



Negative verb clusters in Mari and Udmurt and why they require postsyntactic top-down word-formation

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Abstract In this paper, we provide an in-depth study of the morphosyntactic behavior of negative verb clusters in the Finno-Ugric languages Udmurt and Mari. We argue that the standard treatment of negation as an auxiliary is inadequate for these languages as it does not explain its morphosyntactic and morphophonological behavior, which presents a challenging morphology-syntax-semantics mismatch: Despite taking high scope and governing the highest verb of the clause, negation surfaces immediately before the highest verb rather than at the end of the verb cluster as would be expected in head-final languages. Furthermore, we show that negation forms a complex unit with the highest verb of the clause and thus crucially differs from negative auxiliaries in other Finno-Ugric languages like Finnish and from other auxiliaries. We argue that the properties of negation are best modelled by means of postsyntactic Lowering (Embick and Noyer 2001). Next to the semantic vacuousness of the displacement, the main arguments for a postsyntactic perspective come from the internal constituency of the verb cluster, the possibility to interleave clitics inside the verb cluster only in the presence of negation, and cases where Lowering fails and a syntacto-semantically inert copula is inserted as a repair. We show that competing approaches to complex head formation based on narrow-syntactic head-movement, flexible spell-out in different positions or base-generation fail to capture the crucial properties of negative verb clusters. On a more general level, we thus provide evi-

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dence for the necessity of post-syntactic mechanisms for word formation and a serial architecture of the morphology-syntax interface.

Keywords Negation · Finno-Ugric · Verb clusters · Word formation · Complex head formation · Postsyntactic operations · Lowering

1 Introduction

While describing languages, one often encounters mismatches between the syntax and semantics on the one hand and the morphology on the other. In many cases, we have good reasons to believe that, for the purposes of syntax or semantics, a certain element is in one position, but for the purposes of morphology and morphophonology, we see the element being realized in a completely different position.

Therefore, theories of the mapping between morphology and syntax need to provide a number of tools to resolve these kinds of mismatches. This is particularly true for realizational, late insertion-type frameworks where the syntactic base structure is built up with no recourse to morphological considerations whatsoever. Distributed Morphology (Halle and Marantz 1993), which is probably the most elaborated proposal of this type, maintains several operations to manipulate the syntactic structure to match morphological requirements. Such operations include head-movement, Lowering, Local Dislocation but also Fission and Fusion. And thus it comes as no surprise that one of the major points of criticism concerning Distributed Morphology is the relatively large inventory of this kind of manipulative postsyntactic operations, see, e.g., Bruening (2017).

In this paper, we take a close look at the morphosyntactic properties of negation in the two Finno-Ugric languages Mari and Udmurt and argue that its properties instantiate one such mismatch between syntax and morphology. Concretely, the major contribution we strive to make in this paper consists of two related goals:

The first of our goals is a descriptive one. We aim to show that the standard treatment of negation as a simple auxiliary in Mari and Udmurt is insufficient as it does not explain its morphosyntactic and morphophonological behavior. A number of different tests indicate that negation differs from other auxiliaries or embedding verbs (i.e., verbs embedding verbal/clausal complements) in several respects. Concretely, it is subject to strict word order requirements in that it has to immediately precede the hierarchically highest verb of the clause; furthermore, its behavior with respect to stress and particle verbs suggests that it forms a complex unit with the verb it is adjacent to.

Our second goal is a theoretical one. We show that syntacto-semantically, negation is base-generated high in the structure, but its exponent forms a complex head with the verb low in the structure. We argue that this complex unit consisting of negation and the highest verb of the clause is formed by means of postsyntactic Lowering (Embick and Noyer 2001). The arguments we provide in favor of a postsyntactic Lowering account involve (i) the semantic vacuousness of the Lowering operation, (ii) the constituency of the complex head with negation and T forming a constituent to the exclusion of the verb, (iii) the possibility to interleave adverbial clitics in the

verbal cluster in Udmurt only in the presence of negation as well as (iv) the insertion of a dummy copula in Mari in cases where Lowering fails. All aspects follow straightforwardly under a postsyntactic Lowering account but pose serious problems for other accounts. We show that conceivable alternatives to word formation in terms of narrow-syntactic head-movement, flexible spell-out of complex heads in different positions, or base-generation fail to capture the crucial properties of negative verb clusters. On a more general level, the phenomenon provides new evidence for the necessity of post-syntactic operations and thus a serial conception of the morphology-syntax interface. Furthermore, it sheds new light on the properties of operations in the postsyntactic module and their interactions. More concretely, our analysis provides strong arguments for the necessity of a complex head-formation process that (a) applies top-down, (b) can be successive-cyclic and (c) is triggered by a morphosyntactic rather than a prosodic/phonological requirement. With its top-down successive-cyclic nature and the fact that it need not always lead to affixation, the operation we posit in Mari/Udmurt fills a gap in the typology of Lowering.

The paper proceeds as follows: In Sect. 2, we will illustrate the basic facts about negation in Mari and Udmurt. We show that despite having some typical properties of an auxiliary, the syntactic distribution of negation in these two languages clearly differs from other embedding verbs. Further, we provide evidence that negation is a morphosyntactically bound element inasmuch as it forms a complex unit with the highest verb of the clause. Section 3 presents our account which is formalized in terms of postsyntactic Lowering. Section 4 discusses the placement pattern of adverbial clitics in Udmurt, which can only appear inside the verb cluster in the presence of negation, and shows how the Lowering account can be extended to cover these facts. We then go on to show that alternative accounts in terms of syntactic head-movement or base-generation fail to account for central properties of negative verb clusters. Section 5 discusses two contexts where Lowering fails and as a repair a dummy copula is inserted, viz., constituent negation and negative infinitives. Again, we show that a Lowering account straightforwardly predicts the occurrence and the properties of the dummy copula, while alternative accounts of cluster formation fail to do so. Finally, Sect. 6 addresses the trigger of Lowering and provides evidence for its morphosyntactic nature by investigating the interaction of copula-insertion and ellipsis. Section 7 concludes.

2 Negation in Mari and Udmurt

This section will serve as the empirical basis for our investigation. We will lay out the basic facts about clausal negation in Mari and Udmurt, briefly review the descriptive literature about negation in these languages and then go on to show that the description of negation as an auxiliary is insufficient.

Let us begin with a short introduction of the two languages. Udmurt and Mari belong to the Finno-Ugric (Uralic) language family. They are both spoken in the European part of the Russian Federation, in the Volga Federal District. Udmurt is spoken mainly in the Udmurt Republic; additionally, there are Udmurt diasporas in the Republic of Tatarstan, Republic of Bashkortostan, Perm Krai and Kirov Oblast,

Sverdlovsk Oblast and in the Mari El Republic. According to the Russian Census of 2010, Udmurt has about 324,000 speakers (in an ethnic population of 552,000).¹ Mari is spoken mainly in the Mari-El Republic and in the Republic of Bashkortostan as well as in the Republic of Tatarstan, Kirov Oblast, Sverdlovsk Oblast and in the Udmurt Republic. The number of ethnic Maris is about 547,000, while there are about 388,000 speakers (Russian Census of 2010). Mari has two main varieties that have their own literary norms: Meadow Mari and Hill Mari. In this paper, we investigate the former, and we refer to it as ‘Mari’.²

As far as language contact is concerned, Udmurt and Mari have had language contact with Russian, which has been strongly influencing them since the beginning of the 20th century. Nowadays, practically all Udmurt and Mari speakers are bilingual. The two languages have also been in contact with Turkic languages, and both belong to the Volga-Kama Sprachbund. As for their grammar, Udmurt and Mari are classified as agglutinative, SOV languages with *pro*-drop, nominative-accusative alignment and widespread use of non-finite subordination. In the next subsection we turn to the expression of negation in these languages.

2.1 Basic facts about negation

Negation in many Finno-Ugric languages is usually described as an auxiliary (for an overview, see Mitchell 2006 and the papers in Miestamo et al. 2015). Treating negation as an auxiliary in these languages has some immediate advantages: First, in languages like Finnish, negation is known to be a syntactically independent element. Second, it bears inflectional information that is normally found on main verbs, i.e., ϕ -features and (sometimes) tense or mood. Furthermore, negation governs a special form of the dependent verb, the so-called connegative stem (glossed as CN).

A treatment in terms of an auxiliary is also the standard description for Mari (see Alhoniemi 1993, Riese et al. 2017, Saarinen 2015) and Udmurt (see Winkler 2011, Edygarova 2015). The description of negation as an auxiliary is motivated by the fact that negation bears many of the suffixes which—in affirmative contexts—are found on the main verb. Consider the following minimal pairs from Mari:³

¹The Russian Census of 2010 is available online at: http://www.gks.ru/free_doc/new_site/perepis2010/croc/perepis_itogi1612.htm, last accessed 5 July 2020.

²Unless stated otherwise, all examples are from our own data collection and have been constructed or confirmed by native speakers. We have consulted three female and one male Udmurt speakers, all at the age of 30–40, residing in Hungary/Udmurtia, as well as one female Meadow Mari speaker residing in Yoshkar-Ola, the capital of the Mari-El Republic (age: 40). The tasks involved either providing grammaticality judgments for sentences constructed by the authors or translations from English. In cases where a specific information-structural context was required, we provided contexts for the relevant examples or asked our informants for a suitable context in which the example was possible. In addition to the elicitation and judgment data, we also rely on corpus data from the Udmurt Corpus (see Sect. 4.2).

³We adhere to the Leipzig Glossing Rules. The abbreviations not included in the Leipzig Glossing Rules are the following: ADD: additive, CN: connegative stem, DESID: desiderative (mood), GER: gerund, ILL: illative (case), NACT: non-active (voice); PART: partitive (case). The glossing/transcription of examples from other sources was slightly modified for consistency.

- | | | | | | |
|-----|----|---|----|---|-------------|
| (1) | a. | purǝ-š-na
go.in-PST-1 PL
'We went in.' | b. | ǝ-š-na puro
NEG-PST-1 PL go.in.CN
'We didn't go in.' | <i>Mari</i> |
| (2) | a. | purǝ-ne-na
go.in-DESID-1 PL
'We want to go in.' | b. | ǝ-ne-na puro
NEG-DESID-1 PL go.in.CN
'We don't want to go in.' | <i>Mari</i> |

In the affirmative context (1a), the main verb bears tense and the subject agreement suffix. In the negative context (1b), however, these suffixes attach to the negation. Negation in Mari has four different allomorphs: /i-/ in the imperative; /ǝ-/ in the context of the first and second singular past tense; /ǝ-/ in the context of past or desiderative, as in (1b) and (2b), and /o-/ elsewhere.⁴ The lexical verb in (1b) appears in the connegative form. In Mari, the connegative form is identical to the bare stem of the verb. The alternation of the stem-final vowel /o/, /ǝ/, /ǝ/ is phonologically predictable. The same pattern is found with the desiderative mood in (2a) vs. (2b). In the affirmative context, the desiderative mood marker as well as the agreement markers attach to the lexical verb, but in the negative context they are found on negation.

As in Mari, the lexical verb in Udmurt also bears tense and agreement marking in affirmative context, cf. (3). In the negative context, tense and negation appear as a portmanteau morpheme: the form /u-/ is used in the future and present tense, while /ǝ-/ is used in the past tense, the latter being illustrated in (4).⁵ As for subject agreement, the pattern in Udmurt is slightly different from Mari: person is expressed on the negation, but number is marked on the connegative verb by an alternation of the final vowel of the connegative form, cf. (4a) and (4b). The connegative forms in Udmurt show great similarity to the imperative forms, with the exception of the present tense forms (although this similarity is not explicitly discussed in the descriptive studies). This minimal pair also shows that the form of the negation in Udmurt does not change when the number feature of the subject changes. In contrast, person and number features are both expressed on negation in Mari, cf. (5).

- | | | | | | |
|-----|----|---|----|---|---------------|
| (3) | a. | lǝkt-i-z
come-PST-3SG
'S/he came.' | b. | lǝkt-i-zǝ
come-PST-3PL
'They came.' | <i>Udmurt</i> |
| (4) | a. | ǝ-z lǝktǝ
NEG.PST-3 come.CN.SG
'S/he didn't come.' | b. | ǝ-z lǝkte
NEG.PST-3 come.CN.PL
'They didn't come.' | <i>Udmurt</i> |

⁴For space reasons, we do not provide full paradigms of negation in all tenses and moods in the two languages; we refer the interested reader to Saarinen (2015) and Edygarova (2015).

⁵Negation is exponed by a single vowel in Udmurt. However, the negative form *ug*, albeit morphologically segmentable, is usually glossed as a portmanteau morpheme as it has a very wide distribution: it appears in PRS.3SG, PRS.3PL, PRS.1SG and FUT.1SG contexts. This is why we do not segment it and gloss it according to its actual use in the relevant example.

- (5) a. $\hat{\text{a}}\text{-}\check{\text{s}}$ tol NEG-PST come.CN ‘S/he didn’t come.’
 b. $\hat{\text{a}}\text{-}\check{\text{s}}\text{-t}$ tol NEG-PST-3PL come.CN ‘They didn’t come.’ *Mari*

Syntactically, one can observe that clausal negation always renders the highest verb of the clause in the connegative form. In (6), an example from Mari, we see that the negation determines the form of the modal auxiliary *kert-* (‘can’), which in turn governs the gerund form of the lexical verb *už-* (‘see’). In (7), we see the same configuration in Udmurt, where the negation determines the singular connegative form of the modal *bigat-* (‘can’), which governs the infinitive form on the lexical verb.

- (6) Tud- $\hat{\text{a}}\text{m}$ už- $\hat{\text{a}}\text{n}$ o-m kert.
 3SG-ACC see-GER NEG-1SG can.CN
 ‘I cannot see him.’ *Mari*
- (7) Ta pešanaj kartoška merttj-nj ug bigatj.
 this grandma potato.ACC plant-INF NEG.PRS.3 can.CN.SG
 ‘This grandma cannot plant potatoes.’ *Udmurt*

This hierarchical relation is also reflected in the semantics. Sentential negation in Mari and Udmurt obligatorily takes high scope. In (8) and (9), only one reading is available, namely the one where negation scopes over the verbs in the connegative form (*sör-* (‘promise’) in Mari and *dišt-* (‘dare’) in Udmurt). Crucially, a low scope reading of negation is impossible.

- (8) Tudo möng $\hat{\text{a}}\text{štö}$ kod-aš $\hat{\text{a}}\text{-}\check{\text{s}}$ sörö.
 3SG at.home stay-INF NEG-PST.3SG promise.CN
 ‘He didn’t promise to stay at home.’ (NEG > promise)
 not: ‘He promised to not stay at home.’ (*promise > NEG) *Mari*
- (9) Maša-jen veraškj-nj e-z dištj.
 Masha-INS talk-INF NEG.PST-3 dare.CN.SG
 ‘S/he didn’t dare to talk to Masha.’ (NEG > dare)
 not: ‘S/he dared not to talk to Masha.’ (*dare > NEG) *Udmurt*

In order to enforce low scope of negation, speakers of Udmurt resort either to finite embedding (10) or to a negative converb construction (11):

- (10) Vunet-i-z radio-jez kjsj-no ej val šujsa.
 forget-PST-3SG radio-ACC turn.off-PTCP.FUT NEG.PST COP.PST that
 ‘S/he forgot not to turn off the radio.’ (lit. S/he forgot that the radio shouldn’t be turned off.) *Udmurt*
- (11) Radio-jez kjsj-tek kel’tj-nj vunet-i-z.
 radio-ACC turn.off-NEG.CVB leave:TR-INF forget-PST-3SG
 ‘S/he forgot not to turn off the radio.’ (lit. S/he forgot to leave the radio not turned off.) *Udmurt*

Low readings of negation in Mari have been discussed by Serdbobolskaya et al. (2012), who present examples with negative converbs, similar to (11). Additionally,

speakers of Mari have the possibility of using a different construction involving negation plus a syntacto-semantically inert copula, a phenomenon we address in Sect. 5.

Against the background of these patterns, it is not surprising that negation has been analysed as an auxiliary in Udmurt and Mari. As we will show in the next subsections, this description is empirically inadequate or at least insufficient to describe the syntactic distribution of negation. We will demonstrate that negation in Mari and Udmurt does not behave like other auxiliaries in the two languages. Additionally, it will be shown that negation in Mari and Udmurt also differs from negation in, e.g., Finnish.

2.2 Negation is not a typical auxiliary

In the previous section, we have seen the motivation to treat negation as an auxiliary in Mari and Udmurt. This is the road standardly taken by descriptive grammars of the two languages. In many respects, the morphosyntactic behavior of negation in Mari and Udmurt mirrors the behavior of negation in the related language Finnish.

In this section, we will show, however, that unlike in Finnish, negation in Mari and Udmurt is not a syntactically independent element that is free to undergo word order transformations. We will show instead that negation in these two languages is a bound element which must form a complex unit with the highest verb of the clause.

Negation in Mari/Udmurt also crucially differs from ‘regular’ auxiliaries in the two languages, which can be demonstrated by two factors: word order and adjacency. First, we show that negation has different ordering possibilities than other auxiliaries or embedding verbs before illustrating crucial differences with respect to adjacency.

2.2.1 Verb cluster orders

Mari is a relatively typical SOV-language. Thus, embedding verbs usually occur in descending order at the end of the clause.⁶ This is illustrated by the examples in (12) and (13).

- (12) Môj kušt-en kert-am. [21]
1 SG dance-GER can-1 SG
‘I can dance.’ Mari

- (13) Môj paša-m ôšt-aš sör-en kert-am. [321]
1 SG work-ACC do-INF promise-GER can-1 SG
‘I can promise to do the work.’ Mari

As is typical for many OV-languages, Mari also allows backgrounded material to occur postverbally. Thus, the complement of *kert-* (‘can’) can occur after the verb in the case of preverbal focus.

- (14) Môj kert-am kušt-en. [12]
1 SG can-1 SG dance-GER
‘I can dance (e.g. as opposed to you).’ Mari

⁶We indicate the hierarchical relations by means of numbers after the respective examples. [321] thus instantiates a descending order with the hierarchically highest verb at the end.

Udmurt is even more flexible in terms of word order as it is claimed to be currently undergoing a change from OV to VO (see, e.g., Vilkuna 1998, Asztalos 2018 and references therein). While there are examples with consistently left-branching clusters as in (15), the complements of verbs can more or less freely occur on both sides, cf. (16):

- (15) [...] perepeć, kemeć leštj-nj dišetskij-nj bigat-o-zj. [321]
 [...] perepech.ACC komech.ACC prepare-INF learn-INF can-FUT-3PL
 ‘They can learn (how) to bake *perepech* and *komech*.’
 (Udmurt Corpus, IA Udmurtia, 2017.05.12)
- (16) a. Ta pešanaj bigate kartoška merttj-nj. [12]
 this grandma can.PRS.3SG potato.ACC plant-INF
- b. Ta pešanaj kartoška merttj-nj bigate. [21]
 this grandma potato.ACC plant-INF can.PRS.3SG
 ‘This grandma can plant potatoes.’ Udmurt

Crucially, in neither language does negation have the same ordering flexibility. Negation must always precede the highest verb of the clause. In (17), an example from Mari, we see a 2-verb cluster which only allows the [12]-order. In (18), a 3-verb cluster, the [312]-order is the unmarked case. Additionally, verb clusters can also occur in strictly ascending [123]-order, cf. (18c). Importantly, the strictly descending order in (18b) is ungrammatical. In (19), we see an even more complex example illustrating the same point: negation must precede the highest verb.

- (17) a. Tud-ôm o-m už. [12]
 3SG-ACC NEG-1SG see.CN
 ‘I don’t see her/him.’ Mari
- b. *Tud-ôm už o-m. *[21]
 3SG-ACC see.CN NEG-1SG
- (18) a. Tud-ôm už-ôn o-m kert. [312]
 3SG-ACC see-GER NEG-1SG can.CN
- b. *Tud-ôm už-ôn kert o-m. *[321]
 3SG-ACC see-GER can.CN NEG-1SG
- c. Tud-ôm o-m kert už-ôn. [123]
 3SG-ACC NEG-1SG can.CN see-GER
 ‘I cannot see her/him.’ Mari
- (19) Môm paša-m ôšt-aš sör-en o-m kert. [4312]
 1SG work-ACC do-INF promise-GER NEG-1SG can.CN
 ‘I cannot promise to do the work.’ Mari

In all cases, negation must precede the connegative verb. Otherwise there are no restrictions. Under the assumption that negation is an auxiliary, this is clearly surprising. While other auxiliaries typically prefer to have the complement to their left, negation *must* have it to its right.

The same pattern is found in Udmurt where we would expect word order freedom if negation were a real auxiliary. But as in Mari, negation is required to precede the

connegative verb. In the 2-verb cluster in (20), only a [12]-order is allowed, and in a 3-verb cluster both [312]-orders and [123]-orders are allowed. The strictly descending [321]-order is crucially ungrammatical, cf. (21):

- (20) a. Ta pešanaj kartoška ug merttj. [12]
 this grandma potato.ACC NEG.PRS.3 plant.CN.SG
 ‘This grandma doesn’t plant potatoes.’ Udmurt
- b. *Ta pešanaj kartoška merttj ug. *[21]
 this grandma potato.ACC plant.CN.SG NEG.PRS.3
- (21) a. Ta pešanaj kartoška merttj-nj ug bigatj. [312]
 this grandma potato.ACC plant-INF NEG.PRS.3 can.CN.SG
- b. *Ta pešanaj kartoška merttj-nj bigatj ug. *[321]
 this grandma potato.ACC plant-INF can.CN.SG NEG.PRS.3
- c. Ta pešanaj kartoška ug bigatj merttj-nj. [123]
 this grandma potato.ACC NEG.PRS.3 can.CN.SG plant-INF
 ‘This grandma cannot plant potatoes.’ Udmurt

We thus conclude that, with respect to the general ordering possibilities, negation in Mari and Udmurt behaves crucially differently from other auxiliaries or embedding verbs in these languages.

2.2.2 Adjacency

A similar conclusion can be drawn when looking at adjacency. While auxiliaries and embedding verbs typically tolerate non-verbal material intervening between the embedding and the embedded verb, negation does not. In both Mari and Udmurt, negation must be linearly adjacent to the connegative verb.⁷ Consider the following examples from Mari. In (22), a 2-verb cluster consisting of the modal auxiliary *kert*- (‘can’) and a lexical verb, the object of the lexical verb can occur in between the two verbs regardless of the order they appear in:⁸

- (22) a. Môj kert-am paša-m ôšt-en. [1-DP-2]
 1SG can-1SG work-ACC do-GER
- b. Môj ôšt-en paša-m kert-am. [2-DP-1]
 1SG do-GER work-ACC can-1SG
 ‘I can do the work.’ Mari

But in negative clusters, nothing may ever intervene between negation and the connegative verb:

⁷With the minor qualification of the adverbial clitics in Udmurt which we will discuss in Sect. 4. The special placement of these clitics has been noted by Vilkuina (1998:212), but she does not provide any ungrammatical examples.

⁸It should be mentioned that at least on the surface, the example in (22b) is a violation of the Final-Over-Final Constraint (FOFC) (see, e.g., Sheehan et al. 2017 and much subsequent literature). As we will discuss in Sect. 3.1 below, we remain agnostic about the possible FOFC violations, and more generally, about how right-branching orders in Udmurt and Mari are to be analysed (as involving base-generation or extraposition).

- (23) *Môj o-m paša-m ôšte.
 1 SG NEG-1 SG work-ACC do.CN
 ‘I don’t do the work.’

Mari

In Udmurt, a similar pattern emerges. In a [12]-cluster consisting of the auxiliary *bigat-* (‘can’) and a lexical verb, the direct object may intervene in between, as in (24a). In a [21]-cluster, an intervening object was accepted by two and rejected by one of our consultants, cf. (24b).

- (24) a. Ta pešanaj bigate kartoška merttj-nj. [1-DP-2]
 this grandma can.PRS.3SG potato.ACC plant-INF
 ‘This grandma can plant potatoes.’ *Udmurt*
 b. %Ta pešanaj merttj-nj kartoška bigate. [2-DP-1]
 this grandma plant-INF potato.ACC can.PRS.3SG

Crucially, an intervening direct object between negation and the connegative verb is uncontroversially ungrammatical:

- (25) *Ta pešanaj ug kartoška merttj. *[1-DP-2]
 this grandma NEG.PRS.3 potato.ACC plant.CN.SG
 ‘This grandma doesn’t plant potatoes.’ *Udmurt*

To conclude, even though negation in Mari and Udmurt has some properties of a regular auxiliary, it differs from other auxiliaries in its morphosyntactic distribution. We have seen that unlike other auxiliaries or embedding verbs, negation may only precede the highest verb of the clause and never follow it. Furthermore we have seen that negation is subject to an adjacency requirement in the sense that nothing may intervene between the negation and the connegative verb. Such an adjacency requirement is not attested with regular auxiliaries or other embedding verbs. We conclude from this that a simple characterization of negation as an auxiliary is at best insufficient.

2.3 Negation forms a complex unit with the highest verb

In this subsection, we will argue that negation forms a complex unit with the connegative verb it governs. This, we will argue, describes the syntactic distribution of negation much more adequately. The first argument for this assumption has already been made in the previous section. We have seen that nothing can ever intervene between the negation and the connegative verb. In this respect, negation in Mari and Udmurt clearly differs from Finnish, where the negative auxiliary and the connegative verb can be separated by several different constituents (cf. Vilkkumäki 1998:212–213 and Kaiser 2006:329ff.):

- (26) E-n minä viitsi riskeerata mitään vielä.
 NEG-1SG I.NOM feel.like.CN risk-INF anything.PART yet
 ‘I don’t feel like taking any risks yet.’ *Finnish* (Kaiser 2006:329)

A second argument comes from what Winkler (2011:124f.) calls ‘particle verbs’ in Udmurt, i.e., verb-particle combinations, which have a non-compositional meaning

and diachronically derive from noun-incorporation structures. The verb and the particle normally occur together and are usually also written as one word. Most of them also receive only one word stress. Winkler notes that some of the particles can occur as independent words, but in many cases, they do not. The examples below illustrate the two types. In (27a), the particle *dur* occurs as an independent word ('side'), but *šum* in (27b) does not (this is why we gloss it with STEM).

- (27) a. *dur* + *bašt-*
side take
'to defend someone' (lit. to take someone's side)
b. *šum* + *pot-*
STEM + go.out, seem, appear
'rejoice, be happy'

Udmurt

Crucially, however, they are both separated by negation:⁹

- (28) a. *Ton so-lj dur ɛ-d baštj.*
2SG 3SG-DAT side NEG.PST-2 take.CN.SG
'You didn't defend him.'
b. *Ton ta ivor-lj šum ɛ-d potj.*
2SG this news-DAT STEM NEG.PST-2 go.out.CN.SG
'You were not happy about this news.'

Udmurt

The properties of these particle verbs are still poorly understood, but the examples above clearly suggest that negation forms a very close unit with the verb. Regardless of whether this construction involves actual noun incorporation or pseudo-incorporation (see, e.g., Massam 2001, Chung and Ladusaw 2004), we would not expect an auxiliary to be possible in between the two elements since both of them will be in a low syntactic position below the base position of the negation. Crucially, auxiliaries like *bigat-* 'can', preferably occur outside the particle + verb complex.

⁹We thus crucially assume that the particle does not form a complex head with the verb; otherwise, we would expect negation to precede the particle+verb complex. In fact, with the completely intransparent particle verbs, we actually find optionality as to whether the negation precedes or follows the particle. Thus, in addition to (28b), some speakers of Udmurt also accept (and produce) (i):

- (i) *Ton ɛ-d šumpotj.*
2SG NEG.PST-2 STEM.go.out.CN.SG
'You were not happy.'

Udmurt

This suggests that particle and verb can optionally form a unit (via incorporation); as a consequence, negation precedes the entire complex rather than just the verbal part (a fact that follows under the Lowering account to be presented below: Lowering of a morphosyntactic word targets an entire morphosyntactic word rather than just a subword).

Note that the placement of negation within particle verbs is reminiscent of the placement of non-finite morphology in Dutch and German, which also splits up verb and particle as in (ii):

- (ii) a. *auf-machen* b. *auf-**zu**-machen*
open-make.INF open-to-make.INF
'open' 'to open'

German

- (29) Pići murt gine oži šumpotj-nj bigat-o-z, dĵr.
 small person only this.way STEM.go.out-INF can-FUT-3SG perhaps
 ‘Perhaps only a child can be so happy.’
 (Udmurt Corpus, Udmurt Dunne, 2010.04.02)

Finally, we would like to argue that the phonology of the two languages also gives us an indication that negation and the connegative verb actually form a complex unit. In Udmurt, one can observe that unlike other auxiliaries negation triggers a stress shift (see Edygarova 2015:269). Verbs are stressed on the final syllable (30), but when preceded by negation, the respective connegative form bears stress on the initial syllable (31). This can be viewed as another argument for treating negation and the verb as a cluster. To the best of our knowledge, stress shift has been reported in the grammars only in the case of negation, but not in the case of other auxiliaries and embedding verbs.

- | | | | | |
|------|--|------|---|---------------|
| (30) | dĵsetsk-6-z
study-FUT-3SG
‘S/he will study.’ | (31) | u-z dĵsetskj
NEG.FUT-3 study.CN.SG
‘S/he will not study.’ | <i>Udmurt</i> |
|------|--|------|---|---------------|

In Mari, we can make a similar point on the basis of the phonological process of vowel reduction. Vowel reduction of the copula is observed in the context of negation: The vowel of the copula appears reduced to a back schwa when preceded by negation. The fact that this process does not apply between different phonological words (e.g., within syntactic phrases or members of a compound) suggests that negation and the connegative verb really form a close unit for the purposes of phonology as well.¹⁰

- | | | | | |
|------|----------------------------|------|-------------------------------------|-------------|
| (32) | ul-am
be-1SG
‘I am.’ | (33) | o-m-əl
NEG-1SG-be
‘I am not.’ | <i>Mari</i> |
|------|----------------------------|------|-------------------------------------|-------------|

Before concluding, a remark is in order regarding the terminology we have used in this section. The main goal of this and the previous section was to show that, for morphosyntactic reasons (but also for some aspects of phonology), negation and the highest verb of the clause form one complex unit. One way of interpreting this statement is to say that negation is a bound element that cliticizes to the highest verb of the clause. Negation would be a type 6 clitic in the typology proposed in Klavans (1995), i.e., it would be ordered final with respect to a certain domain (the VP in our case), it would precede the last element of that domain and procliticize to that element. It thus, in a sense, constitutes an instance of a clitic in second-to-last position. The existence of such clitics is still a matter of debate, though. Halpern (1995) famously argues that all of Klavans’ cases of second-to-last examples are misanalyzed and that true second-to-last phenomena are unattested. Peterson (2001), however, provides a

¹⁰It should be noted that verbs other than the copula do not undergo vowel reduction in the presence of negation. This might be a case where only functional material is affected by phonological processes (see, e.g., Moskal 2015 for vowel harmony). We would like to submit, though, that the vowel reduction of the copula shows that negation and the connegative verb are, in principle, local enough to undergo word-level phonological processes, even if these processes are subject to additional restrictions.

compelling case for a second-to-last clitic in Chechen and Ingush; Embick and Noyer (1999:291, fn. 21) also conclude that clitics of this type are rare but attested and provide a possible explanation of their rarity. Against the background of this discussion, it must be noted that the case at hand is not the perfect poster child for a clear second-to-last position clitic as it is not an exact mirror image of instances of true second-position clitics. Second-position clitics can typically appear after various syntactic constituents, while negation in Udmurt and Mari can only precede the highest verb of the clause. Thus, whether true second-to-last position clitics are really attested is still an open question and whether negation in Udmurt and Mari constitutes a case in point very much depends on one's concrete definitions.

Given these uncertainties, we decided to refrain from using the terms *clitic* or *cliticizing*. The main reason for this decision is that these terms might lead to confusion given that we will be concerned with adverbial clitics in Sect. 4 and, while both negation and these adverbial clitics might be considered clitics in some sense, they clearly behave differently. Further, we think that those terms are often rather poorly defined and often lead to more confusion than actual descriptive adequacy. Finally, we would like to emphasize that, in the formal framework we are adopting from Sect. 3 on, the term *clitic* does not bear any theoretical relevance. We will therefore stick to the terms *bound element* and *forming a complex unit* hoping that they are at least to a certain extent theory-neutral and somewhat less loaded and confusing. Finally, even though we treat negation as a bound element in these languages, we refrain from glossing it as connected by a '='-symbol for reasons of uniformity with previous studies on these two languages as well as for the sake of simplicity.

To conclude, this section has introduced the basic pattern of negation in the two languages Mari and Udmurt. We have shown that, at first sight, it seems justified to adopt the standard account of negation as an auxiliary since negation attracts typical verbal categories such as tense, mood and (partly) subject agreement. However, we also saw that treating negation as an auxiliary is insufficient as it does not explain its syntactic distribution. Negation must always immediately precede the highest verb of the clause. Other embedding verbs and auxiliaries display far more word order possibilities. Finally, we have presented a number of arguments showing that negation and the connegative verb form a complex unit for the purposes of morphophonology as well. We will now go on to model this intuition in a formal way in Sect. 3.

3 A Lowering approach

In this section, we will implement the idea that negation occupies a high position in the syntax but forms a unit with the connegative verb in a lower position for the purposes of morphophonology. Section 3.1 will lay out our basic syntactic assumptions and Sect. 3.2 will introduce the operation forming that complex unit, namely postsyntactic Lowering. Arguments for the analysis and against various competing approaches will be presented in Sects. 4 and 5.

3.1 The underlying syntactic base structure

The underlying framework we adopt is a version of the Minimalist Program (Chomsky 1995 et seq.) accompanied by an elaborated, derivational version of a realiza-

tional postsyntactic component as proposed within Distributed Morphology (see, e.g., Halle and Marantz 1993, 1994, Harley and Noyer 1999, Embick and Noyer 2001, Arregi and Nevins 2012). In this section, we will illustrate the basic syntactic structure that serves as the input to the postsyntactic derivation.

As we have seen in the previous section, Mari and Udmurt are both languages with a relatively high level of word order freedom. We assume that the word order freedom in the preverbal domain in both languages is the result of a scrambling-like movement operation as in languages like German or Hindi. Objects can be scrambled to positions outside of the VP. As for the alternation between pre- and postverbal material, we want to remain agnostic as to whether postverbal material can be base-merged in that position or whether it is also derived by means of movement (i.e., extraposition). As far as we can see, assumptions about how the flexible word order in the two languages comes about are orthogonal to the issues we are concerned with in this paper. In what follows, we will nonetheless represent the clause structure of the two languages in a head-final fashion since this is very clearly the unmarked order in Mari and at least uncontroversially grammatical in Udmurt, but it should be kept in mind that nothing really hinges on this decision.

The starting point of our discussion is the observation made in Sect. 2 that negation obligatorily takes scope above the highest verb in the clause. In line with the basic tenets of the framework we adopt, we assume that the semantic scopal order of elements reflects their syntactic height in the tree. Therefore, we assume that negation starts out as a functional head relatively high in the structure. To be more precise, we adopt the following structure:^{11,12}

¹¹Mitchell (2006) posits the same relative order of T and Neg in Mari and Udmurt, although she does so on purely morphological grounds: in her approach, only Neg moves to T in these languages, while V stays put. The Neg > T order is instead adopted for those Finno-Ugric languages where the main verb bears tense and is thus assumed to move up to T (while Neg moves to Agr), as, e.g., in Finnish.

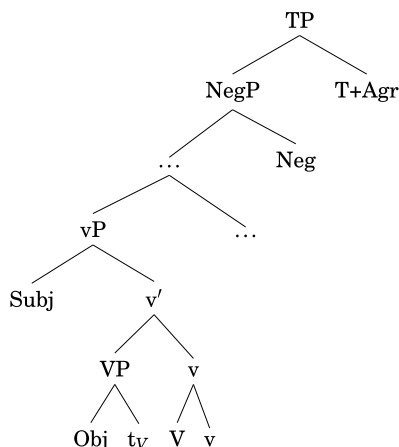
¹²We assume that V head-moves to v in syntax. Apart from theory-internal considerations (under a DM-perspective, this would arguably involve movement of a root to a categorizing head), this is strongly suggested by the fact that voice-related categories are realized on the connegative verb rather than on negation. This is illustrated in (i) for the non-active voice (sometimes called impersonal/passive) in Mari:

- | | | | | | |
|-----|----|--|----|---|-------------|
| (i) | a. | Petr-lan kniga
Peter-DAT book.NOM
pu-alt-š.
give.NACT-PRS.3SG
'The book was given to Peter.' | b. | Petr-lan kniga ok
Peter-DAT book.NOM NEG.PRS.3SG
pu-alt.
give.NACT
'The book was not given to Peter.' | <i>Mari</i> |
|-----|----|--|----|---|-------------|

The same holds for Udmurt, where voice (e.g., non-active, causative) as well as aspect (e.g., frequentative) morphology occurs on the connegative verb in negated sentences. Given our proposal below where T and Neg lower down to v and are linearized before it, the correct morpheme order obtains if these categories are associated with v (or a separate voice head the verb head-moves to). Head-movement to v in the syntax also seems necessary for number agreement in Udmurt:

To account for the differences in ϕ -feature distribution between the two languages (cf. the examples in (1), (3) and (4)) we assume that T is the locus of all agreement features in Mari, while in Udmurt, T only hosts person features, while number features are located on v. The ϕ -probe is thus split, cf., e.g., Sigurðsson and Holmberg (2008). Since in the derivations below T lowers onto Neg and is linearized before v, while v remains in cluster-final position, the ϕ -features end up distributed over the negative verbal complex in Udmurt: Person features are realized on the negation, whereas number features appear on the main verb. The fact that all ϕ -features are realized by a single portmanteau morpheme in affirmative orders

(34)



In its base position, the subject is c-commanded by negation. In addition, we assume that subjects can but do not have to move to Spec,TP (as is often the case in OV languages with free word order). Evidence for this assumption comes from an observation made by Edygarova (2015:281–282) illustrated with examples involving a quantified subject in combination with negation. If the quantifier precedes and forms a constituent with the subject, it takes scope over the negation; see (35a); but if the quantifier is stranded in a lower position, it takes scope below negation (35b). This follows straightforwardly if we assume that negation is merged below T and the subject optionally moves to Spec,TP, thereby potentially leaving behind the quantifier (note that in (35b), subject and quantifier can, according to our informants, be separated by elements that do not belong to the noun phrase).¹³

- (35) a. Tros-ez d̥ʃetskiš-jos ɕ-z vue. many > ¬
 many-DET student-PL NEG.PST-3 arrive.CN.PL
 ‘Many students did not arrive.’

then requires extra assumptions. Since, in affirmative orders, v and T are sisters and linearly adjacent, several theoretical devices of forming the portmanteau morpheme seem applicable. We could, for instance, envisage a fusion rule that applies only under sisterhood/adjacency. This fusion rule would only apply in affirmative orders, while in negative orders it would be bled by the intervening negative head.

¹³Both languages have what at first sight look like subject NPIs, which are only licensed in the presence of sentential negation, cf. Edygarova (2015:281–282) and Saarinen (2015:346):

- (i) N’igö t̥j-ɕm ɕ-š už.
 nobody 2SG-ACC NEG-PST see.CN
 ‘Nobody saw you.’

Mari

However, there are good reasons to assume that this actually instantiates (strict) negative concord: these negative quantifiers can be used as fragment answers, a crucial property that sets negative concord items apart from NPIs (cf. Giannakidou and Zeijlstra 2017):

- (ii) Kin kino-je vetl-i-z? Nokin=no. (iii) Mo-m t̥j kočk-ɕč? Nimo-m.
 who cinema-ILL go-PST-3SG nobody=ADD what-ACC 2SG eat-PST.2SG nothing-ACC
 ‘Who went to the cinema? Nobody.’ Udmurt ‘What did you eat? Nothing.’ *Mari*

- b. Džetskiš-jos tros ɛ-z vue. $\neg >$ many
 student-PL many NEG.PST-3 arrive.CN.PL
 ‘Not many students arrived.’ Udmurt (Edygarova 2015:282)

Some of our speakers report that narrow scope of the quantifier is also possible in (35a), in line with the optionality of subject externalization. More work will be needed to clarify which readings can obtain under which conditions. What is crucial for our purposes, though, is that under stranding, only the narrow scope reading is available.

The structure in (34) does, of course, not match the linear order of elements we observe on the surface. It does not tell us why negation precedes the highest verb and why negation and the connegative verb need to be linearly adjacent. Thus, we face a mismatch: The syntacto-semantic properties of the clause indicate that the underlying syntactic structure is as in (34), but the surface string looks quite different. In the following subsection, we will argue that this mismatch is resolved by means of postsyntactic Lowering.

3.2 The Lowering operation

In the previous subsection, we provided evidence for the relatively high base position of negation in the clausal spine of Mari and Udmurt. At the same time, it is equally clear that the surface position of negation is significantly lower. In this section, we will show how the underlying syntactic structure maps onto the surface structure according to our analysis.

To understand the motivation for our proposal, it is instructive to look at English, where a somewhat similar mismatch obtains. As is well-known, lexical verbs do not move to T. (36) shows that the verb follows vP-adverbials:

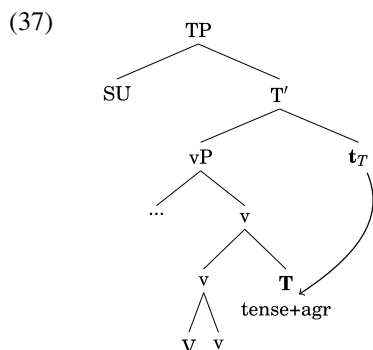
- (36) John {often} eats {*often} pizza.

At the same time, the finite inflection, which originates on T, occurs on the lexical verb. According to an influential account (Embick and Noyer 2001), T lowers onto v in the postsyntactic component. Lowering adjoins a head to the head of its complement and thus involves a hierarchy-sensitive operation. It is thus similar to core-syntactic head-movement in many respects, the major difference being the timing and the directionality. The trigger for Lowering is crucially morpho-syntactic rather than purely morphological (as under the stray-affix filter): T must simply be in a local relationship with v, and, in the absence of movement of v-to-T, Lowering is a means to satisfy this requirement.

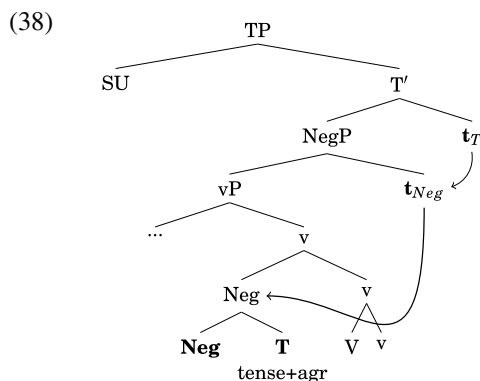
We argue that the verbal complex in Mari and Udmurt is also derived by means of postsyntactic Lowering. We propose that the syntactic heads Neg and T both bear a morphosyntactic requirement to be in a local relationship with v.¹⁴ This requirement is satisfied if these heads are part of the same X^0 as v. In order to satisfy

¹⁴See Sect. 6 for discussion of the nature of this requirement. For now, it is important to note that, as in English, this is a morphosyntactic requirement, which is completely independent from the phonological requirements of the actual exponents of Neg and T.

this requirement, both T and Neg lower postsyntactically. Consider the derivation in (37):



In an affirmative context, T, which bears agreement and tense features, lowers and adjoins to v. In a negative context as in (38), T lowers down to Neg first since Lowering, by assumption, is subject to the head-movement constraint and therefore applies successive-cyclically from the top down. In a second step, the newly created complex consisting of T and Neg lowers onto v:¹⁵



We make the following assumptions about linearization within complex heads to account for the linear order of morphemes.¹⁶

¹⁵A comment is in order regarding the term *successive-cyclic*. What is crucial under our analysis is that complex head formation proceeds top-down and can form successively more complex heads, in our case with T first forming a complex with Neg, followed by Lowering of the Neg+T complex down to v. The term is not meant to imply that both Lowering operations are necessarily triggered by T's requirement. Given that Neg is subject to the same requirement to be in a local relationship with v, the second instance of Lowering may thus be driven by Neg's requirement. Things are different in the clitic derivations in Sect. 4.2 below, where T picks up a clitic on its way to Neg; in that case, the first instance of Lowering is purely due to locality (the head-movement constraint) as it does not lead to a satisfaction of T's requirement.

¹⁶As mentioned above, we ignore the linearization of phrasal constituents as the OV/VO-question is orthogonal to our present concerns. Note also that the complex head in (38) violates the FOFC. However, as discussed in Sheehan et al. (2017:334f.), negative prefixes are a frequent exception to the suffixing prefer-

- (39) Linearization of complex heads
- Functional heads whose sister is lexical are ordered to the right.
 - If both sisters are functional heads, the non-projecting head is linearized to the right.
 - The default linearization statement in (39b) can be overridden by more specific statements imposed by certain functional heads.

The clause in (39a) is required to ensure that *v* is linearized after *V*. This assumption is necessary to account for the final position of voice morphology in both languages and the position of number morphology in Udmurt (recall ex. (4) and the discussion in footnote 12). The clause in (39b) leads to the suffixing default pattern in affirmative clusters. In unmarked cases, where the clause in (39c) does not apply, functional heads are ordered in scope-transparent order from the lowest to the highest (e.g. *V-v-T-C*). This leads to Mari examples like (1a) *purə-š-na* ‘go.in-PST-1 PL’. The clause in (39c) allows for the possibility that some functional heads impose additional linearization statements. One such head is negation, which imposes the linearization requirement in (40):

- (40) Neg in Mari and Udmurt is linearized to the left of its sister.

The statement in (40) overrides the general statement in (39b) and results in the pre-verbal position of negation. The requirement in (40) holds not only for the terminal node of negation but also for the higher segment in (38), which is linearized to the left of its sister *V+v* (note that the linearization of *T* after Neg also follows under (39b)). As *T* is adjoined to Neg in the tree in (38) and Neg is linearized to the left of *V+v*, *T* is necessarily linearized to the left of *V+v* as well. This derives Mari examples like (1b) *ə-š-na puro* ‘NEG-PST-1 PL go.in.CN’.¹⁷

Lowering in Mari/Udmurt thus differs from Lowering of *T* in English in that it is not blocked by negation. This can be related to the fact that negation in Mari/Udmurt can host tense and agreement morphology and, like *T*, is subject to be in a local requirement with *v*. Negation in English, however, has none of these properties.

The Lowering analysis has some immediate advantages: First, it derives the fact that phrasal material can never intervene in between negation and the connegative verb. In Sect. 2, we saw that the negation and the connegative verb cannot be separated by phrasal material such as an object DP. Lowering creates complex X^0 s and, as a consequence, no phrasal material can ever intervene between the parts of a complex X^0 . Note, however, that this does leave open the possibility of other X^0 s intervening between the connegative verb and negation, an advantage we will make use of in our discussion of clitic placement in Sect. 4. Furthermore, since the ordering of negation is handled by a specific linearization statement applying to complex heads, we expect negative clusters to show different ordering properties than clusters based

ence in OV-languages. Furthermore, negative particles often violate the FOFC at the clausal level as well, suggesting that negation may violate the FOFC.

¹⁷We will encounter another specific linearization requirement in the context of clitic placement in Sect. 4.2 below, where a vocabulary item is specified to be linearized to the right of its sister, even though it is inserted into the projecting head.

on other auxiliaries or modals that take verbal complements. Second, it accounts for the distribution of inflectional material: Since Lowering applies successive-cyclically in a top-down fashion, T and negation form a unit to the exclusion of the lexical verb. Tense and agreement morphology thus ends up affixed onto Neg rather than the verb. Note that this result would not obtain if negation lowered onto V before T lowers, an important fact we will come back to in the discussion of alternative approaches to word formation in Sect. 4.3.2 below.

Third, this analysis accounts for the fact that despite its surface position, negation always takes scope above the highest verb. As we have pointed out above, at least in the head-final language Mari, scope is typically read off the surface from right to left. Negation is a principled exception to this rule and the Lowering account offers an explanation for this exceptional behavior. Lowering is a postsyntactic operation and as such does not feed into the semantics. The semantics computes only the output structure of the syntax shown in (34) in the previous subsection. In other words, for the purposes of the semantics, negation is still relatively high and thus takes high scope. It is only for the purposes of morphology and phonology that negation appears in a lower position. In this respect, a Lowering account is specifically preferable to a competing head-movement account (see Sect. 4.3 for detailed discussion). Head-movement is often viewed as a cyclic, genuine syntactic process and it has been claimed that some instances of head-movement can, in principle, have semantic consequences (see, e.g., Lechner 2007, Roberts 2010, Iatridou and Zeijlstra 2013). A syntactic head-movement account would thus have to stipulate that the present instance of head-movement creating the Neg-V-complex does not result in high scope of the verb above negation. The postsyntactic approach can do without this stipulation.

In Sects. 4 and 5, we will present two further arguments in favor of post-syntactic Lowering, viz., clitic placement in Udmurt and *be*-support in Mari, and show that alternative approaches to word formation fail.

4 Clitic placement in Udmurt: An argument for Lowering

The previous section laid out a theory according to which higher heads in the clausal spine (T and Neg) lower to *v* thereby forming a verbal complex. In this section, we will introduce new empirical facts from clitic placement in verb clusters that provide evidence in favor of Lowering and, crucially, against alternative conceptions of verb cluster formation such as head-movement (in various implementations) or base-generation.

4.1 The basic placement pattern of aspectual clitics

In Sect. 2, it was shown that nothing can occur in between negation and the highest verb. However, there is one exception to this: in Udmurt, some adverbs can be interleaved in the verb cluster (Vilkuna 1998; Arkhangelskiy 2014). Arkhangelskiy (2014) argues that these are (prosodic) enclitics that typically occur attached to the

predicate (*clause-level clitics following the predicate* in his terms).¹⁸ In what follows, we will take a closer look at the two clitics which contribute aspectual meaning: *ñi* ('already, anymore') and *na* ('still, yet'). In case of a complex predicate, the clitics usually attach to the highest verb, cf. (41) and (42).¹⁹

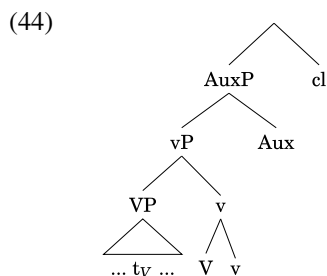
- (41) Ta pešanaj kjrdža-nj bigate=**na**.
 this grandma sing-INF can.PRS.3SG=still
 'This grandma can still sing.' Udmurt
- (42) Ta pići pijaš ljdžž(išk)i-nj bigate=**ñi**.
 this little boy read(INTR)-INF can.PRS.3SG=already
 'This little boy can already read.' Udmurt

Support for these empirical claims comes from the Udmurt corpus, cf. (43). Both *ñi* ('already, anymore') and *na* ('still, yet') occur in cluster-final position, after the auxiliary.²⁰

(43) [V-Aux_{can}]-clusters:

	Hits
V-CAN- <i>ñi</i>	358
V-CAN- <i>na</i>	270
V- <i>ñi</i> -CAN	0
V- <i>na</i> -CAN	0

We interpret these findings such that the base position of the clitic is typically immediately above auxiliaries like *bigat*- 'can' (possibly in the aspectual domain) as in (44) (for ease of readability, we will label the clitics simply as 'cl' in what follows, but 'asp' would be equally appropriate):



¹⁸Note that Udmurt has a sizable number of clitics that are characterized by different placement properties (see Arkhangelskiy 2014 for discussion).

¹⁹Upon elicitation, some of our consultants also accept the V-cl-Aux order. We have to leave an investigation of why the judgments deviate from the corpus data discussed below for future research. It should be emphasized that the judgments on negative verb clusters reported below pattern with the findings from the corpus.

²⁰The corpus, available at: <http://udmurt.web-corpora.net>, last accessed 5 July 2020, currently contains 9.57 million words. The searches were carried out in June 2019. In some, but not all cases, the results were manually disambiguated.

What is interesting for our purposes in this paper is the behavior of these clitics in the context of negation. Both *ñi* ('already, anymore') and *na* ('still, yet') exhibit optionality in the presence of negation. They can either appear at the end of the verbal complex as shown above or in between negation and the connegative verb:

- (45) a. Ta pešanaj ug kjrdža=**ñi**.
 this grandma NEG.PRS.3 sing.CN.SG=anymore
 b. Ta pešanaj ug=**ñi** kjrdža.
 this grandma NEG.PRS.3=anymore sing.CN.SG
 'This grandma does not sing anymore.' Udmurt

Again, these judgments are corroborated by the distribution in the Udmurt corpus which shows that both options are well-attested (with the cluster-final position being more frequent).²¹

- (46) *ñi* and *na* in [Neg-V]-clusters:

	Hits
NEG-V- <i>ñi</i>	4577
NEG-V- <i>na</i>	2167
NEG- <i>ñi</i> -V	1328
NEG- <i>na</i> -V	614

The general picture carries over to clusters involving negation and the auxiliary *bigat*-('can'), both with respect to the grammaticality judgments of our consultants (47) as well as the pattern in the Udmurt corpus (48):

- (47) a. Ta pešanaj kjrdža-ñj ug bigatj=**ñi**.
 this grandma sing-INF NEG.PRS.3 can.CN.SG=anymore
 b. Ta pešanaj kjrdža-ñj ug=**ñi** bigatj.
 this grandma sing-INF NEG.PRS.3=anymore can.CN.SG
 'This grandma cannot sing anymore.' Udmurt

- (48) *ñi* and *na* in [V-Neg-Aux_{can}]-clusters:

	Hits
V-NEG-CAN- <i>ñi</i>	251
V-NEG-CAN- <i>na</i>	82
V-NEG- <i>ñi</i> -CAN	98
V-NEG- <i>na</i> -CAN	23
V- <i>ñi</i> -NEG-CAN	0
V- <i>na</i> -NEG-CAN	0

The crucial observation is that the adverbial clitics *ñi* ('already, anymore') and *na* ('still, yet'), which typically follow the predicate, can precede it, but only in the presence of negation. We will show in the next subsection that this follows straightfor-

²¹The distribution of the two patterns is rather poorly understood, though some observations have been made about differences in terms of register/dialect, see Zubova (2019). What is important for our purposes is that both the corpus data and the judgments of our consultants clearly show that there is optionality with respect to clitic placement in negated verb clusters.

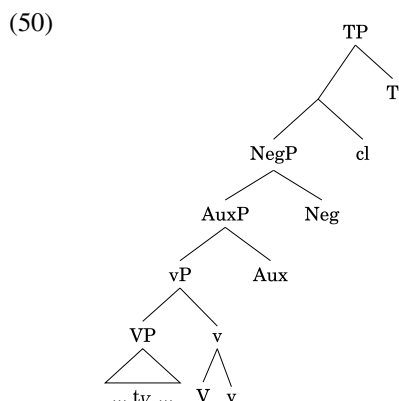
wardly under the postsyntactic approach proposed in the previous section, under the assumption that the clitics can but do not have to be dragged along when T undergoes Lowering.

4.2 Extending the Lowering approach

We start out with the base structure we arrived at in (44) according to which the clitics are merged above the vP. In cases of a complex verbal structure, we saw that the clitics are typically merged above the auxiliaries. Given their aspectual nature, they will be introduced below T:

$$(49) \quad [TP \ [\text{AuxP} \ [_{vP} \ [VP \ t_V] \ V+v] \text{Aux}] \text{cl}] \text{T}]$$

As for its relative position with respect to negation, we adopt the analysis by Löbner (1989), who has shown that particles with the meaning of ‘already’ and ‘not anymore’ as well as ‘still’ and ‘not yet’ are systematically related by internal negation. In Udmurt (and in Hebrew), the relationship between the two meanings is morphologically transparent (unlike in English or German). While ‘already’ asserts that a proposition holds true at point t and presupposes that it was not true before t , ‘not anymore’ asserts that a proposition does not hold true at point t and presupposes that it was true before t . ‘Still’ asserts that p holds at t and presupposes that p will not hold at some point after t . ‘Not yet’ asserts that p does not hold at t but presupposes p will hold at some point after t . Thus, in their negative use, the particles take scope over negation ($t > \neg p$). Unlike what is suggested by the English translation, they are not NPIs but generally express that a change of state has taken place at point t (‘already’, ‘not anymore’) or will take place after point t (‘still’, ‘not yet’). ‘Already’ has an additional pragmatic component that the change occurred earlier than expected. The particles will therefore be merged between NegP and T as in (50):

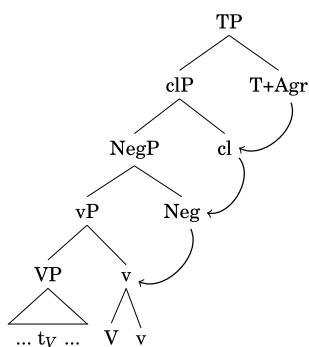


Recall that these aspectual clitics can either occur cluster-internally, attached to negation, or cluster-finally. In order to capture this optionality we adopt the long-standing intuition that clitics are phrase-structurally ambiguous between head and phrase. There are different possible technical implementations of this ambiguity. We will

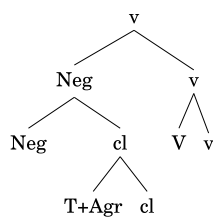
assume that clitics can, as a lexical property, optionally project/provide the label.²² This ambiguity interacts with the Lowering operation as follows: If the clitic projects, it is picked up by T under Lowering and ends up in cluster-internal position attached to negation. If, on the other hand, it does not project its own phrase but is simply a head adjoined to a maximal projection, it is skipped by the Lowering operation and ends up in cluster-final position.²³

We will now show how these assumptions derive the observed pattern. First, consider a situation where the clitic is picked up by Lowering. In this case, Lowering proceeds successive-cyclically top-down: Recall that both T and Neg are subject to a requirement to be in a local relationship with v. T thus undergoes Lowering and first adjoins to the clitic; then, the clitic+T complex adjoins to negation. Finally, the entire complex of negation+clitic+T lowers onto the verb. (51) illustrates the Lowering derivation, (52) shows the resulting complex head created by Lowering, and (53) gives the linearized order of morphemes.

(51)



(52)



(53)

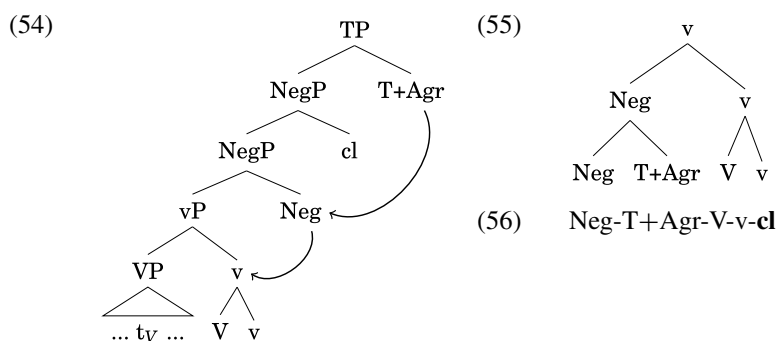
Neg-T+Agr-cl-V+v

²²Motivation for this implementation comes from observations in the grammaticalization literature that adverbial material grammaticalizes into functional heads over time. This view, prominently advocated in Roberts and Roussou (2003) and van Gelderen (2004), argues that adverbial material is reanalyzed as a functional head and, as a result projects its own phrase (see, e.g., the discussion of the Southern Italian irrealis mood marker *mu* which grammaticalized from the Latin adverb *modo* in Roberts and Roussou 2003). Possibly, the clitics in Udmurt are not fully grammaticalized into functional heads and thus their phrase-structural status is still ambiguous: They may either be introduced into the structure as projecting functional heads or as adverbials. See also Simpson and Saurov (2014) for a case from Bangla, where a series of clitic-like elements are either introduced as functional heads or as adverbials.

²³Our implementation is close to the approach of Cecchetto and Donati (2010), who propose that lexical items always have, in principle, the capacity to provide the label. An obvious alternative to capture the ambiguity is to treat the clitics as being always adjoined to NegP and capitalize on the fact that, as heads adjoined to phrases, clitics are [+minimal, +maximal] in Bare Phrase Structure terms (Chomsky 1995). Consequently, they can be targeted by head-movement given their [+minimal] property, but they can also be skipped given their [+maximal] property. Under the proposal in the text, clitics can only participate in Lowering if they are [+min,-max], i.e., when they project, but not if they are [+min,+max], i.e., when they do not project. As far as we can tell, both assumptions about the structural conditions for Lowering are equally reasonable (note that Embick and Noyer 2001 assume that Lowering across a head adjoined to a phrase is invariably blocked, but as far as we can tell, there is nothing that entails this conclusion). Even though our approach requires two different syntactic structures (and may thus be taken to be less economical than one capitalizing on the ambiguity of heads adjoined to phrases), it will turn out to be necessary to account for the non-Lowering of negation in non-finite clauses discussed in Sect. 5 below; otherwise, our proposal in terms of optional projection and an approach based on the ambiguity of heads adjoined to phrases make the same predictions.

Recall from Sect. 3.2 that negation is subject to a specific linearization requirement such that both the terminal node and the higher segment have to precede their sisters. As a side effect of this special linearization requirement, both T and the clitic also occur preverbally (the linearization of cl after Neg would also follow under the general statement that non-projecting functional heads follow their sisters). While T+Agr would normally be linearized after its sister given that it does not project, it does not in the case at hand, i.e., it precedes the clitic. Here, we assume that a vocabulary-specific requirement takes precedence: the VIs for *ni* and *na* are specified to attach to the right of their host (they are enclitic), leading to the linearization in (53).

Next, consider a configuration where the clitic does not project and therefore is skipped by Lowering. Negation and tense (including agreement) lower to v skipping the clitic. At a later stage (after linearization), the clitic will, due to its phonological deficiency, attach to the element it is adjacent to, i.e., the main verb (arguably an instance of string-vacuous Local Dislocation). As a result, the clitic ends up in cluster-final position. (54) illustrates the underlying syntactic structure and the direction of Lowering, (55) shows the resulting complex head, and (56) provides the resulting order of morphemes:²⁴



In sum, the cluster-internal position of the clitic follows as the result of the Lowering operation that was independently argued for in order to remedy the basic syntax-morphology mismatch and the special linearization requirement of Neg, as a side effect of which heads adjoined to Neg, viz., T+cl, also occur preverbally. The

²⁴Note that the clitic is initially linearized at the end of the verb cluster, even though it is not the projecting head here. We will assume that, as a head adjoined to a phrase, it will be treated like non-projecting functional heads that are adjoined to heads; recall the linearization statements in (39) above.

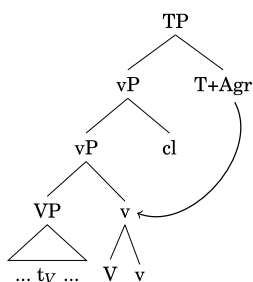
To ensure that postverbal/extraposed material does not interfere with cliticization of the aspectual clitics, we need to assume that such material occupies structurally higher positions. Derivations where such material occurs below the clitic will arguably crash at PF since the clitics, which presumably require a verbal host, could not attach to the intervening non-verbal constituent.

cluster-final position obtains when the clitic does not project and, as a consequence, is skipped by Lowering. ^{25,26}

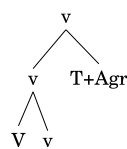
As we will show in the following subsections, such a simple solution to the clitic placement pattern is possible neither in a head-movement approach nor under a base-generation account.

But before we proceed, we need to address clitic placement in affirmative contexts, where we find no optionality; rather, the clitic always occurs in cluster-final position. We will show presently that, although there is indeed optionality in the syntactic derivation, this optionality is not reflected in the surface order since both derivations converge on the same order of morphemes. Let us first consider a configuration where the clitic does not project. The result is that Lowering of T simply skips the clitic on its way down to *v* leading to cluster-final position of the clitic as before (after it leans onto the adjacent verb):

(57)



(58)



(59)

V + v - T + Agr - cl

In a configuration where the clitic projects, the clitic will be picked up by T but end up in the same cluster-final position: As in the previous derivation, the non-projecting complex head *cl*+T will be linearized after its verbal sister; and because

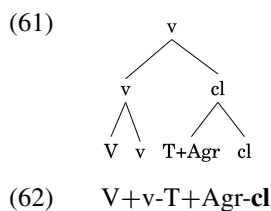
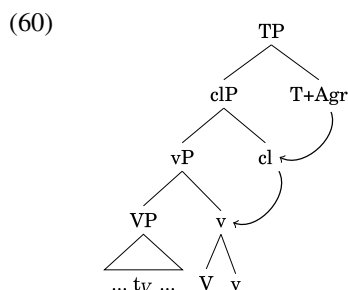
²⁵It should be noted that Arkhangelskiy (2014) mentions cases where the aspectual clitics *ñi* and *na* are doubled and appear in both cluster-internal and cluster-final position:

- (i) Moga, kal' uz=na vu=na marəm-ez?
wait.IMP.2SG now NEG.FUT.3=yet come.CN.SG=yet thingy-3SG
'Wait, isn't that thing ready now?' Beserman Udmurt (Arkhangelskiy 2014)

We do not have a straightforward solution to this doubling pattern. It is extremely rare in the Udmurt Corpus (we have found only 10 examples of clitic doubling with *ñi* 'already, anymore' and *na* 'still, yet'; compared with the 8,686 hits exemplifying the Neg-V-cl and Neg-cl-V orders, cf. (46)) and our consultants judged this pattern as dialectal/spoken. Since we have not been able to determine its distribution and the potential semantic/pragmatic contribution of doubling, we decided to leave this for future research.

²⁶Marcel den Dikken (p.c.) has suggested an alternative treatment of the optionality of clitic placement in terms of timing: the alternation arises because clitics can attach to the verbal complex at different points of the (PF-)derivation. By assumption, T would invariably skip the clitic and form a complex head with Neg. The clitic can then either cliticize onto the Neg+T complex right away and will be dragged along, leading to cluster-internal position. Alternatively, the clitic can wait and eventually cliticizes onto the entire verb cluster, thereby accounting for its cluster-final position. While we see the appeal of such a solution, we refrain from adopting it for the following reasons: First, such an approach fails to account in a principled way for why this alternation affects only clitics but not other elements of the verb cluster. Second, it is unclear how this could actually be implemented, i.e., it is not quite clear what kind of postsyntactic operations would be involved and why the clitic should have the freedom to cliticize at different points of the derivation. If it is the same operation in both cases, late cliticization would arguably violate cyclicity.

of the enclitic nature of *ñi/na*, T will be linearized to the left of the clitic (recall from above). This results in the same linear order as in (59).²⁷



Clitic placement in affirmative orders thus also follows under the assumptions of the Lowering account. The crucial argument for the Lowering approach, however, comes from the negative orders where the clitics display optionality. We will see in the next subsections that this optionality cannot be accommodated in competing approaches.

4.3 Against alternative mechanisms to form complex heads

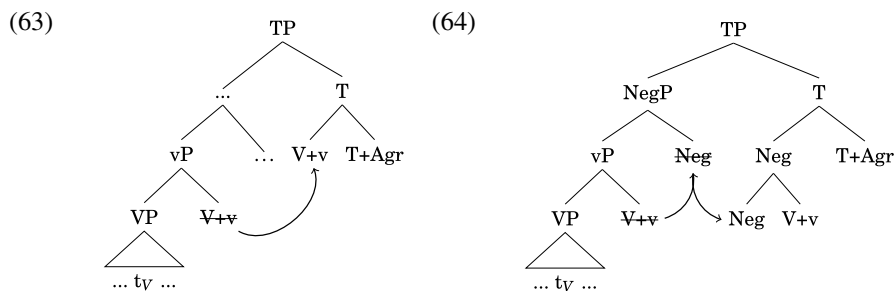
In the previous subsections we have seen how a Lowering approach can straightforwardly account for both the occurrence of inflectional morphology on Neg and the optionality of clitic placement in negative verb clusters. In this subsection, we will see that alternative derivational mechanisms to form complex heads fail to do so.

4.3.1 Classical head-movement

We will first discuss an account in terms of classical upward head-movement. The major motivation for the Lowering approach proposed in Sect. 3 came from the fact that the verb and the negation form a complex unit. Such a complex unit can obviously also be obtained by means of core-syntactic (upward) head-movement. One can simply assume that the verb head-moves to Neg, followed by movement of V+Neg to T. Furthermore, this can be combined with the same assumptions about linearization introduced above. Negation would thus be linearized to the left of the verb that adjoins to it, while other functional heads would be linearized to the right of their adjoinee:²⁸

²⁷Since the derivations differ, this might potentially predict that since the clitic is part of the morphological word in one case but not the other, some subsequent processes also show optionality as to whether they affect the clitic or not. We do not know of such processes at this point but intend to investigate the consequences in future work.

²⁸Mitchell (2006:233f.), who posits verb movement to T in affirmative clusters in Mari/Udmurt, argues that there is no verb movement in negative clusters. She claims that if NegP is projected, head-movement of V is blocked, and it is Neg that moves to T. While this correctly predicts that Neg and T form a complex head, her analysis cannot account for the fact that Neg and V must be adjacent.

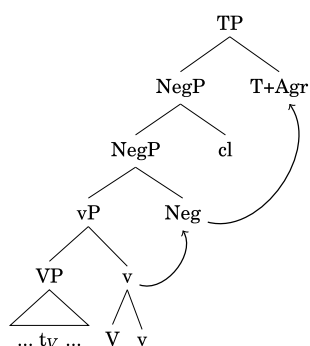


The derivation of the affirmative orders in (63) is unproblematic: The $V+v$ complex moves up and adjoins to T and is linearized before $T+Agr$, deriving, for instance, example (1a) from above, viz., *purə-š-na* ‘go.in-PST-1PL’. However, the head-movement account fails to predict the correct constituency inside the complex head in negative clusters. In (64), the $V+v$ -complex first moves to Neg , then, the $[Neg+[V+v]]$ complex moves to T . Neg thus forms a constituent with $V+v$ to the exclusion of T . Given Neg ’s special linearization requirement, this complex head will be linearized as $Neg-V+v-T+Agr$. This is clearly incorrect as it would predict that tense and agreement would be attached to V —but recall from Sect. 2.1 that it is the negation that bears the tense and agreement suffixes in Mari and Udmurt rather than the verb; cf. example (1b) *ə-š-na puro* ‘NEG-PST-1PL go.in.CN’. The constituency inside the complex head that obtains under the head-movement approach is thus crucially wrong. It fails to capture the fact that negation and T form a close unit to the exclusion of V . Further evidence for the close relationship between negation and T comes from the fact that in Udmurt tense and negation are expressed with a single exponent: *ə-* is used for NEG.PST and *u-* for NEG.FUT/PRS, see Sect. 2.1.

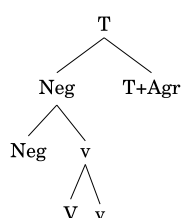
The problems with constituency and morpheme order extend to clusters involving clitics. Under the Lowering account, the different clitic positions follow from the fact that the clitics can either be picked up or skipped by Lowering. Under a head-movement account, the different clitic placement options cannot be captured by capitalizing on the clitics’ ambiguous phrase-structural status: Assuming the same base-structure as above with the clitics introduced between Neg and T , if head-movement skipped the clitic, we would expect it to appear either before the cluster or leaning onto a preverbal constituent. Such orders are, however, unattested. (65) illustrates the head-movement derivation that skips the clitic, and (66) shows the resulting complex head and (67) the morpheme order.²⁹

²⁹One could stipulate that rather than leaning onto a preverbal constituent, the clitic undergoes Local Dislocation with the entire verb cluster. This would probably derive the cluster-final position of the clitic; but to trigger Local Dislocation in this configuration, extra assumptions would be necessary because the cheapest option to satisfy the clitic’s enclitic nature would be to lean onto the preceding constituent (as we have assumed above).

(65)



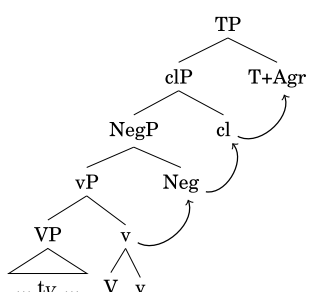
(66)



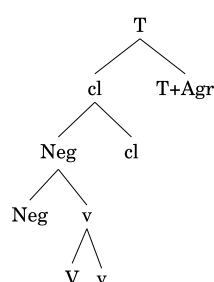
(67) *XP-cl Neg-V+v-T+Agr

Thus, under a head-movement approach, skipping the clitic must not be an option. Rather, the clitic must always be picked up. This derivation is illustrated in (68), with the resulting complex head in (69) and the linear order in (70).

(68)



(69)



(70) *Neg-V+v-cl-T+Agr

This obviously derives the wrong surface order: Not only does T fail to attach to negation, the clitic also occurs in an unattested position.

In principle, a head-movement account could resort to brute force solutions such as additional morpheme reordering operations or variable templates that even include adverbial clitics. However, quite apart from the fact that such operations are generally ill-motivated (see the discussion in Sect. 4.4 below), the Lowering account is clearly at an advantage here since no extra assumptions are needed to capture the correct constituency and the morpheme order.

4.3.2 Recent alternatives to head movement-based word formation

Recently, a number of different approaches have been proposed sharing the basic idea that complex words can be spelled out in different positions of the clausal spine. It is assumed that the same mechanism is responsible for spell-out in different positions rather than distinguishing between narrow-syntactic raising and post-syntactic Lowering (Svenonius 2016, Arregi and Pietraszko 2019, Harizanov and Gribanova 2019, reviving ideas presented in Brody 2000). The effects of raising (viz., spell-out in the position of the head that is higher in the clausal hierarchy) and Lowering (spell-out in the position of the head that is lower in the clausal hierarchy) thus result from the

same kind of operation (a syntactic one, viz., feature-sharing, as under Arregi and Pietraszko 2019, or a postsyntactic one, as in Harizanov and Gribanova 2019). Crucially, however, these approaches also encounter problems with the patterns at hand: Like the classical head-movement account, they make the wrong predictions with respect to the constituency inside the complex head: under both approaches, complex heads are formed bottom-up (at least in Arregi and Pietraszko 2019 and Harizanov and Gribanova 2019—as in Brody 2000; we have not been able to find an explicit statement in the spanning literature).³⁰

In Arregi and Pietraszko (2019), head-movement involves feature-sharing between the heads in the clausal spine. By default the entire feature complex is realized in the highest head position involved in feature sharing. Additionally, special diacritics on heads can enforce spell-out in other positions. What is crucial for our discussion is that the algorithm always leads to mirror-principle compatible constituency as under traditional upward head-movement even if the feature complex is spelled out at the bottom of the Agree-chain. While they provide evidence for this assumption based on the relative agreement prefixes in the Bantu language Ndebele, this assumption makes the wrong prediction for negative verb clusters in Mari/Udmurt since negation would form a unit with the verb, to the exclusion of T. The tense and agreement affixes should thus attach to V rather than Neg, see (71a). Similarly, in the derivations with clitics, the clitic would be wrongly predicted to occur in between V and T+Agr rather than attaching to the negation, (71b). The approach thus makes the same incorrect predictions as classical head-movement, cf. ex. (64) and (68)–(70):

- (71) a. [T [Neg Neg-V+v]-T+Agr]
 b. [T [cl [Neg Neg V+v]-cl]-T+Agr]

In Harizanov and Gribanova (2019) individual heads are specified to undergo either raising or lowering at PF. Again, it is crucially assumed that the derivation proceeds bottom-up: Given a clausal hierarchy $A \succ B \succ C$, Lowering of head B to C must precede Lowering of head A. This also leads to the wrong result for negative verb clusters: Again, the negation would form a unit with the verb, to the exclusion of T, as in (71). But as has been repeatedly pointed out in this section, this does not correspond to the empirical facts in Mari/Udmurt: It is the two higher heads (Neg and T) that form a constituent to the exclusion of the low one (V).

In other words, what these approaches crucially cannot model is successive-cyclic Lowering, as required by the constituency of complex heads containing negation in Mari/Udmurt.³¹

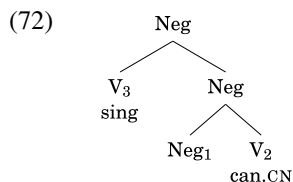
³⁰The unification of raising and Lowering in Arregi and Pietraszko (2019) as syntactic does not obviously allow us to distinguish between instances of head-movement that have semantic effects and those that do not. Things are different in the approach by Harizanov and Gribanova (2019), where head-movement leading to word formation is crucially postsyntactic, while head-movement that does not involve word formation (such as, e.g., V2 in Germanic) takes place in syntax. It remains to be seen, though, whether this generally provides the correct cut.

³¹Karlos Arregi (p.c.) has pointed out to us that this conclusion can be avoided under more traditional assumptions if Neg moves to T in syntax, and then, the T+Neg complex lowers to V+v at PF. While this would indeed derive the correct constituency, it would not adequately account for clitic placement: For the clitic to end up in cluster-internal position, it would have to project so that it is dragged along

4.4 Against a base-generation approach

In this section we will discuss an alternative account for Mari/Udmurt verb clusters that involves base-generation. To repeat, the major challenges posed by negative verb clusters are the following: First, one has to ensure the correct surface position of the negation and the correct semantic interpretation at the same time; this must crucially be restricted to negation and must not affect other auxiliaries. Second, one has to ensure the correct distribution of inflectional morphology (i.e., on Neg in negative clusters). Third, optional clitic placement has to be limited to negative clusters.

In a base-generation approach to verb clusters as, e.g., Bader and Schmid (2009), the negation would be directly generated in its surface position, forming a complex head with the dependent verbs (this will require functional composition):



Ensuring the correct position of inflectional morphology will arguably not be too difficult as long as there is a general rule that associates the inflectional morphology with the hierarchically highest verb of the cluster, viz., negation in the case of negative clusters. As for the ordering properties, there are two aspects: First, one has to ensure that negation invariably precedes the connegative verb (unlike other auxiliaries). Second, one has to find a way to ensure adjacency between negation and the connegative verb. Both are possible if the formalism of Bader and Schmid (2009) is adopted: In this formalism, selectional properties can include directionality statements (*X* selects its complement to the left/to the right) and, crucially, refer to the complexity of the complement, i.e., whether it is phrasal or just a head. The entries for negation and other auxiliaries/modals might then look as follows:

(73) Selectional restrictions in Udmurt/Mari verb clusters

- a. Neg: \rightarrow V
- b. Aux/Mod: \leftarrow V(P)

(73a) states that negation selects its complement to the right and, crucially, that it has to be a (possibly complex) head. (73b) states that other auxiliaries/modals select their (possibly phrasal) complements to the left (we ignore the ascending orders with these

under Lowering. However, in that case, one would expect negation to pick up the clitic already when moving up to T in syntax. However, the clitic would then end up in between Neg and T, leading to the unattested order $[[[\text{Neg}+\text{cl}]+\text{T}]+[\text{V}+\text{v}]]$. The only possibility would thus be for the clitic to be non-projecting. Negation would consequently skip it under syntactic raising, as would the Neg+T-complex under Lowering. While this would derive the cluster-final position of clitics, it would fail to account for the cluster-internal position, where the clitic attaches to the Neg+T-complex.

Discussion about cyclicity at PF is rather scarce. The discussion in Embick (2007) w.r.t. Latin *-que* and French fused prepositions/determiners suggests that the derivation proceeds bottom-up/inside out. But for the negation data in Mari/Udmurt, this would lead to the wrong constituency within the complex head.

auxiliaries to facilitate discussion). With these assumptions, the ordering and adjacency restrictions of Udmurt/Mari verb clusters can be successfully accounted for.³²

There remain two challenges for a base-generation account, the correct interpretation and clitic placement. As for interpretation, one either has to assume that the mapping between syntactic structure and semantic interpretation is significantly more complex, as is generally assumed in non-derivational frameworks like HPSG or LFG. Alternatively, an option also available under base-generation approaches within Chomskyan versions of generative grammar, one can assume that the overtly visible negation is not the element that is semantically interpreted. Rather, what looks like a negative element is just the reflex of an Agree relationship with a higher abstract negation, which is the element that is responsible for semantic interpretation. A famous case for which such a solution has been proposed are so-called split scope readings as in (74), see Penka (2011:Chap. 3):

- (74) dass Hans **keine** Krawatte zu tragen braucht
 that Hans no tie to wear.INF needs
 ‘that Hans need not wear a tie’ $\neg > \text{need} > \exists$ German

The most natural interpretation of the example in (74) is the one indicated, with the modal *brauchen*, an NPI, taking scope between negation and the existential quantifier. This is not obvious given the surface structure in (74), where negation and existential form a single unit, viz., *keine*. To account for the scopal interpretation, Penka (2011) proposes that the negative indefinite is actually non-negative. Rather, it is an indefinite that agrees with an abstract negation as in (75) (the feature specification *i/u* indicates which element is semantically interpreted; as a side-effect, the NPI is licensed by the c-commanding negation; this approach is motivated by work on negative concord in Zeijlstra 2004; see also Bruening 2017 for the role of abstract negation in an approach where complex heads are base-generated). In principle, such a solution is also available under a base-generation approach to negative clusters in Mari/Udmurt. The structure might then look as follows (we label the visible negation as V-Neg to express the fact that this is not the semantic locus of negation), cf. (76):

- (75)

```

graph TD
    VP1_1[VP1] --- NEG1[NEG[iNeg]]
    VP1_1 --- VP1_2[VP1]
    VP1_2 --- VP2[VP2]
    VP1_2 --- V1[V1  
need]
    VP2 --- DP[DP  
no tie[uNeg]]
    VP2 --- V2[V2  
wear]
          
```

(76)

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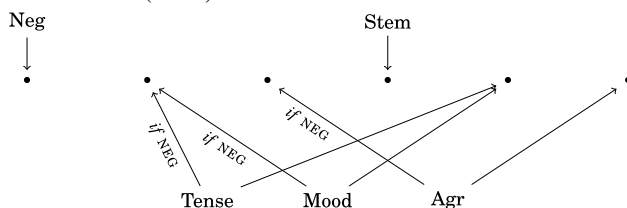
graph TD
    TP --- NegP[NegP]
    TP --- T[T]
    NegP --- VNegP[V-NegP]
    NegP --- NEG1[NEG[iNeg]]
    VNegP --- DP[DP]
    VNegP --- VNeg1[V-Neg]
    VNeg1 --- V3[V3  
sing]
    VNeg1 --- VNeg2[V-Neg]
    VNeg2 --- VNeg1_uNeg[V-Neg1[uNeg]]
    VNeg2 --- V2[V2  
can]
          
```

³²The special distribution of person and number morphology in negative clusters in Udmurt will, however, constitute a challenge. Unlike with auxiliaries/modals, the features are distributed over different elements of the cluster. The rule for inflectional morphology will thus be more complicated and potentially appear rather arbitrary. As discussed in fn. 12 above, the distribution follows quite naturally under a Lowering account.

For this analysis to work, negation must crucially be treated as a verb, and, in addition, as the highest one of the cluster. Otherwise, the distribution of inflectional features would be rather mysterious:

If negation is just treated as a pure agreement head, one would have to combine the base-generation approach to cluster formation with a template-like approach to morpheme order such as Crysmann and Bonami (2016) or Bruening (2017). In these approaches, the templates are assembled in a presyntactic component (the lexicon in Crysmann and Bonami 2016 and a separate workspace in Bruening 2017), and then (in Bruening's approach) licensed against functional heads in the structure in more or less the same way as in (76). The problem that arises is that, in these approaches, the principles that govern the assembly of the template are completely arbitrary. In Crysmann and Bonami (2016), each morph comes with a template position class index, which yields the correct order of morphemes. A schematic representation for the Mari verbal template could thus look like (77):

- (77) Representation of the Mari negation-connegative complex à la Crysmann and Bonami (2016):



In this template, only the stem and negation have a designated slot. All other morphemes depend on the context. Moreover, all other morphemes have the exact same specification (i.e., *if NEG*). This clearly shows that this model misses a generalization here. The ordering of morphemes is not arbitrary. It is perfectly regular and nothing in a template account models that.

The problem becomes even more serious when we consider the clitic pattern. An account in terms of abstract negation which licenses a negation marker on the predicate does not have anything to say about the behavior of the adverbial clitics in general. Why would the position of adverbial clitics in the aspectual domain depend on an abstract agreement relation between negation and the predicate? Syntactic agreement is typically not affected by intervening syntactic heads or phrases if they are of a completely different syntactic type. Thus, the position of clitics should be unaffected by the presence or absence of negation and a cluster-internal position of the clitics is completely unexpected. What is even worse, given that the clitics take scope over the—actual, viz., abstract—negation, they cannot be interpreted in their surface position. Thus, one would either have to resort to some post-syntactic Lowering operation after all, or, more in the spirit of these approaches, treat the surface clitics as mere agreement elements that are licensed by abstract aspectual heads above the abstract negation.³³

³³The presence of clitics inside words generally poses a huge problem for accounts of this type, especially (but not only) those that assume word-formation to be independent of syntax. See the elaborate discussion in Harris (2002).

The only solution we see would be to deny that these adverbial clitics are heads in the syntax and assume that they too are inflectional material that must be assigned a position class index. The schema in (77) did not include the clitics since template-like accounts typically do not address the positioning of clitics. But if these clitics occur inside complex units such as the one consisting of the negation and the connegative verb, template accounts must include them one way or another. The only solution in an approach like (77) would be to include one more bullet in front of the stem and assign this slot to the aspectual clitics optionally in the presence of negation. We consider it highly doubtful that these adverbial clitics should be treated like regular inflectional affixes. Moreover, this would imply another pair of arrows one of which states: *if* NEG and therefore another generalization would be missed.

Note that the problem with clitic ordering also obtains if negation is treated as a proper verb. While this will probably handle the distribution of inflectional categories, it has nothing insightful to say about why the distribution of clitics is crucially affected by the presence of the negative auxiliary. Thus, a template-based approach to clitics is inevitable under those assumptions even though it is, as demonstrated above, highly problematic.

Under our Lowering account, however, the distribution of both the inflectional categories and the aspectual clitics can be directly related to the Lowering operation that is independently motivated: T and negation, having a requirement to be in a local relationship with v, lower in the postsyntactic component and drag intervening functional heads hosting the clitics with them to the cluster-internal position.³⁴

5 *Be*-support in Mari: An argument for a postsyntactic treatment

In this section, we will discuss configurations in Mari where there is no (suitable) verb in the syntactic structure that the negation could lower onto. In these environments, a dummy copula appears together with negation. We will first describe the different environments before exploring the consequences for our analysis: We will provide a formal implementation of the phenomenon, under which it is treated as a repair to satisfy Neg's morphosyntactic requirement to be in a local relationship with v. Thereafter, we will show that it provides yet another argument for a postsyntactic perspective on cluster formation in Mari and crucially argues against syntactic head-movement accounts. *Be*-support will also provide new insights into the nature of the trigger for Lowering that we address together with ellipsis facts in Sect. 6.2 below.

5.1 Contexts with *be*-support

5.1.1 *Constituent negation in Mari*

So far, we have only been concerned with cases of clausal negation, and Mari and Udmurt largely behave identically in this respect. However, the languages differ with

³⁴ Another problem for a base-generation account comes from the phenomenon of *be*-support to be discussed in the next section where in cases where there is no host for negation to lower to, a dummy copula is inserted. Since there is no evidence for the syntactic presence of a VP, a treatment in non-derivational frameworks like LFG or HPSG will be difficult since elements like *do* in *do*-support are treated as proper syntactic auxiliaries in these accounts.

respect to constituent negation. The use of constituent negation in these languages is somewhat restricted: Since they both have the immediately preverbal focus position, it usually suffices to put the constituent that is to be negated in that position (cf. the discussion in Edygarova 2015:285). Sometimes, speakers of Mari do make use of constituent negation. It is especially productive in contrastive pairs as in (78), but it can also occur in isolation (79):

- (78) Tâj šaxmat dene o-g-âł, a šaške dene mod-âć.
 2SG chess with NEG-PRES.3SG-be but checkers with play-PST.2SG
 ‘You played not (with) chess but (with) checkers.’ *Mari*
- (79) Tâj olma-m o-g-âł koćk-âć.
 2SG apple-ACC NEG-PRS.3SG-be eat-PST.2SG
 ‘You ate not an apple.’ *Mari*

The example in (78) involves contrastive PP-coordination with the first conjunct being negated by the element *o-g-âł*, which can be decomposed into a negation morpheme /o-/, the present tense marker /g/ and the reduced copula /âł/. The example in (79) involves a negated direct object, which is negated in the same way.³⁵

While cases such as (78) look like instances of ellipsis at first sight (i.e., backward gapping), (79) makes it clear that this cannot be the right explanation.³⁶ Note also that the negative copula does not agree with the subject of the clause. Rather, it always shows default agreement (i.e., 3SG). We can note further that there is no evidence for a biclausal clefting structure, i.e., something like ‘It was not an apple that he ate.’, because (i) the subject precedes the allegedly clefted constituent (one would probably expect the cleft to be at the edge of the entire construction), (ii) the final verb ‘play’ is a simple finite verb showing no signs of relativization and (iii) the tense and the subject features of the negation are invariantly third person singular present tense regardless of the features of the subject, the negated constituent or the tense specification of the matrix clause. The latter is particularly striking. If (79) were a cleft, we would certainly expect past tense to be possible on the copula that accompanies negation. Finally, we can also exclude a reanalysis by means of a free relative (along the lines of ‘You played with what is not chess’) because

³⁵The very same copula *ogâł* is also used in copular clauses as the negative counterpart of the dropped 3SG copula (ia,b) (cf. with the copular clauses with a 2SG subject in which the copula *ul-* is present in affirmative contexts).

- | | | | | | |
|-----|----|---|------|----|--|
| (i) | a. | Tudo joća.
3SG child
‘S/he is a child.’ | (ii) | a. | Tâj tunâktâšo ul-at.
2SG teacher be-2SG
‘Your are a teacher.’ |
| | b. | Tudo joća o-g-âł.
3SG child NEG-PRS.3SG-be
‘S/he is not a child.’ | | b. | Tâj tunâktâšo o-t-âł.
2SG teacher NEG-2SG-be
‘Your are not a teacher.’ |
- (Riese et al. 2017:110)

³⁶Interestingly, Udmurt uses an ellipsis construction in this context. See Sect. 6.2 for examples and discussion.

the postposition in (78) would be inside the free relative, where it is not semantically licensed, rather than outside. The same type of constituent negation is also possible with subjects and even there, constituent negation only shows default agreement:

- (80) Olma-m tāj o-g-əl, a Petr koćk-o.
 apple-ACC 2SG NEG-PRS.3SG-be but Peter eat-PST.3SG
 ‘Not you but Peter ate the apple.’ Mari

Constituent negation can also be combined with clausal negation resulting in a double negation pattern:

- (81) Petr o-g-əl olma-m ô-š koć.
 Peter NEG-PRS.3SG-be apple-ACC NEG-PST.3SG eat.CN
 ‘Not Peter didn’t eat his apple (i.e. someone else didn’t).’ Mari

All of these examples raise the question why constituent negation is always accompanied by a copula. We propose that the presence of the copula is motivated by the morphosyntactic requirement of the Neg-head to be in a local relationship with a verb. Given that there is no verb for negation to lower onto, the grammar resorts to the insertion of a dummy copula that does not contribute anything syntactically or semantically. Before turning to the formal implementation, we will discuss another context with an unexpected copula.

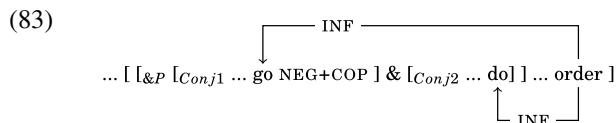
5.1.2 Negative infinitival clauses

Another case of *be*-support can be found in negative infinitives as in (82). In Sect. 2 above, we noted that clausal negation in Mari and Udmurt always takes high scope. Speakers of Mari, however, can express low scope by means of attaching the negation to the infinitival clause:³⁷

- (82) Tāj mē-lan-em vrać deke kaj-aš o-g-əl, a paša-m
 2SG me-DAT-1SG doctor to go-INF NEG-PRS.3SG-be but work-ACC
 ôšt-aš šüdô-š-ôć.
 do-INF order-PST-2SG
 ‘You ordered me not to go to the doctor but to do work.’ Mari

The copula that accompanies the negation in these examples again does not contribute any syntactic features. The infinitive does not become finite by means of the copula as it is still conjoined with another infinitive. Moreover, we can tell that the copula is even invisible for morphological selection. The infinitive on the verbs in the two conjuncts *kaj-* (‘go’) and *ôšt-* (‘do’) is assigned/governed by the matrix predicate *šüd-* (‘order’). If the copula were present syntactically, we would expect it to interrupt the government relation between ‘go’ and ‘order’:

³⁷The same holds for gerundial clauses embedded under verbs like *kert* (‘can’). They can also be negated by attaching *ogəl*.

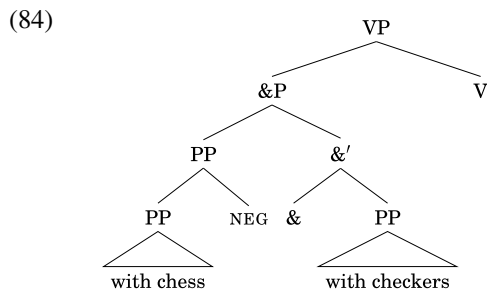


In other words, syntactically, the copula is invisible for (i) the purposes of projection and finiteness and (ii) for the purposes of morphological selection, which is typically modeled as agreement.

5.2 The mechanics of *be*-support

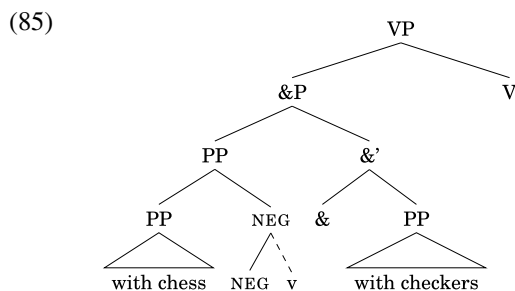
In this section, we will illustrate the formal mechanism of *be*-support in more detail. As we will see, *be*-support must necessarily apply postsyntactically, which serves as an argument that the formal requirement it repairs is also postsyntactic in nature.

We start out with the syntactic structure for contrastive PP-coordination discussed above. The negation is attached to the first conjunct, but we know that, in this case, it is only adjoined since the whole structure is still a coordination of PPs:



The morphological shape of the negation in this case suggests that it is the very same syntactic head that is used with regular sentential negation. Thus, it seems plausible to assume that the Neg-head in (84) also has the morphosyntactic requirement to occur in a local relation with *v*. In clausal contexts, the negation can lower until it hits *v*, but in this structure, Lowering will not help since there is no verb available in the structure.

Thus, the morphosyntactic requirement of Neg cannot be satisfied by means of Lowering. In this context, Mari resorts to a repair operation, viz., *be*-support. In order to satisfy the requirement of the negation to appear next to a verb, the language inserts a verbal dummy element. We model this as an instance of node sprouting, a process also known as insertion of dissociated morphemes (see Halle and Marantz 1993, Bobaljik 1994, Embick 2000, Choi and Harley 2019). Node sprouting or insertion of a dissociated morpheme is typically used to provide a terminal node for a morphosyntactic feature which cannot remain unrealized and is expressed by a separate morpheme. This usually involves agreement or honorification features, as, e.g., in Choi and Harley (2019). But it strikes us as plausible that the availability of node sprouting as an operation can, in principle, repair other kinds of morphological deficiencies. In our case, sprouting of an additional verbal head *v* can repair the morphological requirement of Neg:



Since the copula is semantically speaking the most underspecified verb available, it is eventually chosen as the correct exponent of this v-head in accordance with the standard rules of Vocabulary Insertion. As for the morphological form of the negation-copula complex in configurations such as (84), the actual realization is *o-g-əl*, which is glossed as NEG-PRS.3SG-be with the /g/ corresponding to the gloss PRS.3. The question is, of course, where this feature specification comes from. As for the ϕ -features, it is fairly uncontroversial to assume that third person singular functions as a default specification in cases where agreement was unsuccessful. We would like to contend that, in a similar fashion, the present tense also functions as a default tense specification, at least in Mari. As with the copula, we know that the present tense morpheme does not encode semantic present tense as the examples all involve a past tense main verb. Thus, these default features and their corresponding forms must consequently be supplied at PF as well (given that there is no local T-head that could lower onto the inserted v).³⁸

In (85), there is no verb to lower to and thus the morphological requirement must be repaired some other way. But we have also seen an instance of *be*-support in infinitival clauses, cf. (82), repeated in (86), where there would be a verb to lower onto, viz., the verb in the infinitive. Still, for some reason, the language chooses *be*-support over Lowering, suggesting that Lowering is blocked:

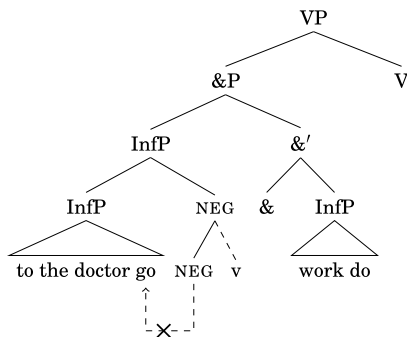
- (86) Təj m̄-lan-em vrač deke kaj-aš o-g-əl, a paša-m
 2SG me-DAT-1SG doctor to go-INF NEG-PRS.3SG-be but work-ACC
 əšt-aš šüdə-š-əč.
 do-INF order-PST-2SG
 ‘You ordered me not to go to the doctor but to do work.’ Mari

We would like to propose that negation is treated as adjoined (i.e., it does not project a NegP). Recall that in the preceding section about the Udmurt clitics, we saw that an adjoined head is skipped for the purposes of Lowering. Thus, it is plausible to assume that adjunction cannot participate in Lowering at all; in other words, Lowering of negation is blocked for structural reasons because the structural configuration for Lowering is not met. As a consequence, node sprouting takes place in negative infinitival clauses as well:³⁹

³⁸Our implementation of *be*-support is thus somewhat different from the treatment of *do*-support in Embick and Noyer (2001), where the head v is introduced in syntax already.

³⁹An alternative way to ensure that the negation does not lower into an infinitival/gerundial clause would be an additional mechanism of morphological selection. Possibly, negation cannot lower onto these kinds

(87)



While we have no deep insights to offer as to why negation should be adjoined in infinitival clauses rather than projecting its own NegP, we would like to point out that first the situation seems to be similar to English where in negative infinitival clauses only the full but not the clitic negation is available and the position of *not* relative to the T-element *to* shows that negation must be higher in non-finite clauses. Thus, the negation also seems to be adjoined to a projection of the phrase headed by *to* rather than projecting its own NegP (see, e.g. Hankamer 2011). Second, there is evidence that the negation of an infinitive indeed has a different status than a finite clause negation; this is suggested by the fact that it does not license negative concord items (NCIs) such as *nigö* ('anyone'):⁴⁰

- (88) Tāj mēlanem *nigö-lan /iktaž-lan ojl-aš o-g-əl, a
 2SG 1SG.DAT anyone-DAT someone-DAT speak-INF NEG-PRS.3SG-be but
 mutdōmo lij-aš šūde-š-āč.
 silent stay-INF order-PST-2SG
 'You ordered me to not speak to anyone but to remain silent.' *Mari*

We leave the question of why exactly NCI-licensing is blocked here for future research but we note that Ladusaw (1992) and Zeijlstra (2004) mention that NPIs and NCIs are typically only licensed by sentential negation. We therefore conclude from this that negative infinitival clauses differ from negative finite clauses structurally in

of verbs because they do not involve a v-head (or not the right kind of v). It is well-known that infinitives and gerunds exhibit some nominal properties in many languages.

Note that it is typologically inconspicuous that the standard negative markers cannot be used in non-finite clauses; as shown in (Miestamo et al. 2015:21f.), many Uralic languages use different negation strategies in these contexts, including special negative non-finite forms; if the relevant forms are not available for certain non-finite clauses, the languages often resort to finite clauses instead.

⁴⁰Interestingly, in the second past paradigm of Mari, which uses a periphrastic verb form including a negative copula, NCIs are licensed:

- (i) Peter nimo-m kočk-en o-g-əl.
 Peter anything-ACC eat-PRF NEG-PRS.3SG-be
 'Peter didn't eat anything.' *Mari*

Even though the two instances of negation are morphophonologically identical, they clearly differ with respect to the licensing of NCIs. We think that this shows clearly that their phrase-structural status must be different.

such a way that Lowering is blocked and, as a consequence, *be*-support is used as a repair.⁴¹

5.3 *Be*-support must be postsyntactic

In the previous subsections, we saw cases where—theory-neutrally speaking—negation had no verb available to form a cluster with. The result was that as a morphological repair of this deficiency, a dummy-verb was inserted to save the derivation. We showed that the dummy-verb makes absolutely no syntactic or semantic contribution; on the contrary, it crucially must be invisible for the purposes of syntactic projection and syntactic agreement:

We saw that the copula did not contribute any syntactic features since its attaching to a PP did not change the PP's syntactic category. Furthermore, the fact that negation was invisible for the purposes of morphological selection was demonstrated by negative infinitival clauses. If the copula were syntactically active, we would expect the copula to occur in the infinitive form or at least to block the assignment of the infinitive and possibly govern the connegative form on the verb it c-commands. But that does not happen. The higher verb governs the infinitive across the copula as if the copula were not present at all.

We think that these examples show quite clearly that the copula in these cases is merely a semantically vacuous dummy element whose only purpose is to satisfy the requirement of the negation to immediately precede a verbal element. In our approach, the syntacto-semantic vacuousness of the copula falls out as expected. In fact, since the requirement of the negation is purely a PF-requirement, none of the potential repairs could ever trigger syntactic or semantic consequences.

In a competing syntactic approach to complex head formation, however, the syntacto-semantic vacuousness of the dummy copula is unexpected. One would need to stipulate for each of the operations (e.g. head-movement, *be*-support) that it does not have any syntactic or semantic consequences: In very much the same way as we did, a head-movement approach could assume that in the configurations with *be*-support discussed in this section, no element head-moves to the negation either because there is no element that could move to begin with or because negation is an adjunct. As a result of failed head-movement, a dummy copula is inserted to satisfy the selectional feature of the negation. As a consequence of this, the copula would be present in syntax already and would thus be expected to have syntactic and semantic effects. For instance, one would expect it to interfere with morphological selection given that it would be merged before the matrix verb is introduced.

We therefore conclude that the general notion of *be*-support and the striking absence of syntacto-semantic effects of the inserted element follows much more straightforwardly under our postsyntactic Lowering account. The insertion of the copula simply comes too late to feed syntactic or even semantic operations. Any syntactic account would, as far as we can see, need to make undesirable stipulations why the copula in these cases fails to interact with syntactic or semantic processes.

⁴¹ Note that negation is adjoined to phrases in both constituent negation and negated infinitival clauses. For its linearization after the constituent it is attached to, recall the discussion in fn. 24.

6 Lowering as a morphosyntactic operation

In the preceding sections, we argued at length that negation lowers onto the lexical verb in the postsyntax. But so far we have remained silent about the trigger for this operation. Given that the exponent for negation only consists of one vowel, it would seem to make intuitive sense to postulate that Lowering is driven by the phonological properties of the negation: one could argue that the exponent of negation is somehow deficient and therefore requires a phonological/prosodic host. Under such an analysis, the special position of negation could be related to its phonological properties, i.e., it would be treated as a proclitic (but recall the discussion in Sect. 2.3 above).

However, such an approach would clash with the architecture of the postsyntactic component as it is standardly assumed that Vocabulary Insertion takes place at linearization (and thus after Lowering, cf. Embick and Noyer 2001). Triggering Lowering by the clitic-hood of negation is thus architecturally impossible because information about the VI is not yet available. Does that imply that we are dealing with an instance of look-ahead, i.e., a syntactic operation being triggered by morphological/phonological properties? We will show in what follows that there is no look-ahead problem because neither Lowering nor the special linearization of negation is triggered by properties of the VI for negation. Rather, Lowering of Neg is driven by a *morphosyntactic* requirement of Neg (cf. Embick and Noyer 2001 on Lowering of English finite inflection) and the special linearization of negation is due to a general property of Neg-heads in the languages. The following two subsections will provide evidence for the morphosyntactic nature of the trigger for Lowering.

6.1 Lowering and inversion without an overt exponent

It can be shown quite straightforwardly that the requirement to appear in a local relation with *v* is a requirement of the syntactic head and not of the exponent (i.e., the Vocabulary Item). First, as noted in Sect. 2.1, we can observe that in Mari, for example, negation has four different allomorphs, all of which show the exact same behavior with respect to Lowering and linearization. Second and most strikingly, Lowering and linearization of the inflectional features to the left of the main verb also takes place with the zero allomorph. Consider the following minimal pair:

- | | | | | | |
|------|----|----------------------|----|----------------------|-------------|
| (89) | a. | Ø-š-əm puro | b. | â-š-na puro | |
| | | NEG-PST-1SG enter.CN | | NEG-PST-1PL enter.CN | |
| | | ‘I didn’t enter.’ | | ‘We didn’t enter.’ | <i>Mari</i> |

A zero allomorph for negation seems somewhat counterintuitive but it is unproblematic since the verb in (89a) appears in the connegative form and it is preceded by the inflectional suffixes, just as in negative contexts with overtly expounded negation (89b). At any rate, this fact shows very clearly that Lowering and linearization cannot plausibly be due to the phonological requirements of the exponent. Rather, the special properties of negation must be due to the morphosyntactic features of the head.

6.2 Interaction with ellipsis

Further evidence that Lowering is due to a morphosyntactic requirement comes from its interaction with ellipsis. The crucial observation is that Lowering of negation is not bled by ellipsis of its complement. This is suggested by examples where the negation survives an ellipsis operation and remains without an overt verb. First, in Udmurt, negation is used without the connegative verb in contrastive coordination (cf. Edygarova 2015:285):

- (90) Lij̆i Tęd'j-jez mi u-m **kjrdžale**, ti kjrdžal-o-dj.
 snow white-ACC 1PL NEG.FUT-1 sing.CN.PL 2PL sing-FUT-2PL
 'Not we but you will sing (the song) *Snow is white.*' Udmurt

Under the assumption that (90) involves ellipsis of the lexical verb or potentially some larger constituent that includes it (accompanied by ATB-movement of the direct object), such examples would be predicted to be ungrammatical since negation ends up without a verb.

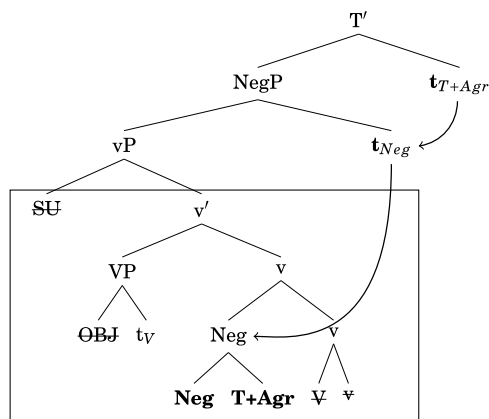
The same point can be made on the basis of answers to polar questions in both Udmurt and Mari: The negative auxiliary can be used as the sole element in this construction (cf. Edygarova 2015:280, Saarinen 2015:344f.):

- (91) Pij kudal-eš mo? – O-g-eš.
 dog run-PRS.3SG Q NEG-PRS-3SG
 'Is the dog running?' – No.' Mari (Saarinen 2015:345)
- (92) Lij̆i Tęd'j-jez kjrdžal-o-dj=a? – U-m **kjrdžale** **Lij̆i**
 snow white-ACC sing-FUT-2PL=Q NEG.FUT-1 sing.CN.PL snow
Tęd'j-jez.
 white-ACC
 'Will you sing (the song) *Snow is white?* – No.' Udmurt

The Mari data are particularly remarkable as one might have expected *be*-support to occur in this configuration. If negation were subject to a *phonological* requirement to be in a local relationship with a verb, such examples would be predicted to be ungrammatical. However, under a morphosyntactic perspective on Lowering, these examples can be accounted for given certain assumptions about the timing of ellipsis. We will crucially assume that under ellipsis, the syntactic structure is still fully present; ellipsis is only an instruction for non-pronunciation, i.e., an instruction that blocks Vocabulary Insertion (cf. Aelbrecht 2010). Thus, the syntactic structure is present at the point of the PF-derivation when T and Neg undergo Lowering. Under the morphosyntactic perspective, Lowering takes place because Neg must be in a local relationship with *v* and not because it needs a host. Even though negation usually ends up forming a cluster with a verb, Lowering as such is not teleological, which is why the derivation does not crash if there is no overt exponent for the verb. In order to ensure that Neg survives ellipsis (i.e., is not affected by the block on Vocabulary Insertion), one has to assume that the terminals inside the ellipsis site are marked for non-pronunciation before Lowering of negation. This can, for instance, be done by assuming that the ellipsis licenser, viz., negation, assigns an ellipsis diacritic to its

VP-complement, which crucially trickles down to the terminal nodes (and thus does not remain on the maximal projection). When negation lowers into the vP, it is the only constituent that is not marked for non-pronunciation, which is why it can remain overt. Thus, the structure of Udmurt examples like (92) is the following (for concreteness' sake, we are assuming in (93) that the subject is zero because it remains within vP and is affected by ellipsis; alternatively, its non-pronunciation could be due to its being *pro*, even if it moves out of vP):⁴²

(93)



We can now answer the question why there is no *be*-support in Mari fragment answers: *be*-support only applies if Lowering is blocked, i.e., if no suitable verb is available in the structure; recall, e.g., the case of constituent negation in (84). Under ellipsis, however, there is a verb present and, as a consequence, Lowering takes place and thus bleeds *be*-support. This is surely the strongest piece of evidence in favor of a morphosyntactic trigger for Lowering. Under a phonological perspective, one would arguably expect *be*-support to come to the rescue.⁴³

⁴² Anders Holmberg (p.c.) suggested an alternative to us. One could assume instead that, as in Finnish, the negation moves to a high position in the left periphery and ellipsis affects the entire CP (cf. also Holmberg 2015). While we find such an analysis convincing for Finnish where movement of the negation is independently established, we refrain from adopting this analysis for Mari/Udmurt because there is no evidence elsewhere in the grammar of these languages that the negation moves in syntax.

Our analysis predicts that elements that have moved out of VP can survive in polar answers. This prediction is borne out as the following data from Udmurt show (the same holds for Mari):

- (i) Maša kniga-jez liddž-i-z=a? – Maša e-z **liddž-i** **kniga-jez**.
 Masha book-ACC read-PST-3SG=Q? Masha NEG.PST.3 read.CN.SG book-ACC
 ‘Did Masha read the book? No, Masha didn’t (someone else did).’

Udmurt

Note that the fact that elements can survive in polar answers can also be captured under Holmberg’s approach as long as the surviving elements move to an even higher position in the left periphery (e.g., because they are contrastive).

⁴³ The reader will have noticed that our assumptions about the timing between ellipsis and Lowering clash with recent work on NP-ellipsis, see, e.g., Saab and Lipták (2016) and Murphy (2018), where ellipsis is crucially argued to block Lowering. In Hungarian, for instance, the Num-head bearing inflectional features is normally lowered onto N so that the number suffix appears on N. Under NP-ellipsis, however, Lowering is blocked and the exponent for number is instead attached to the preceding adjective by Local

We therefore conclude that ellipsis in Mari/Udmurt provides crucial evidence for a morphosyntactic trigger for Lowering: Lowering takes place whenever its structural description is met, even if negation ends up without a host at surface structure. This is an important result because in all the cases we are aware of that Lowering has been applied to in the literature, it invariably leads to affixation; but given the morphosyntactic conception of Lowering in Embick and Noyer (2001), the case we are describing here is in fact expected and thus fills a gap in the typology of Lowering.⁴⁴

7 Conclusion

In this paper we have investigated the morphosyntactic properties of negation in the Finno-Ugric languages Mari and Udmurt. We started out by showing that on the one hand, negation bears some hallmarks of a negative auxiliary as is familiar from other Finno-Ugric languages like Finnish: it governs the form of the highest verb of the clause, bears inflectional features normally associated with the main verb in affirmative contexts and takes high scope. On the other hand, negation also behaves crucially differently from a typical auxiliary both with respect to negative auxiliaries in other Finno-Ugric languages as well as other auxiliaries/embedding verbs within these languages in that it is subject to stringent order restrictions and an adjacency requirement: It must occur immediately before the verb it governs. Furthermore, there is substantial morphosyntactic and phonological evidence showing that it forms a very tight unit with the verb it precedes. In other words, negation represents an interesting syntax-semantics-morphology mismatch: The surface position of negation does not correspond to the position where we would expect it given its syntactic and semantic properties.

In the second part of the paper, we have proposed that the mismatch should be resolved by means of postsyntactic Lowering. We have shown that a Lowering account straightforwardly captures all relevant aspects of negative verb clusters: (i) Given that

Dislocation (without ellipsis, adjectives do not bear number morphology). We believe, however, that the NP-ellipsis facts can be reanalyzed under our assumptions: The terminals within NP would be marked for non-pronunciation before Lowering of Num takes place. Num would adjoin to N in the postsyntactic component and would emerge as the only terminal within NP where VI is not blocked. However, due to the phonological deficiency of the Vocabulary Items inserted into Num (they are affixes), they cannot be pronounced on their own (i.e., without a host). Thus, as a last-resort repair operation, they cliticize to the immediately preceding element, the linearly adjacent adjective by means of Local Dislocation. The only difference between the Hungarian cases and negation in ellipsis in Mari/Udmurt is whether the lowered element itself is phonologically deficient, as is the case with number morphology in Hungarian, or not, like negation in Mari/Udmurt. Only in the former will there be an additional repair operation. As far as we can tell, such a reanalysis would still capture the insights of these analyses of NP-ellipsis without having to commit to the assumption that ellipsis blocks Lowering.

⁴⁴In English inflection, VP-ellipsis actually blocks Lowering and leads to *do*-support. This is in line with the assumptions in Saab and Lipták (2016) but unexpected both under our assumptions and those in Embick and Noyer (2001), where Lowering is also driven by a morphosyntactic requirement; Lowering should actually block *do*-support, given the logic of their approach. What seems to be happening is that the Lowering derivation crashes because the exponents inserted into T fail to find a host, i.e., the structure is ruled out by some version of the stray affix filter (all constituents within vP except T are marked for non-pronunciation). In this situation, *do*-support emerges as the only possibility. Note that this reasoning implies transderivational economy.

the Lowering operation takes place postsyntactically, the semantic vacuousness of the displacement follows automatically. (ii) Since T and negation form a unit to the exclusion of V, the distribution of inflectional categories in negative clusters is accounted for: Since Neg is linearized preverbally, tense and agreement, which are adjoined to negation, automatically also precede the verb. (iii) The special cluster-internal clitic placement in the presence of negation also follows: Since Lowering adjoins T and the clitic to Neg, they are also linearized before the verb. Competing alternatives fail to account for these properties: Classical narrow-syntactic head-movement incorrectly predicts potential semantic effects and leads to the wrong constituency within the complex head with the verb forming a unit with negation to the exclusion of T. Tense and agreement are thus wrongly predicted to attach to the connegative verb. The problems with the constituency extends to the clitic placement pattern, where neither option can be accounted for. More recent alternatives to head-movement like Harizanov and Gribanova (2019) and Arregi and Pietraszko (2019) also predict the wrong constituency since in their algorithms the constituency is derived in a bottom-up fashion even if the equivalent of Lowering is involved. What all these approaches thus cannot capture is the effect of successive-cyclic Lowering, which is necessary to obtain the correct constituency. Finally, we have shown that a base-generation alternative does not fare much better either, not least because it has nothing insightful to say about the clitic placement pattern.

We then went on to provide further evidence for a postsyntactic approach to cluster formation in these languages. The relevant data involved contexts where there is no suitable verb to lower onto and a dummy copula is inserted as a repair, viz., constituent negation and negative infinitives. Since Lowering is post-syntactic, the repair by *be*-support is necessarily postsyntactic as well and thus correctly predicted to be syntactically and semantically invisible. Under an alternative approach based on syntactic head-movement, the syntactic/semantic invisibility of the copula cannot be derived in any obvious way.

In the last part of our paper, we have addressed the more fundamental question about the trigger for Lowering. We have shown that the trigger must be of an abstract morphosyntactic nature despite the seemingly intuitive appeal of a trigger that refers to some deficiency of negation, e.g., certain prosodic and/or phonological properties of the Vocabulary Items involved that force them to seek a host. The evidence for this perspective comes from the fact that Lowering is triggered by various allomorphs, even zero allomorphs, and from its interaction with ellipsis: although negation normally occurs adjacent to the verb, it can be the only element surviving ellipsis; furthermore, no dummy copula is inserted in this context. This pattern can be accounted for if Lowering proceeds whenever its context is met, even if the verb it lowers onto eventually fails to be pronounced. This reveals the non-teleological nature of post-syntactic operations (Embick 2010) and fills a hitherto puzzling gap in the consequences of the Lowering operation: While Lowering as conceived in Embick and Noyer (2001) is a morphosyntactic operation, in the cases it has been applied to so far, it invariably leads to affixation. The Lowering operation we have postulated for Mari and Udmurt crucially does not necessarily do so, exactly as would be expected if only morphosyntactic properties are at stake.

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