

On the structure of coordination from the perspective of binding

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1. (And) Basic Observations and Problem

- Slavic languages (as well as others, such as Japanese, Turkish, Greek) have been observed to allow conjunction/disjunction doubling (cf. Szabolcsi 2018 and the references therein); where a coordinative element such as *i* 'and' (Macedonian, henceforth: MAC), *in* 'and' (Slovenian, henceforth: SLO) appears in front of each junct, see (1).
- In contrast to sentences that contain only one instance of a coordinating element, such as (2); sentences with double coordination give rise to distributive readings only.

- (1) a. I Petar i Marko kupija kniga. MAC
& Petar & Marko bought.3PL book
'Petar bought a book, and Marko bought a book.'
- b. In Peter in Marko sta kupila knjigo. SLO
& Petar & Marko aux.3Du bought book
'Peter bought a book, and Marko bought a book.'
- (2) a. Petar i Marko kupija kniga. MAC
Petar & Marko bought.3PL book
'Petar and Marko bought a book together.'
- b. Peter in Marko sta kupila knjigo. SLO
Petar & Marko aux.3Du bought book
'Petar bought a book, and Marko bought a book.'

- Conjunction doubling has been investigated in light of the syntactic and semantic properties of coordination (Kayne 1994; Progovac 1998, 1999; Mitrović 2015, 2021; Mitrović & Sauerland 2014, 2016; Haslinger & Schmitt 2019; Haslinger et al. 2023; among many others).
- However, its interaction with binding has not yet been extensively considered in the literature.
- In the South Slavic languages under discussion here, each of the conjuncts in conjunction doubled subjects can bind the possessive anaphor *svojot* (MAC) / *svoje* (SLO) 'SELF.POSS' in the object position:

- (3) a. [I Milan₁ i Marija₂]₃ go sakaat svojot_{1/2/*3} grad. MAC
& Milan & Marija it love.3PI refl.poss+the city
'Milan loves his own city and Marija loves her own city.'

b. [In Milan₁ in Marija₂]₃ ljubita svoje_{1/2/*3} mesto. SLO
 & Milan & Marija love.3DU refl.poss city
 'Milan loves his own city and Marija loves her own city.'

- We assume that this is an instance of bound variable binding (Heim & Kratzer 1998), which is observable due to sloppy identity readings, as shown in (4).

(4) a. [I Milan₁ i Marija₂]₃ go sakaat svojot_{1/2/*3} grad, a i Petar. MAC
 & Milan & Marija it love.3PI refl.poss+the city but and Petar
 'Milan loves his own city and Marija loves her own city, and so does Petar.'

b. [In Milan₁ in Marija₂]₃ ljubita svoje_{1/2/*3} mesto, a i Petar SLO
 & Milan & Marija love.3DU refl.poss city but and Petar
 'Milan loves his own city and Marija loves her own city, and so does Petar.'

- The anaphor in object position can only be co-referential with **both** referential instances from inside the coordination (that is, *Milan* and *Marija* in (5)).

(5) a. [Milan₁ i Marija₂]₃ go sakaat svojot_{*1/*2/3} grad. MAC
 Milan & Marija it love.3PI refl.poss+the city
 'Milan and Marija love their city.'

b. [Milan₁ in Marija₂]₃ ljubita svoje_{*1/*2/3} mesto. SLO
 Milan & Marija love.3Du refl.poss city
 'Milan and Marija love their city.'

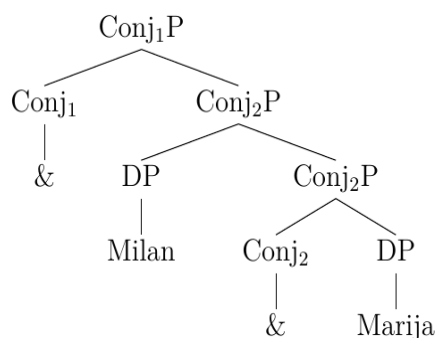
PROBLEM

Sentences like (3) are apparent Principle A (Chomsky 1981) violations:

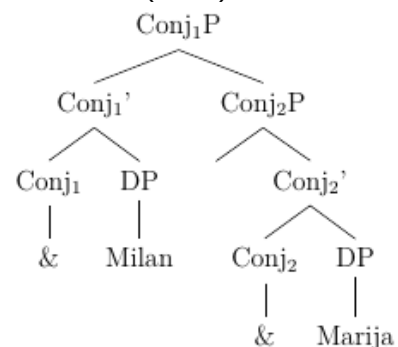
- The two conjuncts do not individually c-command the anaphor.
- Hence, the two conjuncts should not be able to (independently) co-refer with it.

- Regardless of which previous proposal on the structure of double conjunction we assume, the problem remains.

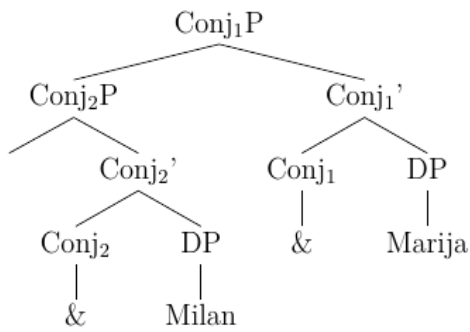
(6) a. Kayne (1994)



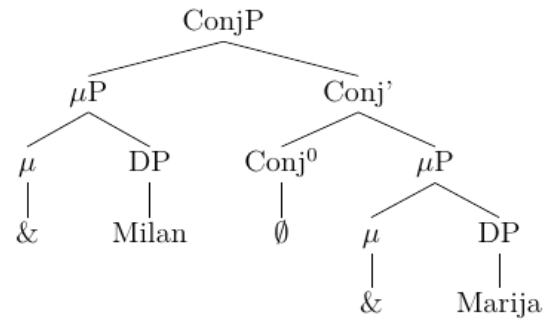
b. Collins (1988)



c. Progovac (1998)



d. Mitrović & Sauerland (2016)



MAIN RESEARCH QUESTIONS

- What allows such binding?
- Are there any equivalent constructions? If so, how similar are they?
- Where does the problem lie? Coordination, binding, or both?

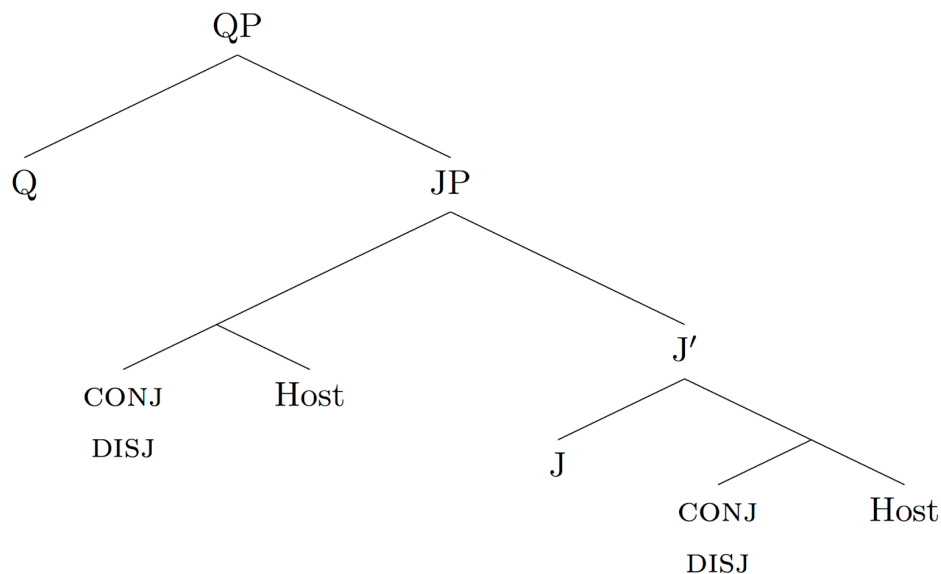
- We will primarily focus on Macedonian and Slovene (and at times English) and attempt to show that the conjuncts in conjunction doubling are quantificational expressions.
- The exact nature of these expressions is still unclear.
- **Binding is still a problem.**

2. Previous Analyses of Conjunction Doubling

2.1. Szabolcsi (2018)

- Argues that certain items (Q-particles) are uninterpreted, but signal the presence of an unpronounced contentful propositional quantifier external to the JP, as illustrated in (7).

(7)



- J is semantically neutral: forms ordered tuples > converted into sets (propositional alternatives).
- MO-particles (conjunction): conjunctive (universal) interpretation, as shown in (8).
- KA-particles (disjunction): disjunctive (existential) interpretation, as shown in (9).

(8) $\forall P = \lambda w. \forall p[p \in P \rightarrow p(w)]$

(9) $\exists P = \lambda w. \exists p[p \in P \wedge p(w)]$

- This system makes the correct prediction about sentences like (1), but it is unclear how it would work with sentences like (3), repeated here as (10).

- (10) a. [I Milan₁ i Marija₂]₃ go sakaat svojot_{1/2/*3} grad. MAC
 & Milan & Marija it love.3PI refl.poss+the city
 'Milan loves his own city and Marija loves her own city.'
- b. [In Milan₁ in Marija₂]₃ ljubita svoje_{1/2/*3} mesto. SLO
 & Milan & Marija love.3Du refl.poss city
 'Milan loves his own city and Marija loves her own city.'

- It is unclear how to ensure that the conjuncts and the anaphor have appropriate co-referential indices:
 - QR cannot apply internally to composed propositions.
 - QR does not ensure that the indices between the binder and the anaphor match (the anaphor would have the index of the coordination, not the individual conjuncts).

2.2. Mitrović (2021)

- Attempts to give a unified account of how the same item (*superparticle* - eg. Japanese -mo) can have a variety of meanings: FCI, NPI, Universal, Additive, and Conjunctive.
- We will exclusively focus on the conjunctive profile.
- Mitrovic's assumptions (following Chierchia 2013):
 - An alternative is an available possibility.
 - Everything is possible = every alternative is active.
 - μ (superparticle):
 - My host's alternatives are active.
 - Trigger EXH.
 - 'Run the Gricean reasoning iteratively.'
 - EXH:
 - $\llbracket \text{EXH} \rrbracket(p) = p \wedge \forall q \in \text{ALT}(p)[[p \neq q] \rightarrow \neg q]$
 - Attaches to proposition-level syntactic structure.
 - Iterative exhaustification occurs in conjunction doubling.

- $\llbracket \text{EXH} \rrbracket(\llbracket \text{EXH} \rrbracket) = \neg \text{EXH}$
- $[p \wedge \neg \text{EXH}(p)]$

- This system also makes the correct predictions about sentences like (1), as illustrated in (11).
- Note that the anti-exhaustive clause of each μP finds its alternative in the other μP (see Kobuchi-Philip (2008) and Szabolcsi (2015)).

(11) $\llbracket [\text{Petar bought a book} \wedge \neg \text{EXH}(\text{Petar bought a book})] \wedge [\text{Marko bought a book} \wedge \neg \text{EXH}(\text{Marko bought a book})] \rrbracket =$
 $\llbracket [\text{Petar bought a book} \wedge \text{Marko bought a book}] \wedge [\text{Marko bought a book} \wedge \text{Petar bought a book}] \rrbracket =$
 Petar bought a book \wedge Marko bought a book

- Once again, it is unclear how to ensure in sentences like (3) that the conjuncts and the anaphor have appropriate co-referential indices.

2.3. Haslinger et al. (2023)

- Attempt to give a unified account of the distributive/cumulative asymmetry possible with conjunction doubling:
 - Conjunction doubled structures only allow a distributive reading wrt. syntactically lower plural expressions, as illustrated in (12a).
 - Conjunction doubled structures allow a distributive and a cumulative reading wrt. a syntactically higher plural expression, as illustrated in (12b).

(12) a. I Petar i Marko napishaa knigi. MAC
 & Petar & Marko wrote.3PL book
 'Petar wrote books, and Marko wrote books.'

b. Decata gi nahranija i kuchinjata i machkite. MAC
 Kids+the them fed.3PL & dogs+the & cats+the
 Reading 1: The kids fed both the cats and the dogs.
 Reading 2: Kid A fed dog B and cat C, kid D fed dog E and cat F.

- Assumptions:
 - For any atomic semantic type a , there is also a type a^* (plural sets of type a).
 - Conjunctions of semantic categories denote pluralities (sums of atomic domain elements).
 - When a plural function combines with a non-plural argument, the result is a plurality by applying each atomic part of the function to the argument ('projects up').
 - A sentence denotes a plurality of plural sets of propositions.
 - A sentence denoting a plurality is true iff at least one plural set (and all its atomic parts) are true.

- Denotation of μ :
 - $[[\mu_{\langle e^*, \langle \langle e, a \rangle^*, a^* \rangle \rangle}]] = \lambda x^*_{e^*} . \lambda P^*_{\langle e, a \rangle^*} . C \langle P^*, x^* \rangle$
 - Arguments of μ :
 - A plural set of individuals.
 - A plural set of predicates.
 - C = rule of Cumulation Composition.
 - $\langle e, a \rangle^*$ ensures that cumulation is not possible with a plurality in the scope of the coordination.
 - This system makes the correct predictions about the distributive/cumulative asymmetry puzzle.
 - It is also unclear how to ensure in sentences like (3) that the conjuncts and the anaphor have appropriate co-referential indices.

2.4 Efremov & Marušič (2023)

- Argue that distributive binding cannot have a syntactic source and that the binding present in examples like (3) is an instance of bound variable binding.
- There is a silent universal quantifier above the coordination in conjunction doubled structures - see (13), where distributed binding is present with simple coordination due to the presence of a universal quantifier or a distributor.

- (13) a. [Peter₁ in Maja₂]₃ sta peljala SLO
 Peter & Maja aux.DU rode
 vsak svoje_{1/2/*3} kolo. (Efremov & Marušič 2023: 18)
 each refl.poss bike
 'Peter and Maja each rode their own bike.'
- b. [Peter₁ in vse punce₂]₃ vozijo svoje_{1/2/*3} kolo. SLO
 Peter & all girls ride refl.poss bike
 'Peter and all the girls ride their bikes.'
- c. [Petar₁ i site devojki₂]₃ go vozat svojot točak. MAC
 Petar i all+the devojka it ride.3PL refl-poss bike
 'Petar and all the girls ride their own bikes.'

- This system, too, makes the correct predictions about sentences like (1), but it is unclear how to ensure in sentences like (3) that the conjuncts and the anaphor have appropriate co-referential indices.

IN SUM

- The distributed binding found in (3) is not possible.

3. Proposal

- We will pursue that:
 - Conjunction particles carry quantificational force.
 - There is no silent quantifier external to the coordination.
 - The nature of the doubled items points to whether there is conjunction or disjunction.
- Distributive binding is present as long as there is a quantifier internal to the conjunction doubled structures, as shown in (14).

- (14) a. Every dog and cat ate their food.
b. Sekoe mache i kuche ja izede svojata hrana. MAC
Every cat and dog it ate.3SG refl.poss+the food
'Every cat and dog ate their food.'
c. Vsaka mačka in pes so jedli svojo hrano. SLO
Every cat and dog are.3PL eaten refl.poss food.ACC
'Every cat and dog ate their food.'

- We suggest that these structures are equivalent to the conjunction doubled ones (as long as they appear in subject position, but see below), such that each conjunction carries some sort of quantificational force.
 - This equivalence is observable in two regards:
 - Homogeneity.
 - Exceptives.
 - Quantificational expressions lack homogeneity effects, unlike plural DPs, as the contrast between (15) and (16) shows.
 - Note that the properties of the quantificational expressions determines the nature of the exceptions:
 - *Every x and y* = exception wrt. each conjunct in the coordination, as shown in (16b).
 - *Both x and y* = exception wrt. to the whole coordination, as shown in (16d).
- (15) a. Bela did not bite Martin and Marta. #She only bit Marta.
(16) a. Bela did not bite every boy and girl. #She only bit Marta.
b. Bela did not bite every boy and girl. She only bit Martin and Marta.
c. Bela did not bite both the boys and the girls. #She only bit Martin and Marta.
d. Bela did not bite both the boys and the girls. She only bit the boys.
- We find an almost identical contrast with conjunction doubled structures, as shown in (17 - 19).

(17) Plural DPs:

- a. Bela ne gi kasna Martin i Marta. MAC
Bela Neg them bit.3SG Martin & Marta.
#Ja kasna samo Marta.
It bit.3SG only Marta.
'Bela did not bite Martin and Marta. She only bit Marta.'
- b. Bela ni ugriznila Martina in Marte. SLO
Bela Neg bit.3SG Martin & Marta
#Ugriznila je samo Marto.
Bit.3SG Aux only Marta
'Bela did not bite Martin and Marta. She bit only Marta.'

(18) Conjunction Doubling (behaves like *both x and y*):

Exception wrt. each conjunct.

- a. Bela ne gi kasna i devojchinjata i momchinjata. MAC
Bela Neg them bit.3SG & girls+the & boys+the.
#Gi kasna samo Martin i Marta.
Them bit.3SG only Martin & Marta.
'Bela did not bite both the boys and the girls. She only bit Martin and Marta.'
- b. Bela ni ugriznila in fantov in punc. SLO
Bela Neg bit.3SG & boys & girls
Ugriznila je samo Martina and Marto.
Bit.3SG Aux. only Martin & Marta
'Bela did not bite both the boys and the girls. She only bit Martin and Marta.'

✓ Exception wrt. to the whole coordination.

- c. Bela ne gi kasna i devojchinjata i momchinjata. MAC
Bela Neg them bit.3SG & girls+the & boys+the.
Gi kasna samo momchinjata.
Them bit.3Sg only boys.
'Bela did not bite both the boys and the girls. She bit only the boys.'
- d. Bela ni ugriznila in fantov in punc. SLO
Bela Neg bit.3SG & boys & girls
Ugriznila je samo fante.
Bit.3SG Aux. only boys
'Bela did not bite both the boys and the girls. She bit only the boys.'

(19) Conjunction doubling + every (behaves like *every x and y*):

- a. Bela ne go kasna i sekoe devojche i sekoe momche MAC
Bela not it bit.3SG & every girl & every boy
Samo gi kasna Martin i Marta.
Only them bit.3SG Martin & Marta.
'Bela did not bite every boy and girl. She only bit Martin and Marta.'

b. Bela ni ugriznila vsakega fanta in vsake punce. SLO
 Bella Neg bit.3SG every girl and every boy
 Ugriznila je samo Martina in Marto.
 Bit.3SG Aux only Martin and Marta
 'Bela did not bite every boy and girl. She only bit Martin and Marta.'

- The conjuncts are quantificational expressions, but their exact nature is unclear.

INSERT FINAL DATA PIECE HERE.

- Problem: we still do not have the distributed binding.
- Potential solution: binding between a quantificational expression and a co-varying anaphor requires scope, not c-command (Barker, 2012; Déchaine & Wiltschko; 2017).

4. Conclusion and Open Questions

- Conjunction doubling in some way or another is inherently quantificational.
- Binding must be revised.
- Beyond DPs: conjunction doubling in Macedonian and Slovene is possible with vPs, TPs, CPs, PPs, ADJPs, ADVPs.
- Which other constructions are equivalent to conjunction doubling?

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LM: Why is it that Szabolcsi and E&M don't predict binding facts? I'm not sure I get the problem.

- h. Bela ni ugriznila ne fantov ne deklet.
Bela NEG.AUX.3SG bitten NEG boy.PL.GEN NEG girl.PL.GEN

- We are still unsure how to treat the difference between (14d) and (15g).

- (20) Bafi didn't bite the two kids, # only Marta.
(21) Bafi didn't bite every girl, only Marta.
(22) Bafi ne gi kasna dvete deca, # samo Marta.
(23) Bafi ne go kasna sekoe devojche, samo Marta.

DEFINE CONTEXTS

- (24) Bafi did not bite every boy and girl, # only Marta.
(25) Bafi did not bite every boy and girl, only Marko and Marta.
(26) Bafi ne go kasna sekoe momche i devojche, # samo Marta.
(27) Bafi ne go kasna sekoe momche i devojche, samo Marko i Marta.
(28) Bafi ne gi kasna Martina i Marta, # samo Marta.
(29) Bafi ne gi kasna i Martina i Marta, tuku samo Marta.

Bello did not bite every girl and every boy. He only bit Maria.

Bello hat nicht jedes Mädchen und jeden Buben gebissen. Er hat nur Maria (und Hans) gebissen.

- conjunction = LIFT.
- conjunct = $\langle\langle e, t \rangle, t \rangle$
- coordination of each conjunct ($\langle\langle e, t \rangle, t \rangle$) = $\lambda Q.Q(M)$ and $\lambda Q'.Q'(M)$
- Homogeneity effects: show the parallelisms.

1. Marko didn't read the books and the articles. (none of them)
2. Marko didn't read every book and every article (exceptions internal to each set).
3. Marko didn't read all the books and all the articles (exceptions internal to each set/in fact, he read only the articles).
4. Marko ne gi prochita knjigite i statiite. (none of them).
5. Marko ne ja prochite sekoja knjiga i sekoja statija. (exceptions internal to each set).
6. Marko ne gi prochite site knjige i site statiii. (exceptions internal to each set/in fact he only read one of the two).
7. Marko ne gi prochite i knjigite i statiite (in fact he only read one of the two).