

The Origin of the Wackernagel Effect in Serbo-Croatian

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This paper aims to unravel the syntax of Serbo-Croatian clitics, which tend to cluster in the second position of the sentence (Wackernagel's Law). It is shown that this phenomenon is due to a morphological peculiarity of the auxiliary verbs in that their conjugation consists of a compound of two morphemes, one of which shows a floating melody, i.e. not associated to the skeleton. Then either a default rule associating the melody to the skeleton takes place in the morphology, in which case the full form surfaces, or else the auxiliary compound enters the syntax, where the floating melody must be eliminated. This is realized by the obligatory adjunction of the auxiliary to a suitable element. By virtue of the temporal adjunction, the deficient morpheme, which is not in the path of the linearization process, is filtered out as stray. As a result, one morpheme surfaces as a clitic. This analysis obviously predicts that both the third person clitic *je*, and the reflexive *se*, which carry the deficient morpheme on their right side (*jeste*, *sebe*) must postpone their placement at the end of the cluster, for whatever material adjoined to them will anchor to the stray morpheme and will disappear with it at the end of the derivation. This morphological peculiarity, together with the widespread specification of the feature ω (which may induce a superiority effect) in various paradigms, accounts for the complexities observed in this language. SC offers a new insight on the role of the adjunction and the subsequent linearization process, which turns out to be much more than a simple pronunciation protocol between the grammar and the oral modality.

Keywords: syntactic features, constraints, vectors, operators, adjunction, skeleton, directionality, word order, coreference, pronoun, anaphor, morphology, phonology, syntax.

1. Introduction

Serbo-Croatian clitics, as is well known, appear in the second position of their structure, which is traditionally known as Wackernagel effect. Such a position is variously characterized in the literature: it is either the first word, the first phrase or the first element in an intonational group (see Bošković 2004, Čamdžić and Hudson 2007, Schütze 1994 for details and references therein). This second position can be that of a single clitic or a cluster of clitics. In the latter case, all clitics are rigidly ordered as follows: *li* (interrogative) > all auxiliaries but *je* > pronominal > reflexive > auxiliary *je*.

Various accounts of these SC facts can be found in many theoretical frameworks, including the Minimalist Program and its ancestors (cf. Bošković 2004 for further references), Word Grammar (Čamdžić and Hudson 2007), Categorical Grammar (Mihalicek 2012), etc. In general, those accounts assume that clitics form a grammatical category in themselves, thus eluding the question why similar elements in other languages are not clitics; and often the order of the clitics is taken for granted, as it is usually defined in a template.

In this paper, I propose a syntactic analysis of SC clitics, which is couched in a feature- and

1 Comments are welcome.

constraint-based theory of grammar, as discussed in Desouvrey (2000) and other works. I will show that movement, placement, and ordering of clitics follow from general principles that have been used to account for Romance clitics, including French, Spanish, Portuguese, Italian, and Romanian, hence nothing specific to SC. In fact, the complexities come from the lexicon to the extent it is there that morphemes are stored with certain morpho-phonological peculiarities. The fact is that instead of having two paradigms for auxiliaries, one for full forms and one for reduced forms (clitics), SC uses a surprising and complex strategy: the conjugation of auxiliary verbs consists of a compound of two morphemes, one of which has a floating melody. The full form is dealt with in the morphology, while the clitic form must be derived in the syntax by adjunction to another element. Under temporal adjunction and the subsequent linearization, which takes place at the skeletal level, the compound is obliterated, giving rise to the emergence of the clitic.

I will proceed as follows. In the next section, I present an overview of the theory I build on; it has more explanatory power while it uses much less machinery than any other theories I know of. (The reader who has read one of my previous papers may skip to section 3). In section 3, I consider what causes so many complexities in SC grammar, namely an extreme freedom of word order induced by the relaxation of head directionality, which is a necessary condition to accommodate the placement of the auxiliaries. In section 4, I tackle the clustering of pronominal clitics with auxiliary clitics and the special behavior of the clitics *je* and *se*. In section 5 and 6, I present two further pieces of evidence based on the interaction of auxiliaries with *wh*-operators and the climbing of clitics to the matrix clause. In section 7, I argue that the clitic *li*, too, originates from a deficient compound. Then in section 8, I discuss some interesting residuals facts, namely the delayed placement of the cluster and its splitting by negation. Finally, I conclude the paper with some remarks on the grammar.

2. Overview of a constraint- and feature-based approach to syntax

2.1 Syntactic features

The central point of this theory is that languages vary according to feature inventory in a given paradigm, which yields various types of complexities. However, the principles that regulate the interaction of these features are universal and apply whenever the conditions are met (cf. Desouvrey 2000, 2005, 2008, 2018, 2019).

One of the crucial features in this theory is Case, which includes Nominative, Accusative and Oblique. The latter comes with various thematic features such as Dative, Locative, Instrumental, etc.,

while the former bear a null thematic, \emptyset , which may be interpreted as either agent of theme. In addition to those traditional features, three further features have been discovered in natural language in the light of this approach: in the one hand, ω - and φ -features, which identify their bearer as a vector and a scalar respectively. A vector is a scopal element such as *wh* and negation; but other syntactic elements may be specified for this feature as well. Thus SC auxiliary clitics, infinitive and tensed verbs, as I will show, are specified for the ω -feature. Omega-specified elements (or vectors) are special in that their initial order in the derivation cannot change easily by movement (cf. the Superiority Condition). Quite contrary, φ -features do not have restrictions other than the combinatorial ones, those that are taken into account during the building stage of the structure by a series of merge. Certain elements are neutral, being compatible with both vector and scalar elements. The interesting fact about ω -feature is that when two or more ω -specified elements are in a morphological or a syntactic compound, they become neutral, and are no longer sensitive to superiority effect and other phenomena regarding vectors. The last important feature is π , which prevents its bearer from adjoining to another element in the structure. Any element bearing such a feature must move outbound, i.e. to an edge of the structure for the purpose of juxtaposition (edge-adjunction). This feature is normally found in *wh*-operators, hence their outbound movement to the left edge of the syntactic structure. As I will show, SC is exceptional in that its *wh*-operators are not π -specified and therefore can cluster together.

It should be emphasized that clitics do not form a category on their own; it is obvious indeed that various types of elements, including auxiliaries, personal pronouns, prepositions, etc., can exhibit clitic properties. In this theory a clitic can be any element specified with a wealth of features. However, since in SC nouns and adjectives are heavily declined for case and agreement features, unlike Romance languages, it is necessary to further refine this definition: a clitic is an element specified with abstract syntactic features, or fossilized features, and whose morphological shape is not predictable from the general pattern of declension. In addition, they are generally light, i.e. composed of a few phonological segments usually making one syllable. SC auxiliaries are clitics to the extent they are physically light; however, this is not this property that governs their syntax, as I will show.² On the other hand, nouns and adjectives get their case by affixation, and take a predictable shape under this mostly regular morphological process. One can say they are heavy in the syntax, hence less prone to undergo adjunction to another element (inbound movement). Instead, they may move to an edge of the structure,

² German verbs, and presumably those of other Germanic languages, are not light but they must cliticize to a host for the same reason as SC auxiliaries (cf. Desouvrey 2021).

for pragmatics or semantics reasons, which are set aside in this paper.

2.2 Syntactic principles

A few principles appear to regulate feature interaction. First, consider the operation which builds the input, i.e. the initial structure of the derivation. Two elements can merge if and only if they are compatible, that is, their features do not clash. Given a head and its complement, it is expected that both are specified for the same features or at least the complement is under-specified (neutral) for the relevant feature of the head. This is the only ways to obtain a well-formed structure. If the head and the complement are specified for different features, no merging is possible.

Once the structure is correctly merged, the Obligatory Contour Principle (OCP) (cf. Leben 1973, Goldsmith 1976, etc.) ensures that any complement clitic specified for the same terminal feature as the verb exits the VP domain (1a). Moved elements must skip another element, consistently with a ban on string-vacuous movement, and they must still be adjacent to the head that licenses them. This is forced by another effect of OCP (1b), which is analogous to the gemination effect in non-linear phonology.

(1) **Obligatory Contour Principle**

- a. Case-specified clitics must exit the complement domain of the verb (OCP-1).
- b. No element can intervene between two elements with identical features (OCP-2).

If an element moved by OCP is not π -specified, it must adjoin to another element. The adjunction process consists in linking the leftmost segment of the moved element to the rightmost segment of the host with an association line running from x-slot to x-slot. As a result, and unlike edge-adjoined elements (π -specified), host-adjoined elements come to be in a different timing tier from their host, which itself may have been adjoined. The multi-tiered structure is then conflated by a linearization convention (2) at the end of the derivation. Thus, adjunction to a host results in a syntactic compound in which the host necessarily precedes the adjunct. This process of adjunction and linearization plays a crucial role in SC grammar, as I will show.

(2) **Linearization Convention**

Proceeding from left to right, embed any adjunct tier into the main tier, and to the right of the host element so as to obtain a continuous flow with no back and forth.

Finally, the grammar imposes a strict limit to the number of derivational steps that can proceeds

from any given input. I refer to this as Derivation Equivalence Number:

- (3) **Derivation Equivalence Number (DEN)**
- a. A well-formed syntactic derivation may not contain more than three steps, including the input.
 - b. Multiple movement may occur in one step with no return to a higher element.

3. The SC complexities

3.1 Word order

Serbo-Croatian has seven grammatical cases, including nominative, accusative, dative, genitive, instrumental, locative, and vocative, as well as a rich agreement system. As a result, word order is completely free. Nevertheless, it is generally assumed that the basic word order is SVO, from which the others are derived by movement mostly under pragmatic considerations.

Although the SVO order seems to be the preferred one, it is unlikely that every sentence is derived from it. If this were the case, an element would have to move multiple times to derive certain outputs. Since the grammar is based on economy, the multiple movement analysis is untenable. I claim that four basic word orders are possible, assuming that there is no head directionality for major constituents of the sentence. Thus, a verb and its complement will always be part of the same phrasal constituent, but they need not be in a fixed order. On this view, the subject can appear at either side of a verb-object constituent, as shown in (4).

- (4) a. [S [V O]]
 b. [[V O] S]

Similarly, an object-verb constituent can have the subject at any side, as in (5).

- (5) a. [S [O V]]
 b. [[O V] S]

On this view, other combinations are derived by leftward or rightward movement of any of the elements. This can be illustrated with the following three-word sentence which yields 6 possible outputs (After Mihalicek 2012: 1). It is clear, if basic constituencies hold, that sentence (6c) is obtained from (6a) by verb movement to the left edge or perhaps from (6f) by object movement to the right

edge, whereas sentence (6e) is derived from (6a) by object movement to the front edge.

- (6) a. Marko voli Vesnu. (SVO)
 Marko.NOM loves Vesnu.ACC
 'Marko loves Vesna.'
 b. Marko Vesnu voli. (SOV)
 c. Voli Marko Vesnu.
 d. Voli Vesnu Marko. (VOS)
 e. Vesnu Marko voli.
 f. Vesnu voli Marko. (OVS)

As I will show, in the derivation of sentences with auxiliary clitics, the freedom of word order must be taken into considerations in order to find out the proper input. It is even highly probable that the relaxation of head directionality is due to the necessity to accommodate auxiliary clitics (see below).

3.2 The morphological structure of auxiliary verbs

I will show that the internal structure of the auxiliary verbs (*biti* 'to be' and *hjtie* 'to want') is the source of the Wackernagel effect. The reason is that each person of the relevant tense is a lexical compound that exhibits a structural deficiency. Consider the conjugation of the present imperfective of the auxiliary verb *biti*. As can be seen in (7), each clitic form results from the suppression of a syllable of the corresponding full form. Interestingly, the clitic is the second syllable for all persons but the 3rd singular. Immediately, one can relate this fact to the peculiarity of the clitic *je*, which parts from other auxiliaries in that it is the rightmost element in the cluster, in alternation with the reflexive *se*, as shown in (8).

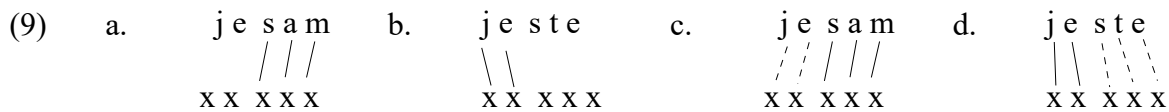
(7) **Present imperfective of *biti* 'to be'** (adapted from Mihalicek)

	Singular	Plural
	clitic / full	clitic / full
1 st	sam / jesam	smo / jesmo
2 nd	si / jesi	ste / jeste
3 rd	je / jeste	su / jesu

(8) **Clitic order**

li > {auxiliaries except *je*} > dative > accusative > genitive > { *se* > *je* / *je* > *se* }

Assuming the x-slot theory of the skeleton (cf. McCarthy 1979, 1981; Kaye and Lowenstamm 1984, Levin 1985, etc.), I would like to suggest that each pair clitic/full form is underlyingly a bimorphemic representation in which one morpheme has a floating melody, i.e. not associated to the skeleton. Let us take the floating melody to be the non-clitic part of the compound. For instance, the representation of the first and third person imperfective present of *biti* is as given in (9a,b) respectively.



Now one can rely on a simple rule associating the melody to the skeleton, consistently with standard assumptions in non-linear morphology and phonology, to obtain the full form (9c,d). I will assume that this rule takes place in the morphology (thus prior to the syntactic derivation). However, to use the clitic form, the grammar must get rid of the floating melody, as well as its unused skeletal slots. This could be realized with what is usually referred to as a stray erasure rule. It is natural to assume, however, that such a rule cannot operate on words, for each person in the conjugation is a lexical entry. I claim that the grammar has recourse to a special strategy: the mandatory adjunction of the auxiliaries to any appropriate element in order to get rid of the unwanted morpheme. On this view, if an auxiliary is not adjoined the derivation will crash. In the next section, we will see how the stray morpheme comes to be filtered out under adjunction.

In addition, I claim that the solid part of each compound is a vector, i.e. it is specified for [ω]. Elements bearing such a feature have scope and direction and hence are subject to the Superiority Condition, as I will show.

Before developing this proposal, it should be stressed that pronominal clitics do not show the pattern just discussed. The paradigm in (7) exhibits a perfect regularity, except for one person. This is different from the pronominal paradigm which has clitics only in accusative, dative, and genitive (cf. Table 1). In addition, there are multiple gaps and irregularities in these three cases. Indeed, the first and second person plural of genitive and accusative show no distinction between strong forms and reduced forms, as a single morpheme is used, *nas* for 1st person and *vas* for 2nd person. Also, the dative reduced form follows a different formation pattern from the accusative and the genitive: *mi* (*m...i*) and *ti* (*t...i*) are the clitics for *meni* and *tebi* respectively, whereas in the accusative one as *me/mene* and *te/tebe*, which is similar to the auxiliary pattern. Since this paradigm is disparate, as certain morphemes exhibit an unpredictable shape, I conclude that the pronominal clitics are not derivable from the full forms and

therefore constitute independent lexical entries (but see fn. 8).

	Full form/Clitic					
	1 st sg.	2 nd sg.	3 rd sg, (m, f, n)	1 st pl.	2 nd pl.	3 rd pl.
genitive	mene/ me	tebe/ te	njega/ga, nje/je, njega/ga	<i>nas</i>	<i>vas</i>	njih/ih
dative	meni/ <i>mi</i>	tebi/ <i>ti</i>	njemu/mu, njoj/joj, njemu/mu	nama/ nam	vama/ vam	njima/ <i>im</i>
accusative	mene/ me	tebe/ te	njega/ga, nje/je, njega/ga	<i>nas</i>	<i>vas</i>	njih/ih

Table 1. Paradigm of pronominal clitics³

3.3 Move or die

I claim that auxiliary clitics must be settled by movement. Specifically, they must get rid of the deficient morpheme, otherwise the derivation will die with them. This case of absolute necessity leads the grammar to grant such elements what we may call a safe-conduct that allows them to be set up before other elements can move to satisfy their own constraints. The input structure has to be aptly generated for movement to take place as soon as possible. To warrant this outcome, it might be the case that the grammar relaxes head directionality for major components of the sentence, hence the extreme freedom of word order. Thus, from any input structure, a suitable host, one that can be reached without incurring a constraint violation, must be (made) available. The constraints at work here are the Well-formedness Condition on Movement (10), and the obligation for these auxiliary clitics to move to the highest possible element, given the assumption that they are ω -specified (vector). The fact is that these scope greedy elements take the opportunity to acquire widest scope by picking up the highest host in the structure. In addition they are subject to the Superiority Condition, which is given in (11). This formulation is different from Chomsky's original formulation which is based on phrase-structure geometry (Chomsky 1973).

(10) **Well-formedness Condition on Movement**

No string-vacuous movement is allowed. That is, a moved element must skip another element.

3 Adapted from https://en.wikipedia.org/wiki/Serbo-Croatian_grammar.

(11) **Superiority condition**

Vectors in the same domain are not commutable by movement rule:

$$[V^1 \dots V^2] \rightarrow * V^2 [V^1 \dots t]$$

Given the freedom of word order in SC, several different inputs may yield the same output. However, under the natural assumption that the grammar is built on some principle of economy, useless derivations are avoided whenever a simpler input exists. Consider the sentences in (12), after Čamdžič and Hudson (2007).⁴ As can be seen, the auxiliary clitic appears in second position after the first word or the first constituent, but not in first and third position, where in my view it is in situ.

- (12) a. Ivan **je** poljubio svoju baku.
 Ivan AUX kissed his grandmother
 'Ivan has kissed his grandmother.'
- b. Poljubio **je** Ivan svoju baku.
- c. Svoju baku **je** Ivan poljubio.
- d. ***Je** poljubio svoju baku.
- e. *Ivan poljubio **je** svoju baku.

It should be noted by the way that in the present theory the syntactic structure is built by successively merging heads and complements, which enter the derivation with their morphological features, and eventually their phonological deficiency as well. There are neither abstract functional elements nor abstract components like PF in current generative theory.

From this perspective, one can posit that the derivation of (12b) and (12c) proceeds from an input as in (13a), where the symbol '~' indicates a compound with an ill-morpheme, as discussed above. I assume that the auxiliary is merged with the verbal head to form a phrase which is then merged successively with the arguments. The auxiliary must move to another element in order to break its compound, but there is no suitable host in this input. Indeed, it cannot adjoin to the adjacent subject, given the ban on string-vacuous movement; neither can it move down to a lower element, the verb or the object, for scope reason. Rather, either the verb or the object may become a host by moving to the

4 Actually example (12a) is not to be found in Čamdžič and Hudson (2007). I assume that it is possible after comparing it with the following example they provide (their (43)):

(i) Ivana je napravila kolače.
 Ivana.nom is made cakes
 'Ivana has made some cakes.'

left edge of the structure, as seen in (13b). From either of the structures in (13b), the auxiliary adjoins to the fronted element, yielding the desired results, (13c), in three derivational steps.⁵ (The equal sign is used to indicate adjunction to which I turn immediately.)

- (13) a. [Ivan [[*je~ste* poljubio] svoju baku] (input)
 b. poljubio [Ivan *je~ste* svoju baku] / svoju baku [Ivan *je~ste* poljubio]
 c. poljubio=*je* Ivan svoju baku / svoju baku=*je* Ivan poljubio (output)

Before turning to (12a), let us see how the auxiliary comes to be set up by adjunction. The representation of the verb-initial structure in (13c) is given in (14), where conveniently only relevant x-slots are shown. As can be seen, this type of adjunction, referred to as temporal adjunction, consists in linking the leftmost skeletal position of the moved element with the rightmost one of the host with a line. Let us suppose that the grammar acts as a cursor pointing successively to the x-slots, and that the validity of every segment is checked before the word can be spelled out. Let us assume that a segment is valid if and only if its melody is linked to an x-slot. Then pointing to the first x-slot of the initial timing tier, that of the segment *p* of *poljubio*, the cursor flows through each x-slot, and goes down to the adjoined clitic via the association line (relevant x-slots are underlined). After reaching the vowel of *je*, it jumps to the first x-slot of *Ivan*, ignoring the bare skeletal slots as garbage. As a result, the second part of the auxiliary compound goes missing in the output. This analysis predicts that any other clitic that adjoins to *je~ste* will disappear with *ste* (see below). In fact, auxiliary *je* is exceptional in that the result would not be different if it had not undergone adjunction, as it has the floating melody on its right side (see below).

- (14)
- | | |
|-------------------------|---------------------|
| Poljubio | [Ivan svoju baku] |
| | |
| ... <u>x</u> | <u>x</u> ... |
| | |
| <u>x</u> <u>x</u> x x x | |
| / | |
| j e s t e | |

Consider now (12a). It is derived from an SVO input in which the verb and the auxiliary are inverted, as in (15a). The auxiliary compound moves across the verb and adjoins to the subject,

⁵ Notice that once an element is moved, it leaves no trace and therefore its branch is assumed to be cut out of the tree structure. In subsequent steps, internal constituents need not be shown; the brackets are used to indicate edge-adjunction.

yielding the correct output (15b). The fact that the auxiliary may be generated after the participle verb is not surprising, given the assumption that head directionality is relaxed in the input as long as basic constituencies are respected. Moreover, the relaxation of the head-complement order is driven by the need to allow the emergence of the auxiliary clitic, which must move anyway or else it dies with the derivation. Here the derivation stops as soon as the clitic is adjoined, indeed neither the participle nor the object can move, as shown in (16).

- (15) a. [Ivan [[poljubio *je~ste*] svoju baku]] (input)
 b. Ivan=*je* [poljubio svoju baku]
- (16) a. *poljubio [Ivan=*je* svoju baku]
 b. *svoju baku [Ivan=*je* poljubio]

However, it is possible to use the aux-participle order in an SVO input if the subject is a constituent, as in (17) (cf. Mihalicek 2012: 195). The sentence in (17b) is derived from a participle-aux input, where the clitic moves across the verb. In (17a), on the other hand, *sestra* is not a possible host, given (10), but the clitic can acquire non-vacuously the possessive determiner (see §8).

- (17) a. [Moja sestra [je došla]] → moja=*je* sestra došla
 my.NOM is sister.NOM arrived
 ‘My sister arrived.’
 b. Moja sestra **je** došla. (input: [Moja sestra [došla je]])

I have shown that auxiliary clitics do not look for the second position, which does not have any theoretical relevance. Rather, they seek to adjoin to a suitable element that meets their scope requirement. To have their widest scope, they adjoin to the first element in the structure.

4. Clitic cluster

4.1 The composition of the cluster

SC clitics are rigidly ordered within a cluster. Pronominal clitics must follow auxiliary clitics, except *je*, in the following order: dative>accusative>genitive (cf. Čamdžić and Hudson 2007, among others). Since the clitics move to make up a cluster, it is a matter to find out where they come from, i.e. their original position in the input. In an SVO input, it is natural to assume that the order is either dative-

accusative or accusative-dative. Which of these orders is active in a given language depends on the distribution of features in the paradigm and the Animacy Hierarchy (AH), which forces the computation of the dative argument (animate) before the theme. In Italian, Romanian, and Spanish, the order is dative-accusative, consistently with the AH, while in French, which does not use this constraint, both orders are found (though not freely), as shown below:

- (18) a. Marie le lui donne.
 M. it.ACC him.DAT gives
 'Marie gives it to him.'
- b. Marie te le donne.
 M. you.DAT it.ACC gives
 'Marie gives it to you.'

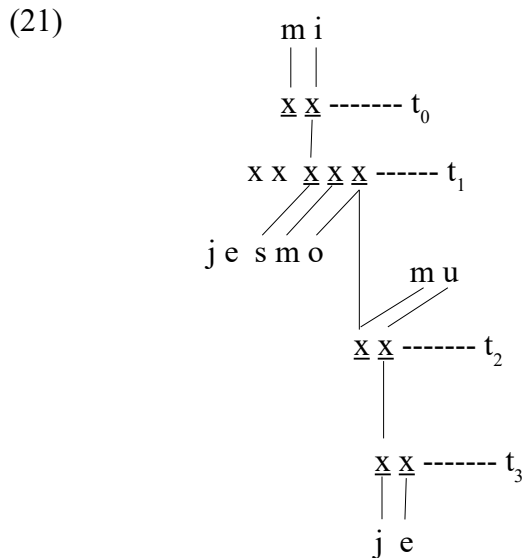
The ordering of the clitics with respect to imperative verbs normally reflects the order in the input since movement is not possible in this subjectless mood. In SC it appears that the order of the arguments is dative-accusative in imperative constructions. Therefore, I assume that in the input the clitics are generated in such an order. (I must ignore the genitive here, which is absent in the available literature.) In addition, argumental clitics are subject to the OCP, but unlike auxiliary clitics, if they fail to exit the VP in certain contexts, the derivation may not crash since they are not compound. Therefore, one may expect them to stay in situ, as is the case with imperative verbs.

Consider the sentence in (19) (cf. Bošković 2004). It can be derived from an SVO input in which the auxiliary follows the participle, as shown in (20a). The auxiliary compound moves to the subject in order to be set up (see below). Then the dative and the accusative clitics moves successively to the cluster in one derivational step, as in (20b).

- (19) a. Mi smo mu je predstavili juče.
 we are him.dat her.acc introduced yesterday
 'We introduced her to him yesterday.'
- (20) a. [Mi [[[predstavili je~smo] mu] je] juče] (input)
 b. Mi=smo=mu=je [predstavili juče] (output)

This auxiliary clitic patterns differently in that the ill-morpheme is on its left side. If it is assumed that an association line can radiate only from a valid x-slot, the leftmost segment of *smo* can acquire the

rightmost segment of *mi* with an association line to realize the adjunction. Then the first argumental clitic adjoins to the auxiliary and becomes the host for the second, as shown in (21). Each clitic appears on its own tier so that a complex compound spanning on four timing tiers, t_0 to t_3 obtains. The linearization starts from the first segment of the original tier, flows forward then down through each secondary tier via the association lines, with no zigzag. Unlike the case of *je*, the first part of the compound disappears during the linearization process since it is not even in the path of the cursor.



So far the auxiliary is at most the third element in the input structure, so that its leftward movement can take place across another element, consistently with the ban on string-vacuous movement. In fact, the auxiliary clitic may be generated in the first position in the input, in which case it has to undergo a rightward movement to the next element. Given the mechanics of adjunction, a rightward movement to an adjacent element cannot be vacuous. Consider the sentences in (22) (cf. Schütze: 27). The pro-drop sentence (22b) obtains from (23a), where the auxiliary moves rightward to the participle, while the other clitics remain in situ by the ban on string-vacuous movement.⁶ The fact that the other clitics do not move is not surprising since they do not carry the same deficiency as their auxiliary counterparts. As for sentence (22a), it is derived from input (23b) (the left side of the arrow); the auxiliary adjoins to *ja*, and then all argumental clitics move successively to the new-formed syntactic compound so that the closest to the target, the dative, is placed first.

6 In fact, an alternative derivation with the input [ja [[[*je~sam dala*] *mu*] *ga*]] may be felicitous if the auxiliary moves rightward to the verb, whereas the subject is dropped to cancel the resulting loss of scope. If from such an input the verb were fronted instead, one would obtain the following output (?)*dala=sam=mu=ga ja*, on which I have not found any judgment in the available literature.

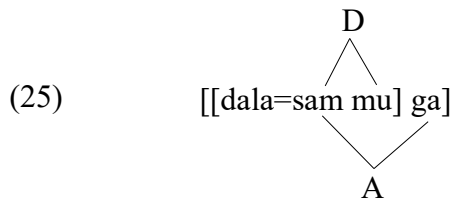
- (22) a. Ja *sam mu ga* dala.
 I aux me it given
 'I gave it to him.'
 b. Dala *sam mu ga*.
- (23) a. [[[*je~sam* dala] *mu*] *ga*] → dala=*sam mu ga*.
 b. [ja [[[dala *je~sam*] *mu*] *ga*]] → ja=*sam=mu=ga* dala.

Consider now the question why the argumental clitics ever have to move to become part of the host-auxiliary compound. In the non-linear representation of input (23b), as given in (24), the verb and the auxiliary bear the same case features, dative and accusative, like the clitics.⁷ So each clitic pairs up with the relevant case of the complex aux-verb, which heads two domains. Normally this configuration is forbidden in natural languages by the OCP. Thus, to avoid this constraint, argumental clitics must exit the VP, just like their Romance counterparts (cf. Desouvrey 2000, 2005, 2018, 2019). What is specific to SC here is that the auxiliary must be set up first, a requirement which is realized here by its adjunction to *ja*.

- (24)
- | | | |
|---|---|---|
| D | D | D |
| | | |
| [ja [[[dala <i>je~sam</i>] <i>mu</i>] <i>ga</i>]] | | |
| | | |
| A | A | A |

In (22b) however, there is no escaping domain, just as in imperative verbs. Thus, what happens is exactly what the OCP is intended to avoid, namely a morpheme build up by case fusion in the complement domain of the verb. Indeed, identical cases are merged, yielding a configuration like (25). If this configuration were universally allowed, i.e. if universal grammar did not use the OCP, all verb-clitic structures would be reanalyzed as a compound, a result which would have unwanted consequences elsewhere in the grammar.

⁷ (24) is a rough representation, for actually dative is a thematic to node which an oblique case depends on (cf. Desouvrey 2018, 2019).



4.2 The special placement of *je*

Being the first element of its compound, it may not be surprising that clitic *je* is placed at the end of the cluster. The reason is that if another element were to be adjoined to *je*, it would attach to the rightmost bare x-slot of the defective morpheme *ste*, and at the linearization the cursor would not reach it, resulting in its disappearance. This is illustrated with the following ill-derivation (Bošković 2004:54), where the clitics *mu* and *ga* have gone missing with their deficient host $\sim ste$:

- (26) a. [ona [[[predstavila *je*~*ste*] *mu*] *ga*]] (input)
 b. *ona= *je*~*ste*=***mu***=***ga*** predstavila → ona=*je* predstavila

To the extent that lexical elements may not in general be lost in the derivation, it is self-evident that the placement of auxiliary *je* must be postponed after all other clitics. So the peculiarity of this clitic need not be stipulated by the grammar, as it follows from the representation. As I will show shortly, the reflexive *se* has the same internal structure as auxiliary *je*, and therefore its placement must be postponed as well. However, the placement of *je* need not be postponed when interacting with ω -specified elements. As I will show, vectors are attracted to each other, and therefore they will never attach to the neutral defective *ste*.

Let us turn now to two additional facts involving *je*. In a cluster with the reflexive clitic, both orders are possible: *se*>*je* and *je*>*se*. In addition, *je* may be dropped in this type of cluster. This is illustrated in (27) and (28) (adapted from Mihalicek 2012: 281).

- (27) a. Ana *se* vidjela.
 Ana.NOM SELF seen
 'Ana saw herself.'
 b. Ana *se je* vidjela.
- (28) a. Ana *ga se* bojala.
 Ana.NOM him.ACC SE be-afraid

'Ana was afraid of him.'

- b. Ana *ga se je* bojala.

It is mentioned in the literature that *se* has a dual nature in SC: it may be either a reflexive of the subject, as in (27), or an inherent part of the verb, (28). It is also noted that only the reflexive *se* has a non-clitic form, *sebe*. If my own observation is right, a further characteristic of this reflexive is that it does not agree in person with the subject. That is, its shape is invariable whether the subject is first, second or third person. This fact suggests that it may not belong to the paradigm of personal pronouns, which carry a person feature. This leads to the assumption that the reflexive constitutes a different paradigm, of which it is perhaps the only element. Since it has a full form, it must be the case that it patterns like auxiliaries, that is, it is underlyingly a compound, *se~be*, from which a clitic is derived by mandatory adjunction in the syntactic derivation. A further assumption is needed: both morphemes of this compound must be ω -specified so that it is a neutral element in the syntactic derivation, the reason for which will become clear shortly. Finally, the fact that it carries the stray morpheme on its right side, just like *je*, ensures its placement after the other clitics, and therefore it should compete with auxiliary *je* for the same position in the cluster.

From this perspective, one can derive the sentences in (27b) from the input shown in (29a). (From now on, each operator bears a superscript indicating their relative rank in the structure; *se~be* is a compound vector, so both of its morphemes have the same number). Both clitics carry the ill-morpheme on their right side. If the auxiliary yields priority, as it does with other clitics, the reflexive adjoins to the subject *Anna*. Since both morphemes *se* and *be* of the reflexive are ω -specified, the auxiliary can be attracted to either (see fn. 9): if it adjoins to the first morpheme *se*, sentence (29b) obtains, but if it adjoins to *be*, it will be filtered out as stray as in (29c), which is acceptable.⁸

- (29) a. [Ana [[vidjela *je*¹~*ste*] *se*²~*be*²]]
 b. Ana=*se*=*je* vidjela
 c. Ana=*se*~*be*=*je* vidjela → Ana=*se* vidjela

⁸ Schütze, after Browne 1975, reports that in spoken language the clusters *me je* and *te je* are similarly reduced to *me* and *te* respectively. It appears thus that in such speeches these pronouns, *mene* and *tebe*, are aligned with *se~be*, i.e. they are reanalyzed as *me~ne* and *te~be*. This is not surprising since they are among the few that show a regular pattern in their paradigm (cf. Table 1). In addition, he reports that the vowel of *se* may be lengthened by certain speakers, i.e. *se* → *se:*. In my opinion, this compensatory lengthening is used by the grammar to 'ratify' the loss of the auxiliary instead of ruling out the sentence. In effect, this loss amounts to a constraint violation and normally should not occur, for after all the placement of *je* is postponed precisely to avoid the loss of the pronominal clitics. This fact is similar to the pitch accent that appears on clitic *le* in French imperatives, where the OCP violation is inevitable. In normal speeches, *le* → *l*, as in *on le prend* [õl prã] 'we take it', but one has: *prends-le!* [prãlã] 'take it!' instead of **prends-l!* [prãl] (cf. Desouvrey 2000).

If the auxiliary moves first, however, the resulting structure is *Ana=je=se vidjela*, which is presumably a well-formed sentence. However, unlike (27a), the omission of the reflexive may not be possible: **Ana je vidjela*. This is consistent with the assumption that both parts of *se~be* is ω -specified, while only the clitic part of the auxiliary is ω -specified. In effect, since vectors attract each other, *se~be* must anchor to vector *je*, but not to the stray *~ste*, which is neutral.

As for the sentences in (28), which show an inherent *se*, they can be similarly explained under the simplest assumption that there is just one clitic *se*, whose full form is never used in non-reflexive contexts. This is more appealing than positing the existence of a homophone inherent *se* since after all these alternations are regularly observed in both types of construction, reflexive or not. Now the relevant question is why the full form cannot be used in non-reflexive contexts. Obviously, *se~be*, must be taken as part of the lexical entry of certain verbs (the inherent-*se* verbs), and as such it directly enters the syntax via an idiom phrase. Quite contrary, the reflexive is called as a complement by a syntactic head, which may or may not require it to pass by the morphology before entering the syntax. That is, if the head requires a full form, *se~be* must be set up in the morphology, otherwise it directly enters the syntax, where it has to be set up by adjunction.

To conclude, the special behavior of *je* and *se* is accounted for in a principled way. A further interesting fact is the possibility for *je*, unlike other auxiliary clitics, to be the first element of the sentence. This occurs in *yes-no* question with *li*, which will be addressed in section 7. In the next section, I will show that the interaction of auxiliaries with *wh*-operators strongly supports the present analysis.

5. Interaction of auxiliaries with *wh*-arguments

Wh-elements are specified for various features, including case. Their morphology does not consist of a stem to which a case morpheme is affixed, just like their pronominal counterparts. Therefore, they must be treated as clitics. In French for instance, each pronominal clitic has a caseless strong form which behaves like an NP. This is the same for argumental operators: their strong form must stay in situ, unlike the clitic equivalent. This is illustrated in (30).

- (30) a. Il fait quoi? / *Quoi fait-il ?
 he does what
 'What does he do?'

- b. Que fait-il? / *Il fait que?
 What does he
 'What does he do?'

Wh-movement is an interesting matter in SC. In simple clauses, it looks as if there were no superiority effect, as such elements are freely ordered with respect to one another. Rudin (1988) argues that the Superiority Condition does not hold in SC, but her arguments are rejected by others using the same framework (cf. Bošković 1997). In this feature- and constraint-based theory, it amounts to say that *wh* in SC are not specified for ω , a feature that confers scope to its bearer. It is unlikely that this is the case since this feature, which may be found in other grammatical categories, is inherent to *wh* and negation. However, what is surprising is the lack of the feature π , which is typical of *wh*-paradigms. It is this feature that forces them, in languages like English and French for instance, to move to an edge of the structure instead of adjoining to the first element out of the OCP domain, like ordinary argumental clitics. It might be that the dismissal of this feature is an effect of the safe-conduct granted to the auxiliaries.

I argue that *wh*-elements in SC can be reordered during the course of the derivation without inducing a superiority effect. This is due to the very nature of vectors, which are directional and scopal elements. If a structure contains more than one vector, there is what may be called a potential difference between them. This energy triggers the attraction of the lower vector to the higher one. When the potential difference is null, as is the case under compounding, whether by morphological affixation (+) or temporal adjunction in the syntax (=), their ω -feature can be said to be inert. For ease of exposition, I will refer to this effect as the Product of Vectors (the symbol '◦' stands for '+' or '='):

(31) **Product of Vectors**

The cluster (noted ◦) of any number of vectors results in the inertness of their ω -feature:

$$\vec{A} \circ \vec{B} \circ \dots \rightarrow A \circ B \circ \dots$$

Consider the sentences in (32) (Bošković 1997, Mihalicek 2012), which show an apparent reordering of the operators *ko* and *koga*. In the present analysis, it includes three operators since the auxiliary is a vector as seen above. Sentence (32a) can be derived from an input as in (33a), where *je* adjoins to the subject operator, and then *koga* adjoins to *je*. The operators in the cluster lose their vector properties by virtue of (31). This is indicated by the absence of their superscript in the output. As for (32b), it proceeds from input (33b), in which the auxiliary is not in a position to move, given the ban on

string-vacuous operation. This input is thus improved by the fronting of the last operator in a second step. Despite the transitory superiority effect, this movement is possible under the safe-conduct of the auxiliary. Thus, the auxiliary moves to the fronted operator; as a result, there is no superiority effect since only one valid operator remains in the output.

- (32) a. Ko je koga vidio?
 who is whom seen
 'Who saw whom?'
 b. Koga je ko vidio?
- (33) a. [Ko^l [[vidio je^2] $koga^3$]] → ko=je=koga vidio
 b. [Ko^l [[je^2 vidio] $koga^3$]] → $koga^3$ [ko^l [je^2 vidio]] → koga=je ko^l vidio

As evidence for this analysis, consider the paradigm in (34), which shows six variants of the same sentence (cf. Mihalicek: 309). In these sentences there are three *wh*-operators and the clitic *je*, hence four vectors in the present analysis. I argue that they exhibit no superiority effect since they originate from different inputs. Recall that the relative order of vectors in the input must be the same in the output. However, in the course of the derivation, vectors may become disabled by adjoining to one another, consistently with (31). In a language where head directionality is almost absent, one expects that only basic constituencies be respected, as discussed above. So, if the verb has two internal arguments, one may have either a [[VO]O], an [[OV]O] or an [O[OV]] structure. Given the requirement that the dative argument must precede the theme and the fact that auxiliaries are vector, one may add two further restrictions on the input: (a) the dative argument must be merged first with the head, and (b) directionality must be respected when both the head and its complement are vector. The logic of this assumption is that vectors are so avid for scope that they may not place a vector complement in a higher position than themselves.

- (34) a. ko je kome šta dao?
 who.NOM is who.DAT what.ACC given
 'Who gave what to whom?'
 b. ko je šta kome dao?
 c. Kome je ko šta dao?
 d. Kome je šta ko dao?
 e. Šta je kome ko dao?

f. Šta je ko kome dao?

Thus, (34a) and (34b) can be derived as in (35a) and (35b) respectively. The auxiliary clitic *je* moves to the first operator, followed by the other operators. As a result, a cluster of four elements is obtained in two derivational steps (35a). Recall that vectors are not at risk to disappear as stray with the defective morpheme *~ste* since they are attracted to the vector part of the auxiliary compound, unlike pronominal clitics. Alternatively, if the fourth operator moves right after the auxiliary, a further derivational step is required to add the third operator to the cluster, (35b).⁹ The reason is that once the fourth operator has moved, the process cannot go back to a higher element, *kome*, in the same step. Similarly, the derivation of (34c,d) proceeds from a VOOS input as in (35c), which exhibits the order participle-auxiliary. Since the auxiliary cannot move immediately, the second operator is fronted. This gives rise to a second step, since the cursor cannot go back to adjoin the auxiliary in the newly available position. Once the auxiliary is set up, both operators move in any order, yielding the desired results, where all operators are disabled.

- (35) a. $[ko^l [[[dao\ je^2] kome^3] \check{sta}^4]] \rightarrow ko=je=kome=\check{sta}\ dao?$
 b. $[ko^l [[[dao\ je^2] kome^3] \check{sta}^4]] \rightarrow ko^l=je^2=\check{sta}^4\ dao\ kome^3 \rightarrow ko=je=\check{sta}=kome\ dao?$
 c. $[[[[dao\ je^l] kome^2] sta^3] ko^4] \rightarrow kome^2 [[dao\ je^l] sta^3] ko^4 \rightarrow$
 $kome=je=sta=ko\ dao / kome=je=ko=sta\ dao$

Let us turn now to (34e,f). They can be derived from an OVOS input with a participle-auxiliary order as in (36a). The auxiliary adjoins to the highest operator and then the other operators adjoin in turn to the cluster in any order, given the pendulum effect (cf fn. 9).

- (36) a. $[\check{sta}^l [[[dao\ je^2] kome^3] ko^4]] \rightarrow$
 $\check{sta}=je=kome=ko\ dao / \check{sta}=je=ko=kome\ dao$
 b. $[ko^l [[[je^2\ dao] kome^3] \check{sta}^4]] \rightarrow \check{sta}^4 [ko^l\ je^2\ dao\ kome^3] \rightarrow$
 $\check{sta}=je=kome\ ko^l\ dao? /*\check{sta}=je\ \text{\textcircled{0}}=kome\ dao?$

It should be noted that the number of possible inputs is presumably reduced by the interaction of the vectors. Specifically, a derivation as in (36b) that yields an output with two successive vector clusters is not acceptable even though there is no superiority effect. The reason is that the third operator would

⁹ The fact that either of the two lower operators can move first is due to a pendulum effect (Desouvrey 2021). That is, the higher operator aligns alternately with each of the lower operator.

automatically bypassed in the output (Desouvrey 2021).

To conclude, we may note that this analysis is only possible in a theory that is based on feature interaction. The inherent property of any lexical element must be related to some feature that can be tracked down. Theories which do not consider that the scope of an operator is due to a feature cannot capture the correlation between the auxiliaries and the *wh*-operators. Two features are essential to this analysis: the feature ω , which is normally found in operators and accidentally in SC auxiliaries, and the lack of the feature π in SC *wh*-operators. It is this missing feature which allows them to cluster together.

6. Clitic climbing

This phenomenon can be thoroughly accounted for under the assumptions made above, namely the lack of head directionality for major constituents of the sentence, and the prominent role of the ω -feature. Since no new apparatus is needed, clitic climbing is a further piece of evidence for the analysis presented above.

Consider for instance the seven variants of a sentence in which the complement of the main verb is an infinitive with two arguments, a clitic and an NP, as shown in (37), adapted from Mihalicek (2012: 420-421). I assume that the matrix verb *će* is a vector clitic which is obtained from the full form (*hoće*) by adjunction, just like the other auxiliaries. A further assumption that is needed here is that infinitive verbs in SC are specified for ω , and therefore they are sensitive to superiority effect, for which evidence will be provided shortly.

- (37) a. Ana *će* poslati *ga* Marku.
 Ana.NOM will send.INF it.ACC Marko.DAT
 'Ana will send it to Marko.'
- b. Ana *će ga* poslati Marku.
 c. Ana *će ga* Marku poslati.
 d. Poslaće *ga* Ana Marku.
 e. Poslaće *ga* Marku Ana.
 f. Marku *će ga* Ana poslati.
 g. Marku *će ga* poslati Ana.

In (37a) the pronominal clitic remains in situ, in the infinitive phrase, whereas in (37b-g) it is in a cluster with the auxiliary, which is hosted by either the subject, the infinitive verb or the second object.

I claim that (37a) is different from the other variants with respect to the status of the auxiliary. In (37a), *će* behaves as a real matrix verb that takes the VP as complement, whereas in the other variants it takes the infinitive as complement, just like the other auxiliaries. The phrase aux-infinitive is then merged with the arguments to form a one-clause structure.

On this view, the derivation of (37a) proceeds from an SOV input as in (38a), where the object is an OVO-type VP. The auxiliary adjoins to the first element, triggering a transitory superiority effect in the intermediate step (38b). Finally the matrix verb and the pronominal clitic move in turn to the cluster, yielding the desired result, (38c).

- (38) a. [Ana [Marku [*poslati*¹ ga]] *će*²] → (input)
 b. Ana=*će*² [Marku *poslati*¹ ga] →
 c. Ana=*će*=*poslati*=ga Marku. (output)

In the other sentences, (37b-g), the clitic has climbed out from the infinitive clause to the auxiliary clause. Mihalicek points out: “If the infinitive’s clitics climb out to the matrix clause, the infinitive itself and any of its non-clitic arguments are just treated as ordinary main clause arguments and can freely reorder with respect to them.” (p. 283). Thus, they may not arise from a two-clause structure. I show that they are derived from various inputs where the infinitive is the complement of the auxiliary, as suggested above.

Thus, for (37b) one can assume a derivation as in (39a). From this SOVO structure, the auxiliary moves to the subject across the pronominal clitic, yielding the correct output in two derivational steps. Notice that the pronominal clitic must stay in situ, given the ban on vacuous movement. As for sentence (37c), it results from a similar input, except that order of the objects are inverted, and hence the pronominal clitic can adjoin to the auxiliary, as in (39b).

- (39) a. [Ana [[ga [*će*¹ *poslati*²]] Marku]] → Ana=*će*¹ ga *poslati*² Marku
 b. [Ana [Marku [[*će*¹ *poslati*²] ga]]] → Ana=*će*¹=ga Marku *poslati*²

Let us turn now to (37d) and (37e) in which the clitic cluster is affixed to the infinitive verb. I suggest that they proceed from two different inputs. The derivation of (37d) proceeds from an SVOO input as in (40). The infinitive is fronted to make possible the setup of the auxiliary. From the resulting intermediate step, the auxiliary and the pronominal clitic adjoins in turn to the auxiliary cluster. On the other hand, (37e) can be derived from a VOOS input as in (41). The auxiliary moves rightward to the infinitive and the pronominal clitic adjoins to the cluster, yielding the desired result.

(40) [Ana [[[*će'* *poslati*²] *ga*] *Marku*]] → *poslati*² [Ana *ce*¹ *ga* *Marku*] →
posla=će=ga Ana *Marku*.

(41) [[[[*će'* *poslati*²] *Marku*] *ga*] Ana] → *posla=će=ga* *Marku* Ana.

The assumption that the infinitive verb is a vector is supported by its shape in the cluster. Indeed, it surfaces as *posla=će* instead of the expected **poslati=će*. This alternation is analogous to that of clitics vs. full forms in the conjugation of the auxiliary verbs. Indeed, both cases are due to the fact that compounds are defective in SC in that the melody of one of the morphemes is floating. Thus, this alternation, which occurs in certain classes of verbs (cf. Mihalicek:191-192), tells us that the infinitive verbs are made of an ω -specified radical and a neutral infinitive affix, which is weakly linked to the skeleton by a default rule of spreading: *posla~ti*. If in the syntax a vector targets the radical, the spreading rule is presumably dismissed, as its original structural description no longer exists. As a result, the infinitive affix disappears as stray at the end of the derivation. It should be noted that a similar phenomenon occurs in European Portuguese, where pronominal clitics, which are also ω -specified, are inserted between the radical and the infinitive ending (cf. Desouvrey 2008b, and references therein). In the light of the present study on SC, this can be further characterized. In Portuguese, the infinitive ending does not disappear because its melody is genuinely attached to the skeleton, whereas in SC it is floating, which triggers a rule of association in the morphology component.

Consider now (37f,g) in which the NP *Marku* is the host of the clitics. Their derivation proceeds as in (42) and (43) respectively. In the SVOO input structure (42), *Marku* is fronted, which gives rise to an intermediate structure for the auxiliary to set up. Then in the last step, the auxiliary and the pronoun adjoin in turn to *Marku*, yielding the desired result. As for (37d), it proceeds from a two-step derivation as in (43). From the OOVS input, the auxiliary just adjoins to *Marku*, the pronominal clitic having no room to exit the VP.

(42) [Ana [[[*će'* *poslati*²] *ga*] *Marku*]] → *Marku* [Ana *će'* *poslati*² *ga*] →
Marku=će'=ga Ana *poslati*².

(43) [[*Marku* [*ga* [*će'* *poslati*²]]] Ana] → *Marku=će'* *ga* *poslati*² Ana.

To complete the analysis of the paradigm in (37), we may note that the replacement of the NP *Marku* by a clitic reduces the number of variants to only three, given that the dative clitic must always

precede the accusative clitic. In addition, neither can be in initial position so as to host the auxiliary. This is due to the fact they must always stay free to be able to eventually exit the VP under OCP. Thus, if the auxiliary is a matrix verb, the derivation proceeds as in (44a). If instead the auxiliary merges with the infinitive verb, only the derivations shown in (44b,c) seem to be possible.

- (44) a. [Ana [ga [poslati¹ mu]] *će*²] → Ana=*će*¹ ga poslati² mu → Ana=*će*=poslati=mu ga.
 b. [Ana [ga [[*će*¹ poslati²] mu]]] → Ana=*će*¹=mu ga poslati².
 c. [Ana [[[*će*¹ poslati²] mu] ga]] → poslati²[Ana [[*će*¹ mu] ga]] → posla=*će*=mu=ga Ana.

It appears that in any construction with a compound tense, the auxiliary must be set up as soon as possible. If it is generated in the second position in the structure, a lower element must be fronted before it can move, given the prohibition of vacuous movement.

7. The interrogative particle *li*

The particle *li* is mainly used in *yes-no* questions, and it must be preceded by a tensed verb or another particle, *da*, as illustrated in (45) (adapted from Mihalicek 2012: 297, 299, 303). To correctly analyze such sentences, the status of both particles must be clarified. I will assume that *da* is a complementizer, consistently with a standard assumption in the literature. However, under my assumptions, the complementizer is a referring element, precisely a relative pronoun/anaphor (cf. Desouvrey 2007, 2008a, etc.). In addition, I assume that it is a vector, just like the clitics, as I will show. As for the particle *li*, I will argue that it is a referring element, an anaphor and also a pronoun that refers to an event, i.e. a clause, instead of an NP. Furthermore, I suggest that morphologically *li* is a part of a compound, *da~li*, where *da* is a deficient morpheme in the sense discussed above. Just as in the case of the verbal auxiliaries, the resulting full form *dali* is derived in the morphology, while the clitic *li* is set up in the syntactic derivation by adjunction. If this view is correct, it is expected that *da~li*, *dali* as set up in the morphology, cooccur with the complementizer *da*. This is borne out, as can be seen in (46).¹⁰

- (45) a. Da li Ana spava?
 DA LI Ana.NOM sleep.3SG
 'Is Ana sleeping?'
 b. Da li mu ga je Ana kupila?

¹⁰ Schütze (1994) briefly reports that in some literature *dali* is sometimes analyzed as a single word, the full form of the clitic *li*, a view that is rejected by Radanović-Kocić (1988) and Hock (1992), which are not accessible to me at this time.

DA LI him.DAT it.ACC is Ana.NOM bought.3SG

'Did Ana buy him that?'

c. Spava li Ana?

d. Jeste li mi ga poslali juče?

are LI me.DAT it.ACC sent yesterday

'Did you send it to me yesterday?'

(46) *Da~li* da ti dam knjigu?

DA LI COMP you give book

'Should I give you the book?' (Schütze 1994: 85, citing Browne 1974: 39)

Given these assumptions, one can posit for (45a) the input in (47a). This is a two-structure input: a small matrix clause, the *da* clause, and a complement clause, which is in fact the main clause.¹¹ For the time being, the indexes descriptively indicate intended coreference: so *Ana* is the antecedent of the complementizer, while the particle *li* refers to the complement clause. It is important to notice that both structures being autonomous, their vectors are not ranked with respect to each other, as indicated by the superscripts. The compound *da~li* adjoins to *da* to be set up, yielding the desired result (47b). Notice the verb cannot be in the first position of its clause, given that anaphor *da* must be adjacent to its antecedent *Ana*, and being a vector it cannot refer to its antecedent across the verb, which is assumedly a vector.

(47) a. [*da~li*_x¹ *da*_i²] [*Ana*_i *spava*¹]_x

b. *da*_i=*li*_x [*Ana*_i *spava*¹]_x

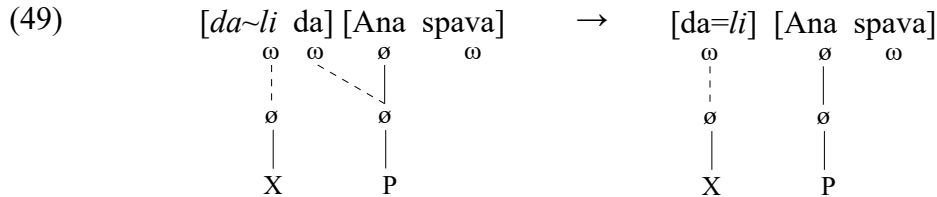
Similarly, the derivation of (45b) proceeds from an input as in (48a). The compound *da~li* adjoins to the relative complementizer (48b), a process which results in the neutralization of their ω -feature. The one-element structure is reanalyzed as an edge-adjoined element, under the safe-conduct of the auxiliary *je*, which must be set up. Thus, this auxiliary yields priority to the pronominal clitics by postponing its placement after them, as seen in (48c), which is the desired result.

(48) a. [*da~li*_x¹ *da*_i²] [*Ana*_i [[[*je*¹ *kupila*] *mu*] *ga*]]_x

11 In this view, a sentence like *John thinks that Mary likes him* consists of a matrix clause and a complement clause: [John thinks that_i][Mary_i likes him]. The scope of the latter is restricted by the matrix clause, which is indeed a restrictive relative clause (see Desouvrey 1997, 2003, 2008a, 2010, etc.). The traditional division is a nonsense since none of the clauses can be qualified as independent: *[John thinks][that Mary likes him].

- b. *da=li=mu=ga Ana je kupila*
- c. *da=li_x=mu=ga=je Ana kupila*

Before turning to (45c,d), we must take a closer look at the mechanism of coreference, which is actually realized by spreading. The referential representation of the input structure (47a), as given in (49), exhibits the fact that the three types of referring elements, namely NPs, pronouns and anaphors, have a distinct feature-tree representation (cf. Desouvrey 2003, 2006, 2013). Every referential element has a root node, which may be either ω (vector), φ (scalar) or \emptyset (neutral). In addition, the NP and the pronoun, unlike the anaphor, have a class node (a thematic node), which is neutral for nominative and accusative argument. The NP is further specified for a terminal feature, P , which is the virtualization of a real world entity, while the pronoun bears the feature X representing the presumably unknown event of the complement clause. Given the assumption that the particle *li* can be either an anaphor or a pronoun, it must be represented with a floating thematic node, which is linked to the root node via a dotted association line only if a referential feature exists, here X . Thus, coreference is then realized by spreading the appropriate feature from one element to another. The pronoun *li* and the NP are referentially autonomous, while the relative anaphor is supplied with a thematic feature by its intended antecedent, the NP *Ana*.¹² Once the compound *da~li* is adjoined to the complementizer, this complex referential pattern is simplified, resulting in the fusion of their root node. The anaphoric relation between *Ana* and the complementizer seems thus no longer necessary.



Thus, under this analysis, it appears that *yes-no* questions are made of the conjunction of two clauses, one of which, the matrix clause, is the repetition of the subordinate clause (actually the main clause) via the anaphor/pronoun *da~li*. This may look like strange, but it might be frequently used in natural languages. For instance, colloquial French uses a similar construction to derive exclamative sentences:

¹² It should be noted that there are further constraints related to the spreading process, among which: the ban on line crossing and feature clash. The latter may happen with an anaphor if its root node is incompatible with that of the R-node (or thematic node). That is, if an anaphor is a vector, it can only target an R-node of another vector or a neutral element (neither vector nor scalar). In addition, a vector anaphor cannot acquire a distant antecedent across another vector. It appears that these constraints are irrelevant here.

- (50) Ce qu'il est gentil! (*que il → qu'il)
 CE that he is kind
 'How gentle he is!'

It is easy to see that the input for (50) is similar to (47a) in that it comprises a matrix clause and a complement clause with the same referential scheme, as can be seen in (51a). Notice that in the standard version, the pronoun *ce* is simply deleted, (51b). In SC as well, such a structure can be simplified by deleting one of the elements in the matrix clause (cf. 45c,d, and below).

- (51) a. [ce_Q que_i] [il_i est gentil]_Q
 b. [ee_Q que_i] [il_i est gentil]_Q (Qu'il est gentil!)

Furthermore, the same *li*-like pronoun *ce* is used in forming modern *yes-no* questions. In current French (but not formal), a dummy matrix clause is used, *c'est que*, which obviates the need for inversion and clitic doubling (see Desouvrey 2007). Compare the formal versions with the normal ones:

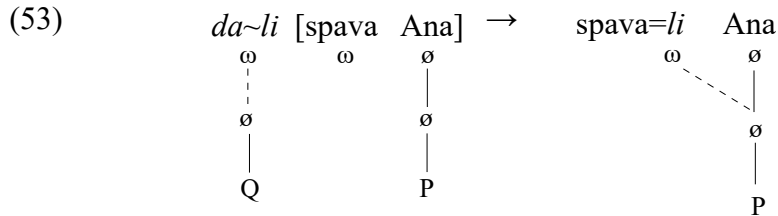
- (52) a. Marie est-elle venue? (formal)
 Marie_i is she_i come
 'Did Marie come?'
 b. Est-elle venue? (formal)
 Is she come
 c. Est-ce que Marie est venue? (normal)
 CE it that Marie is come
 d. Est-ce qu'elle est venue? (normal)

Returning to SC, recall that in the result of derivation (49), the anaphoric relation between *da* and the subject *Ana* is dropped. If this view is correct, *da* may not be essential; thus, it should be possible to obtain the same result without using it if another element is available to host the compound.¹³ As it happens, both (45c,d) are indeed well-formed without the complementizer (I will consider shortly the obligatory subject inversion). The representation of (45c) is as given in (53). Once *da~li* is set up by

13 Actually, either *da~li* or *da* can be omitted since they are both pronoun and anaphor. In the following example (Schütze 1994: 85, referring to Browne 1974: 39), it is clear that *da~li* is dropped. Of course, a specific meaning may be attached to each case.

(i) Da **ti** dam knjigu?
 DA *you give book*
 'Should I give you the book?'

adjunction to the verb, it must be the case that its terminal feature X is no longer necessary, as it is now an element of the structure X. Therefore, *li* simply becomes an anaphor to *Ana* at the output.



The analysis of *li* as an anaphor/pronoun sheds light on the fact in (54), reported in Schütze (1994: 87, citing Browne 1975b). He remarks, “The particle *li* has some other peculiar properties as well. It is not obligatory in *wh*-questions, but when inserted in them it adds the meaning that the speaker is asking him/herself.” In my view, the (54b) interpretation is only possible because *li* is a referential element, precisely an anaphor to *mi*.

- (54) a. Gdje mi je sestra?
 where me AUX sister
 ‘Where is my sister?’
- b. Gdje **li** mi je sestra?
 ‘I wonder where my sister is?’

As for sentence (45d), it is simply obtained from a derivation as in (55). From the input (55a), the clitic *li* adjoins to the null-subject auxiliary *jeste* and becomes an anaphor. Then it is followed by the other clitics, (55b). Notice that in the input, *li* is not linked to the main clause, and may in fact appear at either side of the latter, as it is still an independent structure obtained from the deletion of complementizer *da*; hence it may not be ordered with respect to main clause vectors, a conclusion to which I turn immediately.

- (55) a. $da\sim li^i$ [jeste¹ [[[poslali mi] ga] juče]] →
 b. jeste=*li*=*mi*=*ga* [poslali juče]

The assumption that SC verbs are ω -specified makes it possible to account for the fact that no other element can host the clitic *li* in such a construction (cf. **Ana li spava?*). Recall that in the input both clauses are unordered independent structures, so that either of the following is a possible input: $[da\sim li^i][spava^1 Ana]$ / $[spava^1 Ana][da\sim li^i]$. Alternatively, suppose that the input is either $[da\sim li^i][Ana$

spava'] or [*Ana spava'*][*da~li'*]. Then, if *da~li* integrates into the main clause by adjoining to *Ana*, a ranking alternation of the vectors would result in: [*Ana=li'* *spava'*], or else there would be two vectors with identical ranking in the same structure, [*Ana=li'* *spava'*]. If we count this alternation as a type of superiority effect, then it must be avoided. This can only be realized by the adjunction of *da~li* to the tensed verb (ω -specified), so that their ω -feature is switched off. In addition, the verb has to be the first element in the structure since a vector may not move to a lower position.

There is a third strategy, apparently marginal, which uses the morpheme *je* as a host for *da~li*, as discussed in Schütze (1994), using data from Radanović-Kocić (1988) and Hock (1992), adapted here as in (56):

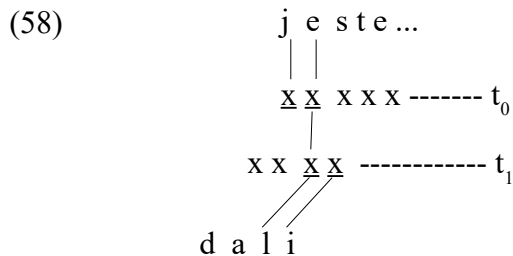
- (56) a. *Je li oni pišu?*
 JE LI they write
 ‘Are they writing?’
- b. *Je li će mi doći radost?*
 JE LI will me come happiness
 ‘Will happiness come to me?’

It is obvious that *je* is not an auxiliary in these sentences since the verbs are in the present tense. It is likely that this instance of *je* is a referring element, namely the third person feminine genitive clitic. In effect, this genitive pronoun may lack its own thematic node, as it depends on the noun it refers to get one. If so, it appears to be an anaphor, and as a result it is suitable to alternate with the relative anaphor *da* for certain speakers. Having no data on the use of this genitive pronoun, I will not discuss this suggestion further.

There are, however, cases where *je* does behave as an auxiliary, as illustrated in (57a) (cf. Milićević: 4b), whose input is given in (57b). Since *je* cooccurs with a participle, it must be the case that it is the third person auxiliary. Thus, it is a matter to account for its unusual position at the beginning of the clause. I show that this position of *je* is consistent with, and indeed supports, the present analysis. In effect, since this auxiliary carries the stray morpheme to its right side, it can get it filter out without moving if it can be the mandatory host to another vector. This is exactly the case in *yes-no* questions, where the compound *da~li* must adjoin to a tensed verb in clause initial position if the complementizer is not used. Recall that adjunction always takes place at the skeletal level and links the leftmost x-slot of the adjunct to the rightmost one of the host. So being a vector, *li* correctly links itself

to the first ω -morpheme, ignoring the stray. This is shown in (58), where only the underlined x-slots are in the path of the linearization. It is self-evident that other auxiliaries which have the deficient morpheme on their back can never be used in such a context. If indeed such clitics were to be used here, the cursor would start with the bare x-slot and would ignore the whole compound as stray.

- (57) a. Je li iko bio ovde?
 AUX Q anyone been here
 ‘Has anyone been here?’
 b. *da~li'* [*je'*~*ste* iko bio ovde]



8. Some residual facts

This section is devoted to certain additional facts, including the delayed placement of clitics in a lower position in the structure, and the splitting of the cluster, which I will discuss in turn.

8.1 Delayed placement of auxiliary clitics

In the present analysis, auxiliary clitics appear in fact in the highest position of the structure, as they become a part of the first word, given the mechanics of the adjunction process. Since the derivation crucially depends on their placement, one may say that they take this as an opportunity to acquire the widest possible scope. However, if the first element in the structure is a phrase, it is obvious that the auxiliary should normally adjoin to the last word of it. Examples where the auxiliary acquires instead the first word of a phrase (a possessive determiner, the first part of a name, etc.) seem rather marginal, but at the same time they justify the absolute necessity for the auxiliary to be set up by adjunction. In other words, a careless speaker may in extremis force an auxiliary to the first word of a phrase to save what would be an ill-derivation, as in (17) above.

In the literature, it is acknowledged that the placement of the clitics takes place either after the first word (1W) or the first phrase (1P). However, if the latter is too long, a clitic avoids it. This fact prompts many to propose a mixed analysis partly based on syntax, phonology, and morphology. Mixed accounts

of clitic placement are built on the observation that clitics are second, not in the sentence, but in their prosodic unit. This seems to be trivial since the prosodic unit is normally the basis of syntactic analysis. Indeed, in the syntactic structure, phenomena such as left or right dislocation, juxtaposed sentences, as well as a variety of clauses are normally set aside, unless they are the subject of the study. For instance, an *if*-clause may precede a *wh*-question, but this possibility need not be taken into consideration in a study of *wh*-movement. To the best of my knowledge, one never asks why *wh*-elements do not move to the left edge of an *if*-clause or across a prosodic boundary.

Of course in certain contexts, it is not obvious to find out the limit of a prosodic unit, which is normally marked with a pause. In pro-drop languages, this is even more difficult since the subject can always be left-dislocated or interpreted as such without the appearance of a pause. Thus, in the following sentences, adapted from Čamdžić and Hudson (2007: 24-25), the clitic, which has been generated in the *t*-position (a notation used for expository convenience), can either adjoin to the participle verb (59a) or to the last element of the subject phrase (59b). The difference between these examples is likely due to a pause, which may be more or less perceptible after the subject phrase: in (59a), but not in (59b), a pause is simply assumed. If in (59b) the speaker accentuates the pause, the sentence may not be grammatical, as Čamdžić and Hudson point out.

- (59) a. Veliki sivi slon *t* spavao=*je* pored rijeke.
 Big grey elephant slept is by river
 ‘A big grey elephant slept by the river.’
- b. Veliki sivi slon=*je* spavao *t* pored rijeke.
 Big grey elephant is slept by river.
 ‘A big grey elephant slept by the river.’

Čamdžić and Hudson comment, “The longer the initial constituent, the more likely the delayed placement.” (p.12) Thus in the following example (adapted from their (26)), the clitic is normally affixed to the participle verb by rightward movement. Of course, such a long phrase will be almost always interpreted as left-dislocated, and therefore the auxiliary must be aptly generated so as to avoid this pitfall (also see below).

- (60) [Cirkuski sivi slon sa velikim ušima] *t* spavao=*je* pored rijeke.
 Circus grey elephant with big ears slept is by river
 ‘A big grey circus elephant with big ears slept by the river.’

To conclude, the prosodic effect is not a significant one in pro-drop languages, where the limit of left-juxtaposed structures is usually fuzzy.

8.2 Split clusters

In certain contexts it happens that auxiliary and pronominal clitics do not cluster together. The following example shows that the auxiliary clitic and the pronominal clitic are separated by a parenthetical clause (cf. Čamdžić and Hudson: 29; they use the slashes to indicate an intonation break.)

- (61) Oni *su* // kao sto sam vam rekla // predstavili *se* Petru.
 they are as am you.dat said introduced self.acc Peter-dat
 ‘They, as I told you, introduced themselves to Peter.’

In this example, the auxiliary clitic normally adjoins to the highest element, and then the parenthetical clause is inserted in extremis, forcing the pronominal clitic to stay in situ in violation of OCP. This is not surprising since OCP is a structural constraint, which may not affect the interpretation of the structure. In fact, both versions of this constraint cannot be satisfied in this context: as the clitic is in situ, OCP1 is violated, but if it were to adjoin to the auxiliary, OCP2 would be violated. Such a sentence is anyway marginal, since even the auxiliary is too far from the verb, which shares with it certain features, in violation of OCP2.

A more regular fact is the splitting of the cluster by negation. This appears to be a strong support for the assumption that auxiliary clitics are ω -specified element, just like *wh* and negation. Consider the following paradigm (Rivero 1991, Schütze 1994):

- (62) a. Ja *sam mu se* predstavio.
 I AUX him REFL introduced
 ‘I have introduced myself to him.’
 b. Ja *mu se* nisam predstavio.
 NEG-AUX
 ‘I have not introduced myself to him.’
 c. *Ja *sam mu se ni* predstavio/ne predstavio.
 d. Nisam *mu se* predstavio.
 e. *Predstavio *mu se* nisam.

In (62a) all the clitics move along with the auxiliary from their post-verbal position within the VP.

However in (62b), to be compared with (62c), negation intercepts the movement of the auxiliary to the first element, but not that of the pronominal clitics, two important facts that must be accounted for. In addition, (62d) (vs. 62e) shows that negation-auxiliary can be the first element of the structure, and hence a host for the pronominal clitics.

I claim that *nisam* is a morphological compound, i.e. the negative morpheme and the auxiliary are concatenated and 'sandhied' (cf. the vowel alternation) prior to the syntactic derivation.¹⁴ As a result, their ω -feature is switched off. The merging of negation and the auxiliary in the morphology may be another effect of the harmonization process; in effect, it aims to avoid the use of parochial rules. As seen above, the auxiliaries always target the first element in the structure to have the widest scope. If negation were not compounded with the auxiliary, the movement of the latter would trigger a transitory superiority effect, and the grammar would rely on the neutralizing effect of further vector adjunction, as shown in the following ill-derivation:

- (63) a. [ja [ne¹ [[[predstavio sam²] mu] se³]]]
 b. *[ja=sam=mu=se [ne¹ predstavio]]

But in sentences with no further vectors, the superiority effect would be permanent as in (64a), unless the auxiliary adjoins to negation as in (64b). If both (63b) and (64b) were possible, the learners would have the difficult task to process a constraint with two conditions: (i) if there are no further vectors to move, adjoin the auxiliary to negation; (ii) if there are other vectors to be adjoined in the structure, let the auxiliary adjoin to the first element. This is not consistent with the harmonization process, which bars such a type of constraints. Thus, the grammar opts for the compounding of negation and auxiliary in the morphology, allowing the placement of pronominal clitics to automatically follow from the OCP, which is not an absolute constraint.

- (64) a. *Ja=sam² ne¹ vidio Marku
 b. Ja ne=sam vidio Marku

Given the compound analysis of negation-auxiliary, one can derive (62b) from the input (65a) (the case features of each element are conveniently shown as a superscript instead of the tiered representation). The pronominal clitics exit two OCP domains, D1 and D2, as shown in (65b). In this

14 The same result could be obtained by syntactic compounding (or adjunction), if one assumes a surface sandhi rule that alters the vowel of negation and thus destroys the boundary: *ne=sam* → *nisam*. More generally, this analysis can be adapted according to the general architecture of the grammar one assumes. I leave this point for future research.

structure, the subject is an evacuating domain for the OCP. However, if it is dropped, cf. (62d), the clitics can only exit their inner domain, D1, by adjoining to the compound, as shown in (66).

- (65) a. [Ja_[D2] nisam^{A,O} [_{D1}[predstavio^{A,O} mu^O] se^A]]]
 b. [Ja=mu=se_[D2] nisam^{A,O} predstavio^{A,O}]
- (66) a. [_{D2} nisam^{A,O} [_{D1}[predstavio^{A,O} mu^O] se^A]]]
 b. [_{D2} nisam=mu=se predstavio]

Notice that a structure like (67) may not be possible as input or output under the assumption that negation, even compounded with the auxiliary, maintains its directionality as a head selecting the VP as its complement.

- (67) *[[[predstavio^{A,O} mu^O] se^A] nisam^{A,O}]

As a further support for this analysis, one can show that negation and tensed verbs make up a compound as well. Consider the following sentences with simple negation (not compounded with auxiliary):

- (68) a. Ne vidim ga. / *Ne ga vidim. / *Ga ne vidim.
 not see.1SG him.
 'I do not see him.'
- b. Ana ga ne voli. /*Ana ne ga voli.
 Ana.NOM him.ACC not love.3SG
 'Ana does not love him.'

As can be seen, in (68a) the clitic follows the verb, whereas in (68b) it precedes both negation and the verb. One may note in this respect that in standard French, (69), pronominal clitics adjoin to the negative morpheme *ne*, even in imperative sentences (69b). Given this French data, these SC facts are far from ordinary.

- (69) a. Marie ne *le* prend pas.
 M. not it takes not.
 'Marie does not take it.'
- b. Ne *le* prends pas!
 'Don't take it!'

Under ordinary assumptions, the representation of (68a) includes two operators in two embedded domains, as can be seen in (70a). Thus, it is surprising that the pronominal clitic cannot exit the VP domain and adjoin to negation, just as in French. Similarly, in the derivation (70b), the clitic cannot adjoin to negation; it has to pick up the subject, just like in positive sentences, (70c).

- (70) a. $[ne^l [vidim^2 ga]] \rightarrow *ne^l=ga \text{ vidim}^2$
 b. $[Ana [ne^l [voli^2 ga]]] \rightarrow [Ana=ga [ne^l voli^2]] / *[Ana [ne^l=ga voli^2]]$
 c. $[Ana [voli^l ga]] \rightarrow Ana \text{ ga voli}^l$

The conclusion is inescapable: the sequence negation-lexical verb is a single syntactic unit, just like negation and auxiliaries. The generalization is that in SC negation and tensed verbs (including auxiliaries) make up a compound. Native learners are hinted by the sandhi rule that affects the negation-auxiliary compound. And just like the latter, the ω -features of this compound are neutralized, consistently with (31). This makes the prediction that no elements, adverbs or else, will ever appear between negation and tensed verb. So far, all the examples I have seen in the literature bear out this prediction. Thus, both of the problems just pointed out naturally disappear, as shown with the appropriate structures in (71). In (71a), the clitic stays in situ by lack of an escaping element, unlike (71b) where it normally exits the OCP domain headed by the compound verb-negation.

- (71) a. $[nevidim ga]$
 b. $[Ana [nevoli ga]] \rightarrow Ana=ga \text{ nevoli}$

Thus, strictly speaking, negation does not split the clitic cluster since it makes up a compound with every tensed verb. pronominal clitics simply exit the domain headed by such a compound.

9. Conclusion

In this paper, I have presented an account of Serbo-Croatian clitics, including their placement and their ordering. The second position phenomenon, known as Wackernagel's Law, is mostly derived from the mechanics of both phonological and syntactic representations. Specifically, I have shown that the conjugation of auxiliary verbs exhibits a special characteristic in that it underlyingly consists in two morphemes, one of which has a floating melody in the sense of the x-slot theory of the skeleton. The full forms of the auxiliary are obtained by the application of a special morphological rule that links the melody to the skeleton prior to the syntactic derivation. On the other hand, if a conjugation form is meant to be a clitic, it enters the syntactic derivation as a deficient compound and it has to be set up in

the earliest stage of the derivation by adjunction to a suitable element. The third person singular of *biti*, namely *je*, being different from the other persons in that it is the first morpheme in its compound, the analysis correctly predicts that it must come in the cluster after all other clitics, except reflexive *se* which has the same characteristic. Indeed, if a pronominal clitic were to adjoin to *je* or *se*, it would target the bare x-slot of their floating melody, and would be filtered out as stray. Furthermore, this clitic is the pivot of the paradigm to the extent that it is a crucial hint to understand the logic of the system, just like the sandhi rule that affects the compound auxiliary-negation is a hint to the generalization that negation and tensed verbs are compounded. Without its special behavior, auxiliary clitics would not be used at all or else they would be reanalyzed as lexical entries on their own, and as a result this grammar would be significantly different. On this view, exceptions proceed from the same reason as the constraint that rules out string-vacuous operations, namely the learnability of the grammar.

This analysis is based on features that the interacting elements are specified for, a few universal constraints that need not be ranked, and the formalism used in non-linear phonology and morphology. The ω -feature plays a crucial role in that it makes the clitics sensitive to superiority effect, just like *wh*-elements and negation. In addition, it is based on the assumption that head directionality is absent in Serbo-Croatian for the major components of the sentence, namely subject, verb and object. Thus, the grammar freely generates either an SVO, VOS, SOV, or OVS input. This great variety of input makes it possible to accommodate above all the placement of the auxiliaries, on which the success of the derivation depends. In fact, it may be the defectiveness of auxiliaries that lead the grammar to relax directionality. I believe that this analysis of the Wackernagel effect is basically correct. If it turns out that some assumptions on feature specification made here run afoul of additional data, it will be a matter to fix the details by updating the analysis, for the basic principles are universal and are not subject to parametric variations across languages. In fact, challenging new data may lead to the discovery of new features or universal principles.

This aspect of SC grammar helps shed light on an aspect of this feature- and constraint-based theory of grammar. In effect, it appears that the linearization process, seen in Desouvrey (2000) as a simple convention required by the oral modality–sign languages need not have it–has a more active role in the grammar, as it is used to filter out stray at the output.

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