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Toward a phonological approach to the edges of NPs

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ABSTRACT. Building upon Bošković's (2019) analysis of the Coordinate Structure Constraint (CSC), this paper extends the empirical domain to rightward extraction of a rightward conjunct and that from the right edge. I will show that grammatical examples of rightward extraction exhibit prosodic effects, which suggests that Bošković's analysis of the CSC should apply only to leftward extraction, and more broadly, that linear order should matter in the computation of human language.*

Keywords: Coordinate Structure Constraint (CSC), edge, intervention effect, left branch extraction, linear order

1. Introduction

Bošković (2019) (B, henceforth) shows that part of the Coordinate Structure Constraint (CSC), namely (1a), holds only for successive-cyclic movement, as in (1b): elements that are base-generated at the edge of a conjunct, or move there independently of successive-cyclic movement, can extract (e.g. (6), (7) in 2.1 below).

(1) a. Extraction out of conjuncts is disallowed.
b. *Who$_i$ did you see [t_i friends of t_i] and Sue? (B: 71)

The implicit assumptions seem to be that (i) elements that are based-generated at the *left* edge of a conjunct, or move *leftward* there independently of successive-cyclic movement, can extract *leftward*, and hence (ii) linear order is indispensable in the syntactic component. It seems so because the data dealt with involve only *leftward* extraction of an element at the *left* edge, which is often the case with the literature that deals with the "edge" at all (e.g. left branch extraction in Serbo-Croatian (Despić 2013), article-incorporation in Galician (Uriagereka

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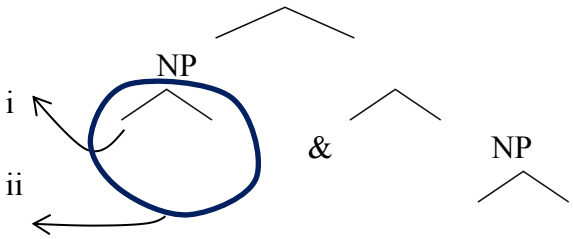
1988), V-2 movement in German (Johnson 2002), quantifier-float in Japanese (Watanabe 2006)).

This paper examines these assumptions by looking at not only (2a) leftward extraction from the left-edge of an NP or that of a left conjunct which Bošković discusses, but also (2b)-(2d) below. I will show that the case of (2b-ii), leftward extraction of a right conjunct, provides more examples of intervention effects B discusses, and the rightward extraction examples of (2c) and (2d) exhibit prosodic effects, implying that B's analysis should apply only to the "leftward" extraction from the "left" edge.[1]

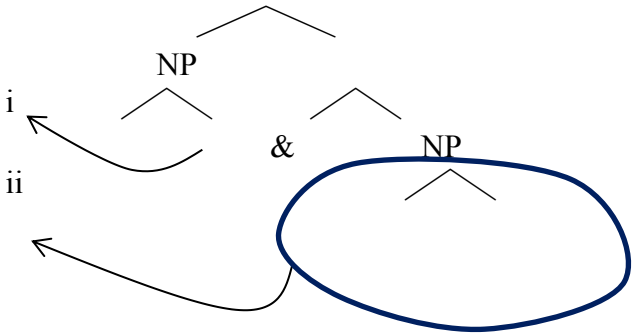
(2) a. Leftward extraction from the left-edge of an NP or of a left conjunct

i. from the left edge ii. of a left conjunct



b. Leftward extraction from the right-edge of an NP or of a right conjunct

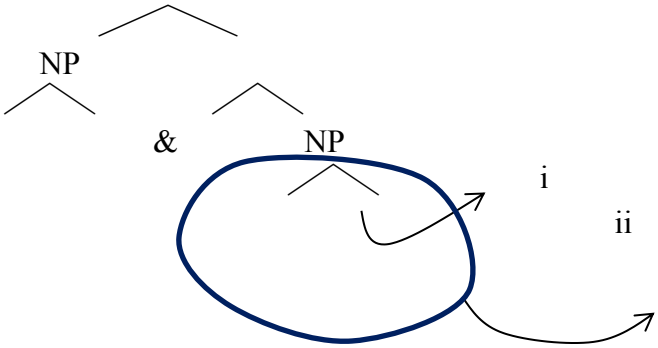
i. from the right-edge ii. of a right conjunct



[1] The cases depicted in (2) do not exhaust all the possible patterns. Namely, when they refer to the extraction from the edge of an NP, the NP can be a left conjunct or a right conjunct. We leave the rest of the cases (e.g. the extraction from the right edge of a left conjunct) for future work.

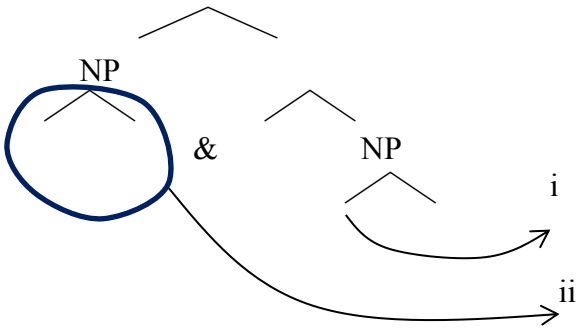
c. Rightward extraction from the right-edge of an NP or of a right conjunct

i. from the right-edge ii. of a right conjunct



d. Rightward extraction from the left-edge of an NP or of a left conjunct

i. from the left-edge ii. of a left conjunct



2. Bošković's (2019) syntactic approach to the extraction from the left-edge of NPs

2.1 Deduction of Coordinate Structure Constraint (CSC)

Bošković (2019) argues that the CSC is deduced in the following way: Movement from the conjunct must proceed successive-cyclically through the conjunct edge. Take the *wh*-interrogative sentence in (3a) as an example. This movement, which involves merger of *who* and the conjunct DP, yields an unlabeled object as in (3b). As a result of the movement, the conjuncts differ in their categorial status: the second conjunct is a DP while the first one is ? (it is unlabeled). (3a) is then ruled out by Coordination-of-Likes requirement (CL) in (4c), which requires conjuncts to be parallel in their categorical status (B: 72).

(3) a. * Who$_i$ did you see [enemies of t$_i$] and John?

b. [$_{ConjP}$ [$_?$ who$_i$ [$_{DP}$ enemies of t$_i$]] and [$_{DP}$ John]] (B: 72)

Assumptions behind Bošković's account, including CL, are shown in (4):

(4) a. Phases and Phase Impenetrability Condition (PIC)
Movement must proceed via phase edges (and conjuncts are phases).
b. Labels
Unlabeled objects during the derivation are allowed, which makes successive-cyclic movement possible (Chomsky 2013).
c. Coordination-of-Likes (CL)
Conjuncts must be parallel in their categorial status. (B: 71-72)

Let us look at some pieces of supporting evidence for B's analysis. First, B's analysis of CSC correctly rules in the across-the-board (ATB) extraction because the ATB extraction does not give rise to a CL violation.

(5) Supporting Evidence 1: ATB extraction
a. Who$_i$ did you see [friends of t_i] and [enemies of t_i]?
b. [$_{ConjP}$ [$_?$ who$_i$ [$_{DP}$ friends of t_i]] and [$_?$ who$_i$ [$_{DP}$ enemies of t_i]]]
(B: 72)

Secondly, his analysis also correctly rules in left branch extraction in Serbo-Croatian (SC), in which the extracted element is base-generated at the left edge of an NP and does not have to adjoin to the left edge of the left conjunct.

(6) Supporting Evidence 2: Left branch extraction in SC[2]

? Markovog$_i$	je	on	[t_i	prijatelja]	i	[Ivanovu
Marko's$_{ACC.MASC.SG}$	is	he		friend$_{ACC.MASC.SG}$	and	Ivan's$_{ACC.FEM.SG}$
sestru]	vidio.					
sister$_{ACC.FEM.SG}$	seen					

'He saw Marko's friend and Ivan's sister.' (B: 73)

[2] Abbreviations used in this paper are the following: ACC =accusative, CL = classifier, DAT = dative, FEM = feminine, GEN = genitive, MASC = masculine, SFP = sentence final particle, SG = singular, TOP = topic.

Thirdly and similarly, scrambling out of the first conjunct is allowed in Japanese when the scrambled element is base-generated at the left edge and does not have to adjoin to the left edge of the left conjunct.

(7) Supporting Evidence 3: scrambling and quantifier float in Japanese

Ringo-o$_i$	Taro-wa	[t$_i$	san	ko]	to	[banana-o	ni	hon]	
apple-$_{ACC}$	Taro-$_{TOP}$		3	CL	and	banana-$_{ACC}$	2	CL	
tabeta.									
ate									(B: 73)

2.2 Conjuncts as contextually determined phases

One of the assumptions in B has to do with conjuncts as phases (cf. (4a)). Namely, Bošković argues that conjuncts are contextually determined phases (Bošković 2014, B: 75), and each conjunct should be a phase even when the relevant phrase otherwise would not be a phase (e.g. IP), as exemplified in (8).

(8) * I wonder [$_?$ what$_i$ Betsy purchased t$_i$] and [$_{IP}$ Sally advertised it].

Furthermore, he assumes that ConjP's islandhood is voided due to movement of an island head, i.e. coordinator (Bošković 2013, B: 78). For example, extraction of the first conjunct is possible in Serbo-Croatian (SC) and Japanese, where the coordinator is a clitic and incorporates into the adjacent conjunct (see Oda 2017 for related discussion on Japanese data).

(9) Extraction of conjuncts in SC and Japanese

a.

? Knjige$_i$	je	Marko	[t$_i$	i-	filmove]	kupio.
books	is	Marko		and	movies	bought

'Marko bought books and movies.'

b.

? Kyoodai$_i$-to	kanojo-wa	[t$_i$	Toodai]-ni		
Kyoto.Univ.-and	she-$_{TOP}$		Tokyo.Univ.-$_{DAT}$		
akogareteiru.					
admire					

'She admires Kyoto University and Tokyo University.'

(B: 77, (9b) based on Oda 2017)

2.3. Intervention effects

Based on the observation that left branch extraction in SC is possible only from the first conjunct, as is shown in the contrast in (6) (repeated below) and (10), B concludes that the *higher*, first, conjunct causes an intervention effect (B: 77).

(6) ? Markovog$_i$ je on [t_i prijatelja] i [Ivanovu
Marko's$_{ACC.MASC.SG}$ is he friend$_{ACC.MASC.SG}$ and Ivan's$_{ACC.FEM.SG}$
sestru] vidio.
sister$_{ACC.FEM.SG}$ seen
'He saw Marko's friend and Ivan's sister.' (B: 73)

(10) * Ivanovu$_i$ je on [Markovog prijatelja]
Ivan's$_{ACC.FEM.SG}$ is he Marko's$_{ACC.MASC.SG}$ friend$_{ACC.MASC.SG}$
i [t_i sestru] vidio.
and sister$_{ACC.FEM.SG}$ seen (B: 77)

In the next section, we will consider whether B's syntactic approach to CSC is strictly structural, or is sensitive to linear order and applicable only to the *leftward* extraction from the *left*-edge. This research question is embedded into a broader question of whether linear order is dispensable or not in the computation of human language.

3. Extraction from the edges of NPs

3.1 Summary of Bošković's (2019) observations and predictions

Let us summarize B's observations on CSC that we saw in section 2, and consider predictions regarding *rightward* extractions from the *right* edge.

(11) Bošković's (2019) observations

edge-direction		B's observations (language)
(2a) L-L	i. from left conjunct	√ (SC (6), Japanese (7))
	ii. of a left conjunct	√ (SC 9a), Japanese (9b)
(2b) R-L	i. from the right-edge	* (English (3b))
	ii. of a right conjunct	---
(2c) R-R	i. from the right-edge	---
	ii. of a right conjunct	---
(2d) L-R	i. from the left-edge	---
	ii. of a left conjunct	---

("---" indicates that the relevant data is missing.)

(12) Predictions

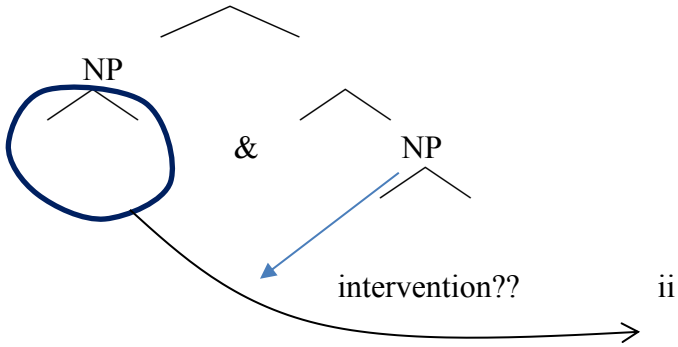
a. Re (2b-ii): Leftward extraction from the right-edge of a right conjunct should be prohibited due to an intervention effect (whether structurally or linearly).

b. Re (2c) and (2d): If linear constraints do not apply in syntax, rightward extraction from the right-edge or of a right conjunct should be possible, as (2a).

c. Re (2d-ii): an intervention effect is not expected structurally, but is expected linearly.

As is seen in the prediction in (12c), (2d-ii) will be the crucial case to see whether the syntactic component is sensitive to linear order or not. This is because in (2d-ii), the case of rightward extraction of a left conjunct, the extraction is downward, over the second conjunct in a lower position, and hence does not correspond to the "structural" intervention effect which a *higher* element causes (see 2.3). The second conjunct, however, does intervene between the first conjunct and its landing site in terms of linear order, and hence should cause a "linear" intervention effect.

(2) d. Rightward extraction from the left-edge of an NP or of a left conjunct



Therefore, if (2d-ii) is ungrammatical, the intervention effect responsible for the ungrammaticality should be linear in nature, rather than structural.

3.2. Leftward movement of a right conjunct (2b-ii)

Leftward movement of a *right* conjunct is prohibited in SC (13a) and Japanese (13b), which provide more examples of the intervention effects that B discusses.

(13) a. * I-filmove je Marko [knjige t_i] kupio.
and-movies is Marko books bought
'Marko bought books and movies.'

b. * Toodai$_i$-ni kanojo-wa [Kyoodai-to t_i]
Tokyo. Univ.-DAT She-TOP Kyoto.Univ.-and
akogareteiru.
admire
'She admires Kyoto University and Tokyo University.'
(Oda 2017: 351)

Note that the assumption regarding Japanese ConjP (&P) here is that it is head-initial, or more generally, ConjP is universally head-initial (Zwart 2005, Oda 2017: 352), despite the fact that Japanese is strictly head-final elsewhere. With this assumption, the left conjunct *Kyoodai-to* is in a higher position than the right conjunct *Toodai-ni*, and hence causes a structural intervention effect.

3.3 Rightward extraction from the right-edge of an NP or of a right conjunct (2c), and from the left-edge of an NP (2d-i)

Rightward extraction of the head noun of the second conjunct is possible in SC (14a) and English (14b), only if the dislocated N carries prosodic prominence (indicated by underscore) in the former and the adverbial phrases that is shifted over is prosodically "isolated from the rest of the sentence by long pauses" (an English informant, p.c., 3 February 2023) in the latter. It does not seem possible in Japanese (14c) no matter how we control the prosody of the sentence.

(14) a. ? On je [Markovog prijatelja] i [Ivanovu t_i]
he is Marko's friend and Ivan's
vidio sestru$_i$.
seen sister
'He saw Marko's friend and Ivan's sister.'

b. [Hiro was tidying up his parents' house.]
It seems that he decided to throw away [his father's notebooks]
and [his mother's t_i], on the next garbage day, [old collections
of cooking recipes]$_i$.

c. ?* Kare-wa Hiro-no yuujin-to [Koto-no t_i],
he-TOP Hiro-GEN friend-and Koto-GEN
atta, imoto$_i$-ni.
met sister-DAT
'He met Hiro's friend and Koto's sister.'

The ungrammaticality of (14c) might be due to a general ban on enclitics being followed by a trace (e.g. *I know where$_i$ John is/*John's t_i*, cf. Kaisse 1983). In (14c), the genitive *-no* is followed by the trace of the NP, *imoto$_i$-ni*.

A similar observation holds for movement of a right conjunct.

(15) a. Marko je [knjige t_i] kupio i-filmove$_i$.
Marko is books bought and-movies
'Marko bought books and movies.'

b. It seems that he decided to throw away [his father's notebooks t_i]
on the next garbage day, [and his mother's old collections of
cooking recipes]$_i$.

c. ??Kanojo-wa [Toodai-to t_i] akogareteiru,
she-TOP Tokyo.Uni.-and admire

Kyoodai$_i$-ni.
Kyoto.Univ.-DAT
'She admires Tokyo University and Kyoto University.'

Rightward extraction from the left-edge of an NP, i.e. rightward left branch extraction (LBE), also exhibits prosodic effects.

(16) a. ?? On je [Markovog prijatelja] i [t$_i$ sestru]
he is Marko's friend and sister
vidio Ivanovu$_i$.
seen Ivan's
'He saw Marko's friend and Ivan's sister.'

b. It seems that he decided to throw away [t$_i$ notebooks] on the next garbage day*(,) his father's$_i$.

c. John-ga [t$_i$ kaban]-o kakusita yo, [Hanako-no]$_i$.
John-NOM bag-ACC hid SFP Hanako-GEN
'John hid Hanako's bag.' (Kato 2007: 42)

Notice here that rightward LBE is possible in Japanese as in (16c), where the extracted element at the right edge is separated by the preceding part with a pause, gets deaccented, and is interpreted as an afterthought.

3.4 Rightward extraction of a left conjunct (2d-ii)

Rightward extraction of a left conjunct is prohibited in SC (17a) and English (17b) regardless of the prosody of the resulting sentence, but marginally possible in Japanese (17c).

(17) a. * Marko je [t$_i$ i-filmove] kupio knjige$_i$.
Marko is and-movies bought books
'Marko bought books and movies.'

b. * It seems that he decided to throw away [t$_i$ and his mother's old collections of cooking recipes](,) on the next day(,) [his father's notebooks]$_i$.

c. ?? Kanojo-wa [t$_i$ Kyooda$_i$]-ni akogareteiru,
she-TOP Kyoto.Univ.-DAT admires
[Toodai-to]$_i$.
Tokyo.Univ.-and

As is the same case with (16c), the Japanese example (17c) is possible only if the extracted element at the right edge is separated by the preceding part with a pause, gets deaccented, and is interpreted as an afterthought.

4. Toward a phonologically based approach

In sections 3.2-3.4, we have seen that the acceptable examples involving rightward extraction exhibit prosodic effects. In this section, we will consider what these prosodic effects imply for the relationship between syntax and phonology, or the role that linear order plays in the computation of human language.

4.1 Right-edge

If rightward movement is syntactic, and the syntactic structure, or at least ConjP or DP/NP, is right-branching across languages (Kayne 1994), the examples we saw in 3.3 suggest that rightward, downward movement should be possible in syntax. If rightward movement is prohibited in syntax for theoretical reasons, as is assumed in e.g. Kayne (1994), rightward movement could be phonological. In fact, the prosodic effects observed for these examples suggest that rightward movement should be phonological, and phonologically conditioned. In English, for example, the rightward-movement sentence is acceptable only if the rightward-extracted element is separated from the preceding part by a pause.

Furthermore, recall that the example of leftward movement of a left conjunct in SC (9a) (repeated below) is more or less acceptable, whereas that of rightward movement of a left conjunct in SC (17a) (repeated below) is ungrammatical. This contrast suggests that intervention effects should be captured in terms of linear order, not structure.

(9) a ? Knjige$_i$ je Marko [t_i i- filmove] kupio.
books is Marko and movies bought
'Marko bought books and movies.'

(17) a. * Marko je [t_i i-filmove] kupio knjige$_i$.
Marko is and-movies bought books
'Marko bought books and movies.'

This is because in the case of rightward extraction of the left conjunct, the extraction moves over the second conjunct in a lower position, and hence does not correspond to the "structural" intervention effect B discusses (see 3.1).

4.2 Phonologically conditioned left-branch extraction

Although Bošković shows LBE in SC as supporting evidence for his analysis of CSC (see 2.1), SC is exceptional in this regard. In fact, English is subject to the Left Branch Condition (LBC) (Ross 1967), and does not allow LBE (**Whose did you see father*?), against B's prediction. Shiobara (2016, 2019, 2020) provides a phonologically based analysis of LBE in (18).

(18) Left branch extraction is filtered out at the syntax-prosody interface unless the resulting sentence exhibits a high-low-high melody. (Shiobara 2020: 11)

In SC for example, the leftward-extracted element exhibits high tone, followed by low tone, and then the element remaining within the NP exhibits high tone, resulting in high-low-high melody. For the LBE sentences like (19), a Croatian informant commented that they "sound poetic" (p.c., 5 February 2023), which seems to be due to the high-low-high melody (Shiobara 2019, 2020). A similar observation holds for LBE in Japanese, but not in English (Shiobara 2019, 2020).

(19) a.

H	L		H
Cijeg	si	vidio	oca?
whose	are	seen	father

'Whose father did you see?' (Shiobara 2020: 6)

b.

H	L		H			
Markovog$_i$	je	on	[t_i	prijatelja]	i	[Ivanovu	sestru]
Marko's	is	he		friend	and	Ivan's	sister

vidio.
see
'He saw Marko's friend and Ivan's sister.'

The accent shift observed in SC seems relevant to this issue. As is seen in (20), proclitics in SC can take over the falling accent from the first syllable of the host, and Talić (2015) establishes the generalization that a proclitic can take over the accent from its host only if the host is allowed to move independently (Oda 2017: 346). As the contrast in (21) shows, the availability of accent shift corresponds to that of LBE. When there are two descriptive adjectives as in (21a), the P and the first A cannot move and accent shift is not observed on the

P. In contrast, when there is only one descriptive adjective as in (21b), the P and the A can move and accent shift is also possible (Oda 2017: 346-347).

(20) u nòvu → ù-novu
in new in-new

(21) a. * [U novoj]$_i$ je on [t_i velikoj kući] živio.
in new is he big house lived
'He lived in a new big house.'

b. [Ù novoj]$_i$ je on [t_i bratovu kuću] kupio.
in new is he brother's house bought
'He bought his brother's new house.'
(Stjepanović 2014, as cited in Oda 2017: 346-347)

Thus, it seems to be the case that whether a language is subject to LBC or not has to do with the general prosodic property of the language. I leave for future research the issue of whether leftward extraction from the edge in general, i.e. (2a) and (2b), is subject to the phonological condition.

5. A broader picture: Remaining issues and theoretical implications

5.1 Toward a phonological analysis of edges

In section 4, we saw that something phonological is going on in the case of "rightward" extraction, which is not a new observation of the present paper. However, it has not yet been clearly established how we could theoretically formulate such phonological effects in terms of the architecture of the language faculty. At this point, one of the possible directions to pursue is Bruening's (2015) approach to non-constituent coordination. He proposes that "ellipsis targets a syntactic/ prosodic } unit XP and deletes all but the head of XP, where the head of XP is the most prominent { syntactic/prosodic } sub-constituent of XP. This is at least consistent with our observations in 3.3-3.4 that a right-dislocated element is prosodically prominent.

5.2 Why "asymmetry" in human language?

If linear order, or "left" or "right", matters in the syntax component at all, the question arises why this is so. In this regard, we cannot avoid referring to Kayne (1994). The main ingredients of Kayne's proposal are summarized as follows:

(22) Kayne (1994)

a. Kayne proposes that "asymmetric c-command invariably maps into linear precedence" (p.3).
b. "[Specifier]-head-complement, and not the reverse, is the only order available to the subcomponents of a phrase" (p.36).
c. "The S-H-C property of UG, as well as the fact that UG does not make both orders [SVO and OVS] available, is thus seen to be ultimately related to the asymmetry of *time*" (p.38, italic mine).[3]

A case relevant to the present discussion comes from evidence for asymmetry between conjoined elements, A & B. In (23), the observation is that when we have different groupings of three conjuncts, the second conjunct *Demetrius* is prosodically longer in (2b) than in (2a), suggesting that there exists an asymmetry between A and B.

(23) a. ø(Lysander and ø(Demetrius and Hermia))
b. ø(ø(Lysander and Demetrius) and Hermia)
(Wagner 2005, as cited in Tokizaki 2022)

Zwart (2009) shows "a fundamental and universal asymmetry between the members of a binary noun phrase coordination, such that the relation between the two conjuncts is invariably marked on the second conjunct" (p.1589). He argues that the asymmetry between members of sister pairs involves both phonological and semantic dependence, suggesting that the asymmetry originates within the central syntactic component of grammar. Furthermore, Asada (2019) shows that even in Japanese Sign Language, in which more than one articulator is available, the conjoined elements are not articulated simultaneously. There is no doubt that coordination is a promising place to examine further when we would like to approach the issue of linguistic asymmetry.

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