

Do*-support as spellout of split head chains

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1. Introduction

Traditional analyses of *do*-support share two core properties: i) they link *do*-support with the inability of the verb to form a relation with an inflectional head, such as T (e.g. via head movement or lowering), and ii) they posit a constraint that requires the inflectional head to combine with a verb (Lasnik 1981, Halle and Marantz 1993, Bobaljik 1995). Based on crosslinguistic data, we argue against both aspects of the traditional view. First, it incorrectly predicts that V-to-T movement and *do*-support should not cooccur in a language (section 3). And second, it does not capture crosslinguistic generalizations about which inflectional heads are supported by *do* (section 4). In section 2, we develop an analysis of *do*-support as the outcome of *chain splitting*, in which a relation between V and T is successfully established and only later split. The successful formation of a head chain (containing V, T, and possibly other heads) accounts for the fact that languages with V-to-T movement may exhibit *do*-support, and derives the attested *do*-insertion positions from independent properties of head chains in a given language.

2. Analysis: *Do* is inserted in split head chains

We assume that heads in the clausal spine form a *head chain*. The precise mechanism of head chain formation is orthogonal. Possibilities include head movement, agreement (e.g. Bjorkman 2011), or a mirror-theoretic complementation line (e.g. Svenonius 2016).¹ The entire head chain is pronounced as an inflected verb in one of the positions it contains. Following previous work, we implement this by positing a diacritic (*) on the head in which the entire head chain is pronounced (Svenonius 2016, Arregi and Pietraszko 2019). In English, for example, the head chain is pronounced in *v* in declarative clauses – a position

*We would like to thank Rajesh Bhatt and audiences at UMass and NELS for helpful feedback and discussion. All errors are ours.

¹In Arregi and Pietraszko 2019, we propose that head chains are formed via Generalized Head Movement – a syntactic relation that unifies head raising and lowering. The analysis of *do*-support we present here does not rely on our particular implementation of head chain formation.

in which the verb follows negation and certain adverbs (1a). In contrast, verbs in French are pronounced in T, preceding negation and adverbs (1b). Another position in which head chains may be pronounced is C. This is the case e.g. in V2/V1 clauses in Germanic languages, such as matrix interrogative CPs in English (1c).²

- (1) a. *English declarative clause*

$$[\text{TP } \text{T} \underbrace{[\text{vP } \text{v}^* \text{ VP } \text{V} \dots]}]$$
 b. *French declarative clause*

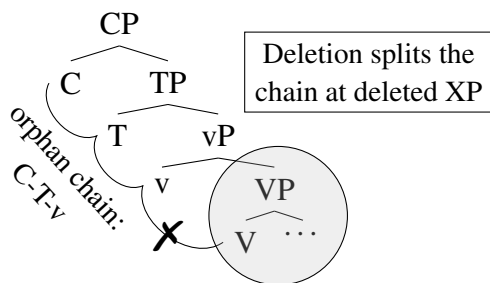
$$[\text{TP } \text{T}^* \underbrace{[\text{vP } \text{v} \text{ VP } \text{V} \dots]}]$$
 c. *English interrogative clause*

$$[\text{CP } \text{C}^* \underbrace{[\text{TP } \text{T} \text{ vP } \text{v}^* \text{ VP } \text{V} \dots]}]$$

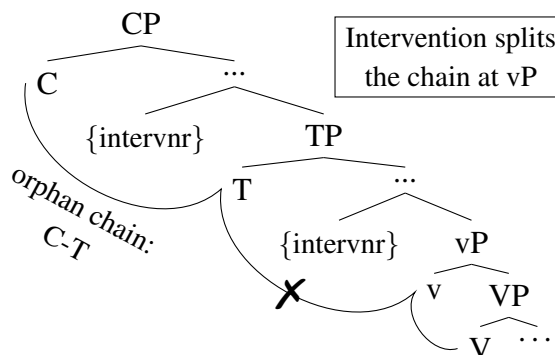
As we see in (1c), a head chain main contain more than one *-head. We propose that head chains are always pronounced in the highest *-position.

We propose that lexical head chains (i.e. those containing a lexical V, rather than an auxiliary) may split in certain structural contexts. Splitting of a successfully formed head chain is the result of applying one of the following rules. *Split-by-deletion* (2) is triggered when part of the head chain is deleted (via ellipsis or copy deletion in phrasal movement). The split occurs at the deletion site. *Split-by-intervention* (3) takes place under different structural conditions, namely when a specifier intervenes between heads in the chain. In English, the set of interveners includes subjects and negation, but not adverbs.³ Split-by-intervention always splits the chain at vP, no matter the position of the intervener.

(2) *Split-by-deletion*



(3) *Split-by-intervention*



Both operations create a new head chain which does not contain a lexical verb (C-T-v in (2), C-T in (3)). We refer to such chains as *orphan chains*. We propose that *do*-support is the spellout of an orphan chain. Under this view, there is no independent *do*-insertion

²We assume that C in part of the head chain in declarative clauses.

³We assume that full and contracted negation in English are both specifiers. Furthermore, traces, such as the vP-internal trace of the subject, do not count as interveners. See Bobaljik 1995.

mechanism, nor do we need to identify the inflectional head that requires *do*-support. The chain is pronounced in whatever position is marked as * in a given language/construction.

Finally, languages may parametrically activate both, one or neither of the chain splitting rules. A partial typology is shown in (4). In English, both Split-by-deletion and Split-by-intervention are active. Danish and other Mainland Scandinavian (MSc) languages have Split-by-deletion (causing *do*-support in VP ellipsis and topicalization), but no Split-by-intervention (responsible for the absence of *do*-support caused by negation or V1/V2). A language with only Split-by-intervention would exhibit *do*-support only in intervention contexts. While we haven't found a clear example of this pattern, Monnese (discussed in section 3) is a language in which there is positive evidence only for Split-by-intervention. The absence of Split-by-deletion effects might be either due to the rule being inactive or due to the absence of VP ellipsis/topicalization, which, to our knowledge, haven't been reported in the language. Languages in which both rules are inactive are languages without *do*-support.

(4)	English	MSc	Monnese	languages w/o <i>do</i> -support
Split-by-deletion	✓	✓	?	✗
Split-by-intervention	✓	✗	✓	✗

3. *Do*-support is not due to failure of Head Movement or Lowering

Under the traditional view, *do*-support arises when the verb doesn't combine with an inflection. This accounts for a well known asymmetry between English and French: unlike English, lexical verbs in French surface in T, bleeding *do*-support. This theory thus predicts that *do*-support should not be possible in a language in which lexical verbs surface in T. In this section we report data from Monnese showing this prediction to be wrong, and demonstrate how Split-by-intervention derives this puzzling pattern.

3.1 Monnese has both V-to-T movement and *do*-support

In Monnese, both auxiliaries and lexical surface to the left of adverbs, that is, both move to T under the traditional account (Benincà & Poletto 2004:59):

(5)	l	à	semper	tʃakolà		(6)	l	tʃàkola	semper			
	he	have.3SG	always	spoken			he	speak.3SG	always			
	'He's always spoken.'					'He always speaks.'						
	[TP	T+Aux	Adv	[AuxP	<Aux>	...	[TP	T+V	Adv	[VP	<V>	...
		↑		↑			↑		↑			

Like English, Monnese exhibits Subject-Auxiliary Inversion (SAI) in interrogative clauses, i.e. a finite verb surfaces in C (Benincà and Poletto 2004:63-68). Given that both lexical verbs and auxiliaries move to T, we expect that both should surface in C in questions (by T-to-C movement). This is, however, only true for auxiliaries (7). With lexical verbs, *do* surfaces instead in C (8).

- (7) kwal è -t tferkà fora? (8) ke fe -t majá?
 which **have.2SG**-you searched out what **do.2SG**-you eat.INF
 ‘Which have you chosen?’ ‘What do you eat?’
- [_{CP} C+**T+Aux** [_{TP} DP <T+Aux> ...] [_{CP} C+**T+do** [_{TP} DP <T+?> ...]

Note that the support verb in C is inflected for tense and agreement, suggesting T is in C in (8). This rules out the interpretation of (8) as a construction in which V moves to T and *do* is inserted directly in C.

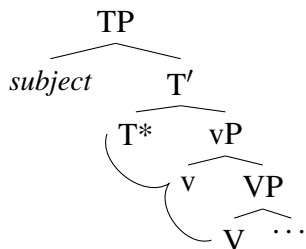
This asymmetry between auxiliaries and lexical verbs shows that *do*-support cannot be linked directly to the absence of V-to-T movement.⁴ In order to account for the appearance of *do* in (8), the traditional analysis would require that V-to-T occur in declarative but not in interrogative clauses. Since the locus of difference between the two clause types is in the C domain, such an analysis would involve a countercyclic derivation where V-to-T movement is precluded by derivationally subsequent T-to-C movement.

3.2 Monnese *do*-support arises due to Split-by-intervention

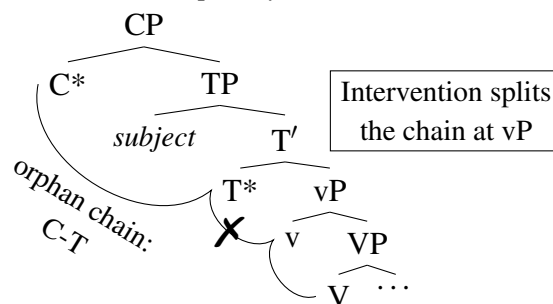
In this subsection, we show how Split-by-intervention derives *do*-support in Monnese SAI. Our analysis directly implements the observation that Monnese shares properties with both English and French. Like English, Monnese has an active rule of Split-by-intervention, causing lexical chains to split in SAI contexts. However, like French, lexical verbs surface in T (in our terms, T is a *-position). The Monnese pattern is allowed under our account because Split-by-intervention is not linked to the surface position of finite verbs in any way.

In declarative clauses, C is not part of the head chain, and thus the subject does not intervene between its heads (9). The inflected verb is pronounced in T*. Interrogative C is part of the chain and is a *-position, causing the appearance of a verb in this position in questions. The subject is now an intervener, causing a split of the chain at vP (10).

- (9) *No SAI: no intervention*



- (10) *SAI: Split-by-intervention*



After splitting, only the lower chain (v-V) contains a lexical verb⁵ The higher chain (C-T) is an orphan chain and is pronounced as *fe* ‘do.2SG’ in the highest *-position, namely C.

⁴Bjorkman (2011) draws a similar conclusion from these facts. The account she offers treats *do*-support in English and Monnese SAI contexts in a non-uniform way, unlike the analysis in the next subsection.

⁵Chains with no *-heads are pronounced in the highest position by default (see Arregi and Pietraszko 2019).

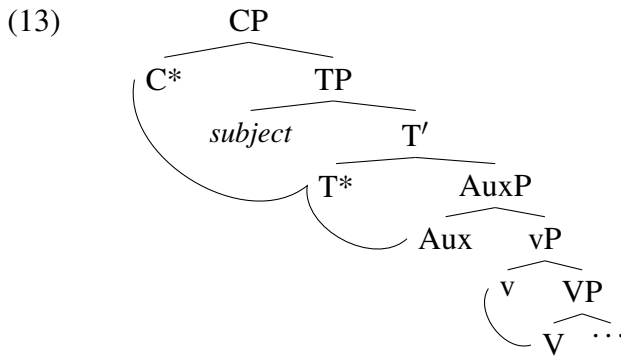
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This analysis correctly predicts that the pronunciation position of the lexical verb in questions is lower than its position in declarative clauses:

- | | |
|---|--|
| <p>(11) I tjàkola <i>mia</i>
 he speak.3SG <i>not</i>
 ‘He doesn’t speak.’
 (Benincà & Poletto 2004:60)</p> | <p>(12) fe -t <i>mia</i> majal ’l pom?
 do.2SG -you <i>not</i> eat.INF the apple
 ‘Do you not eat the apple?’
 (Bjorkman 2011:190–191)</p> |
|---|--|

In declarative CPs, there is no split and the verb is pronounced in T*, preceding negation. The split in interrogative clauses traps the verb inside vP, where it must follow negation.⁶

Auxiliary and lexical verbs form independent head chains (13). Head chains containing an auxiliary verb are not targeted by chain splitting rules, effecting the spellout of an auxiliary in C, the highest *-position.



4. Do-support is not an idiosyncratic requirement of particular heads

In this section, we provide an additional argument for the analysis, based on the prediction that the syntactic position of *do* in Germanic languages follows directly from the interaction of chain splitting (either by deletion or intervention) with independent parameters of verb position. This shows that *do*-support is not due to idiosyncratic properties of particular heads, such as affixal requirements.

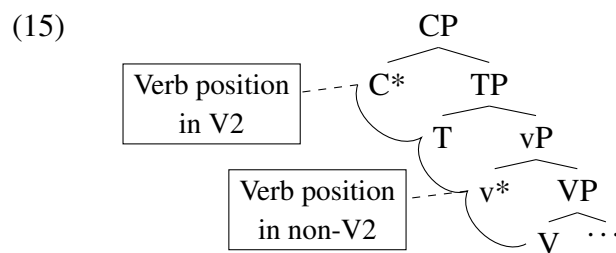
4.1 Mainland Scandinavian: *Do* in C or v

In the absence of an auxiliary, predicate ellipsis in Mainland Scandinavian (Danish, Norwegian, Swedish) trigger the spellout of orphan chains as *do*, whose surface position (C or v) follows from independent parameters on verb position in these languages (we illustrate the MSc generalizations with Danish throughout this section). In these languages, the finite verb surfaces in C under V2 (14a), and in v otherwise (14b) (examples from Vikner 1995:47; see also Taraldsen 1985, Holmberg and Platzack 1995).

⁶Negation in Monnese does not cause a split. We assume, following Benincà and Poletto 2004, that negation is adverbial in this language.

- (14) a. Om morgenen **drikker** Peter ofte kafe.
in the.morning **drinks** Peter often coffee
‘Peter often drinks coffee in the morning.’
- b. Vi ved at Peter ofte **drikker** kaffe om morgenen.
we know that Peter often **drinks** coffee in the.morning
‘We know that Peter often drinks coffee in the morning.’

Like English, MSc has C* and v*. The finite verb surfaces in C* in V2 sentences (the highest *-position). In other sentences, the head chain does not include C, and the verb surfaces in v*.



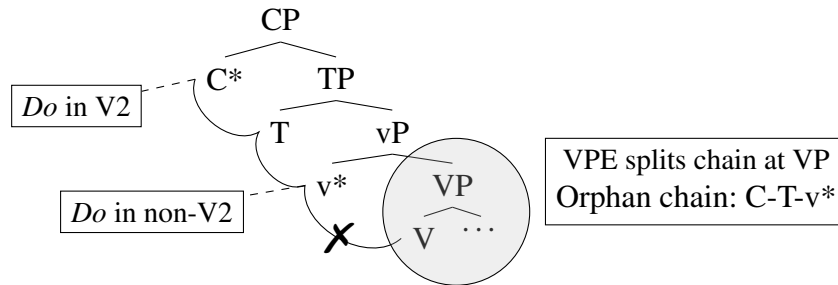
In the absence of an auxiliary, predicate ellipsis triggers *do*-support, and *do* surfaces in exactly the positions that the verb does in the nonelliptical source, i.e. C (16a) or v (16b) (examples from Houser, Mikkelsen, and Toosarvandani 2011:249–252; see also Sailor 2009, 2018, Platzack 2012, Thoms 2012, Bentzen, Merchant, and Svenonius 2013).

- (16) a. Mona og Jasper vaskede bilen, eller rettere Mona **gjorde** Δ
Mona or Jasper washed the.car, or rather Mona **did**
‘Mona or Jasper washed the car, or rather Mona did.’
- b. Der er en forventning om, at vi skall gå videre, selv om det snarere
there is an expectation about that we shall go further even if it rather
vil være en stor skuffelse end katastrofalt, hvis vi ikke **gør** Δ
will be a big disappointment than catastrophic if we not **do**
‘We are expected to go further. That said, it would be a great disappointment,
not a catastrophe, if we don’t.’

We propose that MSc has Split-by-deletion, and that the elided constituent is VP (VPE), which determines the site of the split:

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(17)



The orphan chain contains both pronunciation positions (C* and v*), which correctly predicts the surface positions of *do*. Thus, *do* appears in those positions for the same reasons other verbs do, and in the same contexts, which obviates the need to stipulate that *v* and *C* in these languages have affixal properties that trigger *do*-support.

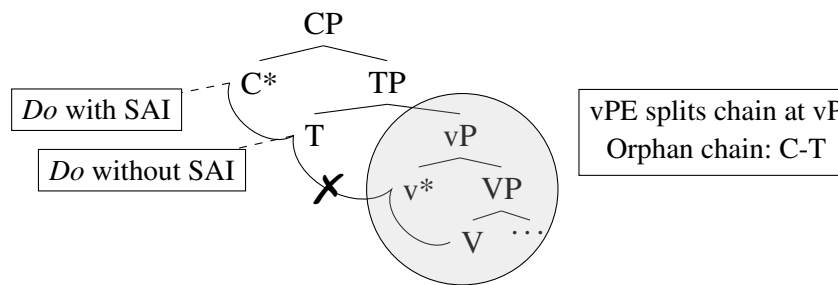
4.2 English: *Do* in C or T

Unlike MSc, the position of *do* in English is different from that of finite main verbs. We argue that this follows from the site of chain splitting (either by deletion or intervention), which is vP. In the absence of an auxiliary, the main verb typically surfaces in a low position, which we take to be *v* (Emonds 1970, Pollock 1989). On the other hand, in predicate ellipsis constructions, *do* surfaces in C in SAI contexts, and in T otherwise:

- (18) a. I know that Sue washed the car, but **did** Mary Δ ?
- b. Sue washed the car, and Mary **did** Δ , too.

English has vP ellipsis (vPE), and by Split-by-deletion, the orphan chain excludes v*. Since the usual position in which the verb surfaces is missing, *do* surfaces in C or T, depending on whether the head chain includes C or not:

(19)

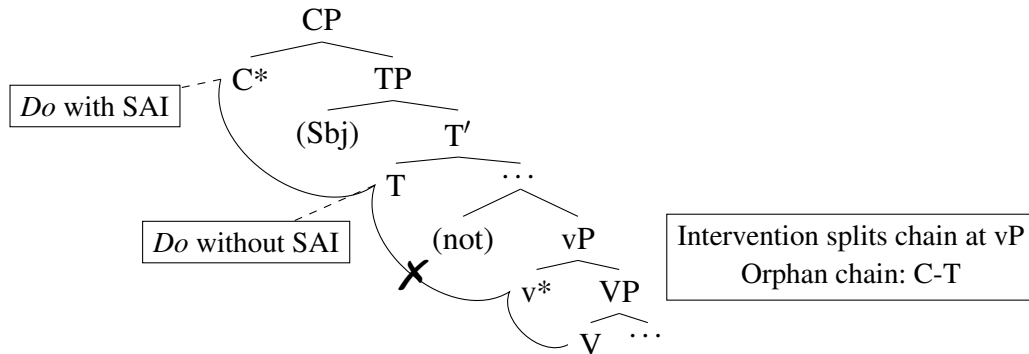


English also has Split-by-intervention under SAI and negation. *Do* surfaces in C or T:

- (20) a. **Did** Mary wash the car?
- b. Mary **did** not wash the car.

As shown in previous sections, the split is always at vP in cases of intervention, which, as in vPE, forces *do* into a higher position. The lower head chain is pronounced in v*:

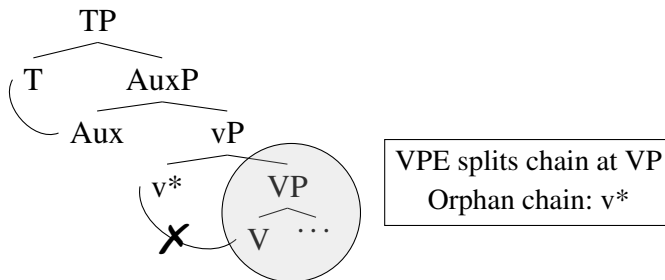
(21)



4.3 VP ellipsis under auxiliaries: *Do* in *v*

The low target of ellipsis in MSc (VP) leads to the correct prediction that these languages have *do*-support under auxiliaries (example from Houser, Mikkelsen, and Toosarvandani 2011:271, see also Platzack 2012, Thoms 2012, Bentzen, Merchant, and Svenonius 2013):

- (22) Nu fisker jeg ikke efter en partner. Men hvis jeg havde **gjort** Δ_{VP} , havde jeg ...
 now fish I not after a partner but if I had **done** had I
 'I'm not looking for a new partner. But if I had, I would ...'



T forms a head chain with the auxiliary instead of the main verb, which is in a head chain with *v**. VPE results in an orphan chain with only *v**, which is where *do* surfaces. *Do*-support under auxiliaries is also possible in British English, which we take as evidence that this dialect has VPE (in addition to vPE) (example from Thoms and Sailor 2018:1; see also Chalcraft 2006, Haddican 2007, Aelbrecht 2010, Baltin 2012, Thoms, to appear):

- (23) Kim isn't running for office now, but she has **done** Δ_{VP} in the past.

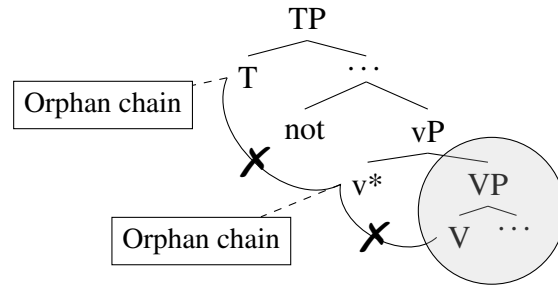
4.4 *Do* in both T and *v* in the same sentence

Since British English has VPE and both types of splits, the analysis correctly predicts sentences with two instances of *do*-support:⁷

⁷Many speakers who accept *do*-support under auxiliaries reject these double-*do* sentences. We assume that, for these speakers, VPE (as opposed to vPE) can only be licensed by auxiliaries.

(24) John said he would help, but he **doesn't** usually **do** Δ_{VP} .

Chalcraft 2006:5



VPE splits the chain at VP, and the resulting orphan T-v* chain is further split by intervention. Thus, the sentence contains two orphan chains, each of which is realized as *do*.

5. Conclusion

Do-support is due to splitting of successfully formed head chains, caused by intervention or deletion. Splits result in orphan chains that are realized as *do*. The account correctly predicts that *do*-support is possible in grammars in which lexical verbs normally surface in T, as attested in Monnese. Furthermore, the variety of positions in which *do* surfaces crosslinguistically follows from independently motivated properties of splits and parameters of verb position, thus voiding the need to postulate idiosyncratic constraints on functional heads, such as affixal requirements.

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