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'Pronounce φ': 'Number' Clitics in a Non-Redundant Null-Subject System *

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Abstract This paper focuses on the very specific linguistic domain of nominative (NOM) clitics of the 'number' class (Poletto 2000) in 'non-redundant null-subject systems' (Roberts 2010). Concretely, I adapt Roberts' (2007) analysis of French NOM enclitics in 'complex inversion' structures to both the assertive and the interrogative NOM clitics of Trevisan, a Venetan dialect. Number clitics, I claim, are not pronominal elements but an inflectional class that surfaces as a consequence of a positive setting of Rizzi's (2017) Spell-Out parameter, i.e., an instruction to pronounce the criterial feature(s). This treatment of number clitics has three main theoretical advantages: (i) it explains their morphosyntactic peculiarities *wrt* to non-NOM clitic pronouns; (ii) it accounts for the morphological variations and different distributions *wrt* the V of the assertive vs interrogative series; (iii) it explains their omission in 'long-subject extraction' environments, i.e., relatives and it-clefts (Rizzi & Shlonsky 2007, Bonan 2017).

1 Introduction

Nominative (NOM) clitics are limited to a geographically circumscribed and contiguous group of varieties of Northern Italy (including the northern part of Tuscany), Southern France, and Switzerland (Poletto & Tortora 2016). Accordingly, the term NOM clitic encompasses a heterogeneous array of reduced elements located in the higher portion of the clause, which makes their linguistic classification a challenging task. Poletto (2000) singled out four basic types of NOM clitics: in this paper, I provide an analysis for the assertive and interrogative NOM clitics of the 'non-redundant null-subject system' (Roberts 2010) of Venetan 'Trevisan', which fall into Poletto's 'number' type. My claim will be that these are in fact not pronominal elements, but rather the phonetic realisations of φ-features in either SubjP or FinP, activated in the presence of well-formed Spec-Head configurations.

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Numerous Northern Italian dialects (NIDs) have two incomplete series of NOM clitics, one used in assertive contexts and one in interrogatives. The two paradigms display morphological variations and different distributional properties: while the former surface in proclisis, the latter are enclitics (Poletto 2000, Manzini & Savoia 2005, a.o.). Since Burzio (1986), Rizzi (1986) and Brandi & Cordin (1989), these unstressed NOM pronouns have systematically been considered clitics, i.e., syntactic heads. In contrast, their French pre-verbal counterparts have in turn been treated as either phonological clitics (Kayne 1983) or as weak pronouns (Cardinaletti & Starke 1999), i.e., maximal projections. Most recent works have essentially continued this type of approach to Northern Italian clitics, explained as realisations of Infl (Poletto 2000, Goria 2004, Roberts 2007, a.o.). This has contributed to the analysis of NIDs as null-subject languages, on a par with Italian.

Roberts (2010: 106) assumes that complement clitics are always argumental elements merged in their canonical argument position and, as such, bear interpretable φ-features. Conversely, he shows that the exactly analogous treatment of NOM clitics is unavailable. As 'a purely heuristic device', he makes use of the feature [±agr] to denote whether an agreement paradigm shows a full set of morphological person-number distinctions (he allows that a full set of distinctions contains at most one zero exponent and one syncretism). Additionally, he assumes that a proper pronominal paradigm must be a full paradigm, i.e., at least five formal distinctions are required for the φ-features to be interpretable, and that a verbal inflection that shows a 'pronominal' paradigm functions as an indicator that the null-subject parameter has a positive value. Both assumptions, which stem from early work on null subjects (Rizzi 1982, 1986), received a justification in Roberts (2010), and constitute the base of my article. In these terms, Roberts then envisages the types of languages in Table 1:

'Fully redundant' null-subject systems	SCL[+agr]	V[+agr]
Non-null-subject systems	SCL[+agr]	V[−agr]
(Usually) complementary systems	SCL[−agr]	V[−agr]
Non-redundant null-subject systems	SCL[−agr]	V[+agr]

Table 1 Roberts' (2010) classification of NOM clitics.

For Roberts, an instantiation of a fully redundant system can be observed in Fioren-tino, in which the clitics and the verbal endings covary, both indicating the person and number of the subject, with only a small amount of syncretism (*(e) parlo, tu parli, e parla, si parla, vu parlate, e parlano,* 'I speak, etc.'). Accordingly, Fiorentino offers an example of 'agreement doubling': its subject clitics are a further realisation of subject-agreement features in addition to the verbal inflection (they are a PF realisation of the unvalued φ-features of T, just like the verbal inflection). French is instead a non-null-subject

system in which, by definition, the verbal inflection is unable to identify a null subject, hence the pronoun paradigm is fully realised (je/tu/elle /paRl/, nous /paRlõ/, vous /paRlɛ/, 'I speak, etc.'). Roberts thus follows Kayne (1983) and Cardinaletti & Starke (1999) and treats French subject pronouns as weak pronouns in SpecTP. Consequently, given that of the 180 Italian dialects reported in Manzini & Savoia (2005) only Soglio has exactly the French pattern of partial syncretism in the verb endings and total differentiation of the subject pronouns, Roberts argues that Northern Italian/Tuscan dialects are significantly different from French: these are consistent null-subject languages while French is not. A third system and a 'fairly common pattern' (Roberts 2010: 108) is the one observed in the Carrara dialect, in which neither the paradigm of NOM clitics nor the verbal inflection paradigm show a full set of forms, although these, combined, form a near-complementary pattern (a dɔrmə, tə dɔrmə, al dɔrmə, a durmiŋ, durmitə, al dɔrmənə, 'I sleep, etc.'). Together, the NOM clitics and the verbal inflection provide distinct agreement marking for each person. For Roberts, these are null-subject systems whose NOM clitics instantiate a φ-set in T. A fourth system is the one exemplified by the Como dialect, which has fully differentiated verbal inflection, but syncretism and gaps in the clitic paradigm (dɔrmi, ta dɔrmat, la dɔrma, dɔrmum, dɔrmuf, dɔrmaŋ, 'I sleep, etc.'). According to Roberts (2010: 108) 'we can certainly treat this as a null-subject system, whatever the status of the subject clitics.' While what has been referred to as 'subject clitics' comprises numerous instantiations of 'φ-bearing' structurally deficient elements, in this paper I exclusively provide a theory of the NOM clitics that fall into this last type.

On the assumption that Trevisan is indeed a 'non-redundant null-subject system' (see section 3), a theoretical explanation for its two series of NOM clitics needs to be provided: while incomplete pronominal series are uncommon, deficient inflectional classes are expected. I shall thus re-adapt Roberts' (2007) analysis of French interrogative enclitics as an inflectional φ-set in C, and claim that both the assertive and interrogative series of NOM clitics of Trevisan are better understood not as proper pronouns but as φ-sets in T and C, respectively (section 4). The assumption that NOM clitics are inflectional classes correctly predicts that it is possible to have incomplete paradigms of these, while accounting for the morphological alternations observed between the two (which I attribute to the presence of [Q]-features in the interrogative series). Also, under the assumption that φ-features are never realised twice over, the complementary distribution of the two classes is explained.

Samo (2019) proposed an application of Rizzi's (2017) understanding of the notion of 'Parameter' to V2-syntax, and argued that 'criterial' Spec-Head configurations can be of three types: (i) the criterial head is pronounced; (ii) the functional head is silent; (iii) an element is attracted into the functional head from within TP. Here, my concern is the third type of configuration: 'number' clitics are featural bundles that 'surface' when the verb is attracted into either Subj° or Fin° (IM_{lex}, in Rizzi's terms), as a consequence of a

syntactic requirement that the features in the criterial head be pronounced (positive setting of the Spell-Out Parameter *wrt* criterial features).

2 The Nominative Clitics of Trevisan

In generative grammar, a positive setting of so-called ‘pro-drop parameter’ is acknowledged to allow empty pronominal elements to be identified by their governor. Structurally, the empty subject position is filled by the silent element known as pro. The unmarked declarative of Trevisan can thus seem subject-less, as in (1):

(1) a. pro ˈvɛno ˈdɔpo ˈsena.
pro come.1PS after dinner

‘I shall come after dinner.’

b. pro ˈfiniˌremo ˈtutaː ˈʧokoˌeata ˈvanti ˈnadal.
pro finish.1PP.FUT all-the chocolate before Christmas

‘We will eat up the chocolate before Christmas.’

Of course, the subject of a clause in a null-subject language like Trevisan can also be overt. The sentences in (1) are indeed still perfectly grammatical in the presence of an overt NOM pronoun of the tonic series, as in (2):

(2) a. ˈ**mi** ˈvɛno ˈdɔpo ˈsena.
I come.1PS after dinner

‘I shall come after dinner.’

b. **no**ˈ**jaltri** ˈfiniˌremo ˈtutaː ˈʧokoˌeata ˈvanti ˈnadal.
we finish.1PP.FUT all-the chocolate before Christmas

‘We will eat up the chocolate before Christmas.’

Full-fledged NOM pronouns like those in (2) constitute a complete paradigm (see Table 2). They are tonic and do not display morphological variations in different types of sentences.

1PS	2PS	3PS		1PP	2PP	3PP	
mi	ti	lu.M	ea.F	nojaltri	vojaltri	lori.M	lore.F

Table 2 Trevisan NOM pronouns.

Trevisan also has two series of NOM clitics, assertive and interrogative. The assertive series is incomplete: only three clitics out of six grammatical persons are available (2-3PS; 3PP). The situation is partially different in the interrogative series, in which the 2PP clitic is phonetically realised, and for

some speakers also the 1PS clitic and the expletive. A crucial property of NOM clitics is that, when available, they cannot be omitted, as in (3):[1,2]

(3) a. ***(te)** ˈga ˈza seˈna.
(2PS) have already had-dinner

'You have already had dinner.'

b. ˈga-***(tu)** ˈza seˈna?
have-(2PS) already had-dinner

'Have you had dinner already?'

The Trevisan clitic paradigms are illustrated in Table 3. Forms in brackets are those that are not at the disposal of all speakers. Note that the 3PS masculine form is elided in the presence of a preceding element ending in a vowel sound and not phrased as an independent intonational phrase:

	1PS	2PS	3PS			1PP	2PP	3PP
ASSERTIVE	∅	te	(e)l.M	a.F	∅.EXPL	∅	∅	i.M / ɛ.F
INTERROGATIVE	(jo)	tu	o.M	a.F	(o.EXPL)	∅	o	i.M / ɛ.F

Table 3 Trevisan NOM clitics.

As mentioned in the introduction, the fact that Trevisan has fully differentiated verbal inflection, but syncretism and gaps in the clitic paradigm (*parlo, te parli, a parla, parlemo, parlé, e parla,* 'I speak, etc.'; *dormo, te dormi, a dorme, dormimo, dormí, e dorme,* 'I sleep, etc.'), makes it a 'non-redundant null-subject system' in the sense of Roberts (2010). I shall therefore take for granted that Trevisan is fully *pro*-drop.

A crucial difference between the clitic and the tonic NOM series is that while in the unmarked case a lexical subject must be construed with the corresponding clitic, as in (4), tonic pronouns can only be construed with lexical subjects if the latter are dislocated, as in (5).

(4) ˈʤani *(l) me ˈga ʧaˈma.
John (=3PS.M) me has called

'John has called me.'

[1] Throughout I gloss the NOM clitics of Trevisan as [PERSON-NUMBER-GENDER] features.
[2] In Trevisan, the question-formation strategy known as 'subject-clitic inversion' is compulsory in answer-seeking matrix questions, wh- and polar (see Bonan 2021a for a discussion).

(5) a. ˈʤani (*lu) *(l) me ˈga ʧaˈma.
John (he) (=3PS.M) me has called
'John has called me.'

b. ˈʤani (lu) *(l) me ˈga ʧaˈma.
John # (he) (=3PS.M) me has called
'John, he has called me.'

While a dislocated lexical subject can be construed with the corresponding tonic pronoun, thus conveying a contrastive meaning, as in (5b), in no case is a 'clitic-less' tonic pronoun felicitously licensed. Also, the contrasts in (6) suggest that, while lexical subjects, tonic NOM pronouns and *pro* compete for the same structural position, the clitic series is conceptually and structurally different:

(6) a. ˈʤani l me ˈga ʧaˈma. 'Gianni has called me.'

b. lu l me ˈga ʧaˈma. 'He (as opposed to someone else) has called me.'

c. *pro* el me ˈga ʧaˈma. 'He has called me.'

2.1 Trevisan NOM clitics in Poletto's classification

I have already mentioned that Poletto (2000) identified four basic types of NOM clitics: 'person', 'number', 'deictic', and 'invariable'. Poletto's classification, contrary to Roberts', deals with the (φ-)features encoded by the different types of clitics, and their distribution. Here, for reasons of space, I will only deal with the latter.

According to Poletto, number clitics display the following morphosyntactic properties:

i. They can be found either to the right or to the left of the negative marker;

ii. They must be repeated in the second conjunct of 'type 1' or 'type 2' coordination, but not in the 'type 3' coordination (see below);

iii. Like person clitics, they do not interact with left peripheral elements, but unlike person clitics, they do cluster with the Comp in embedded clauses;

iv. In contrast with person clitics, they are found in enclisis in interrogatives.

(i) does not apply straightforwardly to Trevisan, in which the negative marker is only compatible with the assertive series of NOM clitics, suggesting that the Trevisan negation is not clitic in nature and counts as a barrier for V-to-C movement. This is illustrated by the contrast in (7):

(7) a. ˈʤani no teo ˈga anˈkora ˈvisto?
John NEG him=2PS have.2PS yet seen

'Haven't you seen John yet?'

b. *ˈʤani noo ˈga-tu anˈkora ˈvisto?
John NEG.him have=2PS yet seen

As for point (ii), in a type 1 coordination, the 'verb + object' in the second conjunct is distinct from that in the first, i.e., it is a referentially distinct verb phrase, as in (8). In a type 2 coordination, the verbs in the two conjuncts are distinct, but they share the same object (if present), as in (9). In a type 3 coordination, the verbs in both conjuncts are identical (and share the same object), differing only in aspect, as in (10):

(8) a ˈniˌvesa ˈmana ˈpomi e *(a) ˈpea ˈperi.
the Nives=3PS.F eats apples and (3PS.M) peels pears

'Nives eats/is eating apples and (she) peels/is peeling pears.'

(9) a ˈniˌvesa ˈpea i ˈpomi e *(a) li ˈmana.
the Nives=3PS.F peels the apples and (3PS.F) them.M eats

'Nives peels/is peeling the apples and (she) eats/is eating them.'

(10) a ˈniˌvesa ˈze ˈdrio maˈnar ˈpomi e (a) li
the Nives=3PS.F is PROG eat apples and (3PS.F) them.M
ˈmana ˈsoˌeo de ˈdoˌmenega.
eats only on Sunday

'Nives is eating apples and she only eats them on Sundays.'

The examples in (8-10), with only type 3 coordination compatible with the omission of the NOM clitic, confirm not only Poletto's distribution of number clitics in coordinate structures, but also the legitimacy of a classification of Trevisan NOM clitics under the 'number' label.

Condition (iii) is also met, since assertive clitics do cluster with the Comp in embedded clauses, as in (11):

(11) ge ˈvemo za ˈdito **kel** ˈga da riˈvar *pi* boˈnaora
DAT have.1PP already said that=3PS has to arrive more early
incuˈɔ.
today

'We've already told him that he'll have to arrive earlier today.'

As for (iv), we have already seen that Trevisan NOM clitics appear in enclisis in interrogatives, therefore this condition is also met. To sum up, Trevisan NOM clitics are of the number type. They are, at least distributionally, proclitic in assertives and enclitic in interrogatives, and they display morphological variations and more forms in interrogatives. These properties argue that we are dealing with two series. I will also show that the morphosyntax of Trevisan NOM clitics suggests that these are not genuine pronouns but rather the Spell-Out of φ-features obtained under precise configurational circumstances.

3 Roberts' Analysis of French Enclitics

Roberts (2007) argued that, in the context of subject-clitic inversion (SCLI) French is a consistent null-subject language. Similarly to Zribi-Hertz (1994) and Sportiche (1999), he claimed that the NOM clitic that is apparently enclitic on the V in the HLP in these contexts is in fact a realisation of the φ-features of C. Roberts' analysis accounts for the limited distribution of French NOM enclitics with respect to proclitics (Cardinaletti & Starke 1999, Sportiche 1999), as in the contrasts in (12, 13), while accounting for the phenomenon of '*t*-epenthesis' in (14):

(12) French (Roberts 2007: 53(54) *apud* Sportiche 1999: 202)

a. Il ou elle connait bien le problème
he or she knows well the problem

'He or she knows the problem well.'

b. *Mange-t-il ou (t-)elle?
eats-*t*-he or (t-)she?

(13) French (Roberts 2007: 43-44(45) *apud* Cardinaletti & Starke 1999: 167)

a. Il aime les choux, mais - ne les mange que cuits?
he likes the cabbages, but - not them eats but cooked

'Does he like cabbage, but only eats it cooked?'

b. *Aime-t-il les choux, mais - ne les mange que cuits?
likes-*t*-he the cabbages, but - not them eats but cooked?

(14) French
A-**t**-il vu Marie?
has-*t*-he seen Mary

'Has he seen Mary?

French *t*-epenthesis is a phonological process that consists in the addition of /t/ in the context of SCLI. This occurs between a V ending in a vowel and a pronoun beginning with a vowel, such as 3PS *il a* ('he has'), which surfaces as *a-t-il* ('has-*t*-he?') once inverted. In a theory that analyses interrogative NOM pronouns as simple instances of inverted assertive pronominal forms, the phenomena in (12) to (14) go unexplained. According to Roberts, in French examples such as (14), the NOM clitic is clearly enclitic on the verb in the HLP. This claim is further supported by the impossibility of inserting material of any kind between the cluster formed by the V and the Subj(ect). In English, it is indeed marginally possible to insert parenthetical material between an inverted Aux and the Subj, as in (15a, 15b), while in the same constructions French rejects interpolation, as in (15c):

(15) Interpolation between an inverted Aux and the subject (Roberts 2007: 42(51, 52))

a. ?Has, by the way, John seen Mary?

b. ?*Have, by the way, you seen Mary?

c. **As, à propos, tu vu Marie?
have, by the way, you seen Mary

In previous work, later published as Roberts (2010), Roberts proposed a general account of cliticisation in which C, a phase head, is a target for cliticisation. Accordingly, assuming that NOM pronouns might cliticise directly to C from the position where they are first-merged, i.e., the Spec of *v*P, is problematic. In Chomsky's (2005) view that subject φ-features are features of C, which C 'withholds' from T in the residual-V2 environment of questions, Roberts argues that there is no reason to think that T also has a V-attracting feature in this environment. Consequently, if T fails to attract V, then straight V-to-C movement can be posited and, by the Strict Cycle, the V moves before the Subj. Strict Cycle, formulated in Chomsky (1973), is given in (16):

(16) Strict Cycle Condition (Chomsky 1973: 51)
No operation can apply to a domain dominated by a cyclic node α in such a way as to affect solely a proper subdomain of α by a node β which is also a cyclic node.

Although there is disagreement as to what counts as a cyclic node, it is commonly assumed that every XP is a cyclic node. Assuming that head

movement is always left-adjunction à la Kayne (1994), the consequence of (16) is that proclisis of the Subj to the V in the HLP is expected, contrary to fact. As a result, Roberts proposes an alternative analysis to the one that takes enclitics to be proper pronouns. Following Chomsky's (2005) above-mentioned assumption that the φ-features of T are actually features of the HLP, Roberts builds on Zribi-Hertz's (1994) and Sportiche's (1999) investigation of French SCLI and proposes that the HLP of French interrogatives is a residual-V2 environment in which the HLP does not pass its features to T. Consequently, the φ-features are realised as enclitics, in a head of the HLP. For Roberts, French enclitics can be thought of as realisations of $C_{[+F]}$, where F is whatever feature best characterises the HLP in residual-V2 configurations (a sort of *conjugaison* interrogative, 'interrogative inflection', à la Pollock 2006).

Furthermore, in interrogatives with SCLI, French has no overt realisation of the 1PS enclitic with lexical verbs, as in (17a), while enclitic forms are attested with auxiliaries, as in (17b), and with modals, as in (17c).

(17) French

a. *Managerai-je des fruits au souper?
eat-je some fruit at dinner

'Shall I eat fruit at dinner?'

b. Suis-je en train de tomber malade?
am-I PROG of falling sick

'Am I galling sick?'

c. Pourras-je avoir mal compris?
could-I have wrong undersood?

'Could I have misunderstood (this)?

In Roberts' words, the contrast in (17) is unsurprising if French enclitics constitute an inflection class but would be unexplained if this was a regular pronominal paradigm.

All of the observed properties of French enclitics thus follow straightforwardly from Roberts' analysis: interpolation, coordination and ellipsis are operations that cannot affect affixes independently of stems, whereby their ungrammaticality under the assumption that French enclitics are the morphological realisation of φ-features on C. In addition, there is marginal evidence that the presence of an interrogative ending of this class causes stem allomorphy on the modal verb *pouvoir* ('can'), as in (18):

(18) French (Roberts 2007: 45)

a. Puis-je?
can-I

'Can I?'

b. *Peux-je?

Stem allomorphy is a morphophonemic process whereby allomorphs are created, i.e., variant phonetic forms of a morpheme or unit of meaning that vary in sound and spelling but not semantically. This process is typically a property of Infl (Zwicky 1983).

Finally, Roberts also provides an explanation for the ungrammaticality of interrogative structures like (19a), where a lexical Subj surfaces postverbally, which become felicitous if the Subj precedes the verb in the HLP, as in (19b):

(19) French (Roberts 2007: 43-45(53, 56))

a. *A Jean vu Marie?
has John seen Mary?

b. Jean a-t-il vue Marie?
John has-*t*-3PS seen Mary?

'Has John seen Mary?'

According to Roberts, the contrast in (19) is explained under the assumption that, in the absence of φ-features in T, there is no Agree relation between T and the Subj , and therefore no attraction of the Subj to SpecSubjP. Instead, the Agree relation clearly holds between the set of φ-features in the HLP and the Subj, which can be attracted to the HLP, giving rise to complex inversion.

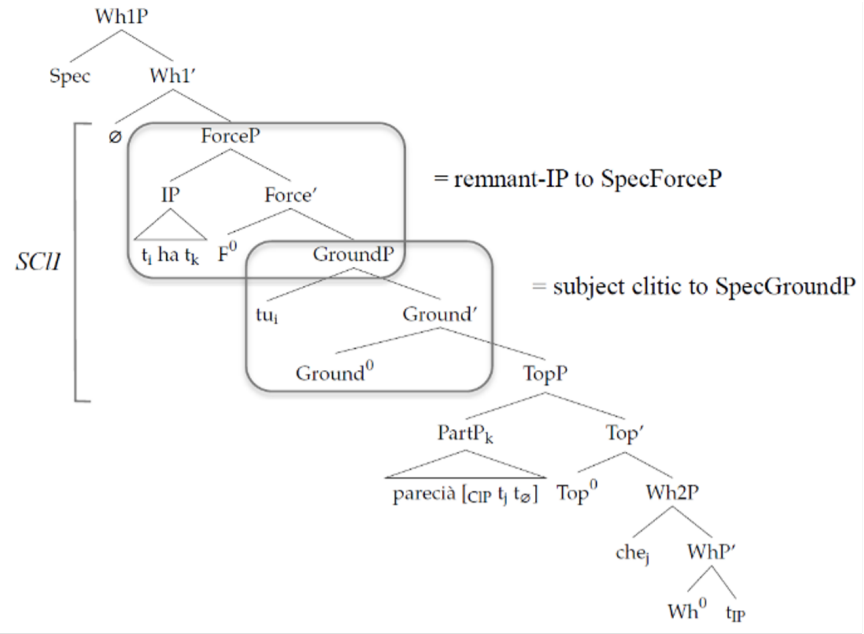
4 Nominative 'Number' Clitics as Inflectional Classes

There exist two potential ways of accounting for the morphosyntax of Trevisan NOM clitics. The first is to assume that there is only one series of NOM clitics that change in form during the derivation (see Cardinaletti & Repetti 2008, 2010 or Manzini 2012 for recent claims along these lines). The second is to posit that there are two different series of NOM clitics that head different functional projections. The first hypothesis is weak for Trevisan, first and foremost because it fails to explain the fact that the the NOM clitic cliticises to the finite verb in different ways depending on the clause type. Also, the first hypothesis cannot account for the fact that certain forms exist in interrogatives but not in assertives: if we were dealing with the same clitics that simply change in form, we would not expect some of them to be phonetically-realised in interrogatives in the absence of an assertive form. However, none of these is excluded if we analyse NOM clitics not as bona fide pronouns but as an inflectional class.

4.1 'Nominative clitic activation'

Following previous studies of Romance clitics, Poletto & Pollock (2000) claimed that interrogative NOM clitics are merged within *v*P and then moved to a cliticisation site in the high TP (à la Sportiche 1989), where they are 'frozen' and cannot move further, unless they move as bigger chunks, i.e., undergo phrasal movement. Ever since their 2000 paper, Poletto & Pollock have proposed an analysis of Northern Italian wh-in situ as an instance of overt wh-movement targeting the lower portion of the HLP, masked by further computations including movement of the remnant-IP to higher functional projections. Under these assumptions, Poletto and Pollock have argued in favour of a treatment of SCLI as phrasal movement of IP-internal chunks into the HLP of the clause, namely attraction of the IP-internal interrogative clitic into SpecGround followed by movement of the remnant-IP into SpecForce. For instance, in their framework the derivation of a Bellunese question such as *Ha-tu parecià che?* (Lit: 'Have-you prepared what?') (Munaro 1999) is done along the lines of (20):

(20) Derivation of SCLI (à la Poletto & Pollock 2000)



However, Trevisan interrogative morphosyntax excludes the possibility of a derivation of wh-in situ in terms of wh-movement into the HLP plus movement of the remnant-IP, and on these assumptions SCLI cannot be movement of phrasal chunks. In Bonan (2021a), I claimed that the clause-internal wh-elements of this language move to a linear position higher than the one targeted by the past participle, as exemplified in (21):

(21) a. ge ˈga-tu ˈdato a ki_i el reˈɔjo _____$_i$?
DAT have-you given to who the watch

‘To whom did you give the watch?’
(Lit: ‘Did you give to who the watch?’)

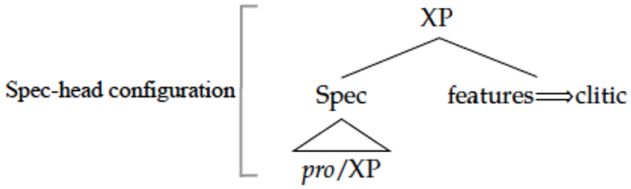
b. ˈga-tu maˈɲa ˈkwando$_i$ el ˈdolse _____$_i$?
have-you eaten when the cake

‘When did you eat the cake?’
(Lit: ‘Did you eat when the cake?’)

On the basis of comparisons with cross-linguistically robust movement patterns, I have argued that the movement in (21) is not proper wh-movement but focus-movement into Belletti’s (2004) SpecFoc (refer to Bonan 2021b for an overview): Trevisan SCLI can only be an instance of head movement.

There are indeed empirical reasons to believe that both series of Trevisan NOM clitics are features activated iff relevant material is inserted in the Spec of the functional projection that they head. My core claim is that both series result from well-formed Spec-Head agreements within dedicated projections, which lead to the Spell-Out of φ-feature bundles in the head of said projections, as in (22):

(22) NOM clitics as a spell out of φ-features



Let us first examine the case of assertive NOM clitics which, as in Rizzi (2016), I take to be the morphological realisation of Cardinaletti’s (2004) Subj°. Given the data overviewed in section 2, I argue that the clitic head is activated *iff* a lexical subject is moved to SpecSubjP, or *pro* is externally-merged therein, as in (23) (the symbol ‘»’ means ‘Spelled Out as’):

(23) Spec-Head agreement + activation of assertive NOM clitics

a. Lexical category in SpecSubjP
$[_{\text{SubjP}}$ XP [Subj°$_{[+\varphi]}$ » Clitic$_{\text{NOM}}$]]

b. Expletive *pro* in SpecSubjP
$[_{\text{SubjP}}$ *pro* [Subj°$_{[+\varphi]}$ » Clitic$_{\text{NOM}}$]]

I follow Rizzi (2016) in preferring the traditional analysis whereby in null-subject languages the EPP is satisfied by expletive *pro*, a non-referential occurrence of the null pronominal, over the alternative analysis in which null-subject languages have no filler at all (according to which the EPP would

be parametrised, and the notion of expletive *pro* becomes superfluous). According to Rizzi, while the classical analysis makes null-subject and non-null-subject languages fully parallel, this parallel is broken in the alternative approach. Furthermore, expletive *pro* can be seen as a formal device to express the ‘aboutness property’ in the absence of an overt subject: not only does *pro* formally satisfy the subject criterion but being deficient in terms of referential content, it also triggers a vacuous interpretation of ‘aboutness’, whence the interpretation of the event as not being about a particular argument. Here, I assume that the interpretable property that agrees with the subject of the utterance, which is then attracted into SpecSubjP, is encoded by the φ-set; in section 5, I will additionally claim that the interrogative series results from the Spell-Out of the φ-features of Fin.

My ‘clitic activation’ analysis offers two major advantages, which I investigate in what follows: it explains the peculiar distribution of Trevisan assertive NOM clitics, which are not pronominal, unlike their French counterparts (these have the same distribution as Trevisan non-clitic nominatives); and, its extension to interrogative clauses accounts for the morphological variations displayed by NOM clitics in the interrogative paradigm.

4.2 Contexts where nominative clitics are excluded

The ‘clitic activation’ analysis sketched in (23) is supported by data on missing NOM clitics. If assertive NOM clitics are an inflectional class in Subj, Spelled-Out in the presence of relevant Spec-Head configurations, then their absence from certain contexts cannot be trivial. For instance, a missing NOM clitic can serve as an indicator that the Spec-Head configuration in SubjP is missing. Observe the subject relative and the subject cleft in (24):

(24) a. ˈgo ˈkonoˌssuo el toˈzato ke(*l) ˈkanta in ˈʧesa.
have.1PS met the guy that(=3PS.M sings in church
‘I met the guy who sings in church.’

b. ˈze me ˈkuʤin ˈtɔni ke(*l) ˈkanta in ˈʧesa.
COP my cousin Toni that(=3PS.M sings in church
‘It’s my cousin Toni that sings in church.’

Both relatives and clefts are widely understood as bi-clausal structures in which an embedded constituent is moved overtly to the matrix domain. Examples like (24) illustrate that, in both types of structures, the presence of the NOM clitic corresponding to the moved subject is ruled out. The mono-clausal counterparts of (24) would of course require the realisation of the NOM clitic, as in (25):

(25) a. kel to'zato*(l) 'kanta in 'ʧesa.
that guy(=3PS.M) sings in church

'The guy sings in church.'

b. me 'kuʤin 'tɔni*(l) 'kanta in 'ʧesa.
my cousin Toni(=3PS.M) sings in church

'My cousin Toni sings in church.'

The best explanation for the contrast between (24) and (25) with regard to the realisation of the NOM clitic is that, in the bi-clausal structures the moved lexical subject is extracted without passing through SpecSubj. From the perspective that what activates the φ-features in Subj is a well realised Spec-Head configuration, the copy of the moved lexical subject in SpecSubj and the φ-features in Subj° should be sufficient for the assertive NOM clitic to be Spelled-Out, contrary to fact. This explanation is in line with Rizzi & Shlonsky (2007), readapted to clefts in Bonan (2017), in which it has been suggested that subject-extraction is done straight out of *v*P in relative clauses, with no movement through SpecSubjP. In what follows, building on Roberts' (2007) work on French SCLI as an instance of straight V-to-C movement, I discuss the 'activation' of NOM enclitics in Trevisan.

5 NOM Clitics vs Non-NOM Clitics

Given the incompatibility of Trevisan interrogative syntax with an analysis à la Poletto & Pollock (2000), I have suggested that Trevisan SCLI ought to be analysed as an ordinary instance of V-to-C movement, i.e., head movement of the (complex) finite verb to the HLP. Contra Kayne (1991), I wish to claim that non-NOM clitics do adjoin to the finite verb, contrary to NOM clitics of the assertive series: while the former are first-merged within *v*P then moved to the higher part of the inflection field along with the finite V, assertive NOM clitics do not adjoin to the V, at least syntactically. In contrast, I will argue that there is syntactic adjunction between the finite verb moved to the HLP and the NOM clitics of the interrogative series, done in the form of left-adjunction of the V to the Fin-head during its movement to its final landing site in the left-peripheral Focus°.

Observe the orderings in (26) which, in the light of my discussion of number clitics, suggest that the V moves as a complex head along with non-NOM clitics.

(26) a. te [$_{V}$ ge [o ['ga]]] 'za 'dato. NOM>DAT>ACC>V
2PS DAT ACC have already given

'You've already given it to him/her.'

b. [$_v$ ge [o ['ga]]] tu 'za 'dato. DAT>ACC>V>NOM
DAT ACC =2PS have already given

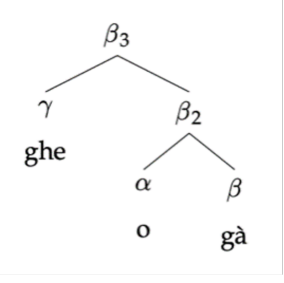
'Have you given it to him/her already?'

In the light of Kayne's (1994) claim that head movement is left-adjunction, the *ge o gà* order in (26) can only be derived if the ACC clitic moves first to the left of the lexical V to satisfy its clitic nature, then the newly created complex verb moves from V° to v° and finally, after the DAT clitic attaches to the left of the complex V, *geo* is attracted to the left of Aux by the φ-features contained therein. This is sketched in (27):

(27) Formation of maximally complex verbal head (Part I)
[$_{TP}$ …[$_{AuxP}$ geogo [$_{PartP}$ <geo> da-to [$_{iP}$ <ge>
<o da-> [$_{VP}$ <da> <o>]]]]]

(27) is a derivation which implies an understanding of head movement and cliticisation à la Roberts (2010). For the purposes of this paper, without going into details of the features that trigger the observed movements, what I am implying in (27) is that the lexical verb stem *da-* (from *dar*, 'to give') first undergoes V-to-*v* movement, followed by cliticisation of its internal (clitic) argument, *o* ('it'). Subsequently, the newly-created head is attracted to the head of the participial phrase, a movement that provides a host for the DAT clitic *ghe* ('to him/her/them'). Once in PartP, the complex verbal head *geo dato* ('her=it given') is 'undone' by an operation that Roberts calls excorporation which, in a nutshell, allows a head to be sub-extracted when it lies on the left edge of its phase, i.e., of a larger derived head such as *geo dato* in (27). Excorporation, possible when the agreeing features of the goal are at the phase edge, eventually gives rise to the complex verbal head *geogo* ('her=it=have'). The technicalities of head movement and cliticisation go beyond the scope of the present investigation; for a detailed account, see Roberts (2010). For the sake of this paper, let us take the complex head *geogo* to have the form in (28):

(28) Maximally-complex verbal head (declaratives)



The NOM > V order in (26a), and the widely accepted assumption that cliticisation operates in a leftward fashion imply that the complex verbal head illustrated in (28) could only be syntactically adjoined to the NOM clitic *iff*

this was a regular pronominal form, i.e., one externally-merged as the external argument of *v*P. However, I have argued that long-extraction structures such as subject clefts and relatives support the claim that Trevisan NOM clitics are not proper pronouns, but an inflectional class. The finite V of Trevisan must therefore stop its V-to-T movement in a head lower than Subj° but higher than both the surface position targeted by the active past participle, and the one in which the adverbial ˈ*za* ('already') is externally-merged: once 'undone' by excorporation, the participle will move alone to a higher aspectual phrase, while the clitic-containing auxiliary finishes its V-to-T movement high in the adverb space, as I show in what follows.

5.1 Movement properties of Trevisan verbs in declaratives

I have mentioned that Trevisan licenses instances of moved 'wh-in situ', derived through a low movement of the clause-internal wh-element, which targets a projection within the LLP. In Bonan (2021b), I argued that Trevisan finite auxiliaries may occupy any of the heads within the higher adverb space (HAS), as in Italian (Cinque 1999, Ledgeway & Lombardi 2005, a.o.). I illustrate this in (29):

(29) ga'veo **pur'trɔpo** (ga'veo) '**forse** (ga'veo) be'vuo 'massa.
had.1PS unfortunately had.1PS perhaps had.1PS drunk too.much

'I unfortunately had perhaps drunk too much.'

Conversely, finite lexical verbs cannot generally target positions within the HAS and, in the unmarked case, these raise to a clause-medial position situated immediately to the left of the presuppositional negator *mi(c)a*, as in (30):

(30) 'ʤani **pur'trɔpo** nol 'dɔrme '**mia**
John unfortunately NEG=he sleeps NEG

'John unfortunately doesn't sleep.'

Also, the limited possibility for the finite lexical verbs of Standard Italian to target particular positions within the lower adverb space (LAS), discussed in Cinque (1999), is unavailable in Trevisan, as in (31):

(31) a. *de'sɔito a maˈria no [LAS '**mia** a 'ʧapa el 'trɛno]
usually the Maria NEG NEG she= takes the train

'Usually Mary doesn't take the train.'

b. *a maˈria [LAS '**subito** a me av'zea]
the Maria at.once she= me warned

'Mary would warn me at once.'

Therefore, the lowest position targeted by the finite verb of Trevisan is structurally higher than the LAS. Given the observation that the Trevisan active past participle does not surface in its external-merge position, similarly to that of Italian as in Cinque (1999), in Bonan (2020) I claimed that this targets an aspectual position located within the LAS, as illustrated in (32):

(32) noo ˈgo [LAS ˈ**mia** maˈɲa$_i$ ˈ**tuto** [vP i]] !
NEG=it= have NEG eaten all

‘No, I haven’t eaten it all!’

(32) is compatible with my analysis whereby clause-internal wh-elements are internally-merged in a vP-peripheral position. The projection that hosts clause-internally moved wh-elements lies lower than the LAS, i.e., within the LLP, as suggested by the relative order between the wh-element *kwando* and the low adverbials in (33):

(33) o ˈgatu maˈɲa ˈ**tuto/ˈben** ˈkwando?
it= have=you.2PS eaten all/well when

‘WHEN did you eat it all/well?’

I thus maintain that the functional head to which the complex verb of examples like (26a) raises in declaratives is within the HAS, plausibly a functional head of Cinque’s T(ense) area, as reported (34):

(34) Cinque’s Adverbial Field (Cinque 1999: 156)
[*frankly* Mood$_{\text{SpeechAct}}$ > [*surprisingly* Mood$_{\text{Mirative}}$ > [*luckily* Mood$_{\text{Evaluative}}$ > [*allegedly* Mood$_{\text{Evidential}}$ > [*probably* Mod$_{\text{Epistemic}}$ > [*once* T$_{\text{Past}}$ > [*then* T$_{\text{Future}}$ > [*perhaps* Mood$_{\text{Irrealis}}$ > [*necessarily* Mod$_{\text{Necessity}}$ > [*possibly* Mod$_{\text{Possibility}}$ > [*usually* Asp$_{\text{Habitual}}$ > [*finally* Asp$_{\text{Delayed}}$ > [*tendentially* Asp$_{\text{Predispositional}}$ > [*again* Asp$_{\text{Repetitive(I)}}$ > [*often* Asp$_{\text{Continuative}}$ > [*always* Asp$_{\text{Continuous}}$ > [*just* Asp$_{\text{Retrospective}}$ > [*soon* Asp$_{\text{Proximative}}$ > [*briefly* Asp$_{\text{Durative}}$ > [(?) Asp$_{\text{Generic/Progressive}}$ > [*almost* Asp$_{\text{Prospective}}$ > [*suddenly* Asp$_{\text{Inceptive}}$ > [*obligatorily* Mod$_{\text{Obligation}}$ > [*in vain* Asp$_{\text{Frustrative}}$ > [(?) Asp$_{\text{Conative}}$ > [*completely* Asp$_{\text{SgCompletive(I)}}$ > [*tutto* Asp$_{\text{PlCompletive}}$ > [*well* Voice > [*early* Asp$_{\text{Celerative(II)}}$ > [? Asp$_{\text{Inceptive(II)}}$ > [*again* Asp$_{\text{Repetitive(II)}}$ > [*often* Asp$_{\text{Frequentive(II)}}$ > …

It follows that instances of V-to-T movement such as (26a) can be understood as in (35):

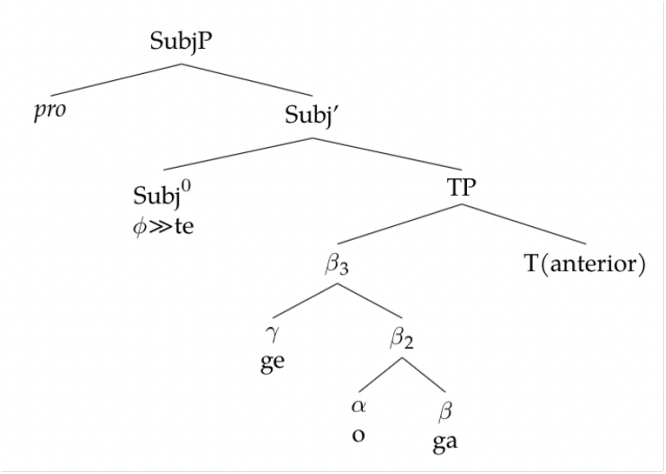
(35) V-to-T Movement
[SubjP *pro* φ » te [TP geoˈga [T(Anterior) ˈza T$_{\text{(Anterior)}}$° [Asp(Prospective) ˈdato Asp$_{\text{(Prospective)}}$° [Aux <geoˈga> [vP …]]]]]]

That the active past participle of Trevisan moves to the head of $\text{Asp}_{(\text{Prospective})}$, i.e., the projection in which the cross-linguistic counterparts of 'almost' are merged, is supported by the orderings in (36):

(36)	a.	'za	'dato	vs	*	'dato	'za
		already	given			given	already
	b.	'sempre	'dato	vs	??	'dato	'sempre
		always	given			given	always
	c.	'kwazi	'dato	vs	*	'dato	'kwazi
		almost	given			given	almost
	d.	*impro'visamente	'dato	vs		'dato	impro'visamente
		suddenly	given			given	suddenly
	e.	*'ben	ma'ɲa	vs		ma'ɲa	'ben
		well	eaten			eaten	well

An analysis along the lines of (36) implies that assertive NOM 'clitics' are syntactically independent from the verb. More precisely, that these are phonological instantiations of the φ-features of Subj. The syntactic independence of NOM clitics from non-NOMs as seen in (35) is sketched in the diagram in (37):

(37) NOM clitics vs complex verbal head



In what follows, I discuss additional supporting evidence for my proposal for the morphosyntax of interrogative NOMs and elaborate my theory of interrogative enclitics.

6 Number Clitics in Interrogatives

Roberts' (2007) claim that French NOM enclitics in contexts of subject-clitic and complex inversion are in fact a manifestation of the φ-features associated with a residual-V2 HLP that triggers inversion extends successfully to the NIDs that are non-redundant null-subject systems, in the sense of Roberts (2010), in which a distinct clitic paradigm of the number type is found in inversion contexts. Following Rizzi (1986), Brandi & Cordin (1989), Poletto (2000), Roberts (2007) claimed that also the properties of the seemingly pro-clitic NOM clitics of certain NIDs are better captured if they are analysed as the realisation of φ-features (contra many authors who argue that NOM clitics in NIDs are not inflectional but real pronouns, such as Manzini & Savoia 2005, Cardinaletti & Repetti 2008, Manzini 2012, a.o.). Let us now see how my analysis applies to Trevisan enclitics.

6.1 Null and lexical subjects

One issue to assess is the fact that for the proclitic series to realise φ-features does not entail that the interrogative HLP realises φ-features twice over. Observe (38):

(38) a. [$_{\text{ForceP}}$ ... te 'ga-eo [$_{\text{TP}}$ *pro* ʧa'ma]] ?
you has=he *pro* called

b. [$_{\text{ForceP}}$ ... te 'ga-eo *pro* [$_{\text{TP}}$ ʧa'ma]] ?
you has=he *pro* called

'Did he call you?'

If the head [v *te* [*ga*]] ('ACC has') moves to the HLP as a consequence of the probing φ-features contained within it, à la Roberts, then in the absence of a null lexical Subj , *pro* can be posited to either be canonically located in SubjP, as in (38a), or to be attracted by the EPP into the Spec of the left-peripheral FinP, as in (38b). Similarly to Zribi-Hertz (1994) and Sportiche (1999), Roberts argued that in SCLI contexts the presence of a null Subj should also be posited for French, as in (39):

(39) French (Roberts 2007: 47(58))
pro a-t-il vu Marie?
pro has-*t*-3PS seen Mary

'Has he seen Mary?'

For Roberts, the null Subj in (39) occupies the left-peripheral Spec that bears interrogative inflection, where it is attracted by the EPP feature associated with the residual-V2 environment. EPP is, in Roberts' words, another feature 'withheld' from T in the case of residual V2. Remember the French examples in (19), repeated as (40):

(40) French (Roberts 2007: 43-45(53 and 56))

a. *A Jean vu Marie?
Has John seen Mary?

b. Jean a-t-il vue Marie?
John has-*t*-3PS seen Mary?

'Has John seen Mary?'

Roberts attributes the difference in felicity between the examples in (40) to the absence of φ-features in T, whence the need for the Subj to move to the HLP.

I have already mentioned that there are robust empirical reasons to believe that the Subj of interrogatives is not attracted into TP in Trevisan either. Observe the declarative clause in (41), where the lexical Subj is attracted into SpecSubjP and activates the φ-features in Subj°, which then surface as the assertive NOM clitic:

(41) ˈʤanil te ˈga ʧaˈma
John=3PS.M you has called

'John called you.'

If, prior to V-to-C movement, the (null) Subj of interrogatives passed through SpecSubjP, or if the NOM clitic was a proper pronoun coming from *v*P, one would expect the assertive clitic to be activated in interrogatives as well, as in (42), contrary to fact.

(42) *[$_{v}$ te [ˈga]]$_{i}$-eo [$_{SubjP}$ *pro* / ˈʤani el ʧaˈma _____$_{i}$] ?
you has=3PS.M *pro* / John 3PS.M called

'Did he/John call you?'

The absence of an assertive clitic in interrogatives suggests that there is no *pro* or lexical subject in SpecSubjP at any point in the derivation. As a consequence, there is no need to posit that φ-features are realised twice over in interrogatives, or that the features that probe the subject into SpecTP are different from those that probe it into the HLP (D-features à la Manzini & Savoia 2005). The φ-features are realised either in Subj° or in Fin° and straight out-of-*v*P subject-movement is at play in interrogatives.

Although I have so far treated Trevisan and French in similar ways, there are reasons to believe that the lexical Subj that precedes SCLI does not necessarily occupy the same structural position in the two languages. In fact, while French allows the interpolation of a lexical Subj between a fronted wh-element and SCLI, as in (43a), Trevisan does not, as in (43b):

(43) a. Quand Jean a-t-il vu Marie?
When John has-*t*-he seen Mary

'When did John see Mary?'

b. *'kwando 'ʤani 'gaeo 'visto a ma'ria?
when John has=3PS.M seen the Mary

The contrast in (43) suggests that, while a fronted wh-element and a lexical Subj moved to the HLP do not compete for the same structural position in French, they do in Trevisan. It is reasonable to think that the movement of the verb stops in Fin° in French and continues to Focus° in Trevisan. That the enclitics of French do not vary in form with respect to their declarative counterparts, while the enclitics of Trevisan do, as a consequence of the [Q]-feature in Focus°, further supports my claim. The contrast in (43) can further be attributed to the fact that only Trevisan is consistently a null-subject language, in both assertives and interrogatives: while the French lexical subject must move to the HLP, the Trevisan one can stay lower. This property can be understood as a consequence of the fact that the left-peripheral φ-set in Fin° is deficient in Trevisan, hence not strong enough to attract lexical subjects (as opposed to the French one, whose paradigm is wholly complete).

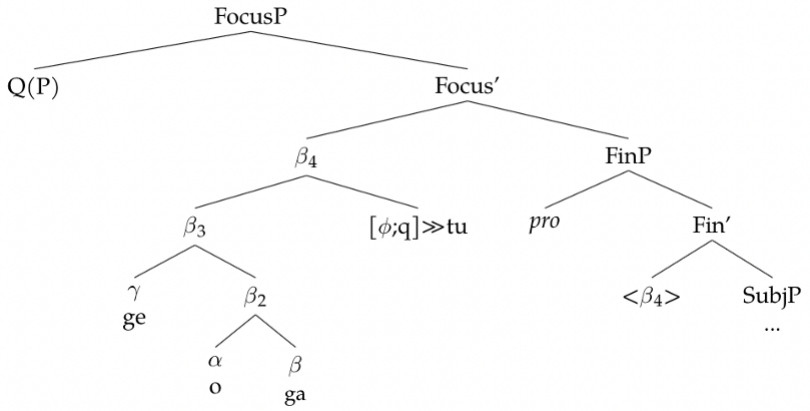
6.2 Phi in Fin, then Q in Foc

For the clitic activation analysis developed in this paper to function correctly in interrogatives, the presence of (phonetically-realised or silent) material in the left-peripheral Spec headed by the φ-bundle must be posited. This is unproblematic for wh- and polar questions if one assumes that Roberts is right with regards to the fact that in languages with SCLI there is no T-to-C movement but straight V-to-C extraction, with *pro* in Fin. Once the correct Spec-Head configuration between the moved V and pro is created in FinP, which activates the relevant φ-set in Fin°, further movement of the complex verbal head into Focus° completes the derivation, as in (44):

(44) V-to-C Movement (formation of maximally complex verbal head)
$[_{\text{ForceP}}$ …$[_{\text{FocusP}}$ geoga$_{\varphi+\text{Q}}$ » tu $[_{\text{FinP}}$ *pro* <geoga+φ> …$[_{\text{TP}}$ <geoga>
$[_{\text{T(Anterior)}}$ za T$_{\text{(Anterior)}}{}^{\circ}$ $[_{\text{Asp(Prospective)}}$ dato Asp$_{\text{(Prospective)}}{}^{\circ}$
$[_{\text{Aux}}$ <geoga> $[_{v\text{P}}$ …]]]]]]]]

I call the focus-head to which the V moves FocusP, à la Rizzi (1997), despite Cable's (2010) claim that pied-piping is not wh-fronting but fronting of QPs, and Bonan's (2021a) implementation thereof according to which the left-peripheral projection called FocusP in declaratives is actually a Q(uestion)P. Regardless of the terminology, the main point here is that the final head targeted by *v*-to-C movement is the one whose SPEC is targeted by the fronting of QPs or Q-particles in general, i.e., the functional projection that encodes [+Q]. The left-peripheral part of the derivation in (44) is sketched in (45):

(45) Interrogative enclisis



6.3 Morphological specifications of Trevisan NOM clitics

I have argued that Trevisan clitics (and, by extension, those of similar languages) are of two types: pronominal, in the case of non-NOM clitics, and inflectional, in the case of nominatives. I have also argued that while non-NOM pronouns behave like regular arguments that are externally-merged within *v*P, NOM clitics do not come from *v*P: they are the product of a Spec-Head configuration that has been correctly created within a φ-containing projection (either SubjP or FinP), and leads to the Spell Out of the relevant φ-set. Trevisan and non-redundant null-subject systems can thus be understood as '*pro*-drop Spell Out-φ' languages (section 7).

My approach, I claim, captures the proclitic/enclitic nature of the two types of clitic. While pronouns cliticise in a leftward fashion, inflectional clitics are in fact suffixes, and they either do not attach to the verb (assertive series) or they surface in enclisis (interrogative series). That non-NOM clitics are different from NOM clitics had already been observed in Roberts (2010), though he took NOM clitics to be moved from a *v*P-internal position. The difference between the clitics analysed in Roberts' work and those of Trevisan, I claim, is that only the former are pronominal in nature. This analysis, inspired by Roberts' (2007) work on French enclitics, is compatible with the morphological variations displayed by NOM clitics in interrogatives, and accounts for the lack of certain forms in a very traditional way: while gaps are not expected in pronominal paradigms, inflectional gaps are unsurprising. As a consequence of the proposed clitic activation analysis, I have claimed that Trevisan SCLI is an instance of straight V-to-C movement triggered by φ-features of the interrogative Fin. Once in the HLP, the Trevisan verb is attracted further into Focus°, where it gets the additional [Q] feature that accounts for the morphological variations between the two φ-series. Following Roberts (2007), the assertive NOM clitics of Trevisan can be understood to have the featural specifications in (46):

(46) Assertive NOM clitics

[+1; -2; -PL; +REF]	⟹	∅
[-1; +2; -PL; +REF]	⟹	/te/
[-1; -2; -PL; -F; +REF]	⟹	/(e)l/
[-1; -2; -PL; +F; +REF]	⟹	/a/
[-1; -2; -PL; -REF]	⟹	∅
[+1; -2; +PL; +REF]	⟹	∅
[-1; +2; +PL; +REF]	⟹	∅
[-1; -2; +PL; -F; +REF]	⟹	/i/
[-1; -2; +PL; +F; +REF]	⟹	/e/

The feature system in (46) classifies the grammatical persons in binary terms, along with a specification for [±PLURAL], [±FEMININE] and [±REFERENTIAL] (to distinguish between expletive and non-expletive pronouns). I abandoned Poletto's (2000) [-HEARER] feature because it does not seem well-represented in Trevisan, in which the consonantal sound is only present for the 3PS masculine. Also, the [HEARER] feature is certainly useful for the characterisation of number clitics as opposed to other types of clitics, but it does not contribute to the interlinguistic classification of their morphosyntactic features.

As a consequence of my discussion, the interrogative paradigm can be seen as in (47):

(47) Assertive NOM clitics

[+1; -2; -PL; +REF; +Q]	⟹	∅
[-1; +2; -PL; +REF; +Q]	⟹	/tu/
[-1; -2; -PL; -F; +REF; +Q]	⟹	/(e)o/
[-1; -2; -PL; +F; +REF; +Q]	⟹	/(e)a/
[-1; -2; -PL; -REF; +Q]	⟹	∅
[+1; -2; +PL; +REF; +Q]	⟹	∅
[-1; +2; +PL; +REF; +Q]	⟹	/('e)o/
[-1; -2; +PL; -F; +REF; +Q]	⟹	/(e)i/
[-1; -2; +PL; +F; +REF; +Q]	⟹	/e(ː)/

The forms in (48) are available to some speakers as well, and are construed with auxiliaries and modals:[3]

[3] As suggested by Ur Shlonsky (p.c.), the marginal availability of the 1PS and EXPL interrogative clitics with auxiliaries and modals suggests that these lighter verbs could be attracted to a left-peripheral projection different from that to which lexical verbs raise. Plausibly, this left-peripheral head is endowed with a richer φ-set. This claim is supported by cross-linguistic data discussed in De Crousaz & Shlonsky (2003). In Franco-Provençal and in French, verbs in the suffix-bearing tenses raise higher than verbs in the simple present in interrogatives. These asymmetrical movement properties are well-justified form the perspective of historical morphology: only suffix-bearing tenses (the future and the conditional) are compounds that evolved from the fusion of a lexical infinitive and the present indicative/imperfect form of *habere* ('to have') in late Latin (Roberts 1992).

(48) Interrogative NOM clitics (ii)
[+1; -2; -PL; +REF; +Q] ⟹ /jo/
[-1; -2; -PL; -REF; +Q] ⟹ /(e)o/

On the assumption that the φ-features in T or C always include person, number and referential specification, while only interrogative NOM clitics are endowed with [Q], the morphological alternations between the two series follow.

7 Number Clitics in the Light of Rizzi's (2017) Parameters

The nativist approach to language, whereby humans are endowed with a specific cognitive capacity for language which is present at birth and requires simple environmental stimulation for linguistic competence to develop, raises the challenge of accounting for the existence of seemingly very diverse grammatical structures in the languages of the world. One of the central claims of so-called 'cartography' of syntactic structures is that these grammatical systems differ along simple lines: the central distinguishing features are accessible to the native speaker on the basis of primary linguistic data. In this framework, Rizzi (2017: 165) formulates the notion of 'parameter', i.e., a binary formal mechanism that determines a finite set of syntactic variability among languages, as 'an instruction for the triggering of a syntactic operation, expressed as a morphosyntactic feature associated to a functional head.' The formalisation of this notion is as in (49):

(49) Parameter (Rizzi 2017: 166(6))
'X has F, in which X is an element of the functional lexicon [...], and F is a morphosyntactic feature triggering syntactic operations of merge, move and spell-out. X may have F in one language, and not in another language, a binary choice.'

7.1 Movement and Spell Out parameters

Concerning movement parameters, Rizzi assumes that Move is a complex operation, in the sense of Chomsky (2001), which may involve a head or a phrase. Accordingly, Move involves the establishment of a probe-goal search followed by (internal) merge of the goal, and 'a functional head acting as a trigger of movement may have two distinct pairs of features, responsible, respectively, for phrasal movement and head movement' (Rizzi 2017: 171). These are defined as in (50) and (51):

(50) Phrasal Movement (Rizzi 2017: 171(20))
a. A search feature at the phrasal level.
b. The corresponding internal merge feature at the phrasal level (IM), what is traditionally called an EPP feature.

(51) Head Movement (Rizzi 2017: 171(20))

a. A search feature at the lex level ($\text{Search}_{\text{lex}}$ Feature).

b. The corresponding internal merge feature, again at the lex level (IM_{lex} Feature).

Accordingly, syntactic operations are simple, highly learnable and restricted to an extremely reduced set for reasons of learnability. Therefore, when one functional element enters the syntax and becomes a functional head in the relevant configuration, it triggers one syntactic operation on the structure which is built. The available operations are those of Merge, Move, and Spell Out; as in (52):

(52) Syntactic operations (Samo 2019: 145(6))

1. Merge
2. Move
   a. Search: Probe-goal relation at the phrasal level
   b. IM: Internal merge of phrases
   c. $\text{Search}_{\text{lex}}$ Probe-goal relation at the head level
   d. IM_{lex} Internal merge of heads
3. Spellout

Spell-out parameters are, according to Rizzi (2017: 175), those that deal with 'variation in the obligatory, optional or impossible pronunciation of certain heads and of their immediate dependents.' One such parameter, perhaps the most famous one, is the null subject parameter, which governs the possibility of licensing a phonetically null subject pronoun. I discuss this parameter in section 7.2. I will nonetheless show how movement parameters work first, for clarification purposes.

The approach to grammar known as the cartography of syntactic structures deals with drawing maps of syntactic configurations that are as precise as possible (on this, see Rizzi & Cinque 2016). In this framework, it is assumed that the functional spine of human language is universal, i.e., it is composed of numerous rigidly ordered functional projections. It is nonetheless widely acknowledged that languages vary to the extent in which they activate the functional heads of the spine, and that they realise these projections using different strategies. For instance, the left-peripheral projection which encodes [focus] is not realised or exploited in the same way by all languages. Samo (2019) elaborates an understanding of the morphosyntax of FocusP in light of Rizzi's (2017) parameters under consideration here. The head of Focus triggers movement of an XP that bears a relevant focus feature. Samo shows that, while in languages such as Gungbe this head is phonetically realised (Aboh 2004), as in (53), its Italian counterpart is silent (Rizzi 1997 and related), as in (54):

(53) Gungbe (adapted from Aboh 2007: 85(9c))
[FocusP KÒFÍ [Focus° **wè** [ùn yró _____i]]]
Kofi FOC 1PS call

'I called KOFI (as opposed to, for example, Enoch).'

(54) Italian (adapted from Samo 2019: 146(8))
[FocusP IL LIBROi [Focus° ∅ [Gianni ha letto _____i]]]!
the book FOC Gianni has read

'Gianni read THE BOOK (as opposed to, for example, the article).'

Samo further claims that another strategy used by languages 'is to move an already merged head to activate Focus°' (Samo 2019: 146). Accordingly, a plausible candidate that undergoes a movement of this type is the inflected verbal head of V2 languages, as illustrated by the German example in (55):[4]

(55) German (adapted from Samo 2019: 146(8))
[SpecFoc DIESES FRESKO [Foc° malte [Giotto]]]
this fresco painted.3PS Giotto

'Giotto painted THIS FRESCO (as opposed to, for example, the one over there).'

Accordingly, the variability of syntactic strategies adopted by different languages stems from different combinations of the syntactic operations of Merge, Move and Spell Out: Gungbe Merges FocusP and Spells Out Focus°; Italian Merges FocusP but does not Spell Out Focus°; German requires both head movement and phrasal movement. The parametrisation of the observed phenomena can be viewed as in Table 4:

	Merge	**Spell Out**	**Search**	**IM**	**Search$_{lex}$**	**IM$_{lex}$**
Italian	1	0	1	1	0	0
Gungbe	1	1	1	1	0	0
German	1	0	1	1	1	1

Table 4 Language variability in activating FocusP (Samo 2019: 147(10)).

In such a framework, the factorial combinations of the Boolean operators are expected to result in fine cross-linguistic analyses of typological variations. While I believe that Samo's conclusions are correct, I reckon that a better

[4] For Samo, the V2 constraint is 'a sum of Spec-Head configurations between the inflected verb and an XP bearing informational properties in every head of the LP' (Samo 2019: 146) (Samo 2019: 146). This theory, known as the 'Criterial V2' was put forth in Samo (2018), and then further investigated in Samo (2019).

way to explain the obligatory raising of the inflected verb in examples like (55) is not as the movement of 'an already merged head to activate Focus°', but rather as a further movement triggered by the activated, albeit silent, Focus head. In a way, while in languages such as Gungbe and Italian the Focus head (pronounced and silent, respectively) only triggers movement of an XP into SpecFocus (IM), in languages such as German it further attracts the verb (IM+IM_{lex}). While the investigation of this matter exceeds the scope of this paper, and I will thus leave it for further work, its main predictions are that there should be languages that pronounce Focus° like Gungbe and attract the verb like German (yielding something like 'DIESES FRESKO malte**wè** Giotto'), languages that pronounce Focus° like Gungbe and attract the verb but not the focussed XP ('malte**wè** Giotto DIESES FRESKO'), and all other logically possible combinations of the variables under consideration.

My claim is indirectly supported by my 'clitic activation' analysis, as I discuss in what follows.

7.2 Pronounce-φ

With Rizzi's (2017) discussion in mind, and Samo's (2019) implementation, let us go back to Trevisan. As explained by Rizzi, since the early 1980s, the null subject parameter has animated a fair amount of generative literature. This single parameter was originally formulated to capture a cluster of properties that, at least empirically, differentiate non-null subject languages like English from null subject languages such as Italian (Rizzi 1982). The latter are indeed known to allow null pronominal subjects with referential and non-referential interpretation, as in (56a), they also allow subject inversion (VS configurations), as in (56b), and free violations of that-trace effects, as in (56c).[5]

(56) a. Parlo italiano.
Speak.1PS Italian

'I speak Italian.'

a'. Piove.
Rains.3PS

'It's raining.'

b. È arrivato Gianni.
Is arrived John

'John has arrived.'

[5] The so-called *that*-trace effect is the phenomenon whereby the Comp cannot be followed by a trace in some languages such as English. In these languages, the Comp must be omitted for subject extraction to be possible.

c. Chi credi che _____ verraà?
Who thinks.2PS that will.come

'Who do you think will come?'

The opposite picture is observed in non-null subject languages, as illustrated by the English translations in (56). While works such as Belletti (2004) have shown that the null subject parameter is not sufficient to account for subject-inversion, for which a further parametrisation of the periphery of *v*P is needed, these three empirical properties remain powerful at the descriptive level. In support of my claim that Trevisan is *pro*-drop, I thus provide the counterparts of (56) in (57):

(57) a. ˈparlo itaˈjan.
speak.1PS Italian

'I speak Italian.'

a'. ˈpjɔve.
rains.3PS

'It's raining.'

b. ˈze riˈva ˈʤani.
is arrived John

'John has arrived.'

c. ˈki ˈpensi-tu ˈke _____ veɲaˈra?
Who thinks-2PS that will.come

'Who do you think will come?'

Rizzi (2017) explained word orders such as SVO as a consequence of the attraction of the subject into SpecSubjP, triggered by the φ-features in Subj°. In this article, I have claimed that the NOM clitics of Trevisan are phonetically-realised instantiations of these φ-features, 'activated' in the presence of material in SpecSubj. In light of Rizzi's (2017) discussion, what I call 'activation' can be understood as a positive setting of the Spell Out parameter, which in turn is a by-product of Search+Merge of either a lexical subject, a tonic pronoun, or *pro*. In a way, the morphosyntax of SubjP in Trevisan is similar to that of FocusP in Gungbe: a feature in the head attracts an XP into the Spec, and the head is also Spelled Out. Nonetheless, at least in the case of Subj, it is reasonable to think that more than just φ-features contribute to the attraction of the subject into SpecSubj or hence the licencing of *pro*: the φ-inflectional class under consideration is indeed deficient. I maintain that this additional property is the need to become accessible to the assignment of NOM case.

In this framework, the differences between the Italian example in (58) and its Trevisan counterpart in (59) are easily accounted for:

(58) Gianni mi ha telefonato nel pomeriggio.
John me has called in.the afternoon

'John called me in the afternoon.'

(59) ˈʤanil me ˈga ʧaˈma ˈdɔpo mexoˈdi.
John=2PS.M me has called after midday

'John called me in the afternoon.'

In (58), the lexical subject is attracted into SpecSubjP, and the φ-features in Subj° are not pronounced. Conversely, in (59), the parametrised instruction that we can understand as 'pronounce-φ' is set positively. Accordingly, while Italian is simply a pro-drop language, Trevisan can be thought as a 'pro-drop Spell Out-φ' language. Note that the Trevisan example suggests that in Italian the finite verb does not raise as high as the head of SubjP. This is in line with Samo's (2019) claim that the finite verb stops in Cardinaletti's (2004) Agr°. The settings of the movement parameters are as in Table 5:[6]

	Merge	**Search**	**IM**	**Spell Out**	**Search$_{lex}$**	**IM$_{lex}$**
Italian	1	1	1	0	0	0
Trevisan	1	1	1	1	0	0

Table 5 Language variability in activating SubjP.

The situation in the Trevisan Fin of interrogatives is slightly different, since here attraction of the verb is involved. On top of the 'pronounce-φ' instruction, Search$_{lex}$ and IM$_{lex}$ must also be set positively, as in Table 6:

Merge	**Search**	**IM**	**Spell Out**	**Searchlex**	**IMlex**
1	1	1	1	1	1

Table 6 Interrogative FinP in Trevisan.

In essence, the morphosyntax of the Trevisan FinP is like the one that I posited for a potential Gungbe-style language in which not only is Focus° pronounced, but the verb is also additionally attracted there. From FinP, the verb then continues to raise to Focus°, a legitimate operation given that heads are not subject to Criterial Freezing (Rizzi 2006). In Trevisan, the left-peripheral FocusP is like the Italian one in that it is not associated with an instruction to pronounce Focus°.

[6] Contra Samo (2019), I list Spell Out after Merge, as a consequence of my 'clitic activation' analysis.

8 Conclusions

In Trevisan, in which clause-internal wh-elements undergo focus-movement into the *v*P-peripheral Foc (Belletti 2004), subject-clitic inversion cannot involve phrasal movement of IP-internal elements to the HLP, *pace* Poletto & Pollock (2000) and further related works. I have therefore claimed that subject-clitic inversion is a canonical instance of V-to-C movement in Trevisan, i.e., movement of a complex-head constituted minimally of the finite V and, maximally, of the V and non-NOM clitics. In the spirit of Roberts' (2007) analysis of French enclitics, I have claimed that the nominative clitics of Trevisan are not proper pronouns, but rather constitute two inflectional classes, i.e. a φ-subset in SubjP in assertives, and a [φ; Q] featural-bundle in interrogatives. These features are Spelled-Out in the presence of a proper Spec-Head configuration in either SubjP or FinP, depending on whether a residual-V2 HLP blocks the transmission to T of the φ-features of the HLP. This treatment of NOM clitics accounts for the apparent proclisis/enclisis asymmetry between the two classes, but also for the non-trivial morphological variations between assertive and interrogative NOM clitics and their complementary distribution which, on the assumption that φ-features are not realised twice over, is expected.

Abbreviations

#	prosodic break	NEG	negation
DAT	dative	NOM	nominative
EXPL	expletive	PL	plural
F	feminine	PS/P	person singular/plural
FOC	focus	Q	question
FUT	future	REF	referential
M	masculine		

References

Aboh, E. O. 2004. *The morphosyntax of complement-head sequences: Clause structure and word order patterns in kwa* Oxford Studies in Comparative Syntax. Oxford: Oxford University Press.

Aboh, E. O. 2007. Leftward Focus versus Rightward Focus: The Kwa-Bantu Conspiracy. *SOAS Working Papers Linguistics* 15. 81–104.

Belletti, A. 2004. Aspects of the low IP area. In L. Rizzi (ed.), *The Structure of CP and IP. The Cartography of Syntactic Structures*, Oxford. 16–51: Oxford University Press.

Bonan, C. 2017. Sè or c'est? On the Cartography of Clefts. In C. Bonan, H. Jiyanyan & M. Pallottino (eds.), *Generative Grammar in Geneva*

(GGG) X, Université de Genève. doi:10.13097/cjg3-tfud.

Bonan, C. 2020. The periphery of *v*P in the theory of wh-in-situ. Research article [submitted].

Bonan, C. 2021a. Romance interrogative syntax. Formal and typological dimensions of variation. *Linguistik Aktuell/Linguistics Today* 266. doi:10.1075/la.266. [forthcoming].

Bonan, C. 2021b. From northern Italian to Asian wh-in situ: A theory of low focus movement. *Isogloss: Open Journal of Romance Linguistic* 7. 1–59. doi:10.5565/rev/isogloss.108.

Brandi, L. & P. Cordin. 1989. Two Italian Dialects and the Null Subject Parameter. In O. A. Jaeggli & K. J. Safir (eds.), *The Null Subject Parameter*, vol. 15 Studies in Natural Language and Linguistic Theory, Dordrecht: Springer. doi:10.1007/978-94-009-2540-3_4.

Burzio, L. 1986. *Italian Syntax: A Government-Binding Approach*, vol. 1 Studies in Natural Language and Linguistic Theory. Dordrecht: Springer.

Cable, S. 2010. *The Grammar of Q. Q-Particles, Wh-Movement, and Pied-Piping*. MISSING: Oxford University Press.

Cardinaletti, A. 2004. Towards a cartography of subject positions. In L. Rizzi (ed.), *The Structure of CP and IP. The Cartography of Syntactic Structures*, 115–165. New York: Oxford University Press.

Cardinaletti, A. & L. Repetti. 2008. The Phonology and Syntax of Preverbal and Postverbal Subject Clitics in Northern Italian Dialects. *Linguistic Inquiry* 39(4). 523–563.

Cardinaletti, A. & L. Repetti. 2010. Proclitic vs Enclitic Pronouns in Northern Italian Dialects and the Null-Subject Parameter. In R. D'Alessandro, A. Ledgeway & I. Roberts (eds.), *Syntactic Variation: The Dialects of Italy*, 119–134. Cambridge: Cambridge University Press.

Cardinaletti, A. & M. Starke. 1999. The Typology of Structural Deficiency: On the three grammatical classes. In H. van Riemsdijk (ed.), *Clitics in the Language of Europe*, 145–233. Berlin/New York: De Gruyter Mouton. doi:10.1515/9783110804010.145.

Chomsky, N. 1973. Conditions on transformations. In S. Anderson & P. Kiparsky (eds.), *Festschrift for Morris Halle*, 232–286. New York: Holt, Rinehart and Winston.

Chomsky, N. 2001. Derivation by Phase. In M. Kenstowicz (ed.), *Ken Hale: A Life in Language*, 1–52. Cambridge, MA: The MIT Press.

Chomsky, N. 2005. On Phases. Ms. MIT.

Cinque, G. 1999. *Adverbs and Functional Heads: A Cross-Linguistic Perspective*. Oxford/New York: Oxford University Press.

De Crousaz, I. & U. Shlonsky. 2003. The Distribution of a Subject Clitic Pronoun in Franco-Provençal Dialect and the Licensing of Pro. *Linguistic Inquiry* 34(3). 413–442.

Goria, C. 2004. *Subject clitics in the Northern Italian dialects. A comparative study based on the minimalist program and optimality theory*. Dordrecht: Springer.

Kayne, R. S. 1983. Connectedness. *Linguistic Inquiry* 14(2). 223–249.
Kayne, R. S. 1991. Romance Clitics, Verb Movement, and PRO. *Linguistic Inquiry* 22(4). 647–686.
Kayne, R. S. 1994. *The Antisymmetry of Syntax*. Cambridge, MA: The MIT Press.
Ledgeway, A. & A. Lombardi. 2005. Verb Movement, Adverbs and Clitic Positions in Romance. *Probus* 17. 79–113.
Manzini, M. R. 2012. On the substantive primitives of morphosyntax and their parametrization: Norther Italian subject clitics. In M. van Oostendorp & H. van Riemsdijk (eds.), *Representing Structure in Phonology and Syntax*, 167–194. Berlin/Boston: De Gruyter Mouton. doi:10.1515/9781501502224.
Manzini, M. R. & L. M. Savoia. 2005. *I dialetti italiani e romanci* Morfosintassi generativa I-III. Alessandria: Edizioni dell'Orso.
Munaro, N. 1999. *Sintagmi interrogativi nei dialetti italiani settentrionali*. Padova: Unipress. Rivista di Grammatica Generativa. Monografie.
Poletto, C. 2000. *The Higher Functional Field. Evidence from Northern Italian Dialects* Oxford Studies in Comparative Syntax. New York: Oxford University Press.
Poletto, C. & J.-Y. Pollock. 2000. On the Left Periphery of Some Romance Wh-Questions. *University of Venice Working Papers in Linguistics* 20(2). 115–182.
Poletto, C. & C. Tortora. 2016. Subject Clitics: Syntax. In A. Ledgeway & M. Maiden (eds.), *The Oxford Guide to the Romance Languages*, 772–785. Oxford/New York: Oxford University Press.
Pollock, J.-Y. 2006. Subject-Clitic Inversion, Complex Inversion and Stylistic Inversion in French. In H. Evaraert & H. van Riemsdijk (eds.), *The Syntax Companion V*, Oxford: Wiley-Blackwell.
Rizzi, L. 1982. *Issues in Italian syntax*, vol. 11 Studies in Generative Grammar [SGG]. Dordrecht: Foris.
Rizzi, L. 1986. On the Status of Subject Clitics in Romance. In O. Jaeggli & C. Silva-Corvalán (eds.), *Studies in Romance Linguistics*, 391–420. Dordrecht: Foris.
Rizzi, L. 1997. The Fine Structure of the Left Periphery. In L. Haegeman (ed.), *Elements of Grammar*, 281–338. Dordrecht: Springer. doi:10.1007/978-94-011-5420-8_7.
Rizzi, L. 2006. On the Form of Chains: Criterial Positions and ECP Effects. In L. Cheng & N. Corver (eds.), *Wh-Movement: Moving On*, 97–133. Cambridge, MA: The MIT Press.
Rizzi, L. 2016. Labeling, maximality, and the head-phrase distinction. *The Linguistic Review* 33. 103–127.
Rizzi, L. 2017. On the format and locus of parameters: The role of morphosyntactic features. *Linguistic Analysis* 41(3-4). 159–191.
Rizzi, L. & G. Cinque. 2016. Functional categories and syntactic theory. *Annual Review of Linguistics* 2. 139–163. doi:10.1146/annurev-linguistics-

011415-040827 .

Rizzi, L. & U. Shlonsky. 2007. Strategies of Subject Extraction. In U. Sauerland & H.-M. Gärtner (eds.), *Interfaces + Recursion = Language? Chomsky's Minimalism and the View from Syntax-Semantics*, vol. 89 Studies in Generative Grammar [SGG], 115–160. Berlin/New York: De Gruyter Mouton. doi:10.1515/9783110207552.115.

Roberts, I. 1992. A formal account of grammaticalisation in the history of Romance futures. *Folia Linguistica Historica* 13(1-2). 219–258. doi:10.1515/flih.1992.13.1-2.219.

Roberts, I. 2007. A Deletion Analysis of Null Subjects: French as a Case Study. In T. Biberauer, A. Holmberg, I. Roberts & M. Sheehan (eds.), *Parametric Variation: Null Subjects in Minimalist Theory*, Cambridge University Press. Cambridge, UK: Cambridge University Press.

Roberts, I. 2010. *Agreement and Head Movement. Clitics, Incorporation, and Defective Goals*, vol. 59 Linguistic Inquiry Monographs. Cambridge, MA: The MIT Press.

Samo, G. 2018. *A criterial approach to the cartography of v2*: University of Geneva dissertation.

Samo, G. 2019. Cartography and Microparametric variation: Criterial V2 in Swiss Romansh varieties. Functional projections, syntactic cartography and nanosyntax. *Rivista Linguística* 15(3). 141–160.

Sportiche, D. 1989. Le mouvement syntaxique: contraintes et parameétres. *Languages* 95. 35–80.

Sportiche, D. 1999. Subject clitics in French and Romance: Complex Inversion and clitic doubling. In K. Johnson & I. Roberts (eds.), *Beyond Principles and Parameters*, vol. 45 Studies in Natural Language and Linguistic Theory, 189–222. Dordrecht: Springer. doi:10.1007/978-94-011-4822-1_8.

Zribi-Hertz, A. 1994. La syntaxe des clitiques nominatifs en français standard et en français avancé. In G. Kleiber & G. Roques (eds.), *Travaux de linguistique et de philologie*, 131–147. Strasbourg: Klincksieck.

Zwicky, G., A. Pullum. 1983. Cliticisation vs. inflection: English n't. *Language* 59(3). 502–513.

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