender on the noun in the plural. In contrast, the feminine agreement triggered in the singular reflects natural gender alone.

4.4.3 Nouns with grammatical feminine gender

Recall that grammatically feminine nouns are assumed to have no gender features on *n*P and only the [gen:f] value on GenP (cf. Section 2.4, example (18)). GenP is therefore the only possible target for Gender Agree. The interesting case here is the order where Gender Agree precedes

Number Agree. Since the natural gender probe is a complex probe, and the mechanism of relativised probing demands that the [∗gen:□[anim:□]∗] probe find the goal with corresponding feature specification, in the case of grammatically feminine nouns, the probe will not find such a goal anywhere on the DP, leading to a failure of valuation on the first cycle of Gender Agree.

(37) **Grammatical feminine gender**: [∗gen:□[anim:□]∗] > [∗#:□∗]



Agreement process:

① Agree (T[∗gen:□[anim:□]∗], *n*P[anim:+]) ⇒ fail

② Agree (T[∗#:□∗], NumP[#:pl]) ⇒ T[#:pl]

③ Agree (T[∗gen:□∗], GenP[gen:f]) ⇒ T[gen:f]

Agree for natural gender will inevitably result in non-valuation of probe's features, as they cannot be provided by the same element, the *n*P in this case. This triggers the new cycle of Gender Agree in which the probe looks only for [∗gen:□∗] feature. Yet, since Number Agree is the next operation in line, it applies right after Agree for natural gender. Note that here we might potentially have another case of indeterminacy of rule application. An additional assumption I put forward is that Number Agree must be carried out before the second cycle of gender Agree. This could be made to fall out of one of two intuitive distinctions between the two types of Agree operations. It follows simply from cyclicity: essentially all instances of first cycle Agree must precede instances of second cycle Agree. Alternatively, we might argue that Number Agree, being an obligatory operation, is privileged to occur before Gender Agree, which is a repair strategy. In any case, after a successful valuation of the probe's number features, the gender probe is ready to carry out the second cycle of gender agreement, which results in grammatical gender specification being provided on T.

If the reverse order of operations applies, the derivation involves the same steps as (34) above. After T's number probe has been valued successfully, gender probe cannot target the *n*P, in which case natural gender agreement fails. The second cycle of Gender Agree is initiated, where the gender feature of the probe [∗gen:□∗] is valued by the gender feature on GenP.

4.4.4 Gender variable nouns

Recall that gender variable nouns (cf. Section 2.3) can bear either masculine or feminine natural gender, as well as only grammatical gender, without any change in form, and the way to disambiguate between the three kinds of gender is to look at the context and agreement they trigger. It was proposed at the end of Section 4.1.1 that roots that derive these nouns are optionally licensed under three different nominalisers. If a root merges with n_m, the noun it creates is assigned natural masculine gender, n_f assigns natural feminine gender to the noun, whereas $n_\varnothing$ yields a grammatically feminine noun, as it does not have any natural gender specified on *n*P. As a result, depending on the nominalizer the root merges with, the newly-created noun will be subject to corresponding consequences concerning its agreement patterns.

If a noun is assigned natural masculine gender under n_m, the agreement it triggers follows the patterns from Section 4.4.1. Thus, in the singular, any order of operations will yield natural masculine agreement since there is no NumP to trigger intervention effects. In the plural, the order of Agree operations [∗gen:□[anim:□]∗] > [∗#:□∗] will yield natural masculine agreement, as Gender Agree, being the first operation to apply, will provide natural masculine features on the probe (see the derivation in the example (33)). Conversely, the order of probing [∗#:□∗] > [∗gen:□[anim:□]∗] will yield grammatical feminine agreement in the plural, as Number Agree will bleed natural gender agreement (the derivation reflects that in (34)).

Similarly, if a noun is assigned natural feminine gender under n_f, the agreement patterns will reflect those presented in Section 4.4.2. Singular nouns will always yield natural feminine agreement. In the plural, ordering Gender Agree before Number Agree on the probing head will result in valuing the probe's gender feature with natural feminine gender by the *n*P. The opposite order of Agree operations, Number Agree being ordered before Gender Agree, results in valuing the probe's gender features with the value for grammatical gender. Number Agree, being the first to apply, renders the domain of NumP opaque for further Agree operations, preventing Gender Agree from targeting anything below the NumP, and forcing the probe to take the grammatical gender value from the GenP, as a repair strategy (as illustrated in (34) above).[12]

Finally, if assigned grammatical feminine, the only target for gender features on the noun is GenP, which means that it can only ever trigger grammatical feminine agreement (like the nouns in 4.4.3). This accounts for examples like (8), where the gender of the referent is irrelevant.

5 Alternative Mechanisms of Agree

In this section, I will consider an alternative analysis to the BCS agreement patterns presented so far, which explores the consequences of having a single cycle of Agree and shifting variation to post-syntax.[13] This analysis has the apparent advantage of being technically simpler in some respects than the one proposed in this paper. Yet, I will show that it fails on empirical grounds.

In order to scrutinise the alternative approach, the assumptions on the featural composition,

[12] Note that the account for agreement with gender variable nouns offered here covers the cases where the plural invariably denotes a group of entities of the same biological gender. As mentioned above (footnote 2), in order to account for mixed groups certain extensions of the account would have to be developed in order to account for the way gender features of mixed groups are resolved. I leave this issue for further research.

[13] Thanks to Amy Rose Deal for suggesting this option to me.

relativisation of the probe towards natural gender, and fallible Agree will be retained from the original analysis. The rest of the assumptions will be changed as in the following list:

1. Structure of DP: As in the main account proposed above, *n*P contains natural gender features, NumP with plural feature is projected above it, followed by GenP, hosting grammatical gender. What will turn out to be essential for the alternative approach is to assume that GenP is only projected if NumP is present in the structure, i.e. in the plural, otherwise it is absent. Recall that, since singular is the absence of number in BCS, there is no NumP projected in the singular. Thus, without NumP and GenP, singular nouns under these circumstances only have natural gender hosted on *n*P, while plural nouns contain both natural and grammatical gender, hosted on *n*P and GenP, respectively.

2. Cyclic Agree: A second major revision is that assumptions on Cyclic Agree are altered so as to allow for partial valuation. In stark contrast to the main analysis where partial valuation is not possible, here this option will be exploited to enable the Agree operation to copy both gender values, without skipping the GenP. Following Béjar and Rezac (2009), I will assume in this alternative account that the following two conditions on Agree hold: (i) MATCH – for every feature F, a subset of F must match; (ii) VALUE – valuation consist in copying of the feature values from the Goal to the Probe (adapted from Béjar and Rezac 2009:45). According to these two conditions, a probe needs to have at least a subset of its features matched and valued. Moreover, Valuation implies that Agree copies the necessary feature, and all the features entailed by that feature, to the probe (Béjar and Rezac 2009:45).[14] The gender probe comes with hierarchically structured unvalued features and during its search, interacts with GenP and *n*P as gender-bearing goals. As the probe first encounters GenP, which only has a subset of the necessary features, the corresponding segments of the probe will be valued, leaving an active residue [∗anim:□∗] (i.e. features that are still left unvalued). Continuing the search, the probe finds the [anim:+] feature on the lower *n*P, embedded under gender. But as valuation consists of copying the necessary feature and all the features it entails, and animacy entails gender, both animacy and gender are copied onto the probe. Finally, if the probe does not find another goal and the [∗anim:□∗] segment does not receive a value, this is unproblematic since the condition for successful Match is that at least a subset of the probe's features is matched and valued. The unvalued segment is simply deleted at the interface (Béjar and Rezac 2009; Preminger 2014; Deal to appear).

3. Order of operations on the same head: While in the main analysis Agree operations triggered by a single head can apply in different orders with respect to each other, yielding different patterns, for the alternative analysis it will be enough to assume just one fixed order of Agree operations (the order of their application is actually irrelevant under this approach, as will become clear shortly, thus I will assume that Number Agree precedes Gender Agree).

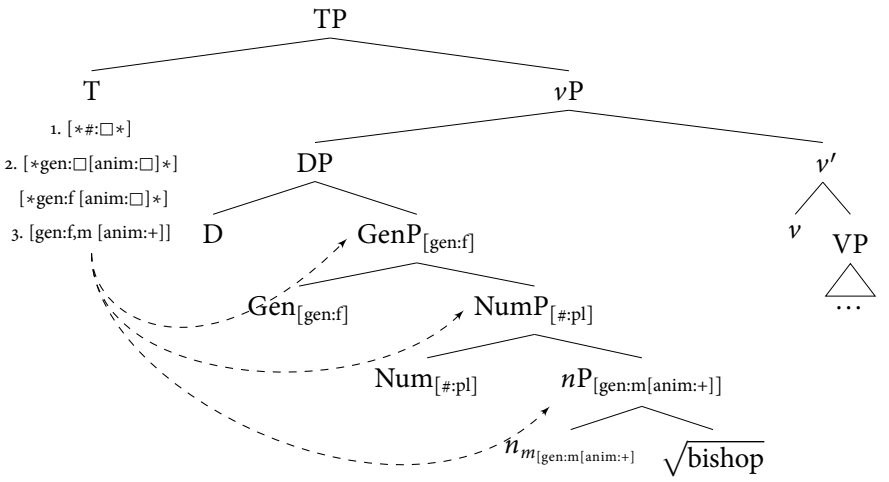
4. Locality: The assumption that once Agree has targeted an XP, it renders this phrase and all the phrases it dominates inaccessible for further Agree operations, present as an ingredient to the main analysis, can also be omitted in the new system.

Implementing the new set of assumptions in deriving agreement with nouns of dual gender in BCS, assume that after successful Number Agree, Gender Agree is initiated. The feature of the

[14] Feature entailment is determined by the internal structure or geometry of the feature. For instance, I have argued that natural gender is represented by a complex feature structure consisting of [gen:f/m[anim:+]]. This means that animacy entails gender – gender can exist without animacy, but animacy cannot exist without gender.

first goal, GenP, is matched, valued and deactivated on the probe. The [∗anim:□∗] segment of the probe is still unvalued, so the search continues until the probe finds the animacy feature on the *n*P, thereafter copying both the animacy feature, as well as the masculine feature entailed by it.

(38) **Natural masculine gender:**



① Agree (T[∗#:□∗], NumP[#:pl]) ⇒ T[#:pl]

② Agree (T[∗gen:□[anim:□]∗], GenP[gen:f]) ⇒ T receives the value for the gender segment, leaving [∗anim:□∗] still active.

③ Agree (T[∗gen:f [anim:□]∗], *n*P[gen:m[anim]]) ⇒ T receives values [m[anim]].

As a result of these stages of the Agree operation in syntax, T's ϕ-features will be valued by the bundle {f,{m,anim},pl}. These can then be post-syntactically realised by means of different exponents. Feminine agreement results if the speaker chooses to realise the features {f,pl} ⇒ *-feminine suffix*. Masculine agreement results if the speaker chooses to realise the features {m,pl} ⇒ *-masculine suffix*. Nouns with natural and grammatical feminine gender (such as *sestra* 'sister', *majka* 'mother') behave in the same manner with the only difference being that at the end of the derivation, T's ϕ-features will be valued by the bundle {f,{f,anim},pl}. Since both gender features are identical and there is no clash between them, realising either of them will require the insertion of the feminine exponent.

I will not go through the derivation of grammatically feminine nouns (e.g. *stolica* 'chair') in detail. Assuming they have only grammatical gender at GenP, this is going to be the only goal for Agree. The unvalued [∗anim:□∗] segment of the probe is subsequently deleted, as the probe will find no animacy feature further down in the DP. As a result, T's ϕ-features will be valued by the bundle {f,pl}, which is realised by a feminine exponent during Vocabulary Insertion.

5.1 Disadvantages of the Alternative Approach

Having laid out an alternative to the main proposal presented in the this paper, I will now argue that this is nevertheless to be dispreferred in favour of the main analysis. Even though simpler at first glance, the alternative system faces some challenges both with the mechanism of Agree and

the structure of the DP.

As for Agree, assumptions on its mechanics might speak in favour of the new approach, as partial valuation is allowed and assumptions on underspecified order and restricting the domains of Agree can be dispensed with. Despite the benefits, it still seems that very little is gained in terms of economy of technical steps, as this approach requires nearly the same number of assumptions to derive the desired patterns. For instance, this approach also needs to provide a repair strategy in the form of deletion of the active residue at the interface, in case the probe does not find all the necessary features. Yet, most importantly, the primary reason why I abandon such an approach is that, no matter how much simpler the Agree mechanism appears to be, this simplification would come at the cost of invoking inconsistent stipulations about the DP structure.

Recall that in order to accommodate the alternative approach to Agree, we have to assume a different structure for the DP in the singular and in the plural. The modified proposal needs to assume that GenP is projected only in the plural because assuming that GenP is always projected within the DP would overgenerate certain agreement patterns – predicting, in particular, that agreement for both grammatical and natural gender should always be possible in the singular as well. This is because of the possibility of partial valuation, which would mean that the probe would necessarily interact with both GenP and *n*P, valuing its features by gender features of both phrases. At the same time, the assumption of having GenP tied to plural number would goes too far in the other direction, i.e. it undergenerates agreement for grammatical gender in the singular in certain instances. The alternative approach predicts that we never get agreement for grammatical gender in the singular since the Gen head that hosts grammatical gender is entirely absent in the singular DP. However, recall that there *are* instances of Class II nouns that trigger grammatical gender agreement in both singular and plural: namely, nouns that bear only grammatical gender (e.g. *stolica* 'chair', *knjiga* 'book', etc.) and gender variable nouns (e.g. *budala* 'fool'). These patterns of agreement are not straightforwardly derivable under the alternative approach.

As a possible solution, one could potentially assume that *n*P can also introduce grammatical gender, which is how these nouns would receive their specification (cf. Kramer 2014). Such a solution would, however, necessarily mean claiming that there are two possible ways of assigning grammatical gender in BCS - either by *n* or by Gen. Combined with the idea that GenP is present only in the plural, grammatically feminine nouns then actually receive two grammatical gender features in the plural – a sub-optimal solution since, without independent theories to restrict gender distribution, it would overgenerate combinations of grammatical and natural gender in BCS DPs. The original approach circumvents this problem entirely by having the rules of gender assignment and the DP structure be consistent throughout in both the singular and plural. I will thus not pursue this alternative approach further in the rest of this paper.

6 Alternative Approaches to Mixed Agreement: Hybrid Agreement in Russian

This section includes a short discussion on how the main analysis presented here fares with respect to some recent approaches to mixed gender agreement, predominantly in Russian (another language with a mixed gender assignment system). In particular, I focus on the Distributed Gender Hypothesis put forward by Steriopolo and Wiltschko (2010), who argue for three possible

structural positions for gender features in the DP and the "gender confusion" approach by Matushansky (2013), where mixed agreement is the result of a mechanism of feature licensing.

Russian is a language similar to BCS, with the same principles of gender assignment (Corbett 1991:34). Some hybrid nouns in Russian also show patterns similar to those found in BCS above. The main difference between the two types of nouns is that the Russian nouns are true hybrids, showing alternations between grammatical and natural gender agreement even in the singular. The grammatically masculine noun in (39a) can trigger masculine agreement (regardless of the natural gender of the referent), whereas the same noun, if it refers to a female person, can also trigger feminine agreement (39b).

(39) a. Naš vrač prišël vovremja.
our.MSG doctor.M arrived.MSG on.time
'Our (male or female) doctor arrived on time.'
b. Naša vrač prišla vovremja.
our.FSG doctor.F arrived.FSG on.time
'Our (female) doctor arrived on time.' Russian (Matushansky 2013:275)

Since the patterns of agreement with hybris nouns are so similar, and the languages are clearly related, I will compare my analysis to the one proposed by Steriopolo and Wiltschko (2010) and Matushansky (2013), indicating why these accounts cannot cover the BCS data, and showing in turn, how the account developed here successfully extends to Russian.

Steriopolo and Wiltschko (2010:157) propose that gender features can be distributed along three possible positions in the DP. Natural gender is located on the root, grammatical gender is introduced by *n*, while an additional type, D(iscourse)-gender, is introduced by D. A noun with natural masculine gender, like *otʹěc* 'father', only has the root-gender (40a). A noun with grammatical gender, such as *čʹelovʹěk* 'person' has no natural gender on the root, but it receives its grammatical gender from *n* (40b). Gender variable nouns, such as *sʹirotá* 'orphan', receive either masculine or feminine gender based on the gender of the discourse referent, and this feature is located in D (40c).

(40) a. $[_{DP}\ D\ [_{nP}\ n\ \sqrt{\text{otʹéc}}_{[m]}\ ]]$
b. $[_{DP}\ D\ [_{nP_{[m]}}\ n_{[m]}\ \sqrt{\text{čʹelovʹék}}\ ]]$
c. $[_{DP_{[m]}}\ D_{[m]}\ [_{nP}\ n\ \sqrt{\text{sirota}}\ ]]$ Russian

This account proposes that a higher gender can override the gender introduced by the lower functional projection. For instance, with hybrid nouns like *vrač* 'doctor' in Russian (39), both grammatical (masculine) agreement and agreement according to discourse referent (feminine) are possible. Steriopolo and Wiltschko (2010) suggest that in the former case, such a noun only has grammatical gender on *n* (cf. (40b)), while in the latter, it has grammatical gender on *n* and D-gender, where the higher one overrides the lower one by becoming the closer goal for verbal agreement.

This analysis faces a few challenges. First, allowing gender features to be present on the root is theoretically problematic, as it conflicts with the view of roots being category-free (see Marantz 2001; Arad 2003, 2005; Borer 2009 for arguments in favour of treating roots as completely void of any formal properties and Acquaviva 2009; Harley to appear for the view that roots as syntactic terminal nodes are differentiated by index notation). If a root can be interpreted only after it

has been categorised, and categorisation is done by *n* in this particular instance, it follows that the categorising head should be the one introducing the relevant features and determining the interpretation (cf. Kramer 2014 for gender) – as indeed I propose here.

Moreover, as Matushansky (2013) notes, the conditions for discourse gender assignment are formally unclear at best, and it is also unclear why such gender would be assigned only to hybrid nouns, and be absent in all other nouns. Recall that my analysis dispenses with the notion of D-gender altogether, therefore not facing this issue, showing, at the same time, that we can derive the mixed agreement patterns with only two gender features, retaining the idea that natural gender is introduced on a lower structural level than the grammatical. In BCS and Russian, grammatical gender is actually a highly predictable property of a noun, determined based purely on membership to a declension class.[15] Class, on the other hand, is not entirely predictable, and thus, as a part of a noun's inherent information, it should be located on *n*.[16] If we assume that class is an inherent property of *n*, together with natural gender, while grammatical gender is a formal property hosted by a functional projection, and supplied via redundancy rules based on the class feature as proposed in this paper, it becomes possible to derive the close connection between class and gender during narrow-syntactic word formation without stipulating complex mechanisms of semantic feature-mapping (such as D-gender).

Some of these issues are taken up by Matushansky (2013). In this account, a distinction is made between semantically interpretable ϕ-features (i.e. natural gender features) and uninterpretable features (i.e. grammatical gender, which can be inherent, e.g. on nouns, and non-inherent, e.g. on verbs). The main hypothesis is that agreement markers on predicates and modifiers, usually bearing non-inherent features, can sometimes additionally bear interpretable features. This means that an adjective or a verb can enter the derivation already bearing grammatical non-inherent gender features, but it may happen that they also be introduced into the derivation bearing natural gender features. Agreement is evaluated under the strictest form of c-command – sisterhood. Thus, when two gender-bearing elements (e.g. a noun and an adjective) merge, their features need to match in order for the combination to be licensed and for the gender feature to be assigned to the newly-created XP. For instance, a grammatically masculine noun, such as Russian *vrač* 'doctor', should merge with a masculine adjective (e.g. *umelyj* 'skillful.msg') in order for the combination to be licensed and projected onto the NP. Mismatches are possible only if the adjective or predicate introduces natural (interpretable) gender, while the noun has only the uninterpretable grammatical one, in which case the natural gender overrides the grammatical one and the whole new XP becomes interpretable.

The theory proposed by Matushansky (2013) goes against several points argued for in this paper. Leaving aside the question of whether gender agreement should be treated as semantically

[15] Recall that class relates to grammatical gender in BCS in such a way that Class I nouns have either masculine of neuter grammatical gender, while Class II and III nouns have feminine. For the class-gender matching algorithm in Russian, see Corbett (1991).

[16] Müller (2004a,b); Alexiadou and Müller (2008) note that inflection class cannot be predicted based on gender, phonological or semantic properties of a noun. Gender cannot be a predictor as, e.g. in BCS feminine nouns can belong to Class II and Class III, while masculine nouns can belong to Class I and Class II. Phonological properties are not a completely reliable diagnostic either, as in BCS nouns that end in -∅ may be masculine (and belong to Class I), or feminine (and belong to Class III). Semantic properties such as animacy are not a good predictor either, as all classes (except for Class III in BCS, which contains inanimate nouns for the most part) can include both animate and inanimate nouns alike. Müller (2004a,b); Alexiadou and Müller (2008) thus conclude (focussing on Russian) that class features must be inherently present on the noun stem, or, in the current terms, on *n*P.

interpretable in the first place, this account faces serious problems with overgeneration both in the lexicon and in syntax. The approach is strictly lexicalist, as it assumes that both nouns and the elements they agree with enter the derivation with already lexically supplied gender features. In this case it is necessary to assume the existence of multiple synonymous occurrences of the same lexical item in the lexicon (e.g. an adjective with a grammatical or natural, feminine or masculine feature). This is a suboptimal solution in comparison to the DM idea that the lexicon contains a single root and a limited number of category-deriving functional items that supply the necessary features (see Kramer 2009 for further arguments against lexicalist treatment of gender features). Furthermore, as Agree in this account involves feature checking strictly under sisterhood instead of valuation of unvalued features on the probe under c-command (contra Chomsky 2001; Béjar and Rezac 2009, among many others), it is expected that the syntax generate multiple structures with various combinations of gender features, placing a lot of burden on the semantic licensing mechanism. This problem, too can be avoided, if the operations in syntax are restricted in the way proposed in my account. Finally, since the proposal in Matushansky 2013 only focuses on gender features, it is unclear how the necessary gender-number feature co-occurrence restrictions should be formalised (in order to derive obligatory natural gender agreement in the singular and alternations in the plural), or indeed, what they are underlyingly motivated by.

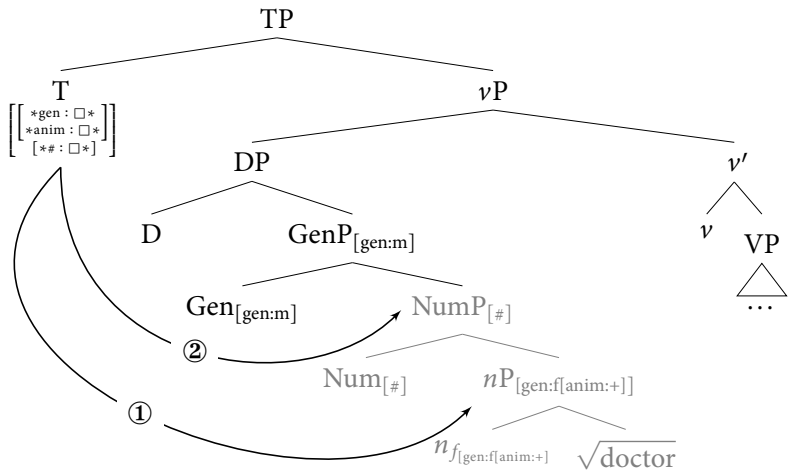
Having now established why the existing accounts on hybrid nouns cannot cover the patterns from BCS presented in this paper, the question arises whether the account I have developed can cover the agreement patterns in Russian. I argue that this is indeed possible, with just one small extension. Recall that the Russian nouns are true hybrids, in the sense that they show alternations between grammatical and natural gender agreement even in the singular (39). Similarly to BCS nouns, a noun of the *vrač*-type referring to a female can be assumed to have a feminine natural gender feature on *n*P, and grammatical masculine introduced at GenP (based on a redundancy rule that assigns masculine to Class I nouns in Russian). Recall that the difference in agreement patterns in BCS was argued to follow from the idea that singular is actually the absence of number in this language. Formally, the NumP with number information was argued not to exist in the singular, but to be projected only in the plural. The possibility of grammatical gender agreement with plural nouns was a direct consequence of this difference, namely, targeting NumP before *n*P for Agree meant that the Num head intervened for Agree with natural gender in the plural, yielding grammatical gender agreement as a possibility only in the plural.

Since the the *vrač*-type nouns in Russian are true hybrids as we have seen – a straightforward way to capture their patterns would thus be to claim that singular is actually not just the absence of number in Russian but is in fact a real feature projected on NumP. Thus, having NumP projected in both the singular and plural DP allows it to intervene for Agree, yielding grammatical gender agreement as an option in both. Interestingly, there is independent empirical evidence that suggests that singular number does behave differently in Russian and BCS. For instance, Bošković (2010) shows how BCS and Russian differ when it comes to number agreement with conjoined nouns, namely Russian allows for singular agreement with two conjoined NPs, while BCS does not. This suggests that number computation is different in the two languages, and the difference may be connected to different representation of number features. So we could assume that languages can be paramterised in this way, i.e. projecting a singular feature or not. As a consequence, in Russian we can expect mismatches even in the singular, as in (40).

In a concrete derivation of the feminine agreement pattern, consider the Agree process under the order of operations where Gender Agree precedes Number Agree, as in (41). Since the *n*P

contains both gender and animacy features, valuation of the first-discharged gender probe with natural gender will be successful. The subsequent Number Agree will also be successful as it applies to a domain dominating *n*P.

(41) **Natural feminine gender:** [∗gen:□[anim:□]∗] > [∗#:□∗]

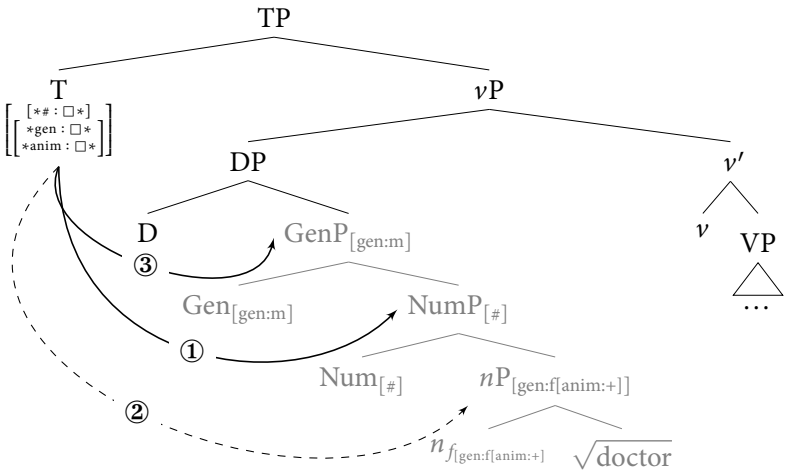


① Agree (T[∗gen:□[anim:□]∗], *n*P[gen:f[anim:+]]) ⇒ T[gen:f[anim:+]]

② Agree (T[∗#:□∗], NumP[#]) ⇒ T[#]

As a result, T's gender feature is valued by natural feminine gender (39b). Under the reverse order, where Number Agree precedes Gender Agree, as in (42), after discharging the [∗#:□∗] probe, any subsequent Agree operation has to apply to a phrase dominating NumP, which was the goal of the first Agree. Gender Agree cannot target the lower *n*P and therefore cannot reach the natural gender feature value. Gender Agree thus fails to find a target, which initiates the second cycle of Agree. In the second cycle, the gender probe is reduced in such a way to look only for [∗gen:□∗] feature. Such a feature is accessible on GenP, which provides T with the grammatical masculine value.

(42) **Grammatical masculine gender:** [∗#:□∗] > [∗gen:□[anim:□]∗]



① Agree (T[∗#:□∗], NumP[#]) ⇒ T[#]

② Agree (T[∗gen:□[anim:□]∗], nP[gen:f[anim:+]]) ⇒ fail

③ Agree (T[∗gen:□∗], GenP[gen:m]) ⇒ T[gen:m]

As a result, T's gender feature is valued as grammatical masculine. The derivations sketched here thus show that the proposal on number and gender agreement interaction outlined in this paper can be successfully extended to cover a wider range of data, accounting for hybrid agreement patterns in other languages with a mixed gender assignment system.

7 Conclusion

In this paper, I have argued that alternations in agreement patterns with hybrid nouns can be captured by a combination of the following sets of theoretical assumptions – precise positional specification of gender and number features within the DP, feature-geometric approach to ϕ-features, relativised probing and separate probing for different ϕ-features, with variation in the order of Agree operations and their cyclic application.

The account developed here successfully captures all the patterns for Class II nouns in BCS, presented in Section 2. Incidentally, the same mechanism is able to derive all the patterns for the nouns from other classes as well. Since masculine nouns of Class I can have natural and/or grammatical masculine gender, any order of operations is bound to yield only masculine agreement, while neuter nouns of the same class only have grammatical neuter gender to be the target for Agree regardless of the order of operations. Class III nouns likewise only offer grammatical feminine gender on GenP as a target for Agree. Crucially, the different orders of Agree operations will only yield different results in cases where the two gender features differ, as is the case with hybrid nouns. All other cases then become trivial, as the same result is expected for whatever order the Agree operations apply in.

Assuming that other languages with mixed gender assignment system function in a similar way, the analysis can be extended to them fairly straightforwardly. In Section 6 above, we have already seen a preliminary implementation of this for mixed agreement in Russian. As a further step in the research, DP-internal agreement could be more closely inspected with the aim to extend the current analysis to the patterns in this area. The results of DP-internal agreement and its interaction with verbal agreement, should hopefully bring us closer to explaining the Agreement Hierarchy (see Corbett (1979) and footnote 1). A potential way to do this might be to simply say that adjectival agreement functions the same as verbal agreement, with relativised probing and different orders of Gender and Number Agree. Upon the valuation of the adjective's features, the adjective itself becomes a goal for the verb, as it now has a gender feature. Consequently, whatever feature the adjective has will be in competition as a goal for verbal agreement. The different patterns and the restrictions could then be derived as a function of: (i) the way adjectival agreement was carried out, (ii) the type and location of gender features on the adjective and the noun and (iii) the order of operations in verbal agreement. The details and concrete implementation of this remain a matter of ongoing research. Mixed agreement patterns in number agreement offer another avenue for extension of the current account. These are discussed at length by Landau (to appear) for Hebrew. The account is based on the Hebrew noun *ba'al* 'husband' or 'owner', which regularly triggers masculine singular agreement when it has singular number, while its plural form (*be'alim*) can trigger either singular or plural agreement on the adjective and the verb.

(43) a. ha-be'al-im ha-kodem maxar et ha-makom lifney šana.
the-owner-PL the-previous.SG sold.3SG ACC the-place before year
'The previous owner sold the place a year ago.'
b. ha-be'al-im ha-kodm-im maxru et ha-makom lifney šana.
the-owner-PL the-previous-PL sold.3PL ACC the-place before year
'The previous owners sold the place a year ago.'
c. ha-be'al-im ha-kodm-im maxar et ha-makom lifney šana.
the-owner-PL the-previous-PL sold.3SG ACC the-place before year
'The previous owner sold the place a year ago.' Hebrew (Landau to appear:ex.17-18)

Landau (to appear) claims that the noun, even though formally plural, is semantically compatible with either singular or plural referent. Adopting terminology introduced by Wechsler and Zlatić (2003), Landau distinguishes between *concord features*, typically reflecting grammatical number and participating in DP-internal agreement, and *index features*, which are introduced in higher functional projections, claimed to reflect semantic number, and participate in verbal agreement. Different agreement patterns are then assumed to be the result of different positions in which ϕ-feature bearing phrases are merged within the DP. This is strictly tied to the interdependence and mapping between concord and index features, and, as such, not straightforwardly translatable into Minimalist and DM concepts of feature structure and structure building. With my analysis, it would be possible to avoid the recourse to concord and index features and deal with the patterns using feature geometries and the Cyclic Agree model instead. Adopting the author's view that there are two possible positions for number features on the DP (also following Acquaviva (2009) among others) and assuming that gender information can intervene between them, number agreement patterns could be derived as an effect of different orders of operations of gender and number agreement and gender feature intervention effect.

An additional advantage of the account proposed in this paper is that it offers novel possibilities for modelling parametric variation. The innovative component of the approach is the proposal that gender the probe in BCS is relativised to search for natural gender features, which successfully accounts for the obligatoriness of natural gender agreement in the singular. Such an approach introduces the possibility of parametrising languages in terms of the complexity of gender features and preferences of gender probes. In that sense, we can assume that the gender probe searches for natural gender in BCS and Russian, but may look for only grammatical gender in other languages. We have also seen that a difference between the DP in BCS and Russian can be stated in terms of whether a language projects singular as a proper feature on the NumP or not, which would constitute another locus of parametric variation between different languages. Finally, decomposing natural and grammatical gender into categorically related features of different complexity in the same way it has been done for person and number in previous accounts offers new analytic possiblities for the closer scrutiny and modelling of the interdependence of class, gender and animacy features and their geometric structural relations.

Ultimately, this account captures the mixed gender agreement patterns in BCS by means of a strictly derivational approach to agreement operations, making correct predictions for both singular and plural, for both hybrid and gender variable nouns, as well as for the nouns without clashing gender features. As its main contribution, this paper has intended to show that what may seem like a random alternation of agreement patterns on the surface, and may therefore seem to require either complex representations or complex Agree mechanisms, can in fact be handled by a combination of existing approaches to agreement, and derived in narrow syntax.

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