Experimenting with Highest Conjunct Agreement under Left Branch Extraction

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1. Introduction

A debate has developed in the recent theoretical and experimental linguistic literature on the status and the locus of conjunct agreement in South Slavic (SS; Marušič et al. 2007, Bošković 2009, Franks & Willer Gold 2014, Puškar & Murphy 2015; Marušič et al. 2015 and Willer-Gold et al. 2016). One of the pertinent issues of the debate is the status of Highest Conjunct Agreement – agreement with the hierarchically highest conjunct (NP1) – in sentences with a preverbal subject. The question around which the debate revolves is a basic one: Is there Highest Conjunct Agreement (HCA) in Bosnian/Croatian/Serbian (BCS), and how is it blocked, or derived, respectively?

A standard view is that agreement emerges in syntax, when an unvalued Probe searches in its local domain for a Goal matching in features (Chomsky 2001). As the Probe only sees c-commanded Goals, a hierarchical locality of the Goal is one of the crucial prerequisites for agreement to obtain. Therefore, assuming an asymmetrical structure for a coordination phrase, agreement with a hierarchically highest conjunct is theoretically predicted to be a prominent agreement option (Benmamoun 1992, Munn 1999, Bošković 2011; Zeijlstra 2013; Preminger 2014; den Dikken 2014).

HCA has been argued to surface in Slovenian (Slo) and BCS when a coordinated subject is in the postverbal position, but only in Slovenian when it is preverbal (Marušič et al. 2015, Bošković 2009). Blocking of preverbal HCA in BCS has been argued to arise from the interaction of Move and Agree Probe in Left Branch Extraction (LBE) fertile environments (Bošković 2009). Since BCS is a strong LBE language, and Slovenian a weak LBE language (Fanslow & Féry 2013), this difference between Slo and BCS is expected.

Here we ask whether the reported variation in HCA is empirically robust, and if so – whether LBE is its true cause, by providing contrasted experimental evidence for the status of HCA under LBE between BCS and Slo, based on the following predictions:

(i) If LBE is really what blocks HCA for BCS but not for Slo, we should observe a difference in acceptability of HCA between Slo and BCS. Concretely, HCA should be judged better/more common in Slo than in BCS.

(ii) If LBE is really what derives LCA via the same mechanism that blocks HCA, we should observe a difference in acceptability of LCA between Slo and BCS. Concretely, LCA should be judged better/more common in BCS than in Slo.

(iii) If the two South Slavic (SS) varieties behave alike with respect to HCA, the difference in the acceptability of HCA under LBE should be related to the different level of acceptability of LBE between the two varieties.

Relevant for this debate is a recent large scale EMSS network comparative experimental production study of BCS and Slo that has provided evidence that HCA is a legitimate agreement strategy across all investigated varieties (Willer Gold et al. 2016). To further explore (i) and (ii), we present and discuss the results of an Acceptability judgment task over HCA-under-LBE uniformly designed and tested on native speakers of Zagreb variety of Croatian, Niš variety of Serbian, and Slovenian.

2. Theoretical grounding: Does LBE facilitate HCA?

2.1. Left-Branch Extraction in South Slavic languages

Large part of the research on LBE phenomena comes from a long tradition of work on Slavic languages (Franks & Progovac 1994, Bošković 2005, Stjepanović 1998, 2015, a.o.). Although optional, LBE in BCS is a highly productive phenomenon. The example in (1) accentuates the flexibility of LBE by demonstrating the extraction of the highest element(s) of the (remnant) nominal constituent across the agreement Goal and Probe. The resulting structure is a highly discontinuous object. In Slo LBE is much more restricted. Examples like (1) are unacceptable in Slo.

(1) Lijepe je mladić plave imao oči. BCS
nice aux kid blue had eyes.
'The kid had nice blue eyes.'

To account for LBE in BCS, Franks & Progovac (1994) adopt Abney's AP-over-NP structure of DP - where NP is a complement of the A head. They argue the NP complement scrambles out of the DP and right-adjoins to IP. This is followed by fronting of the remnant DP containing the adjective to Spec-CP. Contrary to their approach, Bošković (2005) argues against Abney's DP and for the NP-over-AP structure for BCS. He defines LBE as a constituent movement of an adjunct AP out of NP.

A similar operation of extraction of the initial XP from coordinated subjects is attested in strong LBE languages (Ross' Coordination structure Constraint Violation, CSCV), as illustrated in (2a) (Franks & Peti-Stantić 2006; Fanselow & Féry 2013).

(2) a. Sestra će mi ga i njen muž pokloniti. (BCS, Franks & Peti-Stantić 2013)
sister will me it and her husband give
'It is SISTER and her husband who will give it to me.'

b. * Sestra mi ga bosta in njen mož podarila. (Slo)
sister me it will and her husband give
'Sister and her husband will give it to me.'

Stjepanović (1998, 2015), building her argument on the parallelism in the extraction possibilities for LBE and CSCV examples in BCS, extends the mechanics of LBE to both. Adopting Progovac's (1998a,b) structure for &P,[1] she argues that it is precisely this potential to extract the leftwards-most AP/&P that is responsible for CSCV (for her LBE from coordinated structures) in these languages. Stjepanović follows Bošković's (2013, 2014) assuming only the hierarchically highest Specifier/Adjunct counts as a phase edge. This explains the restrictions in multiple conjunct extraction possibilities to only hierarchically highest conjunct, i.e. the initial conjunct in our CSCV cases. Finally, movement of a lower adjective/conjunct in multiple adjectives/conjuncts examples, as in (1a), is only available once the initial/hierarchically highest adjunct/conjunct has undergone movement re-identifying the phase edge and freeing up the lower adjective/conjunct for extraction (which sounds counter-cyclic).

2.2. Highest Conjunct Agreement

In his work on Conjunct Agreement with Coordinated Subjects in BCS, Bošković (2009) attributes the lack of HCA in (3) to LBE. In short, Bošković argues that due to the availability of LBE, movement can target the structurally highest conjunct in parallel to the equidistant &P, whereby the emerging ambiguity blocks valuation and, hence, agreement with the highest conjunct in the subject position, (3).

[1] $[_{\&P1}\ [_{\&P2}$ & NP] $[_{\&P1}$ and NP]]

(3) *Sva sela i sve varošice su juče uništena. (Bošković 2009)
all villages and all small-towns aux yesterday destroyed
'All villages and small towns were destroyed yesterday.'

In more detail, the lexical verb may or may not be endowed with the EPP feature. When it is not, the highest conjunct, being the most local, valuates gender of the verb (number is valued by the ConjP), resulting in closest conjunct agreement with a postverbal subject. When the verb has an EPP feature, then, as the constituent that valuates the verb's gender and/or number must also be the constituent that satisfies the EPP, an ambiguity arises due to the availability of LBE/initial constituent CSCV in BCS. The probe finds both the initial constituent (NP1) and the entire coordinated subject as potential goals. Probing fails, and repeats until a constituent is reached which cannot move. Because this conjunct, i.e. the most deeply embedded conjunct, cannot move, there is no ambiguity and the entire &P needs to be Pied-pipped. As a result, preverbal subjects only have last conjunct agreement (LCA) as a (single conjunct) agreement option.

Assuming that the first conjunct extracts after the EPP triggered movement to the preverbal position, Bošković's account predicts no variation in acceptability of HCA and HCA under LBE for BCS. Whenever LBE is possible, it should also have the same effect on HCA. It also predicts that HCA will not be blocked in a language that does not allow LBE for subject constituents. In fact, Bošković predicts weak LBE languages that do not allow extraction of the first conjunct only have HCA as LCA cannot be derived. We turn next to one such weak LBE language - Slovenian.

In their study on Conjunct agreement in native speakers of Slovenian, Marušič et al. (2015) provide experimental evidence that a structurally highest element does act as an agreement Goal in preverbal position, see (4).

(4) Radirke in peresa so se prodajal**e** najbolje. (Marušič et al. 2015)
$\text{erasers}_{\text{F.PL}}$ and $\text{pens}_{\text{N.PL}}$ aux refl $\text{sold}_{\text{F.PL}}$ the best
'Erasers and pens sold the best.'

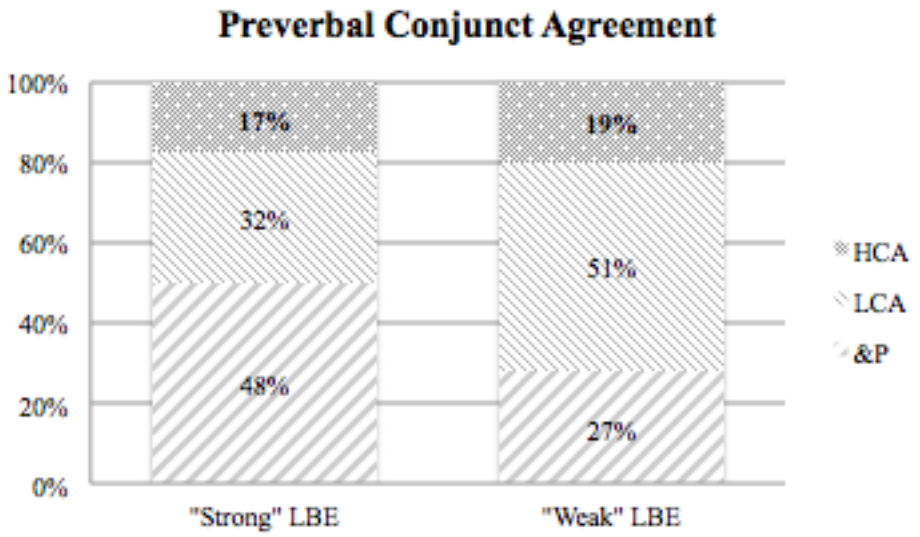
Couching their theoretical account in a multi-component framework, Marušič et al. assume a 2 Step Agree: Agree-Link and Agree-Copy, where Agree-Copy can operate before or

after linearization yielding different outcomes under syntactic (HCA) or linear locality (LCA) for preverbal subjects.

Their theory has nothing to say about HCA under LBE in Slo. Quite independent of agreement such examples are expected to be less acceptable if not fully ungrammatical given that Slo, unlike BCS, does not allow CSC violations. While in strong LBE languages, extraction of Conj1 before Agree-Copy would impede the latter in finding Conj1's gender feature in order to Copy its value, consequently blocking HCA.

Building on the existing debate, a recent large scale comparative experimental study on conjunct agreement in native speakers of BCS and Slo (Willer-Gold et al. 2016) has provided experimental evidence against Bošković's native speaker intuitions, showing that HCA is available in both Slo and BCS. Figure 1 shows that while the strong and weak LBE languages might vary with respect to the ratio of LCA and &P agreement, HCA ratios are comparable across the two language types.[2]

Figure 1.



This encourages the extension of Marušič et al.'s theoretical account to BCS. In this perspective, it becomes relevant to investigate the acceptability of HCA under LBE by comparing experimental data form a strong and a weak LBE language. Such research can show us to what extent the LBE parameter really influences the availability of HCA, and thus offer a way to compare the models by Marušič et al. and by Bošković. As shown in

[2] Figure 1 shows Mean values for agreement options in non-masculine mixed gender NF condition. strong LBE language data represents the sample of BCS - NI, NS, SA, ZD, and ZG and weak LBE language Slo - NG.

(5a) and (5b) we are looking at split coordinated subjects with two plural conjuncts. As Slovenian is a weak LBE language, it does not allow any CSC violations, so all instances of LBE of the first conjunct are predicted to be bad even in cases when the two conjuncts are of the same gender and where there is no conflict in determining agreement.

(5) a. Olovke su i knjige prodane. BCS
pencils$_{F.PL}$ aux and books$_{F.PL}$ sold$_{F.PL}$
'Pencils and books are sold.'

b. *Radirke so in knjige prodane. Slo
erasers$_{F.PL}$ aux and books$_{F.PL}$ sold$_{F.PL}$
'Erasers and books are sold.'

To summarize, Bošković argues HCA is blocked with preverbal subjects. Marušič et al. provide evidence for HCA and have a way of deriving it. On both views, since Slo has been argued to be a weak LBE language, acceptability of HCA under LBE in Slo is predicted to be low. However, considering that neither of the two theories directly explore the question of HCA under LBE in BCS, some room in determining the precise predictions of the two theories will need to be filled by speculation. In case Agree precedes LBE, the theories predict the acceptability of HCA under LBE to be related to the acceptability of HCA in non-LBE environments and to the acceptability of LBE. If LBE takes place prior to agreement and the first conjunct moves to Spec.TP, the two theories predict similar outcomes, they both predict HCA to be the best strategy. Depending on the location of the remnant ConjP, the two theories diverge. For Bošković, LBE means that the EPP feature is satisfied by the initial constituent within the conjoined subject. This is something that should be blocked by his ambiguity of goals, but if the ambiguity is resolved in some way, it should result in HCA as the best strategy. For Marušič et al., the extraction of Conj1 prior to agreement would either force agreement with Conj1 if the remnant is in some position invisible to the probe or else impede agreement with this conjunct, so that no HCA would be expected.

3. Experimental investigation of HCA under LBE

The aim of this section is to bring experimental insight into the processing of LBE in the domain of Coordination; in particular, to shed more light on *(i) the acceptability of single conjunct agreement – HCA and (ii) the acceptability of HCA under LBE, in order to draw*

conclusions about LBE's potential to facilitate or block HCA. To that aim we report on the results from an Acceptability judgement study with native speakers of BCS and Slo The study included an identical experimental design implemented at six different locations included in the EMSS Network. Here we report on the data from three sites - Niš, Zagreb and Nova Gorica/Ljubljana. Other sites within the BCS area gave very similar results to those from Zagreb and Niš.

3.1 Experimental materials and design

An Acceptability judgment task (1 to 5 scale) with a unified experimental design was carried out on native speakers of BCS and Slo at 3 experimental sites - Zagreb, Niš and Nova Gorica/Ljubljana. Participants were first year university students who were neither students of languages under investigation nor of psychology, and were educated in the local area and speaking the local variant (n=30*3). The design was crossed to include four two-level factors: NP1-position (continuous subjects, LBE), Agreement (HCA, *NSg),[3] NP1-gender value (F, N) and NP2-gender value (M, non-M), creating a 2x2x2x2 factorial design with 1 or 2 items per condition (n=20). Neuter singular was used in creation of ungrammatical items (*). Fillers of different structure and (mis)matching in agreement and case were used as distractors (n=24). Examples illustrating four critical conditions are presented in (6).

(6) Sample of material per condition used in Acceptability judgment task

HCA+NF:	Ogledala	i	slike	su	dostavljena	kamionom.
	mirror.NPl	and	painting.FPl	AuxPl	delivered.NPl	truck.Inst
	'(The) mirrors and (the) paintings were delivered by truck.'					
*HCA+NF:	Ogledala	i	slike	su	dostavljeno	kamionom.
	mirror.NPl	and	painting.FPl	AuxPl	delivered.NSg	truck.Inst
	'(The) mirrors and (the) paintings was delivered by truck.'					

HCA+LBE+FN:	Knjige	su	i	pomagala	korištene	u	nastavi.
	book.FPl	AuxPl	and	accessory.NPl	used.FPl	in	lecturing
	'(The) books and (the) accessories were used in the lectures.'						
*HCA+LBE+FN:	Noge	su	i	stopala	ozlijeđeno	u	sudaru.
	leg.FPl	AuxPl	and	foot.NPl	injured.NSg	in	crash
	'(The) legs and (the) feet was seriously injured in the crash.'						

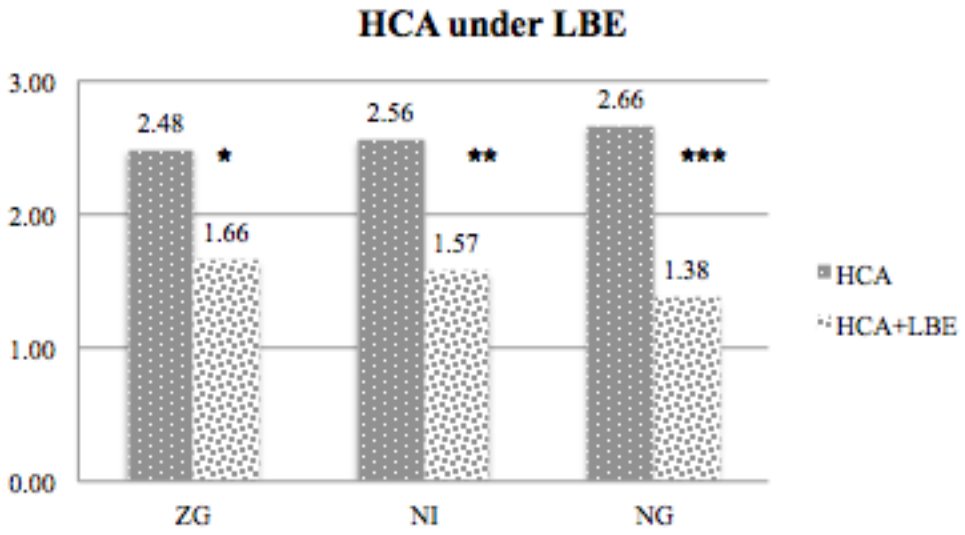
[3] NSg was the agreement value that was taken as one that is always ungrammatical, independent of all other factors.

The experiment was implemented using IbexFarm experimental on-line platform (Drummond 2011). The experiment was administered in a single 30 min session, individually or in parallel to a group of 5 to 10 participants in a computer room under controlled conditions. The participants were asked to rate the sentences based on 'familiarity to their local variety', on a scale from 1 to 5 where 1 is bad and 5 is good.

3.3 Results and discussion

To assess and compare the status of HCA with and without LBE, we conducted a two-way ANOVA (Scheffe Test) with Site (ZG, NI, NG) and Cond (HCA, *HCA, HCA+LBE, *HCA+LBE) as fixed factors. The results for main conditions across three varieties are summarized (Mean) in Figure 2 and p-values are provided for statistically significant results. Three main results follow form the Acceptability judgment task.

Figure 2.

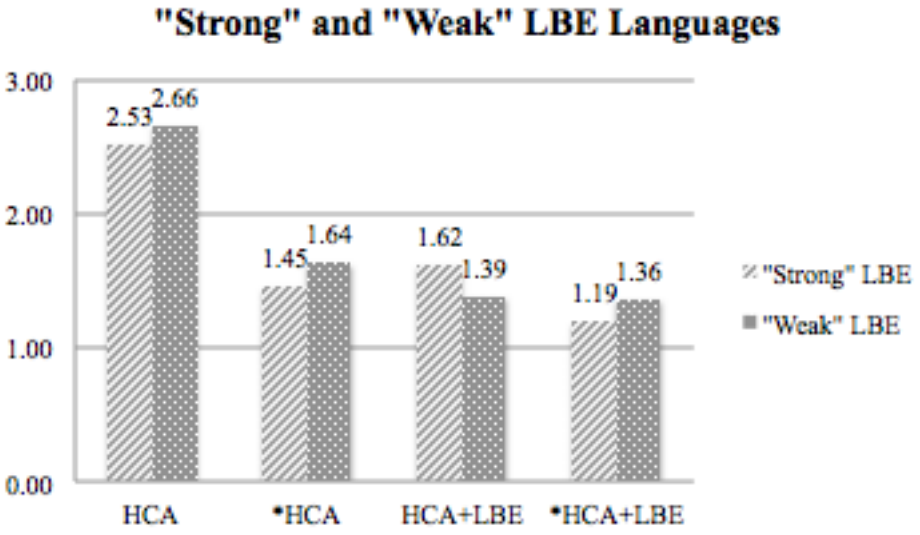


Comparison of HCA across three varieties shows that HCA is available to a more or less equal degree across all three varieties as p-values (ANOVA and t-test) show no significant differences (HCA Mean: ZG=2.48, NI=2.56, NG=2.66), see Figure 2.

Comparison of HCA+LBE condition across three varieties shows a predicted split with respect to strong and weak LBE languages with this condition being rated lower in NG than in NI and ZG (HCA+LBE Mean: ZG=1.66, NI=1.57, NG=1.38, see Figure 2), even though due to a low number of items per condition, the differences do not reach statistical significance (p=.14). However, looking at the ratio of acceptability of the two main conditions - HCA vs HCA+LBE, in each of the three varieties, p-vales do show

statistically significant results of different degrees. The two conditions differ in their acceptability the least in ZG (p<.01), somewhat more in NI (p<.001) and most significantly in NG (p<.00001) (as marked in Figure 1). This confirms the above observed results indicating a split between BSC and Slo regarding LBE. It is also interesting to trace the p-values calculated by two-way ANOVA comparing HCA condition to HCA+LBE and to *HCA+LBE, which are the same for NG (both p<.00001), but not for NI (p<.001 and p<.00001, respectively) and ZG (p<.01 and p<.00001, respectively). Moreover, t-test over the comparison between HCA+LBE and *HCA+LBE condition for each of the three varieties, shows a statistically significant difference between the two conditions for ZG and NI (p<0.05) but not for NG (p=.81), confirming that the degradation in weak, but not in strong LBE languages comes from LBE, see Figure 3.

Figure 3



Because of lack of space, we do not discuss the variables M vs. non-M in Conj2 and the N vs. F in Conj1. For a more detailed discussion on effects of different gender values and conjunct combinations as agreement Goals, we refer the reader to Willer-Gold *et al*. (2016), Marušič *et al*. (2015), Arsenijević *et al*. (in prep.), and Bošković (2009).

The results presented in this and the previous section show that HCA is equally available across all of the (here investigated) SS varieties, and that its acceptability diminishes with LBE. In weak LBE languages (namely Slovenian), both LBE conditions were judged equally unacceptable.

These results support the empirical reports of Marušič et al. (2015) and Willer Gold et al. (2016) regarding the availability of HCA as an agreement strategy in BCS. HCA is a

legitimate agreement strategy for preverbal conjoined subjects in BCS, contra Bošković (2009). The effects of LBE: a general degrading effect on HCA suggests that LBE degrades rather than improves HCA.

Our predictions stated above thus turned out to be all wrong:

(i) If LBE is really what blocks HCA for BCS but not for Slo, we should observe a difference in acceptability of HCA between Slo and BCS. Concretely, HCA should be judged better/more common in Slo than in BCS.

(ii) If LBE is really what derives LCA via the same mechanism that blocks HCA, we should observe a difference in acceptability of LCA between Slo and BCS. Concretely, LCA should be judged better/more common in BCS than in Slo.

(iii) If the two SS varieties behave alike with respect to HCA, the difference in the acceptability of HCA under LBE should be related to the different level of acceptability of LBE between the two varieties.

Add. (i): There was no difference between Slo and BCS in HCA.

Add (ii): LCA is actually judged better in Slo than in BCS.

Add (iii): HCA under LBE is judged in both varieties as ungrammatical, yet we know there is a difference in the acceptability of LBE in the two varieties. There is a difference in the ungrammaticality of HCA under LBE in BCS, but we are not sure we should give this difference any theoretical significance.

5. Conclusion

Bošković (2009) and Marušič et al. (2015) are not the only two theories of conjunct agreement, but we lack the space to discuss them all. We take these two as representative of two approaches to agreement (agreement in syntax proper vs. agreement (partly) in PF). Further, there are obviously many possible ways to derive CSC violations in BCS. The reader is referred to Arsenijević et al. (in prep.) for a full discussion of various options.

The presented results are more in line with Marušič et al.'s (2015) theoretical account of agreement than Bošković's; favouring the suggestion for the former account to be extended to BCS. There probably are ways to save Bošković's (2009) proposal and/or to further fine-tune the proposal by Marušič et al (2015) to get a better match with what is predicted to be good and what should be underivable, but we need to leave this for another article.

All in all, looking at the instances of HCA in conjunction with a split coordinated subject, the theoretical proposal made in Marušič et al (2015) is superior to Bošković (2009).

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