

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

Zorica Puškar
University of Leipzig
zorica.puskar@uni-leipzig.de

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1 Introduction and overview

Problem: According to their agreement patterns, the so-called *hybrid nouns* in Bosnian/Croatian/Serbian (henceforth:BCS) have both natural gender (reflecting the gender of the referent) and grammatical gender (assigned according to inflection class). While in the singular they always trigger natural (masculine) agreement, alternation between the two (masculine or feminine) obtains in the plural:

- (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.'

Aim: I focus on deriving patterns of gender alternation in *verbal agreement* primarily for Class II nouns in BCS, since different types of nouns from this class show interesting variation in gender agreement. I argue that these patterns can shed light on the general agreement mechanism in this language.

Claim: I argue that alternations in the plural are a result of the same underlying syntactic mechanism of agreement, which essentially involves *cyclicity and intervention effects caused by plural number*.

- Natural gender is featurally more complex, containing more atomic units organised in a feature hierarchy (Harley & Ritter 2002).
- Natural and grammatical gender are located at different functional projections in syntax, natural gender being lower in the structure.
- Gender probe is relativised (Béjar & Rezac 2009; Preminger 2014) towards natural gender features in BCS, which derives the preference for natural gender agreement in the singular.
- Plural number is hosted by a functional projection NumP, above the natural gender and below the grammatical gender.
- Gender and number agreement are two separate operations that can be carried out in different orders with respect to each other. The variable orders together with intervention by NumP lead to the agreement alternation in the plural.

Outline:

- ① Patterns of agreement of Class II nouns in BCS
- ② A note on the theory so far
- ③ Main assumptions
- ④ Deriving the patterns of gender agreement, focusing on plural alternations
- ⑤ Conclusions

2 Patterns of agreement of Class II nouns in BCS

In this section I will show that BCS nouns of Class II fall into subclasses that trigger one of the following agreement patterns:

TYPE OF NOUN	SINGULAR AGREEMENT	PLURAL AGREEMENT
natural masculine (<i>vladika</i> ‘bishop’)	masculine (natural)	masculine (natural) / feminine (grammatical)
natural feminine (<i>majka</i> ‘mother’)	feminine (natural)	feminine (natural)
gender variable (<i>mušterija</i> ‘customer’)	masculine/feminine (natural)	masculine/feminine (natural) / feminine (grammatical)
grammatical feminine (<i>stolica</i> ‘chair’)	feminine (grammatical)	feminine (grammatical)

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

All Class II nouns are able to trigger feminine agreement and are therefore treated as having feminine grammatical gender.¹ The interesting cases are the nouns that can have varying agreement patterns in the plural.

2.1 Nouns with natural masculine and grammatical feminine gender

- Denote human animate male referents, hence they are assigned natural masculine gender.
- Include nouns such as *vladika* ‘bishop’, *vojvoda* ‘duke’, *gazda* ‘landlord’, *starešina* ‘head, senior’, *drvodjelja* ‘carpenter’, *bekrija* ‘tippler’, *kolega* ‘colleague’, *komšija* ‘neighbour’, among others (Stanojčić & Popović 1992:288, Stevanović 1989:130ff.).
- 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:

- (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.’

¹In BCS, there is a correlation between inflection classes and the type of gender the nouns have. BCS distinguishes between three inflection classes on nouns (Mrazović & Vukadinović 1990; Klajn 2005). All nouns belonging to Class I are either neuter, carrying the inflection *-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.

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

- Feminine agreement in the plural indicates that they are treated as grammatically feminine nouns by the grammar, based on belonging to a ‘feminine class’ (Corbett 1983, 2010; Wechsler & Zlatić 2000, 2003, 2012; Alsina & Arsenijević 2012a,b).

2.2 Nouns with natural feminine gender

- Include nouns such as *majka* ‘mother’, *sestra* ‘sister’, etc. They denote female referents.
- Their morphosyntactic gender transparently reflects the biological one.

- (3) 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.’

2.3 Nouns with variable natural gender and grammatical feminine gender

- *Gender variable nouns* – nouns to which either masculine or feminine natural gender can be assigned, without any change in form. The discourse is used to disambiguate between the two genders.
- Include nouns such as *budala* ‘fool’, *varalica* ‘cheater’, *kolovođa* ‘leader in traditional dances’, *mušterija* ‘customer’, *propalica* ‘loser, failure’, *pijanica* ‘drunkard’, *skitnica* ‘wanderer, drifter’, *sluga* ‘servant’, *sudija* ‘judge’, among others (Stanojčić & Popović 1992:288, Stevanović 1989:130ff.).
- These nouns have either masculine or feminine natural gender, but their grammatical gender is feminine.
- In the singular, agreement reflects the natural gender of the noun.

- (4) 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- \emptyset redovan- \emptyset mušterija je dobi-**o** popust.
 our-MSG regular-MSG customer.MSG is get.PRT-MSG discount
 ‘Our regular (male) customer got a discount.’

- Alternations between natural and grammatical gender agreement are possible in the plural.

- (5) Naš-**e**/naš-**i** redovn-**e**/redovn-**i** mušterije su dobil-**e**/dobil-**i**
 our-FPL/our-MPL regular-FPL/regular-MPL customer.MPL are get-PRT.FPL/get-PRT.MPL
 popust.
 discount
 ‘Our regular customers got a discount.’

2.4 Nouns with grammatical feminine gender

- Include nouns such as *stolica* ‘chair’, *kuhinja* ‘kitchen’, etc. They denote inanimate objects.
- Their morphosyntactic gender is assigned formally.

- (6) 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.’

2.5 Interim summary

Descriptive generalisations:

1. All the nouns from Class II are grammatically feminine. There is no restriction on their natural gender – on animate nouns it can be feminine, masculine or discourse-specified.
2. Both natural and grammatical gender features can be present on a single noun.
3. Agreement mechanisms in BCS seem to be able to operate on both kinds of gender. Consequently, gender features on nouns must be sufficiently similar in structure for Agree to recognise them. At the same time, gender features also need to be sufficiently different for the Agree mechanisms to be able to target natural gender in the singular and allow for alternations in the plural.
4. Gender agreement needs to “see” the plural number, meaning in turn that agreement for gender must be sensitive to number information on the noun.

3 Previous accounts

- Most of the previous accounts on mixed agreement in BCS note that there is something exceptional about hybrid and split hybrid nouns.
- I will show that, in fact, when put in the larger context of other nouns in the same inflection class, these nouns follow regular agreement patterns, which differ in their results on the surface.
- Some earlier accounts include [Corbett \(1991, 2007, 2010\)](#), offering descriptive patterns and observations, and [Wechsler & Zlatić \(2000, 2003, 2012\)](#), an HPSG account, correctly capturing the correlation between Class II and feminine gender, but ultimately not deriving all the possible patterns.
- Some Minimalist accounts dealing with gender features in BCS through different agreement phenomena include [Bošković \(2009, 2011\)](#) (conjunct agreement) and [Arsenijević & Gračanin-Yuksek \(2015\)](#) (agreement in relative clauses). Both approaches would have to be extended to explain either the existence of two types of features on the same noun ([Bošković 2009](#)), or assuming that two kinds of features are present, how Agree distinguishes and targets them ([Arsenijević & Gračanin-Yuksek 2015](#)).

In general, any account dealing with the nouns above faces the following challenges:

1. capturing the difference in structure and representation of natural and grammatical gender features and their location within the hierarchical structure of a nominal phrase
2. mechanisms of gender agreement, yielding variation in agreement patterns
3. an appropriate explanation for the causes of alternations in the plural.

4 Analysis

I develop a proposal that captures the patterns from Section 2 by means of relativised probing, cyclicity in application of Agree operations, and intervention effects. The proposal includes:

- a proposal for the position of number and (two) gender features within the DP,
- a mechanism of Agree that can distinguish between the two types of gender features,
- showing how plural number's location between the two gender features is what triggers intervention effects for Agree.

The proposal does not include:

- The relationship of person agreement with gender and number agreement, as it is orthogonal to the current discussion.
- DP-internal agreement (concord):
 - I abstract away from the mechanism of adjectival agreement and 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:

(7) 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 (7b) is in accordance with the Agreement Hierarchy (Corbett 1979). If the adjective 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).
 - I also abstract away from the Distance Principle, i.e. the tendency for the semantic agreement to appear more readily on elements that are more linearly distant to the controller (e.g. the verb is more likely to show natural gender agreement than the nominal modifiers).
 - I leave the extension of the account to DP-internal agreement and the issue of agreement in accordance to the Agreement Hierarchy for further research.

4.1 The structure of DP² in BCS

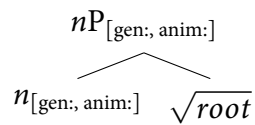
4.1.1 Gender on nouns

- Adopting the framework of Distributed Morphology (Halle & Marantz 1993; Harley & Noyer 1999), I follow Kihm (2005); Lowenstamm (2008); Acquaviva (2009); Kramer (2014) in treating gender as a morphosyntactic feature supplied in the course of the derivation.
- I assume that natural and grammatical gender are introduced on two different functional projections (see Steriopolo & Wiltschko 2010; Matushansky 2013; Pesetsky 2014; Kramer 2015; Landau to appear).

²I follow Progovac (1998); Leko (1999); Caruso (2012); Stanković (2014) in treating the BCS nominal phrase as a DP even though it is a language without articles (contra Bošković 2008; Despić 2013). Importantly, nothing of what follows hinges on this, the analysis can easily be transposed into a system without a D-layer.

Natural gender features: I assume that *natural gender* is a feature introduced by the nominalizing head.

(8) Nominalizer n + a category-free root (Halle & Marantz 1993; Harley & Noyer 1999)



- A language has a limited number of nominalizers and each of them can merge only with certain roots. The possible combinations of nominalizers and corresponding roots are regulated by licensing conditions (Acquaviva 2009, 2014; Kramer 2009, 2014).
- I propose that BCS has three different nominalizers that build the four types of Class II nouns.

(9) a. $n_{m[\text{gen.:m,anim.:+}]^3} + \sqrt{\text{vladik-}}$ ‘bishop’... → natural masculine (cf. Section 2.1)

b. $n_{f[\text{gen.:f,anim.:+}]} + \sqrt{\text{majk-}}$ ‘mother’... → natural feminine (cf. Section 2.2)

c. $n_{\emptyset} + \sqrt{\text{stolic-}}$ ‘chair’... → grammatical feminine (cf. Section 2.4)

- Roots for gender variable nouns, such as $\sqrt{\text{budal-}}$ ‘fool’ (cf. Section 2.3) can be optionally licensed under n_m , n_f or n_{\emptyset} , deriving nouns with natural masculine, natural feminine, or grammatical feminine gender, respectively.

Grammatical gender features: I assume that *grammatical gender features* are present on a higher functional projection, *GenP* (Bernstein 1993; Picallo 2008).

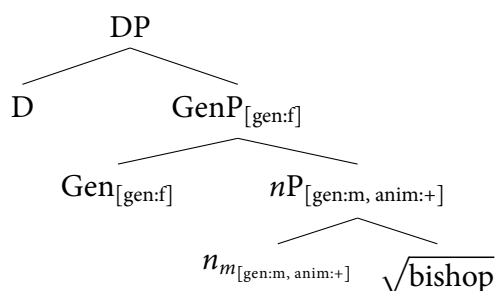
- *GenP* is assigned feminine gender with Class II nouns by a redundancy rule in the grammar of BCS. This rule assigns grammatical feminine gender to Class II nouns on them on the basis of their declension class feature (present on n) (cf. redundancy rules in Chomsky 1965; Harris 1991; Wechsler & Zlatić 2000, and Scheffler 2004 for hybrid nouns in BCS).

(10) $\text{Gen}_{[\text{gen.:}\square]} \rightarrow \text{Gen}_{[\text{gen.:f}]/n_{[\text{class II}]}}$

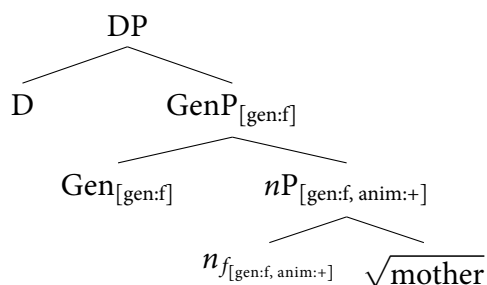
Two positions for gender features on DP: natural gender is lower on n , while grammatical gender is higher on *Gen*.

³I assume that animacy is also a feature introduced by the nominalizer. Animacy together with gender are what constitutes natural gender, as explained shortly below.

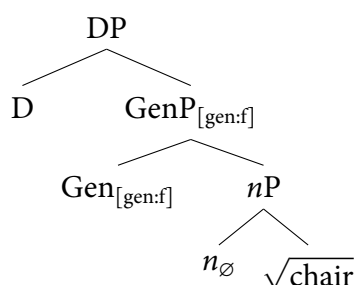
(11) Nouns with natural masculine gender
(cf. Section 2.1)



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



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



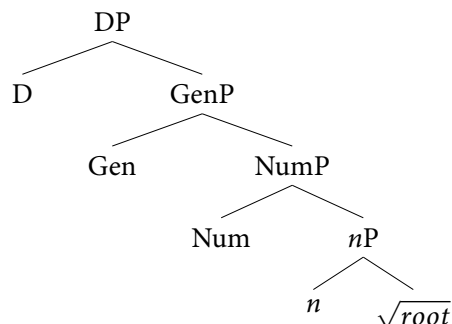
- Gender variable nouns like *budala* ‘fool’ (cf. Section 2.3) can be structured as either (11), (12), or (13), depending on the nominalizer the root is merged with, yielding nouns with natural masculine, natural feminine or grammatical feminine gender, respectively.

4.1.2 Number on nouns

- I assume that number on nouns in BCS is specified on the DP within the functional projection NumP (Picallo 1991; Bernstein 1993; Borer 2005; Acquaviva 2008; Harbour 2008).
- NumP is projected only in the plural (Kratzer 2007). Singular number is therefore treated as the absence of number (see Pesetsky 2014; Ackema & Neeleman 2015 for a similar proposal and Béjar & Rezac 2003; Anagnostopoulou 2005; Adger & Harbour 2007 for a similar treatment of third person as the absence of person features).

I propose that NumP, when present, is projected between *nP* and GenP. As I argue below, this can straightforwardly capture the influence of nominal number marking on gender agreement.

(14) **Interim summary:** structure of DP in BCS:

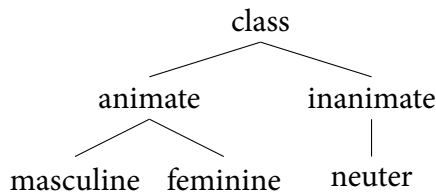


4.2 Feature hierarchies, relativised probing and the mechanics of Agree

4.2.1 Feature geometric approach to ϕ -features

- I adopt the *feature geometry* approach to ϕ -features (Harley & Ritter 2002; McGinnis 2005; Béjar & Rezac 2009; Georgi 2012, 2013; Nevins 2007; Preminger 2011, 2014) whereby ϕ -features are in a hierarchical entailment relationship with respect to one another.
- The complexity of a feature is reflected in the number of nodes it contains (every node in the hierarchy entails the presence of all the nodes above it).

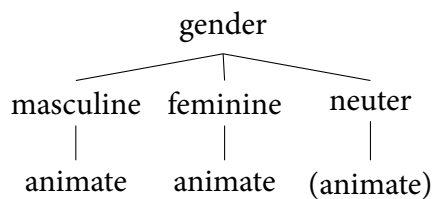
(15) Harley & Ritter (2002) hierarchy for gender:



I propose an adaptation of the hierarchy that can capture gender in BCS (and possibly languages with the same mixed gender system).

- I see the category ‘class’ being re-interpreted as gender in BCS (morphological class features in BCS are connected to gender features via redundancy rules, cf. (10)).
- I propose that gender is the more general category, dominating the animacy node (see (16)).
- Consequently, all nominals in BCS contain the gender node, but those that have natural gender also contain the additional ‘animate’ node below it. Natural gender is therefore more complex than grammatical gender, since it contains an animacy node in addition to a gender node.

(16) Modified hierarchy for gender



Natural gender is in fact just a featural composite, consisting of gender and animacy features.
Grammatical gender is less marked in the geometry and consists of the gender feature alone.

Schematically, the two types of gender will be represented as follows:

(17) Natural gender:

$$\left[\begin{array}{l} \text{gen:m/f} \\ \text{anim:+} \end{array} \right]$$

(18) Grammatical gender:

$$\left[\text{gen:m/f/n} \right]$$

4.2.2 Relativised probing

Assumptions on Agree under the Relativised probing approach (Béjar 2003; Béjar & Rezac 2003, 2009; Georgi 2012, 2013; Nevins 2007, 2011; Preminger 2014):

- A probe can be structured so as to require valuation by a feature of certain type and complexity, i.e. a probe can be *relativised* towards a certain feature.
- Gender probe in BCS is relativised towards natural gender:⁴

(19)
$$\left[\begin{array}{l} *gen:\square* \\ *anim:\square* \end{array} \right]$$

- Condition on Agree: The goal essentially needs to entail all the probe's features, i.e. it needs to be equally structured and equally complex as the probe in order for valuation to succeed (Béjar 2003:67, Preminger 2014:62).
- Result: The probe systematically skips phrases in its search domain as potential goals if they do not have the features of corresponding complexity.
- If the probe does not find the right goal, Agree does not result in valuation, which triggers a second cycle of Agree.
- Consequences for gender agreement in the current system: When a probe targets a noun with natural gender (20), it will skip GenP (21), and target the lower *nP* (22).

(20)
$$[DP D [_{GenP} Gen_{[gen:f]} [_{nP} n_{f[gen:f, anim:+]} \sqrt{mother}]]]$$

(21) Agree with GenP (no valuation): (22) Successful Agree for natural gender:

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

PROBE	GOAL: <i>nP</i>	AGREE
gen:□	[gen:f]	✓
anim:□	[anim:+]	✓

- If the probe does not find natural gender on *nP* (23) (e.g. with nouns with grammatical 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 only look for gender features, disregarding animacy.
- At this point, GenP, as the closest goal with the corresponding feature, is able to value the probe's features, resulting in valuing the probe with grammatical gender features (24).

(23) Agree with *nP* (no valuation): (24) Successful Agree with GenP:

PROBE	GOAL: <i>nP</i>	AGREE
gen:□	∅	×
anim:□		×

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

4.2.3 Modelling number intervention – Assumptions on order and domains of Agree

1. Probing for number and gender features are performed separately by means of two Agree operations (henceforth: Gender Agree and Number Agree)

(see Anagnostopoulou 2003; Béjar 2003; Chomsky 2000; Laka 1993; Marušič, Nevins & Badecker 2015; Preminger 2014; Sigurðsson 1996; Sigurðsson & Holmberg 2008; Shlonsky 1989).

⁴I will use the notation [*F:□*] introduced in Heck & Müller (2007) to denote an unvalued probe feature.

- Both probes for number and gender are located on the same head (Béjar & Rezac 2009).
- The order of application of Agree operations they trigger is underspecified (Müller 2009; Georgi 2014, Assmann et al. 2015): probing for number can be ordered prior to probing for gender, or vice versa.
- Operation-triggering features are ordered on a stack and this order determines probe feature discharge.

(25) Gender Agree > Number Agree

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

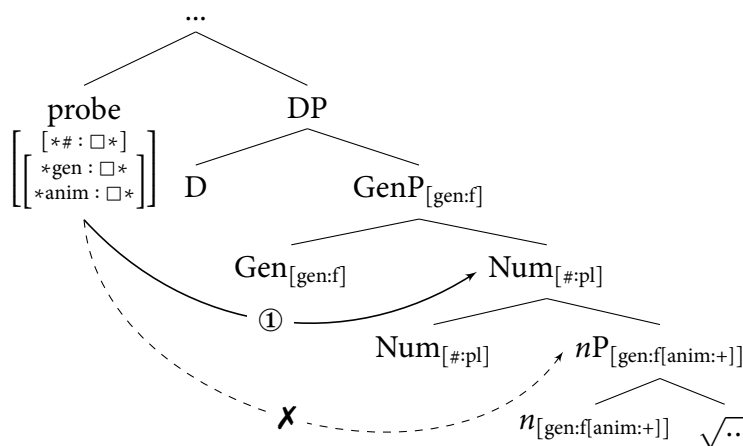
(26) Number Agree > Gender Agree

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

2. In case of multiple Agree operations, one Agree operation can only apply within the domain established by the previous Agree operation.

- After an Agree operation has been carried out, the phrase projected by the head bearing the goal feature, and all syntactic objects dominated by that phrase, become inaccessible for any subsequent Agree.
- Any subsequent Agree needs to target the structure that is within the domain of the previous Agree – between the probe and the goal targeted in the first Agree operation (cf. locality constraints on movement *Shortest Move* (Richards 2001) or *Approach the Probe Principle* (Branigan 2012, 2013)).
- Illustration: assuming the order in (26), if Agree targets NumP, it establishes a domain for the subsequent Agree on the same head by rendering the NumP, and all the phrases dominated by it inaccessible, so the following Agree operation cannot target *nP*.

(27)



3. Failed Agree results in default valuation

- Agree needs to be carried out in appropriate circumstances once it is triggered, but its failure to find a goal does not result in a crash (Preminger 2014). In the case at hand, if the [*#:□*] probe does not find a phrase that contains number features, the number feature of the probe will be valued as singular by default.

4.3 Deriving the patterns

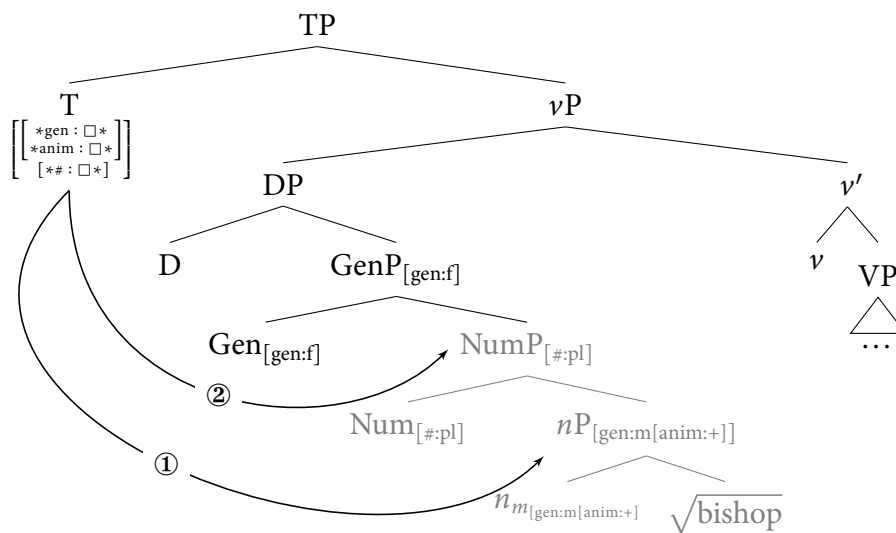
4.3.1 Nouns with natural masculine gender

Recall that natural gender on these nouns is specified as $[\text{gen:m}[\text{anim:}+]]$ on their nP , reflecting the fact that these nouns denote male entities, while GenP is specified as $[\text{gen:f}]$, reflecting the grammatical gender. The aim is to derive the alternations in the plural.

Gender Agree > Number Agree: ♂

- Gender probe is discharged first. Since the nP 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 nP .

(28) **Natural masculine gender:** $[\ast\text{gen}:\square[\text{anim}:\square]\ast] > [\ast\#:\square\ast]$



Agreement process:

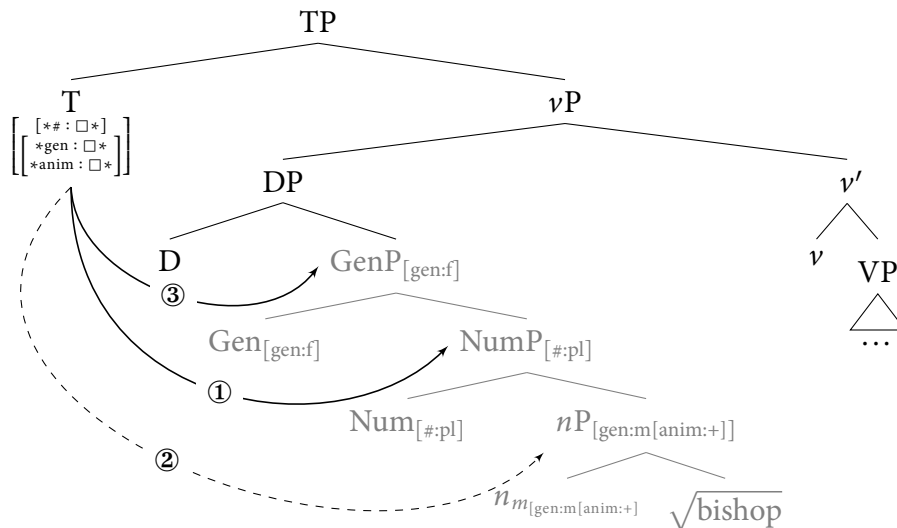
- ① Agree ($T[\ast\text{gen}:\square[\text{anim}:\square]\ast]$, $nP[\text{gen:m}[\text{anim:}+]]$) \Rightarrow $T[\text{gen:m}[\text{anim:}+]]$
- ② Agree ($T[\ast\#:\square\ast]$, $\text{NumP}[\#:\text{pl}]$) \Rightarrow $T[\#:\text{pl}]$

☞ As a result, T's gender feature is valued by natural masculine gender.

Number Agree > Gender Agree: ♀

- After discharging the $[\ast\#:\square\ast]$ 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 nP 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 $[\ast\text{gen}:\square\ast]$ feature. Such a feature is accessible on GenP , which provides T with the grammatical feminine value.

(29) **Grammatical feminine gender:** [$*\#:\square*$] > [$*\text{gen}:\square[\text{anim}:\square]*$]



Agreement process:

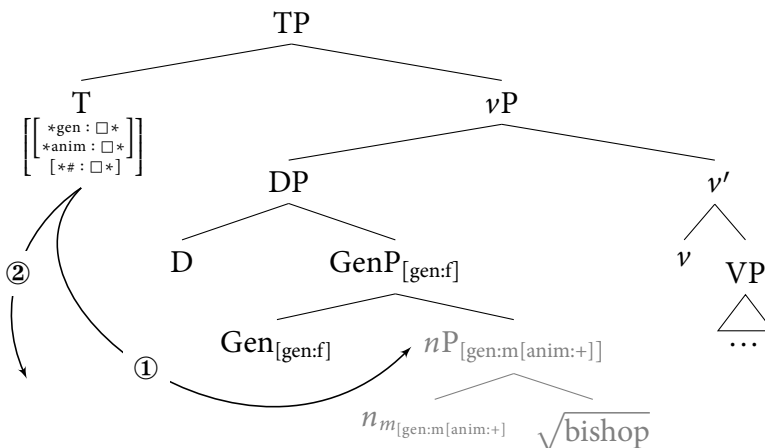
- ① Agree (T[$*\#:\square*$], NumP[#:pl]) \Rightarrow T[#:pl]
- ② Agree (T[$*\text{gen}:\square[\text{anim}:\square]*$], nP[gen:m[anim:+]]) \Rightarrow fail
- ③ Agree (T[$*\text{gen}:\square*$], GenP[gen:f]) \Rightarrow T[gen:f]

☞ As a result, T's gender feature is valued as grammatical feminine.

Singular nouns: ♂

- Recall that NumP is assumed not to be projected in the singular.
- Assuming that Gender Agree precedes Number Agree, gender probe will be discharged first and the probe will be valued by the natural gender feature of the nP.
- The subsequent [$*\#:\square*$] probe will not find a goal as there is no number feature on DP. Number Agree thus fails and the number feature of the probe is valued as singular by default.

(30) Singular agreement ($([*\text{gen}:\square[\text{anim}:\square]*] > [*\#:\square*])$):



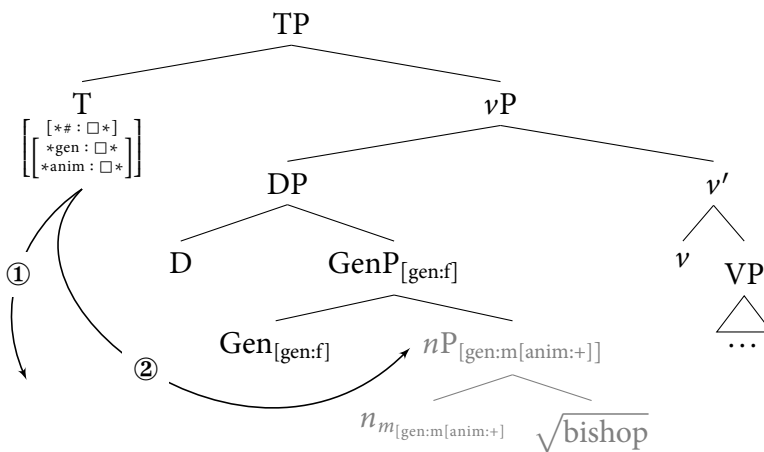
Agreement process:

- ① Agree (T[*gen:□[anim:□]*], nP[gen:m[anim:+]]) ⇒ T[gen:m[anim:+]]
- ② Agree (T[*#:□*]) ⇒ fail, no NumP

☞ As a result, 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 such nouns invariably show masculine agreement in the singular.

- The reverse order of operations yields the same result.
- The number probe 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 gender probe can reach nP and the natural masculine gender feature on it.

(31) Singular agreement ([*#:□*] > [*gen:□[anim:□]*]):



Agreement process:

- ① Agree (T[*#:□*]) ⇒ fail, no NumP
- ② Agree (T[*gen:□[anim:□]*], nP[gen:m[anim:+]]) ⇒ T[gen:m[anim:+]]

☞ This ensures that the gender probe on T will always be valued by natural gender, in case there is no NumP to act as intervener to gender agreement.

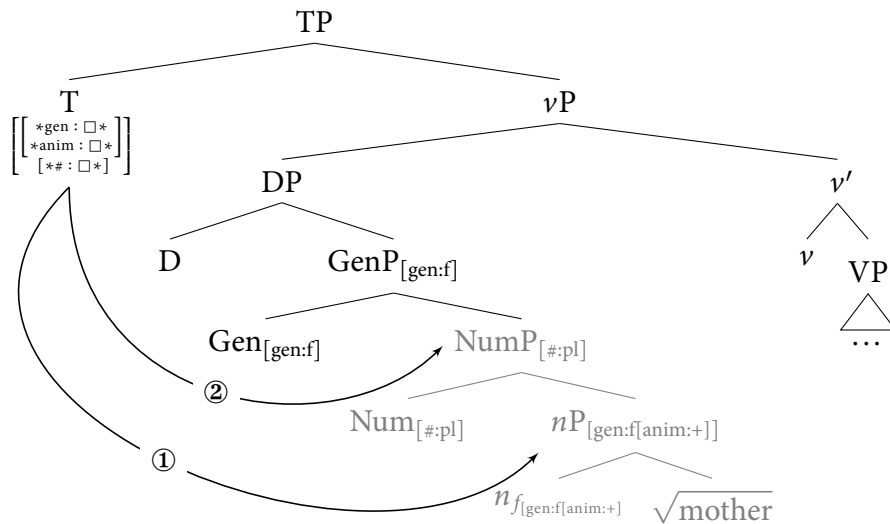
4.3.2 Nouns with natural feminine gender

Recall that nouns with natural feminine gender (cf. Section 2.2) have the features [gen:f[anim:+]] on their nP, and [gen:f] on the GenP, as a reflection of belonging to Class II.

Gender Agree > Number Agree: ♀

- The gender probe will be discharged before the number probe.
- Since the nP 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 nP.

(32) **Natural feminine gender:** [$*\text{gen}:\square[\text{anim}:\square]*$] > [$*\#:\square*$]



Agreement process:

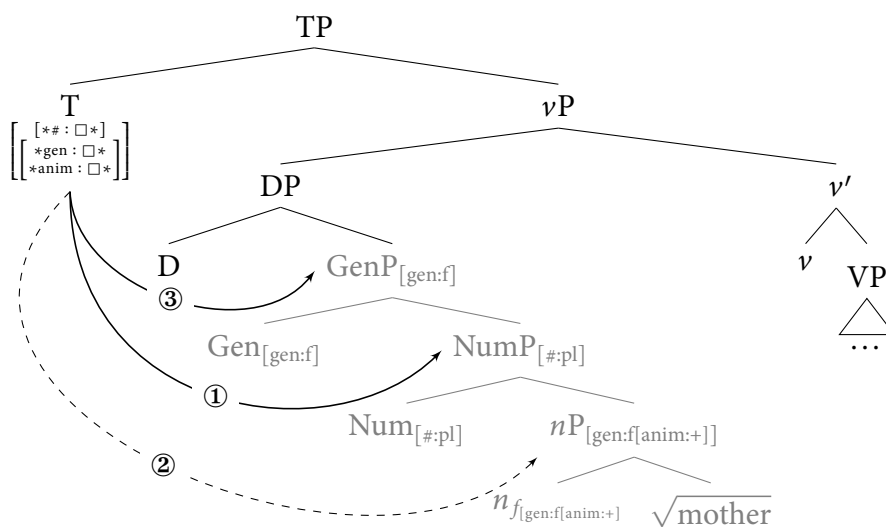
- ① Agree ($T[*\text{gen}:\square[\text{anim}:\square]*]$, $nP[\text{gen:f}[\text{anim:}+]]$) \Rightarrow $T[\text{gen:f}[\text{anim:}+]]$
- ② Agree ($T[*\#:\square*]$, $\text{NumP}[\#:\text{pl}]$) \Rightarrow $T[\#:\text{pl}]$

☞ As a result, T's gender feature is valued as natural feminine.

Number Agree > Gender Agree: ♀

- 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 in (33) is the same as (29) above:

(33) **Grammatical feminine gender:** [$*\#:\square*$] > [$*\text{gen}:\square[\text{anim}:\square]*$]



Agreement process:

- ① Agree (T[*#:□*], NumP[#:pl]) ⇒ T[#:pl]
- ② Agree (T[*gen:□[anim:□]*], nP[gen:f[anim:+]]) ⇒ fail
- ③ Agree (T[*gen:□*], GenP[gen:f]) ⇒ T[gen:f]

☞ As a result, T's gender feature is valued as grammatical feminine.

☞ With these two agreement strategies 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.

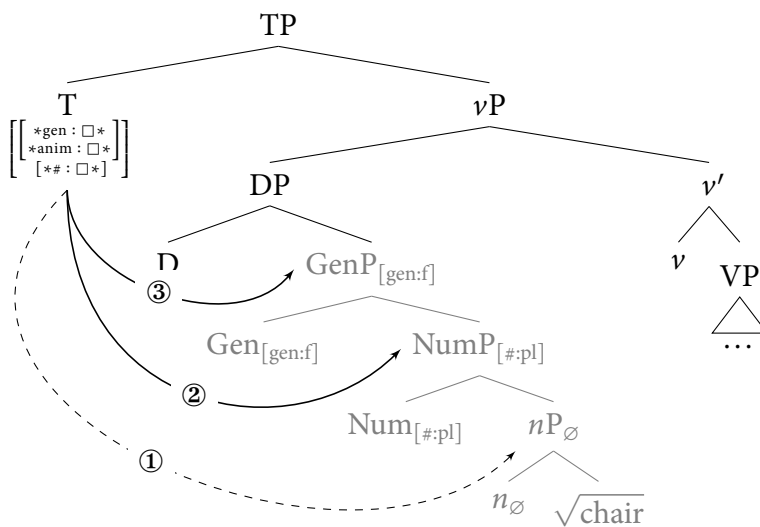
4.3.3 Nouns with grammatical feminine gender

Recall that grammatically feminine nouns have no gender features on *nP*. They only have the [gen:f] value on GenP. GenP is therefore the only possible target for Gender Agree.

Gender Agree > Number Agree: ♀

- Agree for natural gender will inevitably result in non-valuation of probe's features, as they cannot be provided by the *nP*.
- 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, I assume it applies right after Agree for natural gender. This follows under the assumption that all instances of first-cycle Agree precede instances of second-cycle Agree. Alternatively, Number Agree, being an obligatory operation, precedes the second-cycle Gender Agree, which is a repair mechanism.
- After the successful Number Agree, the gender probe carries out the second cycle of gender agreement, targeting the GenP.

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



Agreement process:

- ① Agree ($T[*gen:\square*]$, $nP[anim:+]$) \Rightarrow fail
- ② Agree ($T[*\#: \square*]$, $NumP[\#:pl]$) $\Rightarrow T[\#:pl]$
- ③ Agree ($T[*gen:\square*]$, $GenP[gen:f]$) $\Rightarrow T[gen:f]$

☞ As a result, T's feature is valued as grammatical feminine.

- If the reverse order of operations applies, the derivation involves the same steps as (29) and (33) above. After T's number probe has been valued successfully, gender probe cannot target the nP , in which case natural gender agreement fails. The second cycle of Gender Agree is initiated, where the gender feature of the probe $[*gen:\square*]$ is valued by the gender feature from GenP.

4.3.4 Gender variable nouns

- Recall from Section 4.1.1 that gender variable nouns can have natural masculine or natural feminine gender, depending on the discourse.
- If a noun is assigned natural masculine gender under n_m , the agreement it triggers follows the patterns from Section 4.3.1.
- If a noun is assigned natural feminine gender under n_f , the agreement patterns will reflect those presented in Section 4.3.2.
- Additionally, a gender variable noun can also only have grammatical feminine gender (in case the real gender is not relevant to the speaker). In that case, the noun is assigned grammatical feminine under n_\emptyset , behaving like the nouns in 4.3.3. The only target for gender features is GenP, which means that such noun can only ever trigger grammatical feminine agreement.

5 Conclusions

- Alternations in the agreement patterns with hybrid nouns follow from: the 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 feature-geometric approach to gender features explains the similarities and differences between natural and grammatical gender.
- Existing Agree mechanisms (relativised probing and Cyclic Agree) can be extended to gender agreement, offering a possibility of unified treatment of all ϕ -features.
- The same system extends to nouns of other classes fairly straightforwardly – assuming that redundancy rules exist for other classes and that regular nouns only have one gender feature, Agree has the same result for whatever order the operations apply in.
- The analysis potentially extends to hybrid nouns in other languages (see Appendix).
- Optionality in grammar can be captured through interactions of elementary operations, in a derivational model, under the assumption of underspecification of the order of Agree operations, which respect cyclicity and locality restrictions.

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Appendix

1. Previous accounts

As noted briefly in Section 3, most previous accounts either single out nouns of dual gender and treat them as exceptional, or they deal only with gender agreement in BCS in general terms, without offering to capture the patterns of variation that arise with these nouns. Below I provide a brief review of some of them.

Corbett (1991, 2007, 2010):

- Discusses nouns of dual gender in BCS, offering descriptive patterns and observations.
- Apart from identifying such nouns as 'hybrids' in Corbett (2010:162-163) and stating that they may control both natural and grammatical gender agreement (often termed 'semantic' and 'syntactic' agreement), little is said about how their agreement patterns could be formally explained.

Wechsler & Zlatić (2000, 2003, 2012):

- BCS has *feature-mapping constraints* that regulate formal gender assignment and these determine a noun's grammatical gender on the basis of the declension class it belongs to.
- E.g. 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.
- Semantic constraints can assign a different (natural) gender (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.
- With split hybrid nouns like *komšija* 'neighbour' 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 in the plural (hence the grammatical feminine agreement).

- This account, even though intuitively appealing, 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. It is thus unable to derive the obligatoriness of natural gender agreement in the singular and the alternation in the plural in a systematic way.

Minimalist accounts dealing with gender agreement in BCS:

Bošković (2009, 2011):

- (Grammatical) gender in BCS, as a feature assigned to nouns according to declension class, is a *valued uninterpretable* feature on a noun (following Pesetsky & Torrego 2007). Natural gender, assigned based on the biological gender of the referent is a *valued interpretable* feature. Valuation, instead of checking uninterpretable features, is the driving force of agreement.
- Under such approach, it would have to be assumed that a *komšija*-type noun has both an interpretable masculine and an uninterpretable feminine feature and that the uninterpretable feature can be targeted by Agree only in the plural, an option formally difficult to capture.
- Alternatively, the uninterpretable feminine feature can be assumed to appear only in the context of plural number, but since Bošković (2009) assumes that gender is assigned based on declension class, the feminine feature should in principle always be present.
- Adopting valuation as driving force for Agree, I depart from the interpretable/uninterpretable distinction in favour of feature hierarchies, as a more useful tool in handling Agreement phenomena (on this matter, see also Preminger 2014).

2. Extending the analysis - mixed agreement patterns in Russian

- As noted in Corbett (1991); Steriopolo & Wiltschko (2010); Matushansky (2013); Pesetsky (2014), some Russian nouns, such as the noun *vrač* ‘doctor’, even though grammatically masculine (by virtue of belonging to Class I), can optionally show feminine natural gender agreement on adjectives and predicates.
- The possibility of different agreement on nominal modifiers and verbs (35b) speaks in favour of treating these nouns as having both grammatical masculine and natural feminine gender present on a noun.

- (35) a. Naš vrač prišël vovremja.
our.MSG doctor.MSG arrived.MSG on.time
‘Our doctor arrived on time.’
- b. Naš vrač prišla vovremja.
our.MSG doctor.MSG arrived.FSG on.time
‘Our doctor arrived on time.’

(Matushansky 2013:275)

- Accounts mentioned above face some problems in their analyses of the mixed patterns.
- Steriopolo & Wiltschko (2010):
 - Gender features are 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.
 - *Vrač* in this account has grammatical masculine feature on *n* and (optionally) discourse gender on D based on the gender of the referent. The higher D-gender overrides the grammatical one and turns the noun into feminine.

- 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 otherwise.
- Having gender features on the root is theoretically problematic, as it conflicts with the view of roots being category-free (see [Marantz 2001](#); [Arad 2003, 2005](#); [Acquaviva 2009](#); [Borer 2009](#); [Harley to appear](#)).
- [Matushansky \(2013\)](#)
 - 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).
 - Agreement is evaluated under sisterhood. *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.
 - 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 what they are underlyingly motivated by.

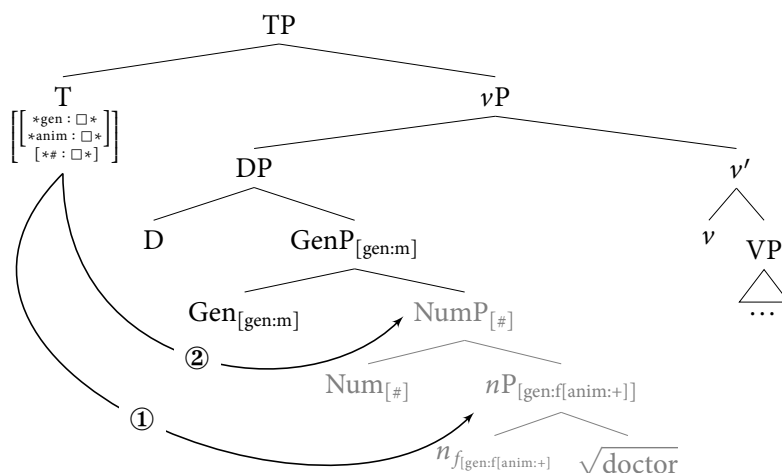
1.1 Deriving the patterns in Russian

- Assume *vrač*-type noun has feminine natural gender feature on *nP*, and grammatical masculine introduced at GenP (based on a redundancy rule that assigns masculine to Class I nouns).
- In Russian, singular number is projected on NumP. Singular number behaves differently in BCS and Russian (see, for instance, [Bošković 2010](#) for an example on different behaviour of BCS and Russian when it comes to number agreement with conjoined nouns).
- Consequence: In Russian we can expect mismatches even in the singular, cf. (35).

Gender Agree > Number Agree: φ

$[*\text{gen}:\square[\text{anim}:\square]*]$ probe is discharged first. Since the *nP* 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 *nP*.

(36) **Natural feminine gender:** $[*\text{gen}:\square[\text{anim}:\square]*] > [*\#\text{:}\square*]$



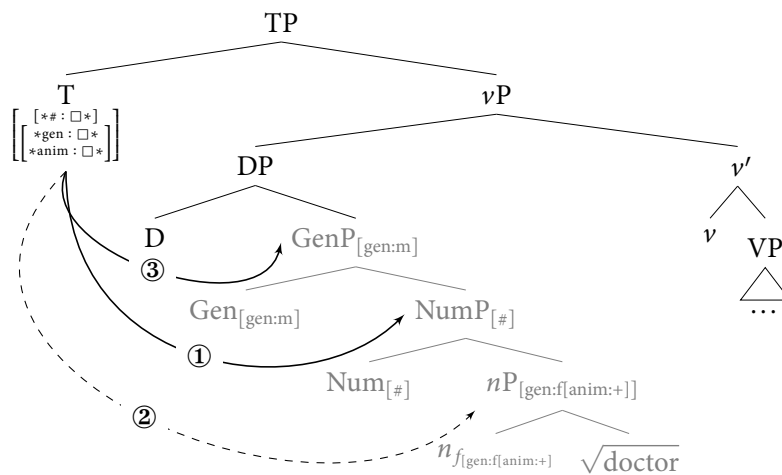
- ① Agree ($T[*gen:\square[anim:\square]*], nP[gen:f[anim:+]]$) $\Rightarrow T[gen:f[anim:+]]$
- ② Agree ($T[*\#: \square*], NumP[\#]$) $\Rightarrow T[\#]$

☞ As a result, T's gender feature is valued by natural feminine gender.

Number Agree > Gender Agree: ♂

After discharging the $[\#\:\square*]$ 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 nP 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 $[*gen:\square*]$ feature. Such a feature is accessible on GenP, which provides T with the grammatical masculine value.

- (37) **Grammatical masculine gender:** $[\#\:\square*] > [*gen:\square[anim:\square]*]$



- ① Agree ($T[*\#: \square*], NumP[\#]$) $\Rightarrow T[\#]$
- ② Agree ($T[*gen:\square[anim:\square]*], nP[gen:f[anim:+]]$) \Rightarrow fail
- ③ Agree ($T[*gen:\square*], GenP[gen:m]$) $\Rightarrow T[gen:m]$

☞ As a result, T's gender feature is valued as grammatical masculine.

The derivations above thus show that the account presented for BCS in this talk can successfully be extended to other languages with a similar, mixed gender assignment system.