

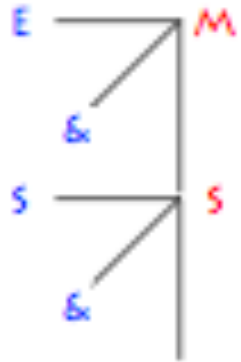
EXPERIMENTAL SYNTAX OF CROATIAN: LINEARITY BEATS HIERARCHY IN GENDER AGREEMENT

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COORDINATED RESEARCH IN THE EXPERIMENTAL MORPHOSYNTAX OF SOUTH SLAVIC LANGUAGES (EMSS)

Leverhulme project: <http://www.ucl.ac.uk/pals/research/linguistics/research/leverhulme>

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MOTIVATION AND BACKGROUND

- Some languages have rules which are basically syntactic, others rely on a semantic principle and yet others show interesting combinations of the two principles. ... gender resolution rules are language specific.
 - [Corbett, Resolution rules, CH8, Agreement pp 175]
 - Greville Corbett: Hierarchies, Targets, and Controllers: Agreement Patterns in Slavic Languages; Gender; Number; Features; Agreement ; The Syntax-morphology interface; Canonical Morphology and Syntax

THEORETICAL ASSUMPTIONS

- In a variety of languages (in Slavic language family Bosnian, Croatian, Serbian, Slovenian, in other languages - Hindi, Ndebele), **coordinated subjects** (and in some cases, objects) consisting of two (and more) **NPs can trigger verbal agreement with only one of these noun phrases, rather than with the coordination as a whole.**
- TERMINOLOGY:
 - non-coordinated/simple/non-conjoined subjects
 - coordinated/complex/conjoined subjects
 - full/resolved agreement vs. partial agreement (agreement with a single conjunct)

BASIC FACTS

- **AGREEMENT – South Slavic languages**

- Verbs obligatorily agree with subjects (both pre- and post-verbally)
- Agreement with finite verbs (aux and main verbs) in person & number – without exception

- Stol stoji nasred sobe. ‘The table is in the middle of the room.’
 - 3.sg 3.sg
 - Stolovi stoje nasred sobe.
 - 3.pl 3. pl

- Nasred sobe stoji stol. ‘In the middle of the room there is a table.’
 - Nasred sobe stoje stolovi.

- Ja stojim nasred sobe. ‘I am in the middle of the room.’
 - 1.sg 1.sg
 - Mi stojimo nasred sobe.
 - 1.pl 1.pl

- Agreement with participles in number & gender – **without exception with number, variable with gender**

BASIC DATA – FULL AGREEMENT

NON-COORDINATED SUBJECTS

Sg

- Dječak je zaustavljen.
• boy.MASC.SG AUX.SG
stop.Part.MASC.SG
- Pjesma je otpjevana.
• Song.FEM.SG AUX.SG sing.Part.FEM.SG
- Pismo je poslano.
• letter.N.SG AUX.SG send.Part.N.SG

NON-COORDINATED SUBJECTS

Pl

- Dječaci su zaustavljeni.
• Boy.MASC.PL AUX.PL
stop.Part.MASC.PL
- Pjesme su otpjevane.
• Song.FEM.PL AUX.PL sing.Part.FEM.PL
- Pisma su poslana.
• letter.N.PL AUX.PL send.Part.N.PL

PARTIAL AGREEMENT

- **Dječak i pas su zaustavljeni.**
 - boy.MASC.SG dog.MASC.SG AUX:PL stop.Part.MASC.PL
 - **Dječaci i psi su zaustavljeni.**
 - boy.MASC.PL dog.MASC.PL AUX:PL stop.Part.MASC.PL
- **Pjesma i melodija su otpjevane.**
 - Song.FEM.SG melody.FEM.SG AUX.PL sing.Part.FEM.PL
 - **Pjesme i melodije su otpjevane.**
 - song.FEM.PL melody.FEM.PL AUX.PL sing.Part.FEM.PL
- **Pismo i pero su poslani.**
 - letter.N.SG feather.N.sg AUX.PL send.Part.MASC.PL
- * **Pismo i pero su poslana.**
 - letter.N.SG feather.N.sg AUX.PL send.Part.N.PL
 - **Pisma i pera su poslana.**
 - letter.N.SG feather.N.sg AUX.PL send.Part.N.PL

BASIC FACTS: MASCULINE

- Sg
 - Dječak je zaustavljen. Zaustavljen je dječak.
- Pl
 - Dječaci su zaustavljeni. Zaustavljeni su dječaci.
- Sg&Sg
 - Dječak i pas su zaustavljeni. Zaustavljeni su dječak i pas.
- Pl&Sg
 - **Dječaci i pas su zaustavljeni. Zaustavljeni su dječaci i pas.**
- Sg&Pl
 - **Dječak i psi su zaustavljeni. Zaustavljeni su dječak i psi.**
- Pl&Pl
 - Dječaci i psi su zaustavljeni. Zaustavljeni su dječaci i psi.
- ... Agreement pattern with Masculine NP's is repeated in Feminine agreement patterns, but not in Neuters.
- **M+M= always M**

BASIC FACTS: FEMININE

- Sg
 - Djevojčica je zaustavljena.
- Pl
 - Djevojčice su zaustavljene.
- Sg&Sg
 - Djevojčica i mačka su zaustavljene.
- Pl&Sg
 - Djevojčice i mačka su zaustavljene.
 - ? Djevojčice i mačka su zaustavljeni. DEF
- Sg&Pl
 - Djevojčica i mačke su zaustavljene.
 - ? Djevojčica i mačke su zaustavljeni. DEF
- Pl&Pl
 - Djevojčice i mačke su zaustavljene.
 - ? Djevojčice i mačke su zaustavljeni. DEF
- **F+F= always F**

BASIC FACTS: NEUTRUM

- Sg
 - Pismo je poslano.
- Pl
 - Pisma su poslana.
- Sg&Sg
 - Pismo i pero su poslani. DEF
 - *Pismo i pero su poslana.
- Pl&Sg
 - Pisma i pero su poslani. DEF
 - *Pisma i pero su poslana.
- Sg&Pl
 - Pismo i pera su poslani. DEF
 - ?Pismo i pera su poslana.
- Pl&Pl
 - Pisma i pera su poslana.
- **N+N= N and M** (coordinated sg's, some coordinated structures with pl involving sg)

BASIC FACTS: PUZZLE

- What happens when the coordinated subjects consists of two nouns that differ in gender?
- Alltogether 9 combinations
 - 3 same-gender combinations: MM, FF, NN
 - 6 different-gender combinations: MF, MN, FM, FN, NM, NF
 - (directionality matters: MF and FM is not the same)

QUESTIONING THEORETICAL ASSUMPTIONS

- 1. Coordination between **same-gender nouns** > **full agreement in plural** (M > M, F > F, N > N)
 - PUZZLE: sg+sg; pl+pl; sg+pl; pl+sg >pl, but no full gender agreement in gender all conditions
- 2. Coordination between **different-gender nouns** > **‘partial agreement’** (sg+sg/pl+pl/sg+pl/pl+sg >pl, but...
 - MF > M and/or F
 - MN > M and/or N
 - FM > F and/or M
 - FN > F and/or N and/or M
 - NM > N and/or M
 - NF > N and/or F and/or M

THEORETICAL ASSUMPTIONS

- Grammars treat Masc as a default/last resort
- If coordination contains Masc, significantly higher proportion of Masc agreement
- If coordination contains Masc, significantly FASTER
 - most probably because of Masc default, ‘consolation’ option
- (OR SLOWER as ‘last resort’)
- **The most interesting conditions are FN and NF (without Masc)**
 - MF > M and/or F
 - MN > M and/or N
 - FM > F and/or M
 - **FN > F and/or N and/or M**
 - NM > N and/or M
 - **NF > N and/or F and/or M**

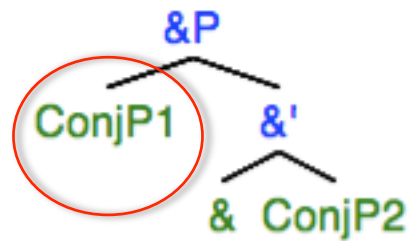
TWO DIFFERENT MECHANISMS

- **1. (Hierarchically) highest/first conjunct (Highest Conjunct Agr) – HCA/FCA**
 - In SV – first (FCA) and at the same time the furthest conjunct
 - In VS – first (FCA), but at the same time closest
- **2. (Linearly) closest conjunct (Closest Conjunct Agr) – CCA**
 - In SV - lowest ranked conjunct
 - In VS - highest ranked conjunct
- **Never agreement with conjunct that is neither the highest/first nor the closest (conjunction with more than two conjuncts, second conjunct in VS)**

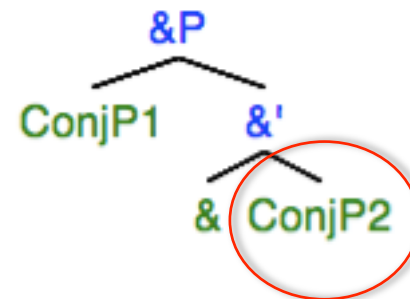
THEORETICAL ASSUMPTIONS

- SV

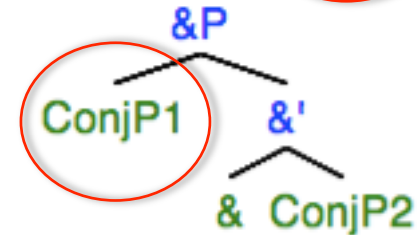
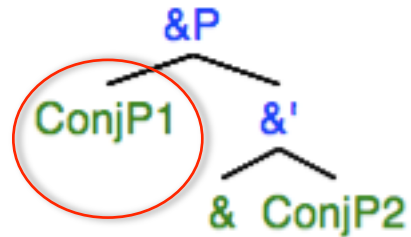
HCA/FCA



CCA



- VS



PREVIOUS RESEARCH

- Bošković, 2009: CCA in SV positions blocked when M hierarchically highest/linearly first
 - ?*Svi gradovi i sva sela su (juče) uništena.
- Murphy and Puškar, 2014: CCA is an illusion
- Marušič et al. 2015: effects of mixing genders and directionality
 - Finding 1: Some default masculine agreement occurs even when both conjuncts are same gender (FF, NN)
 - Finding 2: More default agreement when conjuncts are neuter than feminine
 - Finding 3: Masc Agreement with Masc + non-Masc ambiguous: either default agreement or FCA/CCA
 - Finding 4: NF and FN cases reveal three distinct response types: highest, closest and default

PREVIOUS RESEARCH

Locus of an agreement	&P	HCA	CCA
Bošković	Syntax		
Murphy&Puškar	Syntax		
Marušič et al.	Syntax		PF
EMSS	✓ ✓	✓	✓ ✓ ✓

SV AND VS AGREEMENT: PILOT

- **THREE CONJUNCTS SV:**
- Pjesme, pisma i poruke su poslane. HCA or CCA
 - F N F F
- *Pjesme, pisma i poruke su poslana. Neither HCA no CCA
 - F N F N
- Pjesme, pisma i poruke su poslani. DEF
 - F N F F

- **TWO CONJUNCTS SV:**
- Pjesme i pisma su poslana. CCA
 - F N N
- Pjesme i pisma su poslane. HCA (possible, but rare)
 - F N F
- Pjesme i pisma su poslani. DEF
 - F N M

- **TWO CONJUNCTS VS:**
- Poslane su pjesme i pisma. CCA
 - F F N
- *Poslana su pjesme i pisma. neither CCA nor HCA
 - N F N
- Poslani su pjesme i pisma. DEF
 - M F N

EXPERIMENT: MATERIALS AND PARTICIPANTS

- Controlled experimental study
- 6 partner sites in 4 countries (Slovenia, Croatia 2x, Bosnia, Serbia 2x)
- Uniformity vs. Site specificity
 - uniform experimental testing battery at six universities in parallel
 - keep experimental settings as identical as possible
 - uniform stimulus design, presentation methods, number of participants
 - quantitative analysis

GENERAL GOALS OF THE STUDY

- To extend the purview of psycholinguistic research of morphosyntactic variability to the South Slavic languages.
- Measure elicited production latencies as a function of the 'ambiguity' of the structural possibilities to be produced - a measure of the degree of inter-individual variation for given conditions.
- **HY0** : The structures with the richest array of possibilities (CondFN and NF) - greatest variability of responses
- **HY1: Preverbal coordinated structures** allow a richer array of agreement controllers.

FIRST EXPERIMENT 2015

- **GOAL:** ELICIT SPOKEN AGREEMENT WITH THE PREVERBAL AND POSTVERBAL COORDINATED SUBJECTS.
- **TASK:** preverbal (1a) and postverbal (1b) coordinated subjects matched and non-matched in gender
- **TYPE OF EXPERIMENT:**
 - self-paced reading and sentence completion task
 - on-line elicited production task with digital recording of responses
- **RECORDING AND CODING:**
 - Audacity, Praat, IBEX
 - coded according to agreement endings and agreement features
- **PARTICIPANTS:** n=30 [1st year student, attended the local secondary school, non linguist, not students of B/C/S/S Language, F/M 50/50]
- **LANGUAGE/DIALECT/VARIETY:** Neutral dia-standard.

FIRST EXPERIMENT 2015

- **EXPERIMENTAL ITEMS:**
 - 9 conditions (matched: MM, FF, NN, non-matched: MF, MN, FM, FN, NM, NF)
 - 6 items per condition
 - 54 test examples
 - 54 fillers
 - total of 108 sentences
 - 2 subexperiments for preverbal and postverbal condition
- Model sentences used as primes for the test examples contained a simple non-conjoined singular subjects in Masculine.

GENERAL CONDITIONS

- **1: INTERNAL STRUCTURE of model sentence**
 - WO and internal structures:
 - COND SV: [S Aux V Adv], [S Aux V PP]
 - COND VS: [Adv Aux V S], [PP Aux V S]
 - all nouns in subject and non-subject positions are inanimate plurals
- **2. AVERAGE LENGTH WAS BALANCED**
- **3. SV-VS CONSISTENCY MEANS SV-VS COMPARABILITY** (information structure concern)

PRESENTATION OF STIMULI

- Model sentence:
 - **Prijevod je ovjeren pečatom.**
 - translation.MASC.SG AUX.SG authenticated.MASC.SG seal
 -
- Replacement phrase:
 - **Molbe i rješenja**
 - requests.FEM.PL and solutions.NEUT.PL
 -
- Produced response:
 - **Molbe i rješenja su ovjeren-i/-a/-e pečatom**
 - requests.FEM.PL and solutions.NEUT.PL AUX.PL authenticated.MASC/
FEM/NEUT.PL by.seal

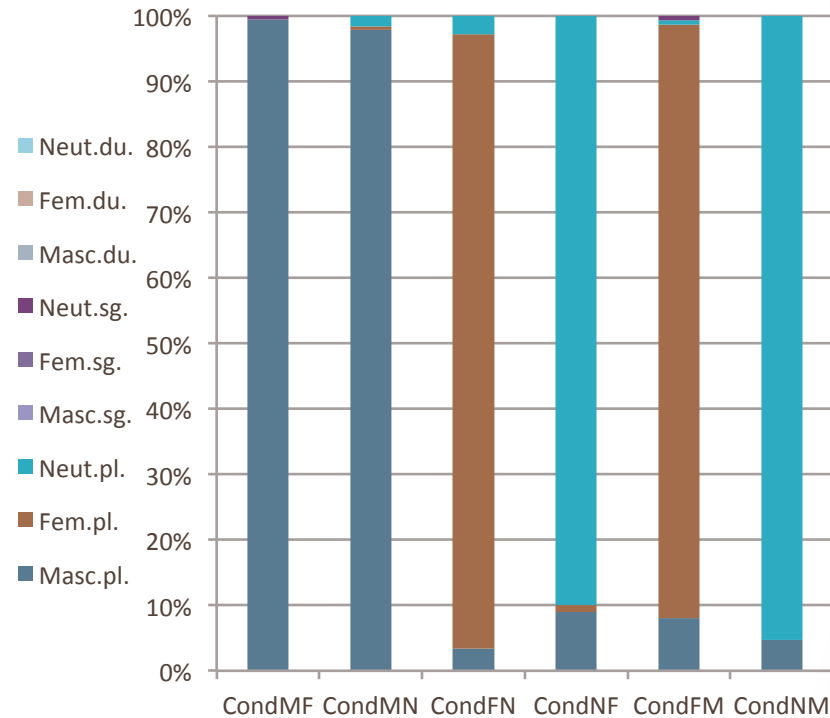
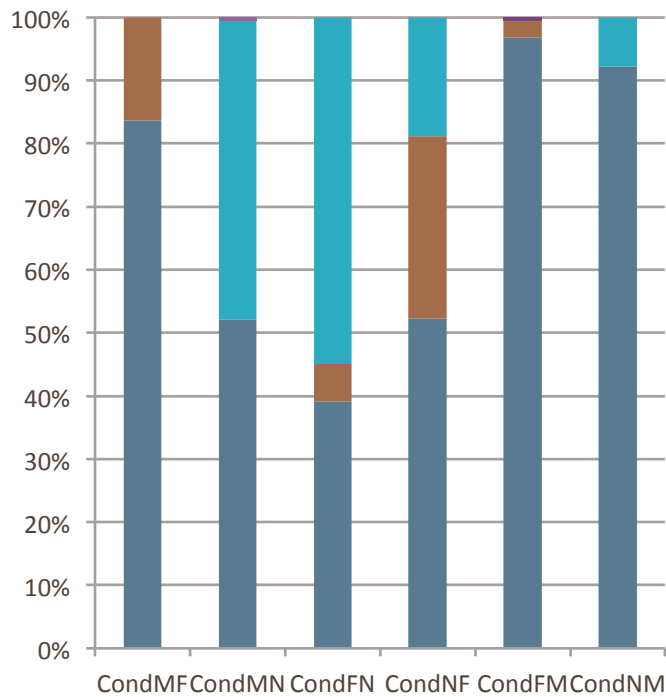
FILLERS

- 6 general conditions: simple non-conjoined subjects in all genders and numbers (Msg, Mpl, Fsg, Fpl, Nsg, Npl)
- 3 additional filler conditions correlating with each of the 6 model sentence conditions consisted of 3 examples, where the 3 conditions were: Paucal, Hybrid noun and Object Relative clause

- Ulica je zatvorena za promet.
- Kćerka je naslijedila bogatstvo.
- Reklama je puštena na radiju.
postavili

Tri trga
Vojvoda
Pitanje koje su
slušatelji

PRELIMINARY RESULTS: Zagreb SV vs. VS



NEW EXPERIMENT: ZAGREB 2016

- **EXPERIMENTAL DESIGN**

- SAME as 2015
 - IBEX
 - stimuli presentation
 - mostly the same sentences
- DIFFERENT from 2015
 - only SV position (54 exp stimuli and 54 fillers – 108 sentences)
 - adverbs and adverbial constructions preceeded coordianated structure (informations structure concern)
 - presentation of stimuly somewhat different (memory concern)
 - different fillers

PRESENTATION OF STIMULI

- **Večeras** je pjenušac natočen u čaše.
- tonight.ADV AUX.sg champagne.MASC.SG
poured.MASC.SG ADV

- **Večeras** su vina i rakije _____ u čaše.
- tonight.ADV AUX.pl wines.N.SG and spirit.F.SG
poured.MASC.SG ADV

FILLERS (animate M and F)

- Iznenada je mladić protrčao terenom.
 - A boy suddenly run across the court.
- Iznenada su sportašice i novinari _____ terenom.
 - Sportswomen and reporters _____ the court.
- Iznenada je djevojka protrčala terenom.
 - A girl suddenly run across the court.
- Iznenada su sportašice i novinari _____ terenom.
 - Sportswomen and reporters _____ the court.

SORTING STIMULI

- 1: stimuli with the coordination between the same gender conjuncts (MM, FF, NN)
- 2: stimuli that include M as a FCA/HCA or CCA (MF, MN, FM, NM)
- 3: stimuli that do not include M (NF and FN)

SV AGREEMENT ZAGREB 2015 AND 2016

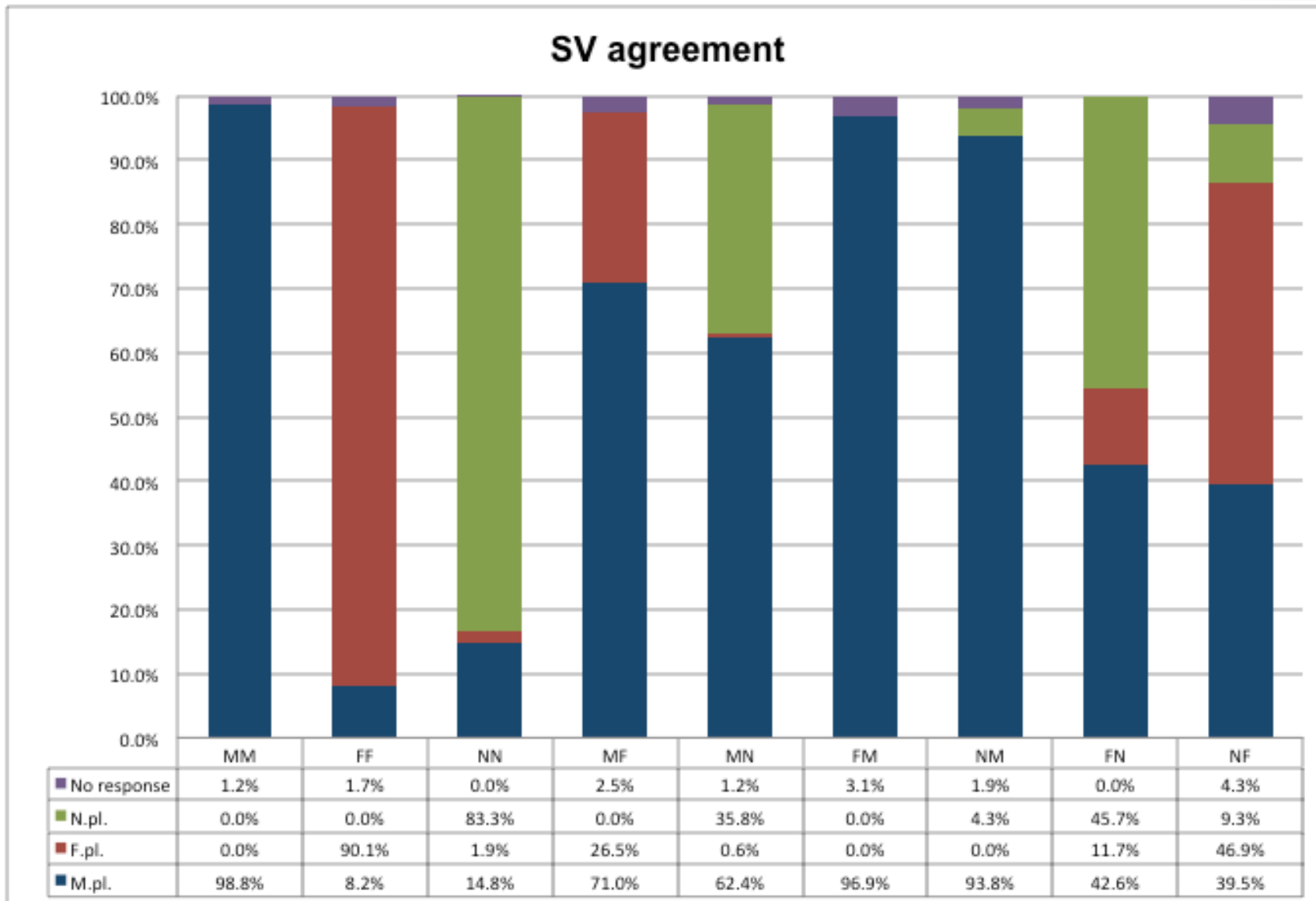
Zagreb, 2015 experiment

SV	M	F	N	No result
MM	98%	0%	0%	2%
FF	15%	78%	1%	6%
NN	15%	0%	85%	0%
MF	83%	16%	0%	1%
MN	52%	0%	47%	1%
FM	80%	2%	0%	18%
NM	76%	0%	6%	18%
FN	39%	6%	54%	1%
NF	51%	28%	18%	0%

Zagreb, 2016 experiment

SV	M	F	N	No result
MM	98.77%	0%	0%	1.23%
FF	8.02%	90.12%	0%	1.85%
NN	14.81%	1.85%	83.33%	0%
MF	70.99%	26.54%	0%	2.47%
MN	62.35%	0.62%	35.8%	1.23%
FM	96.91%	0%	0%	3.09%
NM	93.83%	0%	4.32%	1.85%
FN	42.59%	11.73%	45.68%	0%
NF	39.51%	46.91%	9.26%	4.32%

SV AGREEMENT ZAGREB 2016



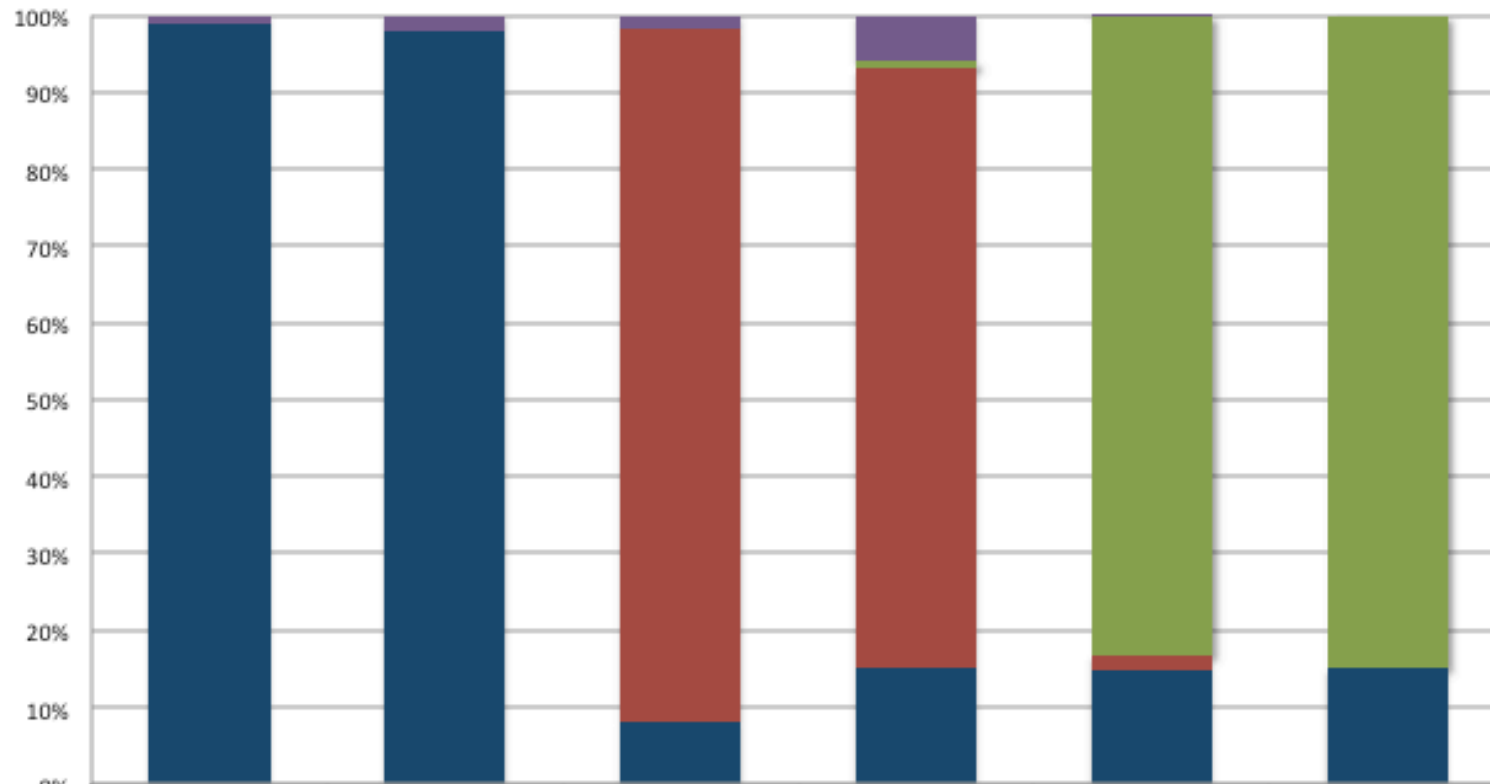
SAME GENDER COORDINATION

- ASSUMPTIONS

- If there are three/four agreement grammars (&P, HCA/FCA, CCA), we might expect them to occupy the same percentages (either 33.3% each or 25% each).
- However, N behaves differently in sg (N.SG+N.SG=M) and sometimes in plural
 - Pismo i pero su poslani. DEF
 - Pisma i pero su poslani. DEF
 - Pero i pisma su poslani. DEF
- Also, there is an option for F+F=M in singular !
 - ? Djevojčice i mačka su zaustavljeni. DEF

SAME GENDER COORDINATION

SV agreement - same gender

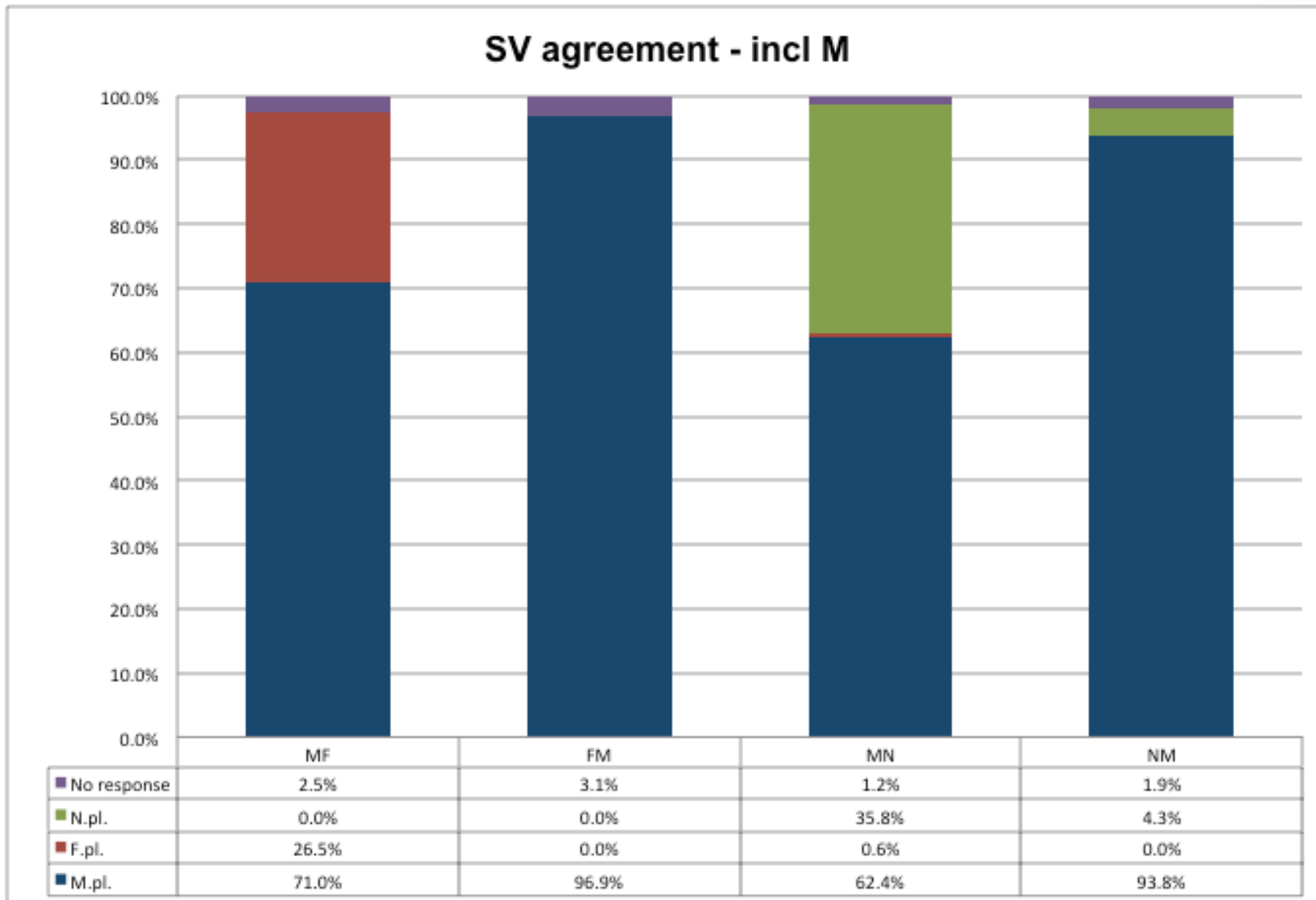


	MM		FF		NN	
	2016	2015	2016	2015	2016	2015
No response	1.2%	2.0%	1.7%	6.0%	0.0%	0.0%
N.pl.	0.0%	0.0%	0.0%	1.0%	83.3%	85.0%
F.pl.	0.0%	0.0%	90.1%	78.0%	1.9%	0.0%
M.pl.	98.8%	98.0%	8.2%	15.0%	14.8%	15.0%

DIFFERENT GENDER COORDINATION (with M)

- ASSUMPTIONS
 - MF, FM, MN, NM
 - expected difference between M in HCA/FCA and M in CCA
 - testing difference between F and N in CCA

DIFFERENT GENDER COORDINATION (with M)



DIFFERENT GENDER COORDINATION (with M)

- **FM – 96.9% M** MF – 71.0% M
- **NM – 93.8% M** MN – 62.4% M
 - Significant difference between M as HCA/FCA and M as CCA (combined difference approximately 95 : 66)
 - Insignificant result (so far) between F and N as CCA
- **Why do I think M matters?**
 - because compared to NN and FF conditions:
 - FF – 90.0 % F
 - NN – 83.3% N
 - M in FM and NM is almost at the ceiling, such as in MM (98.8%) !!!

DIFFERENT GENDER COORDINATION (with M)

- In HCA/FCA condition (MF/MN), M complies with **3 out of 4 mapping constraints**: HCA, FCA and &P (expect high percentage, around 75%)
 - WHAT WE GET?
 - MF – 71%
 - MN – 62.4%
- In CCA condition (FM/NM), M complies with **only 2 mapping constraints**: CCA and &P (expect lower percentage than in HCA/FCA)
 - WHAT WE GET?
 - FM – 96.9%
 - NM – 93.8%
- M in MF – 71% compared to 96.9% of M in FM
- M in MN – 62.4% compared to 93.8% of M in NM
- **RESULTS obviously and strongly point in the direction of CCA agreement!**

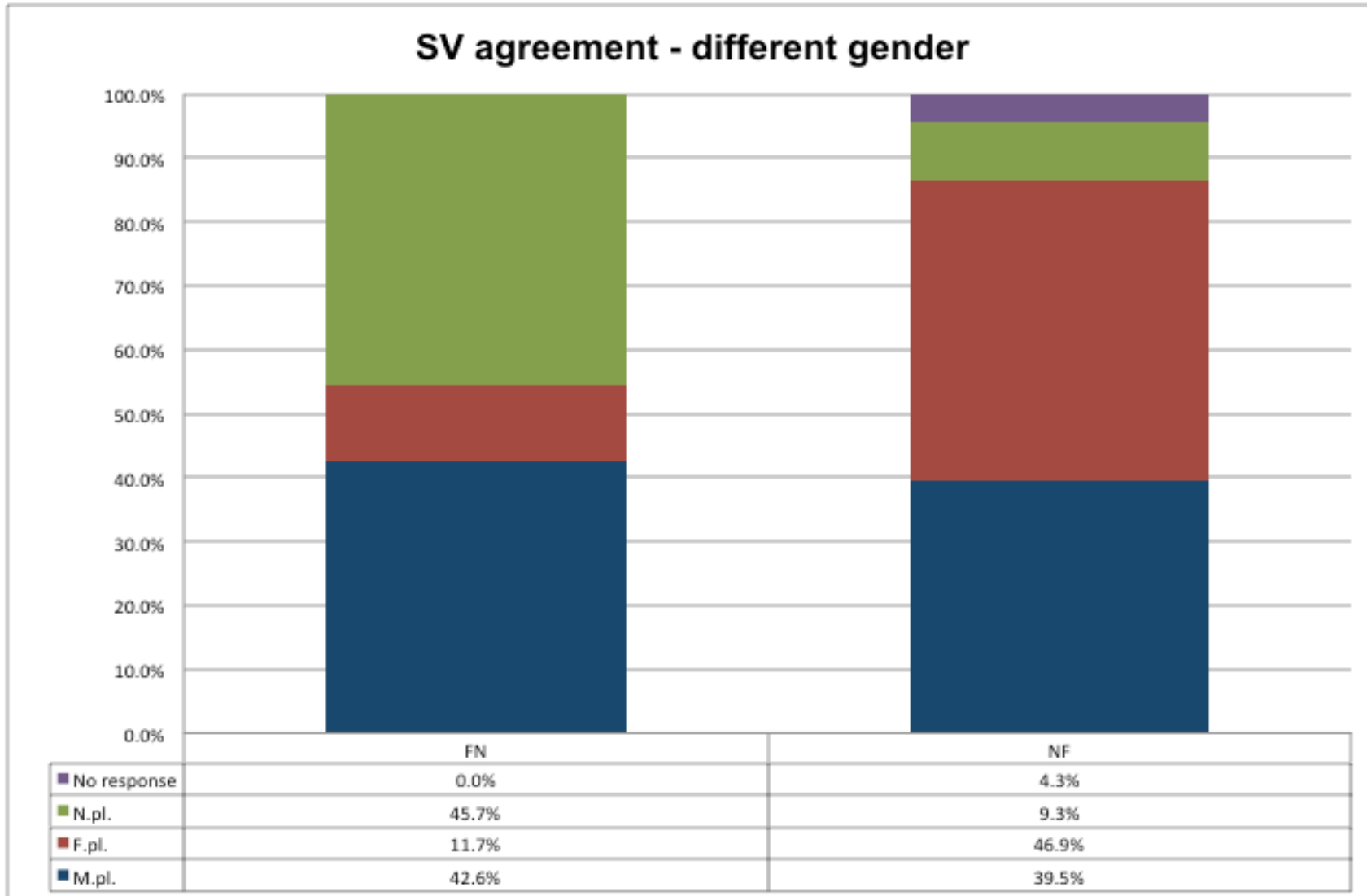
INTERIM CONCLUSIONS

- Same gender conjunct agreement and different gender conjunct agreement with M point to two conclusions:
 - **2. being Masc matters**
 - not insignificant number of Masc in Non-Masc conditions (FF and NN)
 - exceptionally high number of Masc in both +Masc condition (especially MF, MN)
 - **1. linearity matters**
 - percentage of M in CCA is significantly higher than in HCA/FCA
 - in comparison of HCA/FCA and CCA conditions, F and N gain some ground only in CCA condition

DIFFERENT GENDER COORDINATION (without M – only FN and NF)

- ASSUMPTIONS
 - FN and NF
 - all three agreement grammars expected
 - the same pattern expected for both conditions
 - after all, F in FN and N in NF expected to reach the lowest realization (because it's HCA/FCA)

DIFFERENT GENDER COORDINATION (without M – only FN and NF)



CONCLUSION

- THREE/FOUR STRATEGIES OF AGREEMENT among speakers and across them
- HCA somewhat sensitive to the value of gender (difference between N and F)
- CCA most widely spread agreement grammar, most efficient in terms of data integration



HVALA
EMSS team