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Lowest theme vowels or highest roots? An 'unaccusative' theme-vowel class in Slovenian

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This paper focuses on the e/i theme vowel class of verbs in Slovenian to bring together two seemingly unrelated debates: (i) the debate on the correlation between theme-vowel classes and certain argument structures and (ii) the debate on the status of derivational affixes within the framework of Distributed Morphology. Our core data come from a list of 108 unaccusative verbs obtained using adjectival active L-participles as an unaccusativity diagnostic. We show that (i) no unaccusative verbs belong to the two largest theme-vowel classes in Slovenian (a/a and i/i), whereas (ii) the two big theme vowel classes tend to get accusative arguments quite frequently. Most importantly, (iii) the e/i class stands out since more than one half of the unaccusative sample falls into it. The e/i class is furthermore exceptional in that its theme vowel surfaces in adjectival L-participles, it is the theme-vowel class to which inchoatives in inchoative-causative pairs belong and it behaves uniformly with respect to stress. Based on this behavior, which sets the e/i-class apart from other theme-vowel classes, we argue that the morpheme e/i is better analyzed as a derivational affix. We further argue, following Lowenstamm (2014), that derivational affixes are transitive roots rather than categorizers and propose detailed PF and LF instructions for the root under consideration.

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1 Introduction

In recent literature on languages featuring theme vowels, there has been an ongoing debate concerning correlations between theme-vowel classes and the argument structure properties of the verb. For Slavic, several authors have shown that at least some theme-vowel classes strongly correlate with certain argument structures (Jabłońska 2007; Medová & Wiland 2019; Biskup 2019), indicating that theme vowels may have more syntax to them than assumed in approaches which treat theme vowels as sheer markers of inflectional classes or functional structure (e.g., Oltra-Massuet 1999).

A seemingly unrelated debate has been conducted within the framework of Distributed Morphology on the status of derivational affixes. Traditionally, derivational affixes were assumed to be the spellout of categorizing heads. However, Lowenstamm (2014) proposes a revision in which derivational affixes are viewed as transitive roots, which can select either other roots or specific categories (see also Creemers & Don & Fenger 2018 and Acedo-Matellán & Real-Puigdollers 2019 for related proposals).

Bringing these two debates together, we focus on a Slovenian theme-vowel class which has predominantly unaccusative syntax. Our core data come from a list of 108 unaccusative verbs obtained from a corpus using adjectival active L-participles as an unaccusativity diagnostic. As will be shown, in Slovenian adjectival active L-participles, theme vowels are generally either mute, or deleted or modified, with the prominent exception of the theme vowel e/i. This fact, in combination with clear indications that adjectival L-participles only involve root structure, will be used to show that the theme vowel under consideration (e/i) is better analyzed as a root.

The rest of this article is organized as follows. We start by discussing the general structure of the Slovenian verb and the theme-vowel classes that can be identified in present-day Slovenian in Section 2. In Section 3 we first give an overview of the distribution of the L-participle in Slovenian and show how some of its uses distinguish unaccusative verbs. In Section 4 we create an extensive list of unaccusative verbs in Slovenian using adjectival L-participles as diagnostics. In Section 5 we focus on features by which the e/i class stands out. An analysis of the relevant morpheme is offered in section 6. Section 7 concludes the paper.

2 Intro to the Slovenian theme-vowel classes

In general, Slovenian verb forms have the minimal structure root (v) – theme vowel (TV) – tense & agreement morphology. The theme vowel is not predictable from the phonological shape of the root, as can be seen from the minimal pair constituted by the verbs in (1a) and (2a). Verbs can have different theme vowels in finite and non-finite forms, as in (1), but they do not have to, (2). Regardless whether the two theme vowels are the same or different, we gloss the theme vowels in the non-finite forms TV1 and the theme vowels in finite forms TV2.

- (1) a. *trp* - *e* - *ti*, *trp* - *i* - *mo*
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 ‘to suffer, we suffer’
- b. *drž* - *a* - *ti*, *drž* - *i* - *mo*
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 ‘to hold, we hold’
- (2) a. *trp* - *a* - *ti*, *trp* - *a* - *mo*
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 ‘to cram, we cram’
- b. *tež* - *i* - *ti*, *tež* - *i* - *mo*
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 ‘to nag, we nag’

Most traditional grammars of Slovenian distinguish, on the one hand, the portion that consists of the root plus the theme vowel, typically termed the base (Slovenian *osnova*) and, on the other hand, tense and agreement endings (*končnica*). Toporišič (2000: 361) points out that most verbs have only one base in all forms, so they are like the examples in (2), but some verbs have two bases, an infinitival base and a present-tense base (in the example in (1a) the two bases would be *trp-e* and *trp-i*, respectively). Combinations of theme vowels define conjugation classes. Toporišič (2000) recognizes 5 different classes based on the present-tense base and 4 classes based on the infinitival base. Further detailed description makes it clear that this does not mean that there are 20 different combinations of theme vowels, but the exact number or an overview of combinations is not presented. Herrity (2006) defines conjugations as determined by the present-tense theme vowel (TV2). Specifically, *a*, *i*, *je*, *e* and \emptyset define five conjugation classes (Herrity 2006: 165). These conjugations are not explicitly combined with infinitive theme-vowel classes, but the mapping can be established from the detailed description. For instance, it becomes clear from the discussion of the verbs in *-ati* (Herrity 2006: 168–170) that they can belong to any of the five (present-tense based) conjugations.

Marvin (2002), working within Distributive Morphology, focuses on derivational morphology and shows that the non-finite (infinitive) theme vowel (TV1) surfaces in various deverbal nouns and adjectives. It therefore comes as no surprise that she presents a classification into five classes based on the non-finite theme vowels, whereas the finite forms have specialized endings, e.g., *e* for the present tense. The fact that this morpheme is invisible in many classes is accounted for by assuming phonological rules. The rules by which the surface phonology of the theme vowels is obtained are quite abstract and some of them may be hard to motivate synchronically. For instance, verbs such as *trp-a-ti* ‘to cram’ in (2a) are assumed to have the underlying representation

/trp-aj/, whereby the *j* gets deleted by a general Slavic deletion rule (see also footnote 2). For the present tense, where the assumed present-tense morpheme *-e-* gets added, there is another deletion rule (especially for this class), which turns *trp-aj-e-mo* into *trp-a-mo*. As far as we can tell, even with this heavy phonological machinery it is not clear how to assign verbs such as, e.g., *držati* in (1b), to one of the five classes and derive both the finite and non-finite forms.¹

While assuming a single exponent of each theme-vowel class marker and deriving its allomorphs by phonological rules is clearly preferable, we are not aware of any way to achieve this for all theme-vowel classes in modern Slovenian. We therefore assume for the purposes of this article that the theme-vowel combinations are encoded in each verb, so that the verb in (1a) is marked as belonging to the class *e/i*, the one in (1b) as belonging to the class *a/i*, whereas the verbs in (2) belong to the classes *a/a* and *i/i*. We are not the first to approach Slovenian theme vowels in such a way. For instance, Šekli (2010), classifies verbs by their combination of infinitive and present-tense theme vowels. Most differences between Šekli's classification and the one used here follow from different views of phonological rules which can be considered active in present-day Slovenian. For instance, Šekli (2010) unifies the classes *e/i* and *a/i* (illustrated by the examples in (1)) assuming a productive rule which turns *e* into *a* after certain consonants. However, pairs such as those in (3) and (4) show that both *a* and *e* are possible themes in the same phonological environment, so this rule would have to have many exceptions, which may pose a learnability problem.

- (3) a. krič - a - ti, krič - i - mo
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 'to scream, we scream'
- b. rdeč - e - ti, rdeč - i - mo
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 'to become red, we become red'
- (4) a. sp - a - ti, sp - i - mo
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 'to sleep, we sleep'

¹ Another proposal within Distributed Morphology comes from Božič (2015), who focuses on Novo Mesto Slovenian. In this variety, Božič identifies four verbal classes: the *a*-class, the *i*-class, the \emptyset -class and the *e*-class. His classes seem to be defined by considering both the finite and the non-finite forms. More complex representations are required for many verbs, e.g., the *e*-class is actually named after the present-tense theme and gets either *a* or \emptyset as the themes in the infinitive (Božič 2015: 27). The analysis of the Novo Mesto correspondent of *držati* in (1b) becomes clear in the discussion of participles, where the author assigns the verb itself to the *i*-class, but also adds it to the group of "roots that form participles of *a*-class II" (Božič 2015: 32). The exact representation of such roots and the mechanism by which they get different themes in different forms is not made explicit. It should be noted that Novo Mesto Slovenian is in many respects quite different from Standard Slovenian. For instance, in this variety in the *a*-class the root is always stressed (Božič 2015: 29), which is not the case for Standard Slovenian (as evidenced by the Standard Slovenian example *igr-á-mo* 'we play').

- b. kip - e - ti, kip - i - mo
 √ - TV1 - INF, √ - TV2 - PRS.1PL
 ‘to boil, we boil’

On the other hand, Šekli (2010) does not include verbs like *piti-pijemo* ‘to drink, we drink’ in the class \emptyset/e (required independently for verbs like *pas- \emptyset -ti*, *pas-e-mo* ‘to pasture, we pasture’), but includes them in the separate class \emptyset/je . Here we assume j-epenthesis to be productive (as attested in recent loanwords *harikiri-j-e* **harikirie* ‘harikiri-ACC.PL’). Then the verb *piti-pijemo* can be included in the class \emptyset/e and its two forms are underlyingly /pi- \emptyset -ti/ and /pi-e-mo/, respectively.²

Table 1 shows all theme classes in Slovenian that we assume in this article (represented as pairs of TV1 and TV2), as well as the number of members and percentage per class among

TV-CLASS	EXAMPLE (INF, PRS.1PL, GLOSS)	N OF VS (TOTAL = 3000)	% OF ALL VS
a/a	del-a-ti, del-a-mo ‘work’	1047	34.9
i/i	del-i-ti, del-i-mo ‘share’	864	28.8
a/je	or-a-ti, or-je-mo ‘plough’	375	12.5
\emptyset/e	pas- \emptyset -ti, pas-e-mo ‘graze’	330	11
ni/ne	mi-ni-ti, mi-ne-mo ‘pass’	144	4.8
e/i	zven-e-ti, zven-i-mo ‘sound’	125	4.17
a/i	bež-a-ti, bež-i-mo ‘flee’	37	1.23
a/e	br-a-ti, ber-e-mo ‘read’	36	1.2
\emptyset/ne	sta- \emptyset -ti, sta-ne-mo ‘cost’	26	0.87
e/e	um-e-ti, um-e-mo ‘know’	13	0.43

Table 1: Theme-vowel classes in Slovenian.

² As noted by one of the reviewers, there are some arguments for including the glide into the underlying representation. In this case, the underlying representations would be /pij- \emptyset -ti/ and /pij-e-mo/ and the surface form of the infinitive would have to be derived by deleting the glide before *-ti*. The evidence for the underlying glide comes from the imperative form, *pij*, assumed to have no overt ending, differently from, e.g., *pas- \emptyset -ti* ‘to pasture’ from Table 1, where the imperative form is *pas-i*. One issue with including the glide in the underlying representation is that the deletion rule required for the infinitive cannot apply in the non-singular form of the imperative (e.g., *pij-ta* ‘drink.IMP.2DU’). While a full analysis would go beyond the scope of this paper, we suggest that a unification can be achieved if a single imperative affix is assumed (which sometimes gets realized as *i* and sometimes as *j*) and *pij* is derived from *pi + i*. The same would apply to verbs like *del-a-ti* ‘to work’, which have the imperative *del-a-j*, often taken as an argument for an underlying glide, but plausibly derivable from *del-a + i*.

3000 most frequent verbs in the Slovenian national corpus Gigafida.^{3,4} We left out three extremely irregular verbs (*biti* ‘to be’, *imeti* ‘to have’ and *iti* ‘to go’), which may belong to the exceptional athematic class. These three verbs are the first, second and fourth verb by frequency, respectively.

As the table shows, the two largest classes are the a/a class and the i/i class, which account for almost two thirds of all verbs, followed by 8 other, smaller classes. This provides empirical evidence for the claim in Marvin (2002) that *i* and *a* are the default theme vowels in Slovenian.

Finally, theme-vowel classes found in Slovenian are typically assumed not to categorically correlate with argument structure, since members belonging to the same class can receive a different number of arguments, as shown in (5) for the a/a class.

- (5) a. Družina joka. (jok-a-ti, jok-a-mo; 1 argument)
 family cries (to cry, we cry)
 ‘The family is crying.’
- b. Tim kuha kosilo. (kuh-a-ti, kuh-a-mo; 2 arguments)
 Tim cooks lunch. (to cook, we cook)
 ‘Tim is cooking lunch.’
- c. Ana donira denar živalim. (donir-a-ti, donir-a-mo; 3 arguments)
 Ana donates money animals (to donate, we donate)
 ‘Ana is donating money to the animals.’

Before we continue, a short note is in order about a class of morphemes which are often considered on par with theme vowels in traditional literature on Slovenian: secondary imperfectivizers. While the examples we have considered so far consisted of a root, a theme vowel and inflectional morphology, many verbs have more complex structure, often following the templates in (6). Typically, a verb with just the three elements discussed above is imperfective. This imperfective verb can be perfectivized by prefixation (which does not influence the theme vowel). The obtained prefixed form can be rendered imperfective by suffixation. For this reason, the examples in (6) are given in triplets – the first verb is an unprefixated imperfective, the second a prefixed perfective and the third verb is a secondary imperfective.

³ The Slovenian national corpus Gigafida is available at <http://www.gigafida.net/>.

⁴ The database of 3000 most frequent verbs (Arsenijević et al. 2021) was composed for the purposes of the project *Hyperspace the Verb: The interplay between prosody, morphology and semantics in the Western South Slavic verbal domain* under the assumption that this sample is representative for all verbs in the language. The project database consists of Slovenian and Bosnian/Croatian/Montenegrin/Serbian sub-bases, which include verbs annotated for phonological, morphological, syntactic and semantic properties, such as theme vowels, stress, transitivity, root allomorphy (and other properties, not crucial for the purposes of this paper). We only focus on Slovenian data in this paper.

- (6) a. kuh-a-ti, kuh-a-mo / pre-kuh-a-ti, pre-kuh-a-mo
 cook.IPFV.INF, cook.IPFV.PRS.1PL / overcook.PFV.INF, overcook.PFV.PRS.1PL
 / pre-kuh-av-a-ti, pre-kuh-av-a-mo
 / overcook.IPFV.INF, overcook.IPFV.PRS.1PL
- b. skrb-e-ti, skrb-i-mo / pri-skrb-e-ti, pri-skrb-i-mo
 worry.IPFV.INF, worry.IPFV.PRS.1PL / provide.PFV.INF, provide.PFV.PRS.1PL
 / pri-skrb-ov-a-ti, pri-skrb-u-je-mo
 / provide.IPFV.INF, provide.IPFV.PRS.1PL
- c. gor-e-ti, gor-i-mo / iz-gor-e-ti, iz-gor-i-mo
 burn.IPFV.INF, burn.IPFV.PRS.1PL / burn-out.PFV.INF, burn-out.PFV.PRS.1PL
 / iz-gor-ev-a-ti, iz-gor-ev-a-mo
 / burn-out.IPFV.INF, burn-out.IPFV.PRS.1PL

Our representations of the secondary imperfectives in (6) reflect the fact that we analyze secondary imperfectivizers as complex items which contain a theme vowel (*pre-kuh-av-a-ti*, *pri-skrb-ov-a-ti*,⁵ *iz-gor-ev-a-ti*). This is different from traditional grammars, where morphemes like *ova* in (6b) and *eva* in (6c) are viewed on par with theme vowels like *a* in (6a) or *e* and *i* in (6b) and (6c) (Toporišič 2000: 346–350).

An important insight from our database is that all secondary imperfectivizers fall into two theme vowel classes: *a/a* and *a/je*, which means that secondary imperfectives contribute to the size of these two classes.

Having completed the description of the structure of the Slovenian verb, we now turn to unaccusative verbs and the unaccusativity tests in Slovenian.

3 Unaccusativity diagnostics: What is so special about L-participles of unaccusatives?

In this section we turn to the L-participles as a diagnostic of unaccusativity in Slovenian. Slovenian has (active) L-participles, which exist for all verbs and are used in the complex past, future and conditional forms. Next to these, there are (passive) (E)N/T-participles, which are in principle only possible with transitive verbs. This is shown in (7)–(10) below, where the transitive verb *napisati* ‘write.PFV’ has both participles, (7), (9), whereas the intransitive verb *pasti* ‘fall.PFV’ only has an active L-participle, (8), (10).

⁵ As one of the reviewers notes, we still need a rule for the allomorphy in this suffix, since it surfaces as *ov* in front of the theme vowel *a* and as *u* in front of the theme vowel *je*. This kind of theme-vowel conditioned allomorphy is widely attested in the theme-vowel class *a/je*, e.g., in *kl-a-ti*, *kol-je-mo* ‘to slaughter, we slaughter’ (see Simonović 2019 for a detailed analysis in terms of pure phonological conditioning).

- (7) Maja je napisa-l-a veliki slovenski roman.
Maja.F AUX write.PFV-ACT.PTCP-F big Slovenian novel
'Maja has written the great Slovenian novel.'
- (8) Knjiga je pad-l-a na tla.
book.F AUX fall.PFV-ACT.PTCP-F on floor
'The book has fallen on the floor.'
- (9) Veliki slovenski roman je že napisa-n.
big Slovenian novel.M AUX already write.PFV-PASS.PTCP.M
'The great Slovenian novel is already written.'
- (10) *Knjiga je pad-en-a na tla.
book.F AUX fall.PFV-PASS.PTCP-F on floor
(Intended: 'The book has fallen on the floor.')

In this paper we focus on the active L-participle, the 'special' status of which was already addressed in Ilc & Marvin (2016). These authors show that only L-participles of unaccusative verbs can appear in reduced relative clauses (as first suggested in Marvin 2003). As expected, transitive verbs allow the (passive) (E)N/T-participle form in reduced relative clauses, whereas unergative verbs do not allow any participles in reduced relative clauses. Examples below show the relevant contrast between a transitive, (11), an unergative, (12), and an unaccusative verb, (13).

- (11) Otroci, prikaza-n-i / *prikaza-l-i
children.M.NOM.PL show.PFV-PASS.PTCP-M.NOM.PL / *show.PFV-ACT.PTCP-M.NOM.PL
v primeru, so povsem izmišljeni.
in example are completely made-up
'The children shown in the example are completely made up.'
- (12) *Otroci, telefonira-n-I / telefonira-l-i svojim staršem,
children phone-PASS.PTCP-M.NOM.PL /phone-ACT.PTCP-M.NOM.PL own parents
so zdaj šli spat.
AUX now gone sleep
(Intended: 'The children who phoned their parents have now gone to sleep.')
- (13) Otroci, prispel-l-i v štiridesetih, so danes
children.M.NOM.PL arrive.PFV-ACT.PTCP-M.NOM.PL in forties are today
že starčki.
already elderly
'The children who arrived in the forties are already elderly people today.'

The reduced relatives test was established as the most reliable diagnostics for unaccusatives in Slovenian by Ilc & Marvin (2016). Based on this test, the authors compose a list of 52 verbs, which is, as they themselves note, the most comprehensive list of unaccusatives for Slovenian. However, this list is not compiled based on corpus data, which means that there is room for expanding the list.

Ilc & Marvin (2016) further state that they focus on eventively used L-participles, which they distinguish from “purely adjectival stative participles”.⁶ This latter type has been considered as an unaccusativity diagnostic by Aljović (2000) for Bosnian/Croatian/Serbian (BCS). As observed in Aljović (2000), in BCS, only L-participles of unaccusatives can also be used as adjectives (that is, attributively), whereas participial adjectives from transitive verbs are derived using the passive participial suffix -(E)N/T. Finally, unergative verbs do not allow any of these participial adjectives. Examples below show the relevant contrast for BCS and Slovenian. Examples (14a) and (15a) show the expected result for transitive verbs: no adjectival L-participle is allowed (compare to (11)). Examples (14b) and (15b) show that an unergative does not allow any participle in this position. Finally, examples (14c) and (15c) show that an unaccusative verb only allows the L-participle.

(14) *BCS*

- a. prikaza-n-a / *prikaza-l-a djeca
 show-PASS.PTCP-PL / show-ACT.PTCP-PL children
 ‘shown children’
- b. (Aljović 2000: (5b))
 *telefonira-n-I / *telefonira-l-i gosti
 phone-PASS.PTCP-PL / phone-ACT.PTCP-PL guests
 ‘telephoned guests’ (= guests that telephoned)
- c. (Aljović 2000: (3a))
 *padnu-t-i / pa-l-i anđeli
 fall-PASS.PTCP-PL / fall-ACT.PTCP-PL angels
 ‘fallen angels’

(15) *Slovenian*

- a. prikaza-n-i / *prikaza-l-i otroci
 show-PASS.PTCP-PL / show-ACT.PTCP-PL children
 ‘shown children’
- b. *telefonira-n-i / *telefonira-l-i gosti
 phone-PASS.PTCP-PL / phone-ACT.PTCP-PL guests
 ‘telephoned guests’ (= guests that telephoned)

⁶ In this paper the terms verbal L-participles and adjectival L-participles will be used for these two types.

- c. *pade-n-i / pad-l-i angeli
 fall-PASS.PTCP-PL / fall-ACT.PTCP-PL angels
 ‘fallen angels’

Crucially, this means that we can take the ability of L-participles to be used as an attributive adjective as another unaccusative diagnostics. What is more, given the fact that adjectival participles have full adjectival paradigms (unlike verbal participles), this diagnostic allows us to identify them in the corpus and create a more extensive list of unaccusative verbs in Slovenian, as we will do in the following section.

4 Unaccusatives – making a list

As discussed in section 3, for Slovenian, the reduced relatives test was established as the most reliable diagnostics by Ilc & Marvin (2016), as only (active) L-participles of unaccusative verbs can appear in reduced relative clauses. One major drawback of this test is that it cannot be easily implemented in a corpus search, as L-participles of all verbs are also used with the auxiliary to make future, past and conditional forms. Searching a corpus for L-participles will therefore simply give us L-participles of every verb, regardless of its argument structure. However, as shown in section 3, only L-participles of unaccusatives can be used as attributive adjectives, which can be taken as another diagnostics for unaccusativity. Crucially, adjectival L-participles have full adjectival paradigms, which means that this diagnostic can also be implemented in a corpus search to create a list of unaccusative verbs in Slovenian.

In order to extract the verbs that have a corresponding adjectival L-participle, we searched the Slovenian national corpus Gigafida for L-participle forms which end in the genitive/locative dual/plural form of the adjectival declension (i.e., forms ending in *-lih*).⁷ Note however, that in

⁷ The claim that L-participles from unaccusatives are in fact adjectival can be further evidenced with *ost*-nominalizations (roughly comparable to English *ness*-nominalizations). In Slovenian, *ost*-nominalizations can only be derived from adjectives. As examples (ii) and (iii) show, L-participles from unaccusatives can participate in these nominalizations, but L-participles from unergatives cannot, (iv). Interestingly, as noted in Ilc & Marvin (2016), some adjectival participles have a different form from the eventive participles, as illustrated in (iii), where *minil* is eventive, whereas *minul* (with a change of the theme vowel) is stative. In these cases, only the stative participle can undergo *ost*-nominalization.

- (i) sladek - sladkost
 sweet.A - sweetness
- (ii) odrasti - odrasel - odraslost
 grow-up.INF - grown-up.ACT.PTCP - (the property of) being grown-up
- (iii) miniti - minil/minul - *minilost/minulost
 go-by-.INF - go-by.ACT.PTCP - past (noun)
- (iv) telefonirati - telefoniral - *telefoniralost
 telephone.INF - telephone.ACT.PTCP

fact any ending from the adjectival paradigm could be used and the chosen ending was used simply because it can be found in several adjectival forms (the genitive and locative of dual and plural for all three genders in Slovenian), based on which we expected to get a larger number of relevant results. We consequently excluded all the forms that do not have a full verbal paradigm.

The search yielded a sample of 111 verbs. We additionally applied the reduced relative clause test to these verbs, leading to exclusion of 3 verbs (which we further discuss in Section 4.1). In addition, we tested the 111 verbs for telicity and perfectivity (also discussed in 4.1). We classified the remaining verbs with respect to their theme-vowel class. **Table 2** gives the results for the 108 unaccusative verbs. For comparison, we add the relevant data from the 3000-verb sample described in footnote 4.

TV-CLASS	%UNACC(N)	%ALL(N)	RATIO UA/ALL	RATIO UA/ALL(CLASS-UA)	%ACC(N)
e/i	53.7% (58)	4.17% (125)	12.89	2.74	24% (30)
∅/ne	4.63% (5)	0.87% (26)	5.34	1.13	50% (13)
e/e	2.78% (3)	0.43% (13)	6.41	1.36	46% (6)
ni/ne	15.74% (17)	4.8% (144)	3.28	0.70	65% (94)
∅/e	23.15% (25)	11% (330)	2.1	0.44	74% (244)
a/je	0	12.5% (375)	0	/	78% (291)
a/a	0	34.9% (1047)	0	/	71% (747)
a/e	0	1.2% (36)	0	/	92% (33)
a/i	0	1.23% (37)	0	/	41% (15)
i/i	0	28.8% (864)	0	/	86% (745)
defective	0	0.1% (3)	0	/	0

Table 2: Distribution of verbs with respect to theme-vowel classes.

The table compares the distribution of theme-vowel classes in unaccusative verbs (based on the 108-verb sample) to their distribution in all verbs (based on the 3000-verb sample). The *defective* group includes the irregular verbs *biti* ‘to be’, *imeti* ‘to have’ and *iti* ‘to go’.

The column ‘%UNACC(N)’ shows the percentage of unaccusative verbs (based on the 108-verb sample) belonging to each theme-vowel class (followed by the absolute number between brackets), whereas the column ‘%ALL(N)’ shows the percentage of verbs belonging to specific theme-vowel classes in the 3000-verb sample (again followed by the absolute number between brackets). The column ‘RATIO UA/ALL’ shows the ratio between the previous two values including all theme classes, whereas the column ‘RATIO UA/ALL(CLASS-UA)’ only considers the five theme-vowel classes that have unaccusative members.

In order to compare the two samples, we performed a χ^2 test, taking only positive values into account. The differences between the two samples are statistically significant (χ^2 test: $p < 0.0001$), which means that the distribution of theme-vowel classes is crucially different in the class of unaccusative verbs and in all verbs.

Finally, the last column, %ACC(N), is based on the coding of the 3000 verbs in our database, the relevant question being whether a verb *can* get an accusative argument (e.g., 92% of verbs in the a/e class can get an accusative object).⁸

Zooming in on the e/i class, 53.7% of the 108 unaccusative verbs belong to this class. At the same time, in the big sample only 4.17% of the 3000 verbs belong to this class. Tellingly, only 24% of verbs in the e/i class were coded as able to get an accusative argument.

Three general observations concerning (un)accusativity across theme-vowel classes can be made based on this table:

1. no unaccusative verbs belong to the two largest theme-vowel classes in Slovenian (a/a and i/i, previously described as the default theme vowels in Marvin 2002),
2. the two big theme-vowel classes tend to get accusative arguments quite frequently (71% and 86%, respectively), and
3. the e/i class stands out, since more than one half of the unaccusative sample falls into it and it is generally also not associated with accusative arguments (only 24% of this group can get an accusative argument).

⁸ Based on the coding of the database, we can give further insight into the 30 e/i-verbs that can get an accusative argument. Interestingly, only 7 out of these are not prefixed (*videti* ‘to see’, *skrbeti* ‘to worry/take care of’, *boleti* ‘to hurt’, *želei* ‘to wish’, *vrteti* ‘to spin’, *trpeti* ‘to suffer’, *viheti* ‘to swing’), while the remaining 23 are prefixed (and out of these, 15 are derived from the first mentioned 7 verbs). The fact that a majority of transitive e/i-verbs are prefixed is especially relevant given what we know about prefixation in Slavic, specifically that some (lexical) prefixes can change argument structure (see Biskup 2019 for a recent overview of prefixation in Slavic). This is relevant for verbs such as *pre-leteti* ‘to fly over’ (which was one of the 23 verbs). While *leteti* ‘to fly’ does not get an accusative argument (though it is not unaccusative, since it does not pass any of the tests, as it is also imperfective, see section 4.1), *pre-leteti* obligatorily gets either a PP complement or an accusative one (see Svenonius 2004b for an account of such verbs).

Still, note that prefixation does not have to change argument structure. For example, *po-leteti* ‘to begin flying’ in which *po-* is a superlexical prefix, (ii), does not exhibit a change in argument structure (as superlexical prefixes in general do not influence argument structure).

- (i) Letalo je pre-letelo mejo / čez mejo.
 Airplane.N AUX over-fly.PFV.ACT.PTCP.N border.ACC / over border
 ‘The airplane flew over the border.’
- (ii) Letalo je po-letelo (čez mejo) / *mejo.
 airplane.N AUX at-fly.PFV.ACT.PTCP.N over border / border.ACC
 ‘The airplane started flying over the border.’

A further class stands out as the opposite to the e/i class: the a/e class. No unaccusatives belong to this class and it is in turn typically associated with an accusative argument (92%).

Strong tendencies for theme-vowel classes to have accusative or non-accusative members are especially interesting since theme vowels are typically taken not to be related to a specific argument structure (recall the discussion in Section 3). As our data show, at least some classes tend to correlate with specific argument structure, which means that a model is needed which can account for such tendencies. In Section 5, we will only focus on the e/i class in order to account for its behavior. Before this, we briefly turn to the potential issues with the used unaccusativity diagnostic.

4.1 Issues with the diagnostics

As previously mentioned, the main advantage of the unaccusativity diagnostic used here lies in the fact that it is possible to apply it in a corpus study. However, three potentially problematic verbs ended up in the resulting list of unaccusatives created in this way (later excluded by an additional filter). In order to address these examples, we need to consider the issue of aspect.

One of the shortcomings of the reduced relatives test for unaccusatives in Slovenian proposed in Ilc & Marvin (2016), as the authors themselves note, is the fact that the test only works for perfective verbs. The following example shows this for the perfective verb *dozoreti* ‘to ripen completely’ and its secondary imperfective counterpart *dozorevati* ‘to ripen completely.IPFV’.

- (16) Sadje, dozorelo / *dozorevalo na soncu, smo pobrali
 fruit.N ripen.PFV.ACT.PTCP.N / ripen.IPFV.ACT.PTCP.N on sun AUX.1PL picked-up
 vsak dan.
 every day
 ‘We picked up the fruit that ripened in the sun every day.’

- (17) Dozorelo / *Dozorevalo sadje smo pobrali.
 ripen.PFV.ACT.PTCP.N / ripen.IPFV.ACT.PTCP.N fruit.N AUX.1PL picked-up
 ‘We picked up the ripe fruit.’

This may not be a shortcoming, as it does seem that secondary imperfectives lose their unaccusativity. We can also find examples that show that the verb *dozorevati* can get an accusative argument (see also Aljović 2000 who shows that imperfectivization in BCS leads to the loss of unaccusativity):

- (18) Celice smo dozorevali v prisotnosti lipopolisaharida ...
 cells.ACC AUX.1PL ripen.IPFV.ACT.PTCP in presence lipopolysaccharide
 ‘We ripened the cells in the presence of a lipopolysaccharide...’ (Google)

- (19) Plodove smo dozorevali v atmosferi s CO2
 fruits.ACC AUX.1PL ripe.IPFV.ACT.PTCP in atmosphere with CO2
 ‘We ripened the fruits in an atmosphere with CO2...’ (Google)

The test used in this paper in general seems to behave in the same way as the reduced relative clause test. That is, all the verbs in the sample obtained with the help of adjectival L-participles were also tested for perfectivity and telicity and 108 verbs (out of 111) were shown to be both perfective and telic. However, somewhat surprisingly, 2 imperfective verbs and 1 biaspectual verb show up in our corpus search results. First, the imperfective verbs *gniti* ‘to rot’ and *vreti* ‘to boil’ pass the ‘L-participles as adjectives’-test, but not the reduced relative test (we only give the examples for *gniti*, but *vreti* behaves in the same way). Since the two verbs do not pass both tests, they were excluded from our list of unaccusative verbs.

- (20) *Sadje, gnilo na mizi, smo vrgli stran.
 fruit.N rot.IPFV.ACT.PTCP.N on table AUX.1PL thrown away
 Intended: ‘We threw away the fruit that had rotten on the table.’

- (21) Gnilo sadje smo že kompostirali.
 rot.ACC.PTCP.N fruit.N AUX.1PL already composted
 ‘We already composted the rotten fruit.’

Secondly, comparing unaccusative verbs given in Ilc & Marvin (2016) to our list of unaccusatives has shown that verbs on both lists belong to the same theme-vowel classes. There was one exception, as our corpus search results contained one verb from the a/je class, *napredovati* ‘to advance’. Interestingly, this verb is biaspectual and passes the tests for both telicity and atelicity:

- (22) a. Špela je napredovala 10 minut. [atelic]
 Špela AUX.3SG advance.ACC.PTCP 10 minutes
 ‘Špela advanced for 10 minutes.’
 b. Špela je napredovala v 10 minutah. [telic]
 Špela AUX.3SG advance.ACC.PTCP in 10 minutes.
 ‘Špela advanced in 10 minutes.’

In this case as well, the verb fails the reduced relative test, but also has an additional quirk. Unlike *gnil* ‘rotten’, ‘advanced’ has a highly lexicalized meaning, i.e. it means advanced in the medical sense (e.g., *napredovale faze raka* ‘advanced stages of cancer’, *napredovala bolezen* ‘advanced disease’). As with *gniti* and *vreti*, we excluded the verb from our list of unaccusative verbs.

Before we proceed, it should be emphasized that in the 111-verb sample only these verbs stood out with respect to perfectivity/telicity, or put differently, the remaining 108 verbs were all perfective and telic. Interestingly, this is also noted in traditional Slovenian grammars. Toporišič (1992: 22) observes that imperfective stative participles in Slovenian are relatively uncommon (but mentions *gnil* ‘rotten’ and *vrel* ‘boiling’ among the exceptions). This opens the question whether unaccusativity is possible without perfectivity or telicity. In other words, is there an issue with the tests (i.e. are the tests ‘faulty’, only giving us perfective and telic unaccusatives) or is it the case that imperfective/atelic verbs are never unaccusative? There are good reasons to assume that a relation between telicity and unaccusativity exists, since this relation has been observed many times in the literature (see van Hout 2004 and the references cited therein). As for aspect, while it is true that Ilc & Marvin (2016) claim that (im)perfectivity has an influence on the outcome of the test, they do not explain how they define (im)perfectivity. Similarly, Aljović (2000: 2) associates unaccusativity to (im)perfectivity, but also assumes telicity to be “some sort of perfectivity”, see also Aljović (2021). Given that a large body of work (again, see van Hout 2004 and the references cited therein) associates unaccusativity to telicity and the same was suggested for Slovenian (and BCS) by Boban Arsenijević & Stefan Milosavljević (p.c.) and Cetnarowska (2000) for Polish, we will assume a relation between unaccusativity and telicity,⁹ but we leave further exploration of the issue to further research.

⁹ A reviewer suggests verbs with the delimitative prefix *po-* as a potential differentiator between perfectivity and telicity, as verbs with delimitative *po-* are perfective but also atelic. Delimitative *po-* indeed works this way, as the verb *pospati* ‘to sleep for a bit/little while’ shows. Examples in (i) show that it is perfective, examples in (ii) that it is atelic.

- (i) a. *Miha je začel pospati.
Miha AUX.3SG started po-sleep.INF
- b. Samo še po-spim pa pridem.
only just po-sleep.PRS.1SG and come.PRS.1SG
‘I’ll just sleep for a bit and then I come.’
- (ii) a. Miha je po-spal pet minut.
Miha AUX.3SG po-sleep.PFV.ACT.PTCP pet minutes
‘Miha slept for five minutes.’
- b. *Miha je po-spal v petih minutah.
Miha AUX.3SG po-sleep.PFV.ACT.PTCP in five minutes

However, the issue is that Slovenian has a low number of verbs with the delimitative prefix *po-*, largely belonging to the stative class (Dickey & Hutcheson 2003: 27) and the prefix *po-* in our sample of unaccusative verbs acts as a completive affix, as in, for example, (23) and (24) in the next section. In fact, adding *po-* to verbs we identified as unaccusative, typically results in a completive reading (e.g., *zaledeneti* ‘to freeze’ – *po-zaledeneti* ‘to freeze over’), though note that *po-* cannot be added to some of the perfective verbs (*zakasneti* ‘to be delayed’ **po-zakasneti*). Unfortunately, this means that we cannot use *po-* to make a distinction between perfectivity and telicity in relation to unaccusativity.

5 The e/i class

In Section 3 we have seen that the theme-vowel classes in Slovenian are typically viewed as conjugation classes, which is in line with the claim that “theme vowels instantiate conjugation classes as purely morphological markers; that is, they determine the verb’s morphophonological surface shape but not its syntactic or semantic properties” (Oltra-Massuet 2020: 1). Furthermore, we considered the e/i class as one of the theme-vowel classes. However, as the previous section has shown, the e/i class is not ‘well-behaved’ with respect to the standard understanding of theme vowels, since we find a correlation between this class and unaccusativity. But the exceptionality of this class is not restricted to an exceptionally high number of unaccusatives. The e/i class is also exceptional if we consider (i) inchoative verbs, which fall into the e/i class (but do not necessarily belong to unaccusatives, despite their lack of an accusative argument), (ii) prosody and (iii) the preservation of the theme vowel in adjectival L-participles. We will address each of these properties in the following subsections.

5.1 A detour to deadjectival inchoative & causative verbs

The standard understanding of theme vowels mentioned above is also adopted by Marvin (2002: 95), who states that a theme vowel is “a piece of morphology that carries no syntactic information, such as agreement or case, and makes no contribution to meaning.” Marvin goes on to say that “the theme vowel appears solely for morphological reasons and is part of the morphological well-formedness of words in Slovenian (and many other languages)”. Finally, “each verb must have a theme, the choice being dependent on the root.”

If theme vowels do not capture semantic or syntactic properties of the verb, it is rather surprising that inchoatives, verbs which never project an external argument or get an accusative argument and are consistent with respect to their interpretation (i.e. ‘become x’), are related to the e/i theme-vowel class in Slovenian. On the other hand, their causative counterparts, which get an external and an accusative argument and the interpretation ‘make somebody/something x’, consistently fall into the i/i class. This restriction has already been observed in Marvin (2002: 100) for the deadjectival verbs of this class (*rumen-e-ti* ‘to become yellow’ vs. *rumen-i-ti* ‘to make yellow’).

Still, while we associated the e/i class with unaccusativity in the previous section, inchoatives do not necessarily behave like unaccusatives, since they do not all pass the unaccusativity test. The reason for this is imperfectivity (but see section 4.1), as only perfective verbs pass the unaccusativity tests we discussed here (the reduced relative and adjectival L-participle tests). So while non-prefixed deadjectival inchoative verbs are imperfective and do not pass the tests, their prefixed counterparts are perfective and do pass it. The comparison of the verb *modreti* ‘to become blue’ and its perfective prefixed counterpart *pomodreti* ‘to turn/become completely blue’ shows the contrast (note that *po-* does not change the argument structure):

- (23) *Obraz, *modrel / pomodrel zaradi pomanjkanja*
 face *become-blue.IPFV.ACT.PTCP / become-blue.PFV.ACT.PTCP because lack
kisika, ji je ostal v spominu.
 oxygen she.DAT AUX.3SG stayed in memory
 ‘The face turned completely blue because of the lack of oxygen, stayed in her memory.’
- (24) **Modrel / Pomodrel obraz je izkazoval*
 become-blue.IPFV.ACT.PTCP / become-blue.PFV.ACT.PTCP face AUX.3SG showed
pomanjkanje kisika.
 lack oxygen
 ‘The face turned completely blue showed the lack of oxygen.’

Still, even if non-prefixed inchoatives are excluded from the list of unaccusatives, they are still in line with the general tendency of the e/i class not to get an accusative argument. In fact, considering the list of unaccusative e/i verbs obtained with the help of the adjectival L-participles, 48 (out of the 58 identified) can be taken to be inchoative. As for the e/i-verbs in the database (n = 125), 28 can be taken to be inchoative.

5.2 Stress

The e/i class displays extremely uniform behavior with respect to stress: 97% of all the e/i verbs (in the 3000-verb sample) have the theme vowel stressed in both finite and non-finite forms. As a matter of fact, there is only one root which accounts for all the exceptions, that of *vid-e-ti, vid-i-mo* ‘to see, we see’ and its prefixed derivatives. Tellingly, this verb belongs to different theme-vowel classes in many widespread dialects (e.g., i/i in Styria, Upper Carniola, Lower Carniola and Ljubljana). This verb also stands out because of its argument structure, as it typically gets an accusative argument.

The correlation between stress and argument structure becomes more evident if we compare inchoative e/i-verbs to their causative i/i pairs. Specifically, inchoative verbs consistently get stress on the theme vowel, (25), whereas causative verbs have an alternating stress pattern with the stressed theme in the non-finite forms and stressed root in the finite forms (though some speakers consistently place stress on the root), (26).

- (25) a. *bel - é - ti*
 white- TV - INF
 ‘to become white’
- b. *bel - í - mo*
 white- TV - PRS.1PL
 ‘we become white’

- (26) a. bel - í - ti
white - TV - INF
'to make x white'
- b. bél - i - mo
white - TV - PRS.1PL
'we make x white'
- c. bél - i - ti
white - TV - INF
'to make x white'

The stress patterns in (25) and (26) actually illustrate the possible stress patterns of verbs in Slovenian. In other words, Slovenian verbs allow stress in two positions: either on the theme vowel or on the syllable preceding the theme vowel. While some theme-vowel classes tend to have stress primarily on the last syllable of the root (in the case of the a/a class, 92.37% of all forms get stress in this position), some on the theme vowel (in addition to the e/i-group, a/i also behaves in a similar manner, with 89.19% of verbs stressed on the theme vowel), some groups display varying behavior (the a/je class has theme stress in the infinitive in a majority of verbs (80.8%), but in the present tense all a/je verbs have stress on the syllable preceding the theme vowel).

While a detailed account of the attested stress patterns would go beyond the scope of this paper, we can offer some initial remarks. Unlike systems that lack lexical prosodic contrast in verbal prosody (see, Oltra-Massuet 1999 for Catalan and Oltra-Massuet & Arregi 2005 for Spanish predictable verb stress), Slovenian allows a limited, two-way contrast: stress on the theme vs. stress on the syllable preceding the theme. Simonović & Mišmaš (2021) argue that the two constellations come from two different structures (see Marvin 2002 for an analysis where stress is an indicator of syntactic structure). In their analysis, assuming that stress has to be assigned in the first cycle, a theme vowel can only be stressed when it is in the spellout domain of the root, whereas unstressed theme vowels are outside of the spellout domain of the root. We return to the question of stress in relation to e/i verbs in section 6.1.

5.3 Preserving the theme vowel

The e/i class is also exceptional with respect to the preservation of the theme vowel in past and adjectival L-participles. Since the latter can only be found in the few theme-vowel classes in which we find unaccusatives, we only give examples from these classes. In the e/i class, (27), theme vowels are preserved in both verbal and adjectival L-participles. The same is true of the very small class e/e, as illustrated in (28).¹⁰ The third class, ni/ne, is more complicated. Its

¹⁰ In our unaccusative sample, this class only contains three verbs, all sharing the same root: *u-sp-e-ti* 'succeed', *pri-sp-e-ti* 'arrive' and *do-sp-e-ti* 'arrive'. This extremely limited sample is the reason why we don't analyse this class further.

infinitive theme vowel, *ni*, never surfaces in the adjectival L-participles. Instead, it either surfaces as *nu* (29a) or disappears altogether (29b).¹¹

- (27) a. dozor -e -ti / je dozor -e -l / dozor -e -lo sadje
 ripen -TV -INF / AUX ripen -TV -ACT.PTCP / ripen -TV -ACT.PTCP-N fruit.N
 ‘to ripen, has ripened, ripened fruit’
- b. zard -e -ti / je zard -e -l / zard -e -l dojenček
 blush -TV -INF / AUX blush -TV -ACT.PTCP / blush -TV -ACT.PTCP.M baby.M
 ‘to blush, has blushed, baby who blushed’
- (28) prisp -e -ti / je prisp -e -l / prisp -e -la gospa
 arrive -TV -INF / AUX arrive -TV -ACT.PTCP / arrive -TV -ACT.PTCP-F lady.F
 ‘to arrive, has arrived, lady who arrived’
- (29) a. mi -ni -ti / je mi -ni -l / mi -nu -lo leto
 go-by -TV -INF / AUX go-by -TV -ACT.PTCP / go-by -TV -ACT.PTCP-N year.N
 ‘to go by, has gone by, year gone by’
- b. ugas -ni -ti / je ugas -ni -l / ugas -∅ -la sveča
 put-out -TV -INF / AUX put-out -TV -ACT.PTCP / put.off -TV -ACT.PTCP-F candle.F
 ‘to burn out, has burned out, extinguished candle’

In (30) we show examples from the two classes with no overt theme vowel in the verbal L-participle, ∅/ne and ∅/e. Both classes allow for adjectival L-participles with no modification. Note that [ə] in (30b) is epenthetic. Note also that in the final example the infinitive has the theme vowel realised as [e], added by a morphophonological rule, which ensures that there are no infinitives in *-rti*.

- (30) a. zaosta -∅ -ti / je zaosta -∅ -l / zaosta -∅
 fall-behind -TV INF / AUX fall-behind -TV -ACT.PART / fall-behind -TV
 -l tekač
 -ACT.PTCP.M runner.M
 ‘to fall behind, has fallen behind, runner who fell behind’
- b. odras -∅ -ti / je odras -[ə] -l / odras -[ə] -l
 grow-up TV -INF / AUX grown-up -TV -ACT.PTCP / grown-up -TV -ACT.PTCP.M
 pes
 dog.M
 ‘to grow up, has grown up, grown-up dog’

¹¹ As pointed out to us by a reviewer, this difference goes back to an old difference attested in verbal paradigms in Old Church Slavonic (see Nessel 2012 for an overview). Note that in Slovenian, strictly verbal forms, including verbal L-participles, never show this dichotomy.

- c. umr -e -ti / je umr -∅ -l / umr -∅ -l pacient
 die TV -INF / AUX die -TV -ACT.PTCP / die -TV -ACT.PTCP.M patient.M
 ‘to die, has died, patient who died’

We will return to this property of the e/i class in Section 6.2.1 after presenting the general analysis of the morpheme e/i.

6 So what is e/i? An analysis

In the previous sections we have shown that the e/i class is a standout with respect to the other theme-vowel classes regarding argument structure and stress. This makes e/i incompatible with the standard understanding of theme vowels, i.e. the proposal that theme vowels are purely ornamental, inserted post-syntactically (Embick 2010; Calabrese 2015; Oltra-Massuet 1999; Gribanova 2015, but see Oltra-Massuet 2020 for a recent overview of the issue). Once again, we would expect that theme vowels would not be related to any specific syntactic or semantic structure. While this is the case with other (major) classes in Slovenian, it does not hold for the e/i class.¹² This problematic behavior can be accounted for if we assume that e/i is in fact not a theme vowel, but rather a derivational affix, as we will do in the remainder of the paper. Furthermore, we argue that derivational affixes are adequately analyzed as transitive roots (following Lowenstamm 2014, see also Simonović 2020; Simonović & Mišmaš 2020). Our account relies on two basic assumptions. The first is the standard claim (in Distributed Morphology) that roots do not carry information about the category, but that the category is determined by a categorial head (Marantz 1997).¹³ The second assumption comes from a recent proposal in Lowenstamm (2014), according to which derivational affixes are viewed as transitive roots (or, as in Lowenstamm 2014, “bound” roots), which can select either other roots or categories. As other roots, derivational affixes have semantic and/or phonological content, while categorial heads are typically phonologically empty (since either all or most ‘traditional’ nominalizers, verbalizers and adjectivizers are now viewed as roots).

There are several predictions that follow from assuming that the morpheme e/i is a transitive root. We expect that it will be bound, we expect it to have some influence on stress and

¹² An analysis of theme vowels is offered in Marvin (2002: 95), who suggests that in Slovenian the theme vowel adjoins to the root to form a root phrase, which is only then categorized, but also notes that theme vowels could be adjoined to other category-forming heads, but not to any other functional heads, making Slovenian incompatible with the approach in Oltra-Massuet (1999), according to which a theme vowel is adjoined to each functional projection.

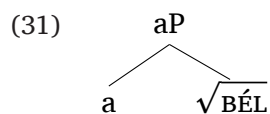
¹³ Note that there exist approaches according to which theme vowels have a specific function, for example they are light verbs/verbalizers, see Fábregas (2017) (for Spanish) and Svenonius (2004a) (for Slavic). Under this approach, the theme vowel is the realization of the *v* head. While our account is in principle compatible with such approaches, we are not making this assumption, because, as we show, the morpheme under consideration seems to be attested in other categorial contexts as well.

interpretation, and we also expect it to be able to show up in different categories. This is exactly what we find. We first start our discussion of *e/i* as a bound root by presenting arguments for the root-selecting behavior of *e/i* from stress and segmental differences in inchoative-causative pairs in 6.1 In 6.2 we show arguments that *e/i* is itself a root and extend this proposal to L-participles. In 6.3 we give the interface instructions for \sqrt{E} .

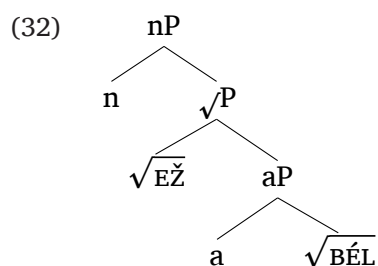
6.1 Inchoatives are deradical

We have so far termed verbs such as *beleti* ‘to become white’ deadjectival. However, the stress and the segmental content of these verbs indicates that these are in fact not deadjectival but rather deradical.

As briefly argued in 5.2, all theme vowels that carry stress are arguably in the spellout domain of the lowest root. This is arguably true of all stress-attracting morphemes in Slovenian. Following Marvin (2002), Simonović (2020) and Simonović & Mišmaš (2020) assume that categorial heads trigger spell-out, which means (somewhat simplifying) that the material spelled out with the first categorial head will get stress, which will remain preserved in any further derivation. For an adjective such as *bel* ‘white’, the following is the relevant structure (for clarity, stress is marked on the root):



Simonović (2020) shows that this structure is preserved in true deadjectival nominalisations, e.g., *ež*-nominalizations, such as *bél-ež* ‘white wall paint’ and, consequently, so is stress:



Note that Simonović’s (2020) proposal is developed in a model where all derivational affixes are roots. In this case the root $\sqrt{EŽ}$ is adjective-selecting, as attested by the fact that it is never stressed and *ež*-nominalisations always have attested adjectives as bases. By the same token, we expect that deadjectival verbs will have stress on the root, since it is the aP that gets spelled out first. This is what we typically see in the causative members of the causative-inchoative pairs (in the finite forms for all speakers, and in all forms for at least some speakers). However, as the example

(25) in section 5.2 shows, this is not the case for the inchoative e/i-group, which consistently gets stress on the theme vowel (e.g., *pomodr-ě-ti* ‘to become completely blue’). The contrast becomes even clearer if we compare inchoative verbs to verbs derived from comparatives, which, to the best of our knowledge, cannot be analyzed in any other way than as deadjectival:

- (33) a. *krátek* / *krájš-i* / *krájš* - a - ti
 short.ADJ / shorter.ADJ-M / shorten - TV - INF
- b. *dólg* / *dáljš-i* / *dáljš* - a - ti
 long.ADJ / longer.ADJ-M / elongate - TV - INF

Based on stress behavior, we propose a deradical structure of inchoatives and the e/i verbs in general. How stress is assigned in these structures will be shown in the following section.

Returning to the complements of e/i, while most members of the e/i class indeed have bases which do not appear as independent roots (e.g., *trpeti* ‘to suffer’, but **trp* is not a word), a potential problem for the deradical analysis is presented by cases where the inchoative e/i verb includes an overt adjectivizer. One example is *led-en-ě-ti* ‘to become frozen’ (related to *led* ‘ice’ and *led-ěn* ‘icy, frozen’). In analyzing such cases we follow Simonović (2020), who allows for exceptional ‘stray’ roots in root complexes, in this case *en*. This analysis does predict, however, that ‘stray’ roots are used unsystematically, sometimes without attested corresponding adjectives. This is indeed the case, as testified by *dreven-ě-ti* ‘to become stiff’, related to *drv-ěn* ‘stiff, wooden’, where the expected adjective *??drev-ěn*, is judged unfamiliar by most speakers and there is no causative counterpart **dreveniti* ‘to make stiff’. The same is true of *črv-av-ě-ti* ‘to become maggot-infested’, related to *črv-iv* ‘maggot-infested, maggoty’ and *črv* ‘worm, maggot’, whereas the adjective **črv-av* and the causative verb **črv-av-i-ti* do not exist. One final example is *kost-en-eti* ‘to become stiff, to ossify’, which contains the adjective *kost-ěn*, which is registered in dictionaries, but not recognized by modern speakers.^{14,15}

¹⁴ A reviewer points out that we should show independent arguments for the affixes preceding e/i in the two words under consideration, *en* and *av*, being roots. While a detailed analysis would go beyond the scope of this paper, we list some evidence. One piece of evidence is the idiomatized meaning of the adjective *drv-ěn* ‘stiff, wooden’ (whereas the base *drv-a* refers to ‘firewood’), another is the fact that *av* shows up in other categories, e.g., in the verb *pre-kuh-av-a-ti* ‘overcook.IPFV’ from (6a), where it functions as a secondary imperfectiviser and in the noun *povez-av-a* ‘connection’ (cf. *povez-a-ti* ‘to connect’).

¹⁵ A reviewer points out that we should address an alternative analysis in which *drev-en-ě-ti* and *črv-av-ě-ti* actually are derived from *drv-ěn* and *črv-iv*, respectively, using some kind of ablaut rules. We could not find any other words which would follow these rules and an analysis which assumes ablauting processes for specific words is essentially unfalsifiable. A further disadvantage of such an account is that it actually turns roots into other roots as both *drev-* and *drv-* are independent roots (in *drev-o* ‘tree’ and *drv-a* ‘firewood’). The same is true of *iv* and *av* (e.g., in *hir-av* ‘withering’, related to *hir-a-ti* ‘to wither, waste away’ and *igr-iv* ‘playful’ related to *igr-a-ti* ‘to play’).

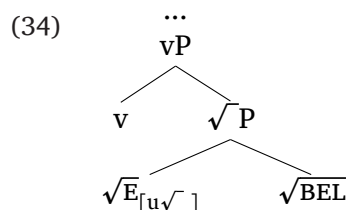
Our account further predicts that at least some inchoatives will show a root structure not attested in the causative pair. One such word is *rd-é-ti* ‘to become red’ (related to *rd-eč* ‘red’), whereby *rd* is not an independent word. This verb does not have the corresponding causative **rd-i-ti* ‘to make red’. Rather, for ‘to make red’ *rdeč-i-ti* is used. One further example in favor of a deradical analysis is *vdov-é-ti* ‘to become a widow(er)’. This verb is crucially used both for widowed females (*vdov-a* ‘widow’) and males (*vdov-ec* ‘widower’) and no specialized male-only form **vdovč-e-ti* is possible.

In sum, the stress pattern and the shape of the base in the inchoative group indicate that these verbs are not derived from adjectives, but that *e/i* is merged with a root.

6.2 E as a root

We have seen that *e/i* attaches directly to roots. If this morpheme is itself a root, \sqrt{E} , as we will argue in this section, this means the two roots form a so-called radical core. It is only the radical core that is then verbalized (we leave the higher functional structure aside here).

We assume that \sqrt{E} is a root that, following Lowenstamm (2014), cannot project to a phrasal level without a complement and given the data, the complement itself is a root, which means that \sqrt{E} comes with an uninterpretable feature $[u \sqrt{\quad}]$ that needs to be checked by its complement. It is therefore the “bound” character of \sqrt{E} that leads to the root-selecting behavior and the attested order of the two roots. This is shown in (34) for the inchoative verb *bel-e-ti* ‘to whiten’.



Assuming the representation in (34), the stress of the *e/i* class follows naturally from the stress assignment algorithm from Simonović (2020) and Simonović & Mišmaš (2020). According to them, all radical cores have the default stress, which in Slovenian is stem-final (in the sense that stress is placed at the end of the radical core). In the representation in (34), this means that stress falls on *e*. This is in fact consistent not only with inchoatives, but rather with 97% of the *e/i* group, as shown in 5.2. As for the only exception (*vid-e-ti* ‘to see’, *vid-i-mo* ‘we see’), for the varieties in which it exists, we need to resort to a ‘stray’ root analysis for this single item, where \sqrt{E} is combined with a categorized structure, most probably the noun *vid* ‘sight’.

Returning to the radical core, the verbalization of the radical core is then no different than the verbalization of a simplex root. Crucially, this means that we do not take the unaccusativity of the *e/i* class to be a consequence of the \sqrt{E} root. Rather the unaccusativity is due to the

structure under which it is embedded – we take this to be a v_{become} -head in the sense of Harley (2009), see also Folli & Harley (2007).

One important prediction of our analysis is that \sqrt{E} , being a root, should be able to appear in other contexts as well (be able and not must, since not all ‘traditional roots’ show up under different categories). We have identified at least a few candidates. There is a morpheme *e* in derived nouns of neuter or masculine gender denoting humans characterized by some negative property *počasn*-[*é*], *počasn-é-t-a* ‘a slowly moving person (NOM.SG, GEN.SG)’ (related to *počásen* ‘slow’), *usran*-[*é*], *usran-é-ta* ‘a coward, shitty person’ (related to *usrán* ‘dirty, shitty’). In addition, there is a nominal formant *e* in several animate masculine nouns (not denoting negative properties, but consistently denoting humans) such as [ǰ]č-*e*, *oč-é-t-a* ‘father (NOM.SG, GEN.SG)’, *Franc*-[*é*], *Franc-é-ta* ‘France (name) (NOM.SG, GEN.SG)’, *Tón*-*e*, *Tón-e-ta* ‘Tone (name) (NOM.SG, GEN.SG)’. We separate these from the nouns that denote a negative property due to stress – while in the negative-property nouns stress is consistently on *e*, in the second group the stress placement can vary.¹⁶ We can also add deverbal manner adverbs to the list, e.g., *sedé* ‘sitting down’ from *sesti* (underlyingly *sed-Ø-ti*) ‘to sit down’, *molčé* ‘quietly’ from *molč-a-ti* ‘to be quiet’, *hoté* ‘wantingly’ from *hot-e-ti* ‘to want’. Note that in all these cases, *-é* is added directly to the root. As evident from the examples, *e* can derive adverbs from roots found not only in unaccusative verbs, but verbs in general (*hoteti* ‘to want’ being transitive and *sesti* ‘to sit’ an unergative). There are also cases where the *é*-adverb has undergone further idiomatization, e.g., *mimogredé* ‘incidentally’ (related to *iti mimo/gremo mimo* ‘to pass by/we pass by’) and *gledé* ‘concerning’, related to *gled-a-ti* ‘to look’.

We can take stress of the *e/i* class together with the wide range of meanings associated with \sqrt{E} as arguments for \sqrt{E} in fact being a root. The same is true of the preservation of “theme vowels” in adjectival L-participles, to which we turn next.

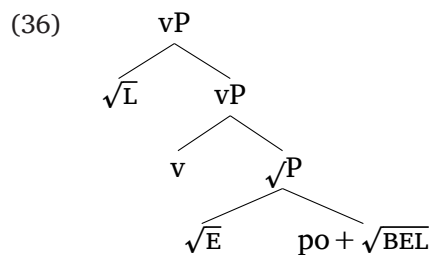
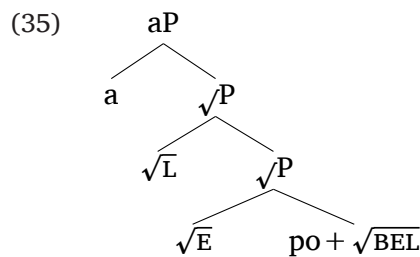
6.2.1 L-participles

We started the paper by discussing two different participles in Slovenian – the adjectival and verbal L-participles, where the adjectival participles have the ability to behave like attributive adjectives, while verbal L-participles are used in complex tenses. The proposal in the previous subsection in fact allows us to account for the difference between these participles.

Specifically, in section 5.3 we showed that *e/i* was the only theme-vowel-like element (next to *e/e*, attested with one root) that surfaces in adjectival L-participles. Proposing that \sqrt{E} is a

¹⁶ The traditional Slovenian grammar (Toporišič 2000: 280) also takes this *e* to be an affix, the crucial evidence being that this *e* is not a case ending. While nouns with the *e* affix (root) get an additional (epenthetic) *t* in the forms with an overt case ending (e.g., *počasn-é-t-a* ‘slow person.GEN’), this is not the case for nouns with the *e* as the nominative singular case ending, e.g., *sonc-e* ‘sun.NOM’, *sonc-a* ‘sun.GEN’.

root automatically explains why this is the case. We propose that L is a derivational affix and, as such, a root, which can merge with a root or a phrase (resulting in different interpretation, similarly to \sqrt{E} in different context, see the following subsection). The two types of L-participles are then different with respect to what they select and what they are selected by. In the instances of adjectival participles, \sqrt{L} attaches to the categoriless radical core, (35). In past participles, \sqrt{L} attaches to the verbalized structure, (36). (The structure is potentially more complicated, but we leave this aside here. We also leave aside the issue of prefixation.)



The question is again whether the root \sqrt{L} can appear in other contexts that are not associated with verbs. The answer is yes, since we can find it in cases such as *o-krog-e-l* ‘round’ and *krog-l-a* ‘sphere, bullet’ (both related to *krog* ‘circle’).

As for stress, the analysis is the same as before. The radical core (e.g., in (35)) will get default stress but since \sqrt{L} cannot be stressed, the vowel before \sqrt{L} gets stressed (except shwa, which is unstressable in most varieties). This is true of all the 108 adjectival L-participles in our data set, as well as of all the cases such as *o-króg-[ə]-l* ‘round’ and *króg-l-a* ‘sphere’.

Finally, the fact that e/i surfaces in adjectival participles (unlike all theme vowels) is evidence that e/i is not a theme vowel. That is, in adjectival participles \sqrt{L} consistently selects a \sqrt{P} , in which no theme vowels are present, hence we expect no theme vowels in adjectival participles. The preservation of \sqrt{E} in these cases is not surprising if \sqrt{E} is a root. On the other hand, in verbal participles, \sqrt{L} selects a full vP , which means that the theme vowels will surface just as in all verbal forms. Furthermore, since in the latter case a vP is selected, the stress of verbal participles will not be affected by \sqrt{L} (indeed, we find the same stress in the infinitive and verbal L-participles, e.g., *plés-a-ti* ‘to dance’, *plés-a-l* ‘danced’).

6.3 PF & LF instructions

As we have seen throughout the paper, the surface form of \sqrt{E} has one segmentally different allomorph, i.e., *i* in finite verbal forms. For this we propose the following PF list.

- (37) $\sqrt{E} \leftrightarrow i / _ [+ \text{finite}]$
 $\leftrightarrow e$ elsewhere

It needs to be noted that \sqrt{E} is not the only morpheme which can get allomorphs triggered by the finiteness of the higher functional structure. Another bound root that behaves this way, described in Simonović & Mišmaš (2020), is \sqrt{OV} , with *ov* ~ *u* allomorphy, e.g., in *pot-ov-a-ti* ‘to travel’, *pot-u-je-mo* ‘we travel’. A similar pattern is encountered in the ‘traditional’ root \sqrt{KL} with *kl* ~ *kol* allomorphy in *kl-a-ti* ‘to slaughter’, *kol-je-mo* ‘we slaughter’ (see also footnote 5).

The LF instructions for \sqrt{E} are more intricate. Assuming \sqrt{E} is in fact a root implies that the meaning of \sqrt{E} will be assigned as with any other root (e. g., \sqrt{DOG}). Specifically, we follow Harley (2014: 243), who proposes that “the identification of the correct interpretation of a given root in context, will work a lot like the identification of the correct vocabulary item for a root in context.” Following Harley (2014), we assume that roots are abstractly individuated in syntax and that there is a list for semantic interpretation in a specific morphosyntactic environment (similar to that for vocabulary insertion). For \sqrt{E} the interpretations are listed in (38):

- (38) $\sqrt{E} \leftrightarrow$ ‘to see’ / $[v[[_]][\text{vid}]_{\text{NP}}]_{\text{VP}}$
 \leftrightarrow ‘to suffer’ / $[v[[_]][\sqrt{\text{TRP}}]]_{\text{VP}}$
 \leftrightarrow ‘to worry’ / $[v[[_]][\sqrt{\text{SKRB}}]]_{\text{VP}}$
 \leftrightarrow ‘to hurt’ / $[v[[_]][\sqrt{\text{BOL}}]]_{\text{VP}}$
 \leftrightarrow ‘to wish’ / $[v[[_]][\sqrt{\text{ŽEL}}]]_{\text{VP}}$
 \leftrightarrow ‘to spin’ / $[v[[_]][\sqrt{\text{VRT}}]]_{\text{VP}}$
 \leftrightarrow ‘to swing’ / $[v[[_]][\sqrt{\text{VIHT}}]]_{\text{VP}}$
 {...other meanings in other context...}
 \leftrightarrow ‘person with property (in complement)’ / $[n[[_]][\sqrt{_}]]_{\text{NP}}$
 \leftrightarrow ‘0’ / $[v_{\text{become}}[[_]][\sqrt{_}]]_{\text{VP}}$
 No Elsewhere interpretation available

Crucially, assuming this list, nothing blocks \sqrt{E} from merging with a (transitive) *v* head, hence the existence of transitive verbs like *trpeti* ‘to suffer’ (see footnote 8), but the transitive interpretation will be available only in seven specific contexts. These are not grouped in a single entry, since they do not share argument structure (*videti* ‘to see’, *vihteti* ‘to swing’, *vrteni* ‘to spin’ are always transitive, *želeti* ‘to wish’ can be ditransitive, *trpeti* ‘to suffer’ is unergative or transitive, in *boleti*

‘to hurt’ and *trpeti* ‘to suffer’ the subject is the experiencer) and have different syntactic context (remember that \sqrt{E} in *videti* is a stray root, merging with an nP). Such treatment also has the advantage of separating \sqrt{E} from v_{become} , which means that unaccusative verbs that do not have \sqrt{E} are still possible (e.g., *odrastiti* ‘to grow up’). Finally, \sqrt{E} has no elsewhere interpretation, hence the restricted use that we describe here (see Harley 2014 for other such cases).

In this article we have pursued the claim that that all derivational morphemes are roots (via Lowenstamm) and have taken the ability of the morpheme *e* to appear in adverbial, nominal and verbal environments as an argument for *e* being a root. However, in a recent proposal, Creemers & Don & Fenger (2018) suggest that at least some derivational affixes are functional morphemes that realize categorial heads (as was proposed for all derivational affixes in standard Distributed Morphology literature, e.g., Marantz 1997). In their view, “only affixes showing categorial flexibility are roots; all other derivational affixes realize functional heads” (Creemers & Don & Fenger 2018: (6)). Even assuming these strict criteria, the *e* morpheme can still be taken to be a root, as it displays categorial flexibility. Still, one might argue that *e* only appears in a limited number of contexts. We can indeed find derivational morphemes/roots that are much more multifunctional, for example *ov*, which can be found in verbs, different possessive and kind adjectives and in the nominal declension (see Simonović & Mišmaš 2020). However, it is all but clear how versatile an element needs to be in order to be considered a bona fide root, since many unbound roots fail to appear in various categories (e.g., for many speakers of English *cat* is only a noun, *arrive* is only a verb and *nice* is only an adjective).

A final issue concerns the relation between the morpheme *e* and elements that actually work as theme vowels. If we take these verbs to be structurally comparable to all other verbs, built with a verbalized root, a question that we need to address is why we do not get a theme vowel in these cases (if theme vowels mark the same functional structure in all verbs). The most promising solution is allowing a very limited number of verbs to surface without an overt theme vowel. Other examples of such verbs include, following Šekli (2010), *imeti* ‘to have’, *iti* ‘to go’ and potentially *biti* ‘to be’, i.e. the three irregular verbs that we excluded from **Table 1**. This analysis is especially pressing for *imeti*, *imamo* ‘to have, we have’, since this seemingly regular verb always has a vowel before the inflectional endings, but this combination of vowels (e/a) is not attested in any other verb (which means that we would potentially have to establish a whole new theme-vowel class just to include this verb). *Iti*, *gremo* ‘to go, we go’ also has vowels preceding the inflectional endings, while *biti*, *smo*, *je* ‘to be, we are, he/she is’ is unique in not having anything that could qualify as a theme-vowel in the present tense. While this means that a \emptyset/\emptyset class would be added to the list of theme-vowel classes a Slovenian, the potential advantage of allowing a \emptyset/\emptyset class is that all verbs include a position for theme vowels, with the former e/i theme-vowel class subsumed under this class.

7 Conclusion

This paper considered the intricate relation between theme vowels, stress and argument structure. On the empirical side, we expanded the list of unaccusatives in Slovenian and provided a refined two-step diagnostic for unaccusativity. Within the list of unaccusatives, we identified the e/i class as dominant and focused on this class. We presented arguments for singling out the theme-vowel class e/i and reanalyzing its theme vowel as a derivational affix (and, as such, a transitive root) which selects roots. Other theme classes are assumed to remain ornamental, although we identified a least one potential candidate for a similar analysis (the extremely transitive a/e class).

One residual issue is that the test(s) used to identify unaccusative verbs only yield prefixed perfective verbs. The issue of the relation between unaccusativity and perfectivity/telicity and prefixation is an important issue that we left aside. A further issue that we hope will be tackled by future work is that of transitive roots. The two roots that we identified here (\sqrt{L} and \sqrt{E}) are predicted to occur in various categorial environments. While we indicated some potential candidates, further work is necessary to confirm the adequacy of this approach.

Abbreviations

ACC = accusative, ACT = active, ADJ = adjective, AUX = auxiliary, BCS = Bosnian/Croatian/Serbian, DAT = dative, DU = dual, F = feminine, IMP = imperative, INF = infinitive, IPFV = imperfective, M = masculine, N = neuter, NOM = nominative, PASS = passive, PFV = perfective, PL = plural, PRS = present, PTCP = participle, SG = singular

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Competing interests

The authors have no competing interests to declare.

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