

# Declension tracks gender: Insights from mixed agreement in Russian\*

Mariia Privizentseva

(Leipzig University, *mprivizentseva@uni-leipzig.de*)

## 1 Introduction

### Nominal declension and gender

- In some languages, nominal inflection is determined not only by features like number and case but also by a property called declension class.
- Declension class is related to gender but there is no one-to-one correspondence between them.
  - For instance, Russian has 3 genders and 4 declension classes (at least according to the most widespread view; see Corbett (1982) for an overview of different approaches).
  - Class III  $\rightarrow$  FEM, but class II  $\begin{cases} \nearrow \text{FEM} \\ \searrow \text{MASC} \end{cases}$ ;      NEUTR  $\rightarrow$  class IV, but FEM  $\begin{cases} \nearrow \text{class II} \\ \searrow \text{class III} \end{cases}$
- Gender is relevant for agreement in syntax. Declension is relevant for inflection in morphology.

*What is declension class and how its relation to gender can be captured?*

#### (1) Distinct declension features

(GENDER  $\rightarrow$ ) DECLENSION  $\rightarrow$  INFLECTION

- Declension and gender are presented by distinct sets of features (see Corbett (1991), Aronoff (1994), Alexiadou (2004), Müller (2004), Alexiadou & Müller (2008), Kramer (2015)).<sup>1</sup>
- Inflection targets class features, not gender.
- There are implicational rules connecting them:
  - [N, Feminine]  $\rightarrow$  [class 2] (Aronoff, 1994)
  - Insert [THEME, II] in the context of n[+FEM] (Kramer, 2015)

#### (2) Declension tracks gender directly

GENDER,  $\alpha$ , ( $\beta$ ,  $\gamma$  ...)  $\rightarrow$  DECLENSION

- There are no features directly corresponding to declension classes in morphology or syntax.
- Sets of inflectional exponents called declensions result from the combination of other features (see Roca (1989), Harris (1991), and Caha (2019)).
- One of these features is gender.

- (3) **Mixed approach:** Distinct declension features that represent classes and are determined by gender + some exponents target gender (see Halle (1992, 1994), Calabrese (2008), Kučerová (2018)).

*On the basis of novel data on mixed gender agreement in Russian, I will argue for the second view.*

### Proposal

- Restrictions on mixed gender agreement in Russian indicate that insertion of nominal exponent targets gender features.
- Gender alone is not sufficient to determine class. Declension arises from the combination **gender** ([ $\pm$ fem]) and **an idiosyncratic feature of a root** ([ $\pm\alpha$ ]).

#### (4) Declension in Russian

I		[−fem][+ $\alpha$ ]
II		[+fem][− $\alpha$ ]
III		[+fem][+ $\alpha$ ]
IV		[−fem][− $\alpha$ ]

\*Novel data on mixed agreement in Russian come from 5 native speakers. I am very grateful for their help. I also would like to thank Maria Kouneli and Gereon Müller for comments and suggestions.

<sup>1</sup> Note that here declension does not have to be a primitive feature as well, cf. Halle (1992), Müller (2004).

## 2 Mixed agreement in Russian

### 2.1 Background

- In Russian, some profession-denoting nouns are grammatically masculine, but allow for feminine agreement if the referent is female (see Panov (1968), Mučnik (1971), Skoblikova (1971), Crockett (1976), Graudina et al. (1976), Corbett (1991), and Gerasimova (2019)).

(5) Xoroš-**ij** / xoroš-**aja** vrač prini<sup>o</sup>majet tol'ko zavtra.  
good-M good-F doctor receives only tomorrow  
'The good doctor is available only tomorrow.'

(6) Vrač prišol / prišl-**a**.  
doctor came.M came-F  
'The doctor came.'

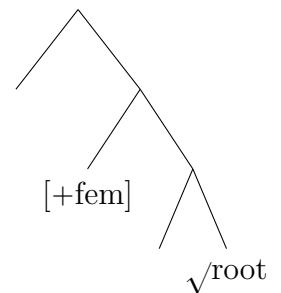
- Different agreement probes can bear different gender features:

(7) Xoroš-**yj** vrač prišl-**a**.  
good-M doctor came-F  
'The good doctor came.'

- The analyses of this phenomenon agree that there is an additional feminine gender feature in the noun phrase but differ with respect to where this feature is introduced.

- It may be on a dedicated functional projection (see Asarina (2009), Pesetsky (2013)),
- on the D head (see Pereltsvaig (2006), Steriopolo & Wiltschko (2010), King (2015), Lyutikova (2015), Steriopolo (2018)),
- on the Num head (see Landau (2016)),
- on the noun (as in Smith (2015, 2017), Puškar (2017, 2018), Salzmann (2018)),
- or on a nominal modifier directly (see Matushansky (2013), Čaha (2019)).

(8) Semantic gender



- Higher position of the feminine gender is often motivated by the following restrictions:
  - First, feminine agreement is not possible with low classifying adjectives.

(9) General'n-**yj** / \*gerenal'n-**aja** direktor opiat' kričit.  
general-M general-F director again yells  
'The executive director is again yelling.'

- Second, only the switch from masculine agreement on lower modifiers to feminine agreement on higher probes is allowed.

(10) a. ?et-**a** nov-**yj** vrač vs'o pereputal-**a**.  
this-F new-M doctor everything mix.up-F  
'This new doctor mixed everything up.'  
b. \*et-**ot** nov-**aja** vrač vse pereputal.  
this-M new-F doctor everything mix.up.M  
'This new doctor mixed everything up.'

- In what follows I will introduce a different type of restrictions on feminine agreement.

## 2.2 Case number restrictions

- Russian has 6 cases and 2 numbers. Feminine agreement is possible only in some of these forms.
- As shown above, feminine agreement is allowed in the nominative singular form.

(11) Xoroš-**aja**    vrač            prišl-**a**.  
 good-F.NOM doctor.NOM came-F  
 ‘The good doctor came.’

- Feminine agreement is ruled out if the noun is in singular and has any case other than nominative.
- Examples below show ungrammaticality of feminine agreement with a singular noun in the accusative, genitive, dative, locative, and instrumental case form.

(12) a. vižu nov-**ogo**    / \*nov-**uju**    vrač-a  
 see new-M.ACC    new-F.ACC doctor-ACC  
 ‘see the new doctor’  
 b. net nov-**ogo**    / \*nov-**oj**    vrač-a  
 no new-M.GEN    new-F.GEN doctor-GEN  
 ‘The new doctor is absent.’  
 c. k nov-**omu**    / \*nov-**oj**    vrač-u.  
 to new-M.DAT    new-F.DAT doctor-DAT  
 ‘to the new doctor’  
 d. o    nov-**om**    / \*nov-**oj**    vrač-e  
 about new-M.LOC    new-F.LOC doctor-LOC  
 ‘about the new doctor.’  
 e. s    nov-**ym**    / \*nov-**oj**    vrač-om  
 with new-M.INSTR    new-F.INSTR doctor-INSTR  
 ‘with the new doctor’

- Gender agreement in Russian is mainly restricted to singular forms, but *ob-a/e* ‘both-M/F’ shows it in plural as well.
- Gender is marked by the vowel that precedes regular case and number exponents:

(13) *ob-o-ih* ‘both-M-LOC.PL’ vs. *ob-e-ih* ‘both-F-LOC.PL’  
*ob-o-im* ‘both-M-DAT.PL’ vs. *ob-e-im* ‘both-F-DAT.PL’

- As observed by Pesetsky (2013), ‘both’ agrees in semantic feminine gender with a plural noun marked for cases other than nominative:

(14) a. vižu ob-**o**-ix            / ob-**e**-ix            vrač-ej  
 see both-M-ACC.PL    both-F-ACC.PL doctor-ACC.PL  
 ‘see both doctors’  
 b. net ob-**o**-ix            / ob-**e**-ix            vrač-ej  
 no both-M-GEN.PL    both-F-GEN.PL doctor-GEN.PL  
 ‘Both doctors are absent.’  
 c. k ob-**o**-im            / ob-**e**-im            vrač-am  
 to both-M-DAT.PL    both-F-DAT.PL doctor-DAT.PL  
 d. ob    ob-**o**-ix            / ob-**e**-ix            vrač-ax  
 about both-M/F-LOC.PL    both-F-LOC.PL doctor-LOC.PL  
 e. s    ob-**o**-imi            / ob-**e**-imi            vrač-ami  
 with both-M/F-INSTR.PL    both-F-INSTR.PL doctor-INSTR.PL

- The availability of feminine agreement in the nominative plural form cannot be tested, ‘both’ (as some numerals) requires the genitive singular form of the noun then.

(15) Ob-a / \*ob-e vrach-a prishli.  
 both-M both-F doctor-GEN came  
 ‘Both doctors came.’

**Summary:** Feminine agreement is possible in SG NOM and in PL  $\neg$ NOM.

- Some of these restrictions is occasionally mentioned in the literature (see Pereltsvaig (2006), Matushansky (2013), King (2015), and Gerasimova (2019)) but except for King (2015) there are no attempt to provide an analysis of the pattern.
  - King (2015) suggests that the semantic gender feature is introduced in the D head that is absent in oblique case forms.  
*Problem:* Absence / presence of the D head in the required forms is not supported by data.
- I will present two novel observations showing that:
  - **Ungrammaticality stems from the form of the noun, not agreement.**

## 2.3 Syncretism

- The difference between the forms where semantic agreement is allowed and the forms where it is ungrammatical lies in their morphological makeup of nominal inflection.
- Four nominal declensions can be distinguished in Russian (see Timberlake (2004), see also Corbett (1982) for an extensive discussion of different classifications).

- Class I includes only grammatically masculine nouns.
- Class II predominantly consists of feminine nouns but also includes a small group of animate masculine nouns.
- Class III includes only feminine nouns.
- Class IV (sometimes labeled IB) consists of neuter nouns.

(16) Gender and declension in Russian

I	MASC
II	FEM, some animate MASC
III	FEM
IV	NEUTR

- Nouns that trigger mixed agreement belong to class I, i.e., to the declension class, where all nouns are morphologically masculine.
- Feminine semantic agreement is restricted to forms where exponents of class I were syncretic to exponents of class III that contains feminine nouns.

(17) Nominal inflection: SG, animate<sup>2</sup>

	I MASC	II FEM, MASC	III FEM	IV NEUTR
NOM	∅	a	∅	o
ACC	a	u	∅	o
GEN	a	i	i	a
LOC	e	e	i	e
DAT	u	e	i	u
INSTR	om	oj	ju	om

(18) Nominal inflection: PL, animate

	I MASC	II FEM, MASC	III FEM	IV NEUTR
NOM	i	i	i	a
ACC	ov	∅	ov	a
GEN	ov	∅	ov	∅
LOC	ax	ax	ax	ax
DAT	am	am	am	am
INSTR	ami	ami	ami	ami

<sup>2</sup> The choice of an accusative exponent also depends on animacy. In some classes, the accusative form coincide with the nominative for inanimate nouns and with genitive for animate nouns.

- In the singular:
  - Class I is syncretic to III in the nominative.
  - Locative exponents in I and II are segmentally identical but differ in their accentual properties: The class II exponent is underlyingly stressed, the class I exponent is not (see Melvold (1989)).<sup>3</sup>
  - Class I is syncretic to IV in the genitive, locative, dative and instrumental, but class IV does not include feminine nouns.
- In the plural:
  - I, II, and III are syncretic in the nominative.
  - Classes I and III are syncretic in the accusative and genitive.
  - Inflection do not differentiate between classes in LOC, DAT, INSTR.

**Conclusion:** The correlation indicates that the restrictions are due to the inflection on the noun.

## 2.4 Ellipsis

- The case number restrictions do not hold under ellipsis:

- (19) a. Vse pacienti žalovalis' na nov-**ogo** / nov-**uju**.  
 all patients complained on new-M.ACC new-F.ACC  
 ‘{Context: The previous doctor was great, while} all patients complained about the new one.’
- b. O nov-**om** / nov-**oj** my ničego ne znajem.  
 about new-M.LOC new-F.LOC we nothing not know  
 ‘{Context: The previous doctor was great, while} we don’t know anything about the new one.’

- Assuming that the elided part of the sentence is syntactically present but exempt from Vocabulary insertion (see Merchant (2001), van Craenenbroeck & Merchant (2013), and Saab (2019) on nominal ellipsis), this shows that **it is insertion of a nominal form that causes ungrammaticality**.

**Conclusion:** Ungrammaticality arises from Vocabulary insertion of nominal inflectional exponents.

## 3 Declension is a gender feature plus $[\pm\alpha]$

### 3.1 The argument

1. If a grammatically masculine noun triggers feminine agreement, it has an additional feminine gender feature. ← almost a consensus in the literature
2. Case number restrictions arise because of the inability to accomplish Vocabulary insertion of a nominal inflectional exponent. ← case syncretism and ellipsis data

↔ Additional gender features rules out insertion of a nominal inflectional exponent.

- While there is no pure gender exponent on the noun, such a dependency strongly implies that **Vocabulary insertion of nominal inflection targets gender directly** rather than just by class.
- Gender alone is not enough to determine the declension class, i.e., it must be gender accompanied but some other feature(s).
- I suggest that declension arises from the combination of a gender feature and an idiosyncratic feature of a nominal root ( $[\pm\alpha]$  here).

<sup>3</sup> See also Zalizin’ak (2010) for the same contrast between these two exponents in Old Russian, and Müller (2004) for the suggestion that these are different affixes on the basis of other, theoretical, considerations

## Against distinct declension class features

- Current approaches to nominal inflection postulate separate declension class features that mediate the relation between nominal exponent and gender (see, e.g., Embick (2010), Kramer (2015)).
- Gender features can be used in determining the declension class of a noun but Vocabulary insertion targets declension features, not gender.

(20) GENDER → DECLENSION → INFLECTION

- Approaches of this type cannot derive the observed pattern:
  - Vocabulary insertion of a nominal exponent cannot crash due an additional gender feature because Vocabulary insertion targets class features.

*What if ungrammaticality is due to inability to insert a class feature?*

- First, the approach requires to complicate assumptions about ellipsis. Class feature assignment should not apply to an elided noun.
- Second, if insertion of a class feature fails in presence of a certain gender features, it ungrammaticality is predicted in all case forms, contrary to the data.

## 3.2 Decomposition of declension class

### On gender

- I assume that there are two binary gender features  $[\pm\text{masc}]$  and  $[\pm\text{fem}]$ .
  - Feminine nouns are  $[\text{+fem}]$ .
  - Masculine nouns are  $[\text{-fem}][\text{+masc}]$ .
  - Neuter nouns are  $[\text{-fem}][\text{-masc}]$ .
- Only  $[\pm\text{fem}]$  is relevant for insertion of declension class exponents.

### On gender and class

- Class I with masculine nouns and class IV with neuter nouns share  $[\text{-fem}]$ .
- Classes II and III have  $[\text{+fem}]$ .
- I assume that animate masculine nouns in II have  $[\text{+fem}]$ , but due to their lexical semantics also have  $[\text{+anim}][\text{+masc}]$ . Since classes are not specified for  $[\pm\text{masc}]$ , so this cannot raise complications.

### On $[\pm\alpha]$

- Class I and III share  $[\text{+}\alpha]$ .
- Class II and IV have  $[\text{-}\alpha]$ .
- Despite some previous attempts to connect a formal feature to phonological properties (see, e.g., Roca (1989)), I do not pursue this option here.

(21) Class feature specifications in Russian

Class	Gender of nouns	Decomposition
I	MASC	$[\text{-fem}][\text{+}\alpha]$
II	FEM, some animate MASC	$[\text{+fem}][\text{-}\alpha]$
III	FEM	$[\text{+fem}][\text{+}\alpha]$
IV	NEUTR	$[\text{-fem}][\text{-}\alpha]$

## On trans-paradigmatic syncretism

- Exponents syncretic between classes are underspecified for features that distinguishes between them.
  - Affixes shared by class I and III are underspecified for gender and bear only [+α].
- Albeit the features used in the decomposition are different, the produced natural classes match those suggested by Müller (2004), Alexiadou & Müller (2008). They are argued to be best suited for capturing syncretism between declensions and produce the least possible number of exponents.

**Further evidence:** augmenative *iš'* (Švedova (1980, 213), Timberlake (2004, 146))

- Combined with feminine noun, it gives nouns of class II:
  - *kinga* (II, FEM) → *kniž-iš'-u* (II class, ACC) 'book';
  - *gr'az'* (III, FEM) → *gr'az'-iš'-u* (II class, ACC) 'mud'.
- Combined is masculine or neuter (i.e., [−fem]), it produces noun of class IV .
  - *gorod* (I, MASC) → *gorod-iš'-e* (IV class, ACC) 'city';
  - *selo* (IV, NEUTR) → *sel-iš'-e* (IV class, ACC) 'village';
- Assuming that the suffix is specified for [−α], the class of the derived noun is this abstract feature combined with the gender of the original noun:
  - [+fem] and [−α] → class II; [−fem] and [−α] → class IV.

## 4 Analysis

### 4.1 Assumptions

- Late-insertion model: Structures produced by syntax are subject to Vocabulary insertion in the post-syntactic morphology.
- Vocabulary insertion proceeds according to the Subset Principle (Halle, 1997).

(22) The Subset Principle:

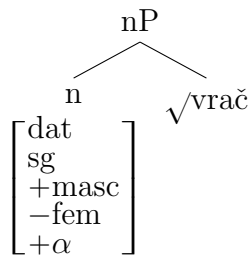
- a. **Compatibility:** The item matches all or a subset of the grammatical features. **Plus:** No contradicting features are allowed.
- b. **Specificity:** Where several vocabulary items meet the conditions for insertion, the item matching the greatest number of features must be chosen.

- Vocabulary insertion targets a set of features on a syntactic node.

### 4.2 Sample derivation

- In Russian, a single inflectional exponent cumulatively expresses nominal features: case, number, 'class' (i.e., gender and [±α]), and sometimes animacy.
- This implies that all relevant features must appear on one node in the structure that is subject to Vocabulary insertion.
  - For concreteness, let's assume, it is *n*. Features can appear in this position due to agreement or Lowering, they can be also base generated there.
- Here I abstract away from decomposition of case; see Müller (2004) or Caha (2019) for some options.

(23) Dative singular, class I



(24) Vocabulary items

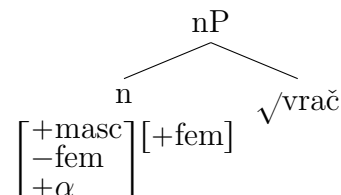
- a. /e/ ↔ [dat][sg][+fem][−α];
- b. /u/ ↔ [dat][sg][−fem];
- c. /i/ ↔ [dat][sg][+fem];

**Exponent /u/ from (24b) is inserted!**

### 4.3 Morphological conflicts and syncretism

- When class I nouns trigger feminine agreement, they bear the usual [−fem][+masc][+α] features and also semantic gender [+fem]. Values of FEM feature **contradict** each other.
- Contradictory features on one node are **tolerated by syntax** but often assumed to be contained in different feature sets co-existing on one syntactic node (see, e.g., Asarina (2011) and Coon & Keine (2020)).
- Ineffability arises in morphology: **Vocabulary insertion fails to provide an exponent.**
- Recall that the evidence for this comes from resolution by a syncretic form and ellipsis.
- Patterns like this where conflicting features can be resolved only by a syncretic form have been observed cross-linguistically for different types of phenomena; see, e.g., Groos & van Riemsdijk (1981) on matching in free relatives; Zaenen & Karttunen (1984), Dalrymple et al. (2009), Asarina (2011) on right node raising; Citko (2005), Hein & Murphy (2019) on ATB-movement; Schütze (2003), Bhatt & Walkow (2013), Coon & Keine (2020) on agreement with multiple targets.
- In (25), Vocabulary insertion is possible only if a lexical item is **underspecified for [±fem]** and compatible with [+α].
- Class I has [+α], but vocabulary items specific for this class have [−fem] as well. Lexical items that are syncretic between I and III are underspecified for the gender feature.

(25) Mixed agreement



(26) Nominal inflection: SG, animate

	I [−fem][+α]	II [+fem][−α]	III [+fem][+α]	IV [−fem][−α]
NOM	∅	a	∅	o
ACC	a	u	∅	o
GEN	a	i	i	a
LOC	e	é	i	e
DAT	u	e	i	u
INSTR	om	oj	ju	om

(27) Nominal inflection: PL, animate

	I [−fem][+α]	II [+fem][−α]	III [+fem][+α]	IV [−fem][−α]
	i	i	i	a
	ov	∅	ov	a
	ov	∅	ov	∅
	ax	ax	ax	ax
	am	am	am	am
	ami	ami	ami	ami

- This is the case in the nominative singular and in the accusative and genitive plural:
  - Exponents are syncretic between I and III, i.e., they are specified for [+α] but not for the gender feature.

(28) a. /∅/ ↔ [nom][sg][+α];  
 b. /ov/ ↔ [acc/gen][pl][+α];

- This is also the case in the locative, dative, and instrumental plural forms, where the vocabulary items don't differentiate between classes.



- (29) a. /ax/ ↔ [loc][pl];  
 b. /am/ ↔ [dat][pl];  
 c. /ami/ ↔ [instr][pl];

- Exponents are also syncretic in the nominative plural but there is no data showing whether this form resolves the gender feature conflict.
- The remaining exponents are specific for I or syncretic to IV that are both [−fem].

- (30) a. /u/ ↔ [dat][sg][−fem].  
 b. /om/ ↔ [instr][sg][−fem].

#### 4.4 Ineffability

- As noted by Asarina (2011), morphological realization that is based on the Subset Principle cannot fail due to the presence of too many features.
- The Subset Principle imposes two conditions on a selected vocabulary item:
  - Compatibility: A vocabulary item cannot have features that are not present on a syntactic node.
  - Specificity: A vocabulary item must match as many features as possible.
- When there is an additional feature on a node and there is no more specific item matching this new feature as well, the ‘old’ item is predicted to be inserted.
- However, morphological ineffability resulting from additional features appears to be a robust pattern cross-linguistically (see references above).

#### Proposal

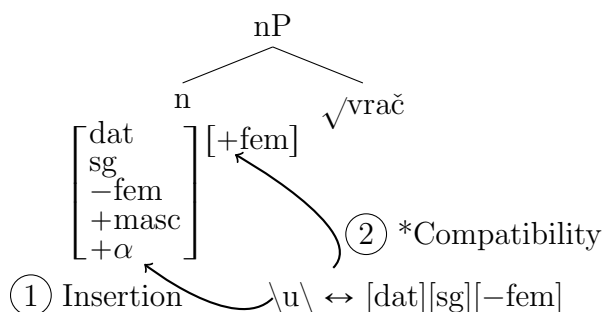
- In the usual case, one syntactic node has one set of features. In case of conflicting features, there are two feature sets on a single node.
- Ineffability follows directly from the Subset Principle coupled with the articulated procedure of how insertion applies to multiple feature sets on a single node.

*Assumptions:*

1. Vocabulary insertion targets sets of features.
2. Only one vocabulary item can be inserted in a terminal node.
3. The Subset Principle underlies Vocabulary insertion, and it holds for an inserted item and all features in a node.
4. \*Deletion of lexical material

*Derivation*

- (31) Ineffability in morphology



- ① Vocabulary insertion targets one of the features sets; the one with most features.
- ② The result is ineffable because **the inserted exponent is incompatible** with the second feature set. Due to **the ban on deletion of lexical material** it cannot be altered.

## Existing analysis

- Some of the analyses (e.g., Asarina (2011), Citko (2005), and to some extent Hein & Murphy (2019)) add the condition that the inserted exponent should be compatible with both features structures.
  - Such approaches don't exclude insertion of a default exponent that by definition is compatible with any feature specification.
- Others depart from the Subset Principle and suggest that all features have to be morphologically realized (see Bhatt & Walkow (2013)).
- Approach developed by Coon & Keine (2020) captures the phenomenon but appears to be more complex and involves an OT-like system of ranked and fallible constraints that arguably should not be present in DM.
  - One vocabulary item must be inserted into a given head.
  - If a node has two feature structures, best candidates for both are selected.
  - Next, if neither item is a better fit than the other feature structure, none can be inserted.

## 5 Conclusion

### Summary of analysis

- The case number restrictions arise due to the conflict between the grammatical  $[-\text{fem}]$  and the semantic  $[\text{+fem}]$  gender features.
- Contradicting features block insertion of a vocabulary item specified for one of them and lead to ineffability in morphology.
- The conflict can be resolved by a syncretic underspecified exponent or by ellipsis under which Vocabulary insertion does not apply.

### Implications for declension class

1. Declension is **decomposed into gender and a formal feature of a root** (here,  $[\pm\alpha]$ ).
2. Inflectional exponents have **direct access** to gender features.
3. Nominal declensions in Russian have the following feature specifications:

(32) Declension in Russian

I	$[-\text{fem}][+\alpha]$
II	$[\text{+fem}][-\alpha]$
III	$[\text{+fem}][+\alpha]$
IV	$[-\text{fem}][-\alpha]$

### Implications for mixed agreement

1. Semantic feminine gender is present in the extended projections of the noun.
  - $\leftrightarrow$  An argument **against introducing semantic gender only on a modifier** (see Matushansky (2013), Caha (2019))
2. Semantic gender appears on the same node as grammatical gender and other nominal features.
  - Recall that there are height restrictions on semantic feminine agreement:
    - (i) It is ungrammatical with low classifying adjectives;
    - (ii) The switch from the semantic agreement back to the grammatical masculine is ruled out.

- Some approaches derive this restrictions from the height at which the feminine feature is introduced (see, e.g., Asarina (2009), Steriopolo & Wiltschko (2010), Pesetsky (2013), King (2015), Steriopolo (2018)), while others build on the Agree operation itself (see Smith (2015, 2017), Puškar (2017, 2018), Salzmann (2018), i.a.).
- ↔ Appearance of semantic and grammatical gender on the same node somewhat **undermines approaches that derive height restrictions from the position** where the feminine feature is introduced

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