

# Hybrid agreement in Bosnian/Croatian/Serbian

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## A puzzle from Bosnian/Croatian/Serbian (BCS)

### Agreement Patterns of BCS

#### Approaches to hybrid agreement

Van Eynde (2020)

Wechsler and Zlatić (2003)

#### Proposed Analysis

Default Unification

Functor analysis

# Motivation

- Salzmann (2020) revisits the NP vs. DP debate
- Discusses arguments for and against the DP-hypothesis
- Shows that most arguments in favour of DP are theory internal by the time the DP-hypothesis came up
- The language examples that should favour the DP-hypothesis can be analysed also as NP
- Introduces hybrid agreement in BCS and argues that it can only be analysed with DP-hypothesis
- This presentation aims to show that a NP analysis is possible

**A puzzle from  
Bosnian/Croatian/Serbian (BCS)**

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(1) (Puškar, 2018, 278)

- a. star-**i**/**\***star-**a**      vladik-**a**    me je juče  
old-M.SG/old-F.SG bishop-SG me is yesterday  
posetio- $\emptyset$ /**\***posetil-**a**  
visit.PTCP-M.SG/F.SG  
'the old bishop visited me yesterday'
- b. star-**e**    vladik-**e**    su me juče  
old-F.PL bishop-PL are me yesterday  
posetil-**e**/posetil-**i**  
visit.PTCP-F.PL/M.PL  
'the old bishops visited me yesterday'

- c. star-i      vladik-e    su    me juče  
old-M.PL bishop-PL are me yesterday  
posetil-i/\*posetil-e  
visit.PTCP-M.PL/F.PL  
'the old bishops visited me yesterday'

## Agreement patterns of BCS

- Class II nouns like *vladič* bear grammatical gender *feminine* and semantic gender *masculine*
- If used in singular only semantic agreement is possible (1a)
- If uses in plural both grammatical (feminine) and semantic (masculine) gender can be used (1b-1c)
- Once semantic agreement is used, grammatical agreement is not permitted (1c)

## Agreement patterns in BCS

(2) BCS (Puškar, 2018, 304)

On-e            vladik-e    su    me    jučce  
those-F.PL    bishop-PL    are    me    yesterday  
posetil-e/posetil-i.  
visit.PTCP-F.PL/M.PL  
'Those bishops visited me yesterday'

(3) BCS (Salzmann, 2020, 34)

Oni            star-e        vladike    su    se  
Those-M.PL    old-F.PL    bishops    are    REFL  
posvadjal-i/\*posvadjal-e    na    ulici.  
argued-M.PL/argued-F.PL    on    street  
'Those old bishops argued on the street'



(4) The Agreement Hierarchy:

attributive >> predicative >> relative pronoun >> personal  
pronoun

'the possibility of syntactic agreement decreases monotonically from left to right. The further left the element is on the hierarchy, the more likely syntactic agreement is to occur, the further right, the more likely semantic agreement (that is, with no intervening decrease).' (Corbett, 2006, 207)

# Agreement patterns in BCS

## Generalisation

A	D	V
(gram)	(gram)	gram/sem
(gram)	sem	*gram/sem
sem	(*gram/sem)	*gram/sem

**Table 1:** Hybrid agreement Patterns in BCS

# Agreement patterns in BCS

## Test Cases

- (5)
- |  |  |
|--|--|
| a. $A_{\text{fem}} \gg V_{\text{fem}}$                     | g. $A_{\text{fem}} \gg D_{\text{masc}} \gg V_{\text{masc}}$  |
| b. $A_{\text{fem}} \gg V_{\text{masc}}$                    | h. $A_{\text{masc}} \gg D_{\text{masc}} \gg V_{\text{masc}}$ |
| c. $A_{\text{masc}} \gg V_{\text{masc}}$                   | i. $*A_{\text{masc}} \gg D_{\text{fem}} \gg V_{\text{fem}}$  |
| d. $*A_{\text{masc}} \gg V_{\text{fem}}$                   | j. $*A_{\text{fem}} \gg D_{\text{masc}} \gg V_{\text{fem}}$  |
| e. $A_{\text{fem}} \gg D_{\text{fem}} \gg V_{\text{fem}}$  | k. $*A_{\text{masc}} \gg D_{\text{masc}} \gg V_{\text{fem}}$ |
| f. $A_{\text{fem}} \gg D_{\text{fem}} \gg V_{\text{masc}}$ |  |

- The system/formalism should:
  - produce/explain patterns in (5a)-(5c) and (5e)-(5h)
  - **not** produce but explain patterns in (5d) and (5e)-(5h)

## Approaches to hybrid agreement

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# Approach by Van Eynde (2020) i

## Marking Principle

(6) *head-argument-phrase*  $\Rightarrow$

SYNSEM   CATEGORY   MARKING	$\boxed{1}$ <i>marking</i>
HEAD-DTR   SYNSEM   CATEGORY   MARKING	$\boxed{1}$

(7) *head-nonargument-phrase*  $\Rightarrow$

SYNSEM   CAT   MARKING	$\boxed{1}$ <i>marking</i>
DAUGHTERS $\left\langle \left[ \text{SYNSEM   CAT   MARKING } \boxed{1} \right], \boxed{2} \right\rangle$	
HEAD-DTR	$\boxed{2}$ <i>sign</i>

## Marking Principle

(8) (Van Eynde, 2020, 10)

*head-functor-phrase*  $\Rightarrow$

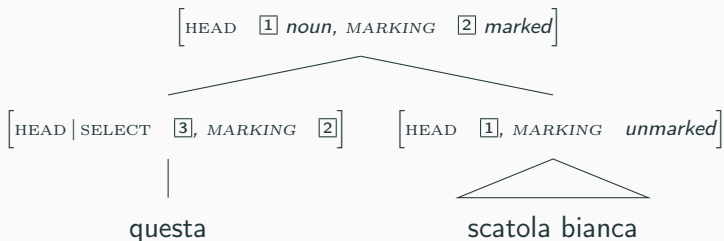
$$\left[ \begin{array}{l} \text{DAUGHTERS} \quad \left\langle \left[ \text{SYNSEM} \mid \text{CAT} \mid \text{HEAD} \mid \text{SELECT } \boxed{1} \right], X \right\rangle \\ \text{HEAD-DTR} \mid \text{SYNSEM} \quad \boxed{1} \text{ } \textit{synsem} \end{array} \right]$$

- Adjectives bear the MARKING attribute *unmarked* and select *unmarked* nouns
- Determiners are also analysed as functors but bear the marking attribute *marked*

## Marking Principle

(9)

(Van Eynde, 2020, 12)



- Two types of gender features based on Wechsler and Zlatić (2003)
- CONCORD|GENDER and INDEX|GENDER
- The sign for 'bishop' is underspecified for INDEX|GENDER but bears grammatical gender (feminine)

(10) (Van Eynde, 2020, 15)

CATEGORY   HEAD   AGR   GENDER	<i>feminine</i>
CONTENT   INDEX   GENDER	<i>gender</i>

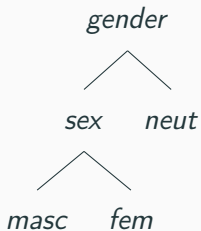
- Determiners agree with the index gender of a head, adjectives with AGR
- Can not produce semantic gender agreement of adjective (e.g., (5c)), since adjectives agree with AGR|GENDER *feminine*
- Can not produce patterns where gender of determiner and verb mismatch (e.g., (5f)), because both determiner agree with INDEX|GENDER



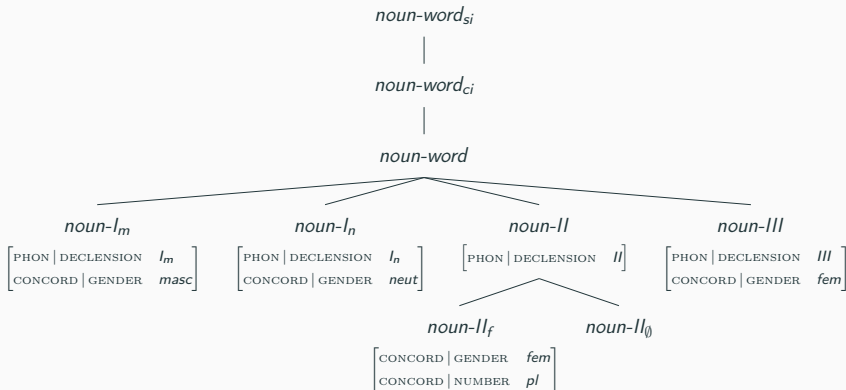
# Approach by Wechsler and Zlatic (2003)

## Type hierarchy for gender

(11) (Wechsler and Zlatic, 2003, 47)



# Type hierarchy for BCS (Wechsler and Zlatić, 2003, 36)



## Default unification

- Wechsler and Zlatić employ default unification (YADU Lascarides and Copestake 1999)
- Values consists of a hard value and a default value separated by a slash (*hard-value/default-value*)
- Default values can be overwritten by hard values
- Subtypes take priority over super types, hence a hard value defined on a subtype overwrites the default value of the super type

## Default unification constraints

(12) *noun-word*<sub>sj</sub>: (Wechsler and Zlatić, 2003, 66)

CONTENT	INDEX	GENDER	<i>gender</i> /[1]
	RESTR	SEX	[1]sex

(13) *noun-word*<sub>ci</sub>: (Wechsler and Zlatić, 2003, 66)

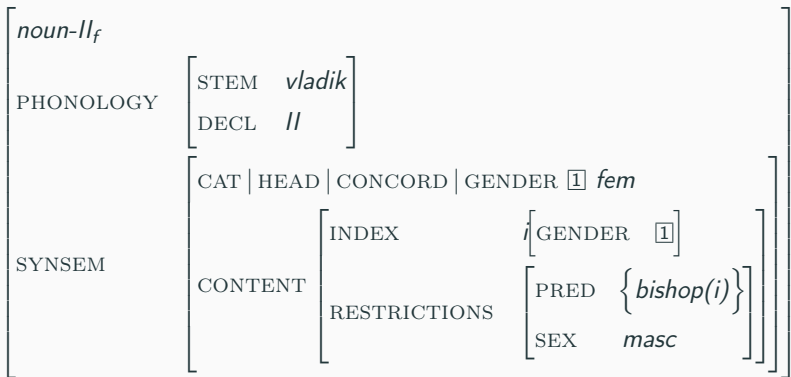
CONCORD	GENDER	/[3]
	NUMBER	/[4]
INDEX	GENDER	/[3]
	NUMBER	/[4]

## Default unification at work i

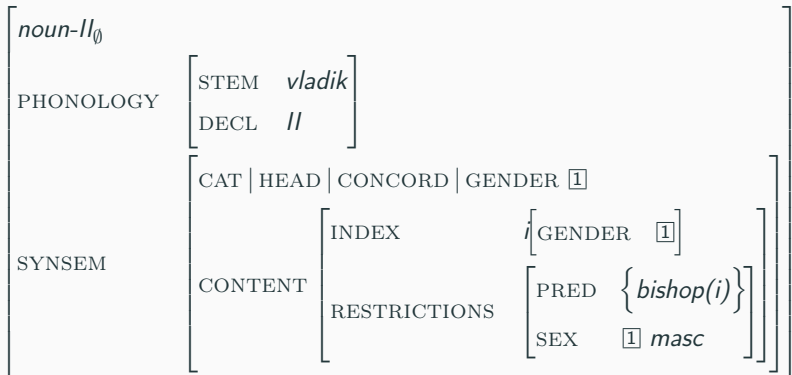
- Type  $noun-II_f$  constraint  $CONCORD|GENDER$  *feminine* and  $CONCORD|NUMBER$  *plural* and is underspecified for  $INDEX|GENDER$ 
  - $noun-word_{ci}$  applies default unification for  $INDEX|GENDER$
  - $noun-word_{si}$  does not apply since  $INDEX|GENDER$  already defined by subtype
  - Results in  $INDEX|GENDER$  *feminine* only for plural
- type  $noun-II_\emptyset$  underspecified for  $INDEX|GENDER$  and  $CONCORD|GENDER$ 
  - $noun-word_{ci}$  applies default unification
  - $noun-word_{si}$  applies default unification
  - Results in  $INDEX|GENDER$  *masculine* for male bishops (*vladik*)

# Default unification at work ii

(14)



(15)



## Limitation of approach by Wechsler and Zlatić (2003)

- Singular nouns of type *noun-ll<sub>∅</sub>* and plural of *noun-ll<sub>f</sub>*
- Some speaker allow for index agreement for plural nouns (*noun-ll<sub>∅</sub>*)

(16) Croatian (Wechsler and Zlatić, 2003, 71)

Ti            stari        sudije    su        dobro    sudili.  
that.M.PL   old.m.pl   judges   aux.pl   well    judged.pprt.m.pl  
'Those old (male) judges judged well.'

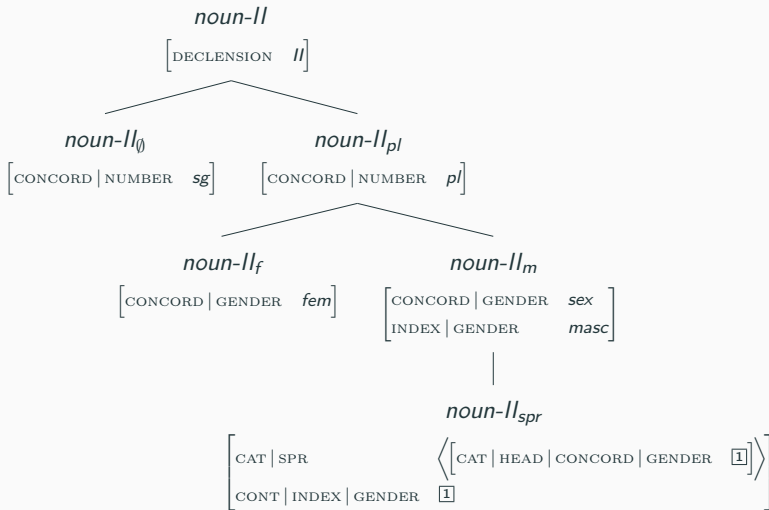
- Mixed agreement patterns can not be produced



# Proposed Analysis

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# Augmented type hierarchy for *noun-11*



## Additional default unification constraint

(17) *noun-word*:

$$\left[ \begin{array}{l} \text{SPR} \left\langle \left[ \text{CAT} \mid \text{HEAD} \mid \text{CONCORD} \mid \text{GENDER} \ / \boxed{1} \right] \right\rangle \\ \text{CONCORD} \mid \text{GENDER} \ / \boxed{1} \end{array} \right]$$

# Type hierarchy and default unification at work i

- $noun-II_0$  underspecified for CONCORD|GENDER and INDEX|GENDER
- SPR|CONCORD|GENDER through  $noun-word$   
CONCORD|GENDER through  $noun-word_{ci}$  (13) and  
INDEX|GENDER through  $noun-word_{si}$  (12)
- Generates all feminine or masculine patterns for singular number, based on the gender of the referent

$$(18) \left[ \begin{array}{l} noun-II_0 \\ \\ SYNSEM \end{array} \left[ \begin{array}{l} CAT \left[ \begin{array}{l} CONCORD | GENDER \boxed{1} \\ SPR \left\langle \left[ CAT | HEAD | CONCORD | GENDER \boxed{1} \right] \right\rangle \end{array} \right] \\ \\ CONT \left[ \begin{array}{l} INDEX | GENDER \boxed{1} \\ REST | GENDER \boxed{1} sex \end{array} \right] \end{array} \right] \right]$$

## Type hierarchy and default unification at work ii

- *noun-ll<sub>f</sub>* has CONCORD|GENDER *feminine*
- INDEX|GENDER through constraint on *noun-word<sub>ci</sub>* (13)
- Specifier bears feminine gender through constraint on *noun-word* (17)

$$(19) \left[ \begin{array}{l} \textit{noun-ll}_f \\ \text{SYNSEM} \left[ \begin{array}{l} \text{CAT} \left[ \begin{array}{l} \text{CONCORD | GENDER } \boxed{1} \textit{ fem} \\ \text{SPR} \left\langle \left[ \text{CAT | HEAD | CONCORD | GENDER } \boxed{1} \right] \right\rangle \end{array} \right] \\ \text{CONT | INDEX | GENDER } \boxed{1} \end{array} \right] \end{array} \right]$$

- Generates all feminine patterns (5a, 5e)

## Type hierarchy and default unification at work iii

- *noun-Il<sub>m</sub>* underspecified for CONCORD|GENDER *sex*, INDEX|GENDER specified for *masc*

$$(20) \left[ \begin{array}{l} \textit{noun-Il}_m \\ \text{SYNSEM} \left[ \begin{array}{l} \text{CAT} \left[ \begin{array}{l} \text{CONCORD | GENDER } \boxed{1} \textit{sex} \\ \text{SPR} \left\langle \left[ \text{CAT | HEAD | CONCORD | GENDER } \boxed{1} \right] \right\rangle \right. \\ \left. \text{CONT} \left[ \text{INDEX | GENDER } \textit{masc} \right] \right. \end{array} \right] \end{array} \right] \end{array} \right]$$

- Allows either *feminine* or *masculine* adjective
- Gender of determiner identical with adjective
- Participle verb bears *masculine* gender
- Generates mixed patterns (5b, 5f) or all masculine patterns (5c, 5h)

## Type hierarchy and default unification at work iv

- $noun-II_{spr}$  subtype of  $noun-II_m$  but specifies SPR|GENDER

(21)

$$\left[ \begin{array}{l} noun-II_{spr} \\ \\ SYNSEM \left[ \begin{array}{l} CAT \left[ \begin{array}{l} CONCORD | GENDER \textit{sex} \\ SPR \left\langle \left[ \begin{array}{l} CAT | HEAD | CONCORD | GENDER \quad \boxed{1} \end{array} \right] \right\rangle \end{array} \right] \\ \\ CONT \left[ \begin{array}{l} INDEX | GENDER \quad \boxed{1} \textit{masc} \end{array} \right] \end{array} \right] \end{array} \right]$$

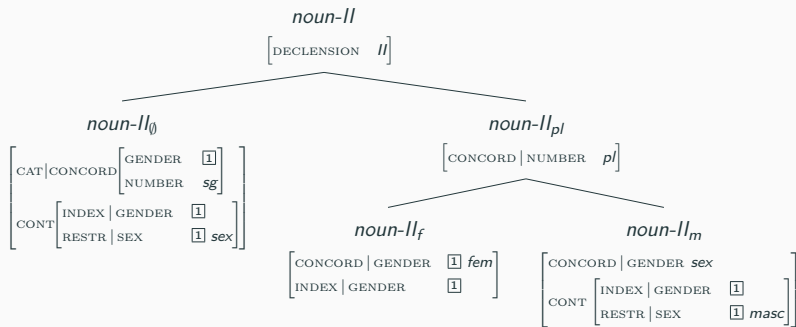
- Allows either *feminine* or *masculine* adjective
- Gender of determiner bound to INDEX|GENDER
- Generates all masculine patterns (5c, 5h) or mixed pattern (5g)

## Additional assumptions/ weakness

- Types are not maximal,  $noun-II_m$  resolves to feminine specifier while its subtype  $noun-II_{spr}$  resolves to a masculine specifier.
- Possible two analysis for sentences without a specifier, since feminine or masculine determiner can be left out.
- An analysis without  $noun-II_{spr}$  being the subtype of  $noun-II_m$  is possible, but it would still result in two analysis for sentences without a specifier



# Functor analysis: Revised version of the class II type hierarchy



## Type hierarchy at work

- Determiners and adjectives agree with the `CONCORD|GENDER`
- *noun-ll<sub>∅</sub>* generates all masculine or feminine patterns for the singular number, based on sex attribute of referent
- *noun-ll<sub>f</sub>* generates all feminine patterns
- *noun-ll<sub>m</sub>* are restricted to male entities and generate patterns with masculine participle verbs

## Additional assumption for masculine determiners

- Masculine determiners are underspecified for CONCORD|GENDER but constrained such that the selected element is of INDEX|GENDER *masculine*

$$(22) \left[ \begin{array}{l} \text{det} \\ \text{CONCORD} \mid \text{GENDER } \textit{sex} \\ \text{SELECT} \left\langle \left[ \text{CONT} \mid \text{INDEX} \mid \text{GENDER} \quad \boxed{1} \textit{masc} \right] \right\rangle \end{array} \right]$$

- Masculine determiners block feminine gender on participle verb

## Conclusion

- Default unification has two solutions for all masculine patterns.
- Functor analysis possible but needs additional assumption for determiners.
- Unclear data, based on single example by Puškar (2018) and Salzmann (2020)
- Corpus research on mixed agreement patterns necessary
- Are all possible patterns used/accepted by speakers of BCS ?
- NP-analysis possible in opposition to Salzmann's claim

## References

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