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Unlocking the verbal spine in Malayalam: Past tense is key

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The focus of the paper is the internal structure of the verbal spine. Our aim is to show, using data from Malayalam, how verbal structures can be built, allowing for a new understanding of verb alternations as well as the verbal spine. The paper provides a novel analysis of the various v/Voice features, and proposes the adjunction of a √AGENT to the functional heads v and Voice. The difference in the loci of adjunction of the √AGENT is shown to be directly correlated with the differences in the semantics of the verb with consequences for the argument structure, specifically, the external argument at Spec, VoiceP. This analysis not only unpacks the verbal spine to help build a uniform account of verb alternations, but also provides for a clear understanding of the complex past tense morphology in the language. The contextually driven allomorphy of the past tense is shown to be directly linked to the morphosyntactic features and the expression of the exponents at v/Voice. The paper also proposes that the feature specifications on the verbal spine are becoming synchronically opaque for a variety of reasons, and are often only indirectly recoverable via the past tense morphology.

1 Introduction

A central concern in morphosyntax is the elaborated structure of the verbal spine and its relationship with morphological verb alternations. In this paper, we develop an analysis of the verbal spine of Malayalam to account for the observed alternations (unaccusatives, unergatives, transitives, and low causatives) and argue for a structural pattern that is different from the patterns discussed in the literature. The analysis presented here also allows us to explain the complex past tense morphology in the language. Previous studies on Malayalam verbal morphosyntax have looked at aspects of finiteness, tense marking, and complex predicate structures (Babu & Punnappurath 2003; Killimangalam & Michaels 2006; Amritavalli & Jayaseelan 2008; Menon 2011; Swenson 2017; 2019), but have not considered the internal composition of the verbs themselves. In unpacking the various verb forms, we demonstrate how different roots combine with the functional heads v and Voice with varying morphosyntactic features and how the expression of such features can be directly correlated with the complex past tense allomorphy in the language, and how the past tense allomorphy in turn allows us to unlock the verbal spine and recover the morphosyntax of verbs. Using the framework of Distributed Morphology (DM) (Halle & Marantz 1993; 1994), we show how a single root can participate in different verb spines and yield different verbs with predictable consequences for the semantics as well as the syntax. Our analysis of Malayalam also brings new data to bear on the much researched topic of causative alternations across languages.

Malayalam exhibits the same causative-inchoative alternation that we find in English, as shown in (1) and (2).

(1)   *break*
    a.   The vase broke
    b.   The man broke the vase

(2)   *poṭṭ-* 'break$_{intr}$' ~ *poṭṭikk-* 'break$_{tr}$'
    a.   kalam   poṭṭ-um
        pot.NOM break-FUT
        'The pot will break.'

    b.   aʋan   kalam   poṭṭikk-um
        he.NOM   pot.ACC break.FUT
        'He will break the pot.'

Malayalam also allows for alternations as in (3) and (4) which are impossible in English (5), but are attested in other languages like Hebrew (6) and Japanese (7).

(3)   *paaṭ-* 'sing' ~ *paaḍikk-* 'make sing'
    a.   ammu   paaḍ-i
        Ammu.NOM sing-PST
        'Ammu sang.'

(b.) cinnu ammuʋi-ne paaɖiccu
Chinnu.NOM Ammu-ACC sing.PST
'Chinnu made Ammu sing.'

(4) *uɳɖaak-* 'become' ~ *uɳɖaakk-* 'make'

a. keʈʈiɖaŋŋaɭ uɳɖaay-i
buildings.NOM become-PST
'Buildings came to be built.'

b. haɾi keʈʈiɖaŋŋaɭ uɳɖaakk-i
Hari.NOM buildings.ACC make-PST
'Hari built buildings.'

(5) a. She sang/*Henry sang her
b. She danced/*The man danced her
c. Joe built the house/*The house built

(6) *rakad* 'dance' ~ *hirkid* 'make dance' (Schäfer 2009)

a. Hu rakad
He danced
'He danced.'

b. Ha-nagan hirkid oto
the-musician danced him
'The musician made him dance.'

(7) *tatu* 'come to be built' ~ *tateru* 'build' (Yamaguchi 1998)

a. ie ga tat-ta
house NOM build-PST
'The house came to be built.'

b. Bill ga ie o tate-ta
Bill NOM house ACC build-PST
'Bill built a house.'

Verb alternations in Malayalam are signalled morphologically either through phonological changes to the root or through the affixation of the morpheme *-kk*. We label the former *lexical* causatives and the latter *affixal* causatives to keep the two strategies distinct. Malayalam morphological causatives are formed differently in comparison to the ways in which similar complex verb forms are thought to be constructed in other languages. For example, in Tagalog, Halkomelem and Japanese (Nie 2020), morphological causatives are generally analysed as affixed forms that realise Voice as either 'transitive' or 'causative'. In Malayalam, morphological

valence changes are enabled by the adjunction of an agentive root (√AGENT) to the syntactic heads v and/or Voice. The adjunction of the √AGENT at v adds *agentive* semantics to the verb (v), while its adjunction at Voice adds *cause* semantics to the verbal complex. The formation of morphological causatives via the adjunction of an agentive suffix at Voice is not a strategy that has been discussed in the literature to the best of our knowledge.

We also show that the morphosyntactic outcomes at v and at Voice are integral to a determination of the visible past tense allomorphy. Past tense formation is itself an extensively discussed property of the language (Rajaraja Varma 1917; Wickremasinghe & Menon 1927; Kunjan Pillai 1965; Asher 1969; Nayar 1972; Valentine 1976; Sadanandan 1999). Previous studies have either included the affixal material within the verb stem (Rajaraja Varma 1917; Kunjan Pillai 1965; Valentine 1976) or, in some cases, have analysed a part of the verb root into the affix (Killimangalam & Michaels 2006). All such accounts are either incomplete and leave unexplained many observed features of the morphosyntax, or make incorrect predictions about the forms that may be produced and their semantics.

In fact, the differences across verbs in how past tense marking is instantiated is what enables us to unpack the verbal spine and identify its components, especially because the other inflectional affixes (such as tense or mood) apply across the board to all the verbs. This point can be clarified by considering verbs in Malayalam that are homophonous, but that are not identical in their underlying morphosyntactic structure. For example, the verb *ʈuukk-* can mean either 'hang' or 'sweep'. These different meanings are associated with two different roots, each participating in a different verbal derivation. The verb meaning 'hang' is the transitive counterpart of the intransitive *ʈuuŋŋ-* 'hang' with the valence change being reflected by phonological changes on the stem (here, denasalisation) as can be seen in (8).

(8)   *ʈuuŋŋ-* 'hang$_{intr}$' → *ʈuukk-* 'hang$_{tr}$' → *ʈuukkikk-* 'make hang'

   a.   ɳakṣaʈraŋŋaɭ ʈuuŋŋ-i
        stars.NOM   hang-PST
        '(There were) stars hung.'

   b.   aʋan   ɳakṣatram ʈuukk-i
        he.NOM star.ACC   hang-PST
        'He hung the star.'

   c.   kuʈʈi   ammay-e   koɳɖɨ ɳakṣatram ʈuukkiccu
        child.NOM   mother-ACC   with   star.ACC   make hang.PST
        'The child made the mother hang the star.'

However, the verb *ʈuukk-* with the meaning 'sweep' has the internal structure *ʈuu-* + *-kk* where the root *ʈuu-* combines with the exponent *-kk* that realises √AGENT. These two verbs also differ in their past tense forms, with the former selecting the past tense exponent *-i* (8b) and the

latter selecting the exponent *-Tu* (9a). The causative counterparts of the two verbs are also correspondingly different, building *ṭuukkikk-* 'make hang' (8c) and *ṭuuppikk-* 'make sweep' (9b), respectively.

(9)   *ṭuukk-* 'sweep' → *ṭuuppikk-* 'make sweep'

    a.   avaḷ   muttam   ṭuuṭṭu
        she.NOM courtyard.ACC sweep.PST
        'She swept the courtyard.'

    b.   avar   avaḷ-e   koṇḍɨ muttam   ṭuuppiccu
        they.NOM she-ACC with   courtyard.ACC make sweep.PST
        'They made her sweep the courtyard.'

In this paper,[1] we derive the different verb alternations in Malayalam and propose a unified morphosyntactic structure that will permit the different, underlying, verbal structures. We will also provide an account of the complex past tense allomorphy in Malayalam and correlate it with the analysis of the verbal spine. We will also offer different kinds of evidence to show that the vocabulary insertion rules of affixes at v and Voice are becoming synchronically opaque, with specific consequences for the morphology of the language.

    The outline of the paper is as follows. Section 2 provides the theoretical assumptions that we make about how the various morphosyntactic features on the functional heads v and Voice are manifested, together with an overview of Malayalam verbal roots and affixes. Section 3 offers a detailed discussion of the different verb structures and the attendant past tense allomorphy. Section 4 provides the evidence for the synchronic opacity of the vocabulary insertion rules. Section 5 presents the conclusions.

2 Malayalam morphosyntax

2.1 Theoretical Assumptions

In DM, an acategorial root is adjoined to categorising heads such as a, n, and v (Wood & Marantz 2017). The category assigning v head verbalises the root and merges the internal argument(s) as complement(s). The external argument is introduced by the higher functional head, Voice (Kratzer 1996; Pylkkänen 2008; Marantz 2013). Following Alexiadou & Anagnostopoulou & Schäfer (2006) and Pylkkänen (2008), we take v and Voice to be separate nodes along the verbal spine with the external argument being located in Spec, VoiceP. T is the locus of tense with only the exponent T, since Malayalam does not express *phi*-agreement.

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[1] The original data presented in this paper is based on the authors' judgements as native speakers of Malayalam and Tamil in consultation with other native speakers, far too many to name individually. When other resources (dictionaries and grammars) are used, they have been cited where relevant.

Since Malayalam, like many other languages, has overt intransitive morphology, we assume a uniform Voice head (following Alexiadou & Anagnostopoulou & Schäfer (2015) and others (Kastner 2019; Nie 2020)) for all verb types including unaccusatives where the Voice head, while present, nonetheless prohibits a specifier. To generate the different verbs, we propose the following. We assume that v in Malayalam is covert/null and that Voice can bear the features [+transitive], [−transitive] or be unspecified.[2] While the feature [−transitive] is realised by the vocabulary item *-N*, [+transitive] is phonologically null, but *always* induces phonological changes on the verb stem. Unspecified Voice has no phonological content. Phonologically null elements of the morphosyntax like v and unspecified Voice are assumed to be removed by *pruning* (Embcik 2010).

We also adopt the Voice theory (Alexiadou & Anagnostopoulou & Schäfer 2006; 2015; Kastner 2019) which takes causative alternation to be a Voice alternation without the introduction of an additional causing event into the syntax. In general, valency changing properties are attributed to v and Voice, and the morphemes indicating transitivity are assumed to be variant expressions of Voice as has been shown for German (Alexiadou & Anagnostopoulou & Schäfer 2015), Greek (Alexiadou & Doron 2012), Hebrew (Doron 2003; Kastner 2019) and other languages (Schäfer 2009). Both the lexical (formed via phonological change) and the morphological (formed via affixation) causatives of Malayalam are *low*-causatives which are cross-linguistically shown to be transitives, and to possess idiosyncratic properties such as differences in productivity, semantic opacity etc. (Marantz 1997; Travis 2000; Embick 2004). While the phonological changes that the verb undergoes to signal an increase in valency is assumed to be induced by the [+transitive] feature on Voice, the exponent *-kk* that marks such valence change is not an exponent of Voice, but an expression of √AGENT. Our treatment of *-kk* as an agentive morpheme, and not as either a causative or a transitive affix, follows from the fact that the exponent occurs with unergatives, transitives, and causatives (see Section 2.2). We will also show in detail in Section 3 that √AGENT may adjoin at v or Voice, or at both.

This approach is similar to that of Kastner's for Hebrew. Kastner (2017) introduces an element √ACTION which may be adjoined to Voice and which imposes a [+human] requirement on the DP in Spec, VoiceP. He sees √ACTION as an 'agentive modifier with predictable spell-out and consistent semantics'. Since this element does not have any syntactic requirements but has phonological and semantic content, Kastner proposes that √ACTION is root-like. We believe that this is true of the √AGENT that we are proposing for Malayalam as well. While √AGENT has semantic and phonological

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[2] We use the feature [±transitive] because we are not concerned about argument introduction but about argument licensing and/or case on a DP in the complement domain of Voice and not its Specifier. The morphophonology, including Vocabulary Insertion and morphologically triggered phonological rules, is, in this proposal, sensitive to this feature. [−transitive] groups unaccusatives and unergatives into a natural class which is crucial for Malayalam to reconcile the overt expressions of agentivity and intransitivity. [+transitive] on Voice allows it to look downwards, triggering phonological modifications on v. Thus, [±transitive] shows the relationships along the root-v-Voice path and is not strictly about the argument structure though the forms may on the surface be transitive. Our thanks to an anonymous reviewer who asked about the use of D as a possible feature. Our thanks also to Alec Marantz for detailed discussions in this regard.
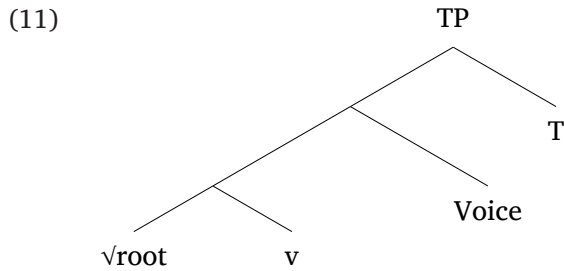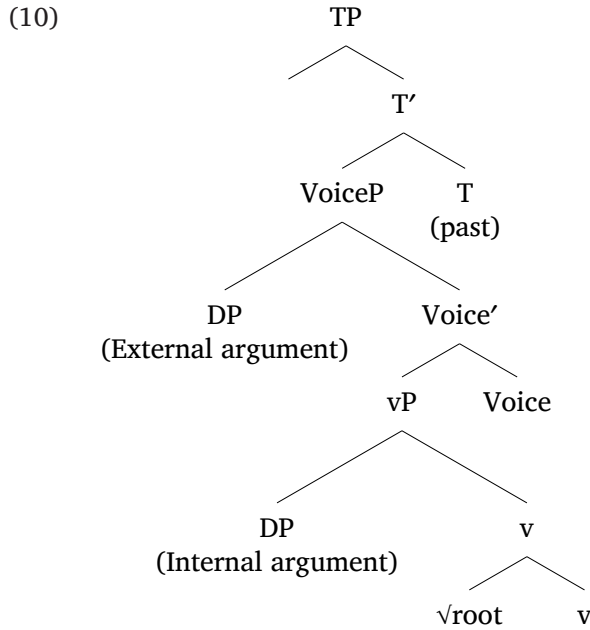
content, it does not have an impact on the syntax and, hence, it is also root-like. However, our proposed element √AGENT differs from Kastner's √ACTION in the following ways. √AGENT may adjoin to either v or to Voice, to even both or to neither. It does not impose a [+human] (or other) requirement on the external argument in Spec, VoiceP. Our proposed structure also differs from the Voice-over-Voice structure proposed by Nie (2020) for morphological causatives in languages like Halkomelem, Tagalog, Japanese, and Kinande. Unlike these languages, a single Voice head is enough to account for causative alternations in Malayalam, since morphological causatives are not formed via the affixation of transitive or causative morphemes but via √AGENT adjunction.

There is much cross-linguistic evidence to differentiate agentivity and causation (Sichel 2010; Alexiadou et al. 2013). In Malayalam, the *locus* of adjunction of √AGENT is directly correlated with the interpretation of the external argument as an *agent* or as a *causer*. The addition of √AGENT at v signals the direct performance of the action by the subject while its addition at Voice *always* signals causation, i.e., the external argument is the causer. However, both external arguments are agents, one that *acts* and one that *causes*. By default, Malayalam roots may have inherent agentive semantics which in turn will generate unergative and transitive structures without an overt agentive affix at v. However, there are certain roots that can only receive added agentive semantics through √AGENT adjunction at v. There are phonological properties of roots that distinguish the former type of verbs from the latter type. However, both kinds of roots can undergo √AGENT adjunction at Voice to produce low causatives. We see √AGENT on v as modifying the external argument of the root's event structure (root semantics) marking it as an *agent*, while √AGENT on the Voice modifies an added external argument, associated with intransitive/causative alternations.

The differences discussed above also underlie the two different valence changing processes in Malayalam that we outlined earlier, that is, phonological change on the verb (lexical causatives) versus *-kk* affixation (morphological causatives). These two processes are in complementary distribution. Intransitive to transitive alternations (e.g. *aaʈ-* 'swing$_{intr}$' – *aaʈʈ-* 'swing$_{tr}$') are effected on the verb stem by a Voice that bears the [+transitive] feature. Affixal transitives are derived, in our account, by the adjunction of √AGENT at v, and morphologically instantiated as *kk*-affixation. Thus, combinations of Voice$_{[+tr]}$ and √AGENT-v are in complementary distribution, and their co-occurrence is ruled out.

Contrary to the view offered by Amritavalli & Jayaseelan (2008) which argues that Malayalam lacks *Tense*, we assume here that Malayalam has the grammatical category Tense and a TP layer, as has also been argued for by Babu & Punnappurath (2003), Menon (2011), and Swenson (2017; 2019). These latter accounts all agree that Malayalam marks the past tense overtly, and this agreement is adequate for the purposes of this paper. However, Babu & Punnappurath (2003) and Swenson (2017) posit *-u* as a past tense affix, but we believe that this identification is incorrect. In concurrence with Rajaraja Varma (1917) and Krishnamurti (2003), we take the two past tense exponents to be *-Tu* and *-i.*

We propose (10) as the basic morphosyntactic structure for Malayalam, a head-final language. Since this paper focuses on the generation of different verb structures stemming from the combination of various morphosyntactic features on v and Voice together with the subsequent selection of the past tense allomorph, we will use the minimal structure given in (11) in the discussions that follow.

(10)

```
                    TP
                   /  \
                      T'
                     /  \
               VoiceP    T
              /   \     (past)
           DP      Voice'
      (External     /  \
       argument)  vP    Voice
                 /  \
               DP    v
         (Internal  / \
          argument) √root  v
```

(11)

```
                    TP
                   /  \
                  /    T
                 /    \
                /     Voice
              /  \
          √root   v
```

2.2 Roots, affixes, and verbal forms in Malayalam

We can identify two primary types of verb structures in Malayalam: i) structures with no intervening affixes at v/Voice between root and T,[3] and ii) structures with phonologically expressed features/affixes at one or the other of v and Voice or at both. In the former type, the

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[3] In our discussion of the verbal spine, we take VoiceP to directly merge with T. Swenson (2019) argues that Malayalam does not have a perfective feature at AspP and suggests two ways in which perfectivity could be encoded in Malayalam grammar. We broadly agree with one of Swenson's proposals that no AspP is present in the syntax, and that the verbs themselves are enriched for the perfective semantics. Consequently, aspectual interpretations will not change the Tense allomorphy analysis provided here. Our thanks to the reviewer who asked us to clarify the question of Aspect as a functional node.

semantics of the root is fixed when it combines with v and this structure can yield unaccusatives, unergatives, and transitives. For example, *minn-* 'strobe' (12) is an unaccusative verb with an internal argument which must raise to Spec, VoiceP, while *paaḍ-* (13), an *action*, is a transitive verb with an internal argument (an object) as well as an external argument. The roots which generate unergative verbs and transitive verbs have inherent agentive semantics.

(12)   ʋiḻakkɨ   minn-i
        lamp.NOM   strobe-PST
        'The lamp strobed.'

(13)   ammu   paaʈʈɨ   paaḍ-i
        Ammu.NOM   song.ACC   sing-PST
        'Ammu sang a song.'

These verbs directly condition the allomorphy on T since, at Spell-Out, the categorised roots and T will come to be linearly adjacent to each other (assuming pruning) as shown in (14).

(14)   root-T adjacent
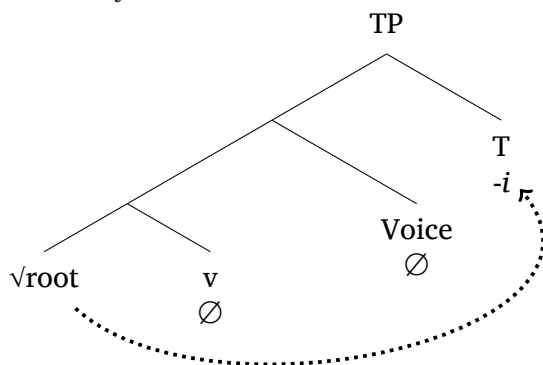
Any intervening exponents at the heads v and Voice have a crucial role to play both in the semantic interpretation of the verbs and in determining the alternation, intransitive or transitive. In these structures, the roots do not and, in fact, cannot condition the allomorphy at T since there are intervening affixes at v and/or at Voice, and the root cannot come to be linearly adjacent to T during Spell-Out. For example, absent affixes at Voice, v will come to be in a linearly adjacent position to T at Spell-Out and will provide the conditioning context for the past tense selection at T as in (15a). If there are affixes at Voice, then Voice and not v will provide the context for conditioning the past tense allomorphy at T as in (15b). We use dotted lines with and without a cross to visually represent possible/impossible adjacency relations. In short, a root can enter into different kinds of derivations by combining with v and Voice with varying feature specifications and derive verb spines with varying syntax and, consequently, semantics. We describe each structure in detail in Section 3.

(15) root-T non-adjacent

a.
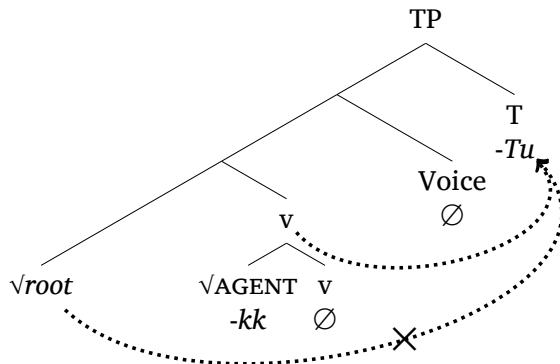
b.
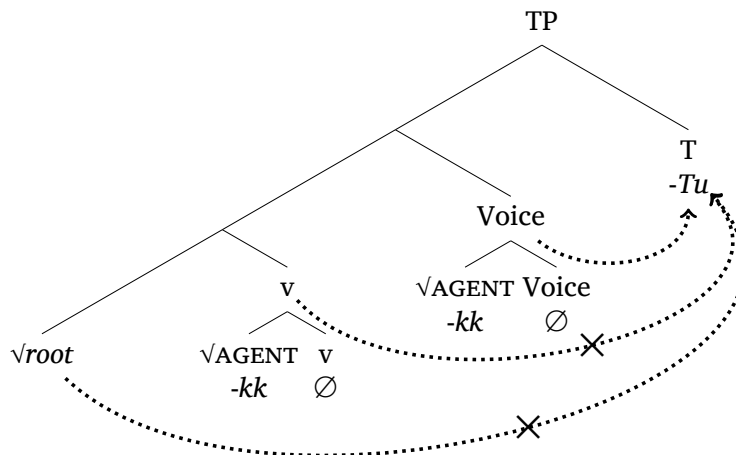
When the categorised roots themselves directly condition the allomorphy at T, the past tense exponent is realised as *-i*. In all the other cases, where the intervening affixes (at v and/or at Voice) condition the allomorphy at T, the past tense exponent that is selected is *always -Tu*, whose initial consonant /T/ is phonologically place-underspecified.

Malayalam has a number of transitive-intransitive pairs of verbs created from the same root.[4] Diachronically, the two affixes *-kk* and *-N* marked the transitive and intransitive (typically, unaccusative) verbs, respectively. Evidence for this is readily available in the history of Dravidian languages. For example, the root *kɨɟa-* forms the transitive (16) and the unaccusative (17) counterparts through such affixation of *-kk* and *-N*, respectively.

(16) *kɨɟa-* + *-kk-* 'mix$_{tr}$'
      ɲaan   maavɨ   kuɟaccu
      I.NOM   dough.ACC   mix.PST
      'I mixed the dough.'

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[4] Some of these roots may also be categorised as nouns and occur in the nominal syntax with adjectives, case, and number affixes.

(17) *kɯɖa- + -N-* 'mix_intr'
      maavɨ   kɯɖaɲɲu
      dough.NOM mix.PST
      'The dough got mixed.'

Krishnamurti (2003) identifies *-kk* as the transitivity affix and *-ntu* as the past tense marker for Proto-Dravidian intransitive verbs. Rajaraja Varma (1917) and Sadanandan (1999) also consider the nasal to be part of the past tense suffix. However, we differ from these accounts in arguing that the feature specification for *-kk* is not [+transitive] but [+agentive] and, further, that the past tense marker for intransitive verbs is not *-ntu* or *-Nu*, but *-Tu*, the actual past tense suffix, seen in combination with the [−transitive] affix *-N*. If *-kk* were a transitivising affix as suggested by Krishnamurti (2003), a feature clash between *-N* characterised as [−transitive] and *-kk* characterised as [+transitive] is inevitable while forming the past tense. We note that all verb forms that are generated through the affixation of *-kk*, whether transitive or intransitive, are *all* agentive. This becomes evident when we consider unergative verbs (agentive and intransitive) which have *-kk* and *-N* affixed at v and Voice, respectively, and select the past tense marker *-Tu* as shown in (18). Rajaraja Varma (1917) rightly treated *-kk* as an agentive suffix, but he considered these unergatives exceptional, since he could not explain the presence of the nasal. A closer analysis of these unergative verbs shows us that they are generated through the morphosyntactic combination in (19) with the corresponding morphophonological combination in (20).

(18) Unergative verbs in Malayalam:

Unergative verb	Past form	Example	Gloss
parakk + N- 'fly'	paraṉṉu	kiḻi paraṉṉu	The bird flew
naḍakk + N- 'walk'	naḍaṉṉu	avaḷ naḍaṉṉu	She walked
iɾikk + N- 'sit'	iɾiṉṉu	ɲaan iɾiṉṉu	I sat
n̪ilkk + N- 'stand'	n̪iṉṉu	avar n̪iṉṉu	They stood

(19) root + [+agentive] + [−transitive]

(20) root- + -kk + -/N/

Acquisition data provide us additional evidence for the affixal nature of *-N* and *-kk*. Omission errors in early productions are seen to target affixal morphemes and children often omit one or the other of these morphemes (among others) in their utterances, establishing their affixal status (Krishnan 2019).

(21) ceecci   n̪ookk-i-*iɾicc-appam   oɾu kaḍ-eelɨ oɾu kokkin-e   kaṇḍu (A, 2;5.16)
      ceecci   n̪ookk-i-iɾiṉṉ-appam   oɾu kaḍ-eelɨ oɾu kokkin-e   kaṇḍu [expected form]
      sister.NOM look-PTCP-sit.PST-ADV one shop-LOC one crane-ACC see.PST
      'When sister looked, she saw a crane.'

(22) iviɖe *ʋeyy-aam   (A, 2;4.18)
      iviɖe ʋey**kk**-aam   [expected form]
      here put-MOD
      [ɳamu-kkɨ] [bukkɨ]   iviɖe ʋeykk-aam   [full form]
      [we-DAT]   [book.ACC] here put-MOD
      'Let's put the book here.'

Extant accounts of verbal morphology in Malayalam analyse the agentive -*kk* and intransitive -*N* markers quite differently. While Krishnamurti (2003) identifies it as a transitivity affix, Sadanandan (1999) treats -*kk* as a causative affix, and Killimangalam & Michaels (2006) argue that it plays three different roles, namely, a verbaliser, a transitiviser, and a causativiser. These characterisations are all inaccurate.

Killimangalam & Michaels (2006) and Michaels (2009) propose that -*kk* affixation applies across the board to all roots. In roots where -*kk* affixation is not seen overtly, they argue that it has coalesced with the root. However, they then concede that their coalesced roots' behaviour with respect to past tense selection, compounding, and OCP (Obligatory Contour Principle) effects is inexplicably different from the roots that bear the affix overtly. We demonstrate that valence change is signalled in more than one way and that there is no need to suppose any coalescence of root with some underlying affix, because such an account fails to explain the morphosyntactic behaviour of these verbs.

We have already demonstrated that -*kk* is an agentive suffix (seen on intransitive and transitive verbs) as has also been pointed out by Marantz (2007). The unaccusative *poʈʈ*- 'break', for example, can be changed to the transitive *poʈʈikk*- 'break' by adding the agentive affix -*kk*. This is not causativisation. In fact, a second change can be effected by stacking the -*kk* suffix, i.e., adding the agent (a causer) with concurrent OCP (Sadanandan 1999; Killimangalam & Michaels 2006) induced dissimilation of the first -*kk* to -*pp*, as in (23). In this causative construction, the causee can appear as an (optional) oblique instrumental argument or may remain implicit as shown in (23c). The OCP effect that changes -*kk-kk* to -*pp-kk* as in *poʈʈippikk* 'break$_{cause}$' only occurs when there is a stacking of two -*kk* affixes. All sequences of -*kk-kk* are not similarly treated by the phonology, and OCP application requires this recursive morphological context. We must also point out that the visible -*cc*- sequence in the past tense forms as in (23c) *poʈʈippiccu* is not the product of OCP. The -*cc*- sequence is the result of assimilation of the underspecified /T/ of the past tense suffix -*Tu*.[5]

(23) *poʈʈ*- 'break$_{intr}$' → *poʈʈikk*- 'break$_{tr}$' → *poʈʈippikk*- 'break$_{caus}$'
      a. kuɖukka   poʈʈ-i
          piggy bank.NOM break-PST
          'The piggy bank broke.'

---

[5] There are a number of phonological effects in Malayalam which are syllable structure sensitive. We do not discuss them further here.

    b. amma   kuḍukka   poṭṭiccu
       mother.NOM piggy bank.ACC break.PST
       'The mother broke the piggy bank.'

    c. kuṭṭi   [ammay-e   koṇḍɨ]ₚₚ kuḍukka   poṭṭippiccu
       child.NOM [mother-ACC with]   piggy bank.ACC break.PST
       'The child made the mother break the piggy bank.'

The feature [+ transitive] on Voice has no exponent with phonological content, but induces alternations which are evidenced as direct phonological changes on v. Such changes are possible since root-v-Voice are thought to be part of the same phase (Marantz 2007). The feature [− transitive] is realised by the exponent -*N* which can only be phonetically interpreted if it is followed by a consonant-initial suffix with which it can share a phonological timing slot and acquire place of articulation features. Except for the past tense exponent -*Tu*, other verb inflections in Malayalam are either vocalic or vowel-initial suffixes. Hence, the nasal that marks [− transitive] becomes *visible* only in the past tense forms. The exponent -*Tu* at T can look back and anchor the nasal at Voice. Since both the nasal /N/ and the consonant /T/ of the past tense affix lack place features, they may assimilate a place feature from the root; absent a suitable root consonant, they may be assigned the default place value (which in Malayalam is dental). In the other tense forms, the nasal, lacking a supporting consonant, will fail to be phonologically represented and receive a phonetic interpretation and must delete, as shown in (24).

(24)   Appearance of exponent -/N/ in past tense forms:

Root	Present	Future	Infinitival	Past
ṭiṟiy- 'turn_intr'	ṭiṟiy-uṇṇu	ṭiṟiy-um	ṭiṟiy-aan	ṭiṟiɲɲu
kuray- 'decrease_intr'	kuray-uṇṇu	kuray-um	kuray-aan	kuraɲɲu
ʋiiɻ- 'fall'	ʋiiɻ-uṇṇu	ʋiiɻ-um	ʋiiɻ-aan	ʋiiɳu

This is one of the main ways in which the past tense morphology helps us unlock and tease apart the components of the verbal spine. The mysterious appearance and disappearance of the nasal with the different tense affixes which has troubled many grammarians can now be clearly accounted for and easily understood in our account.

    Conversely, the agentive exponent -*kk* is not visible in the past tense forms since it creates consonant clusters that are not permitted by Malayalam phonotactics when it co-occurs with the consonant-initial past tense affix. The agentive affix is, however, visible in all the other tense forms because resyllabification separates the clustered consonants using the available onset position of an adjacent vocalic or vowel-initial verbal suffix as shown in (25).

(25) Deletion of exponent *-kk* in past tense forms:

Root	Present	Future	Infinitival	Past
ṭiɾi- 'turn$_{tr}$'	ṭiɾi**kk**-uṇṇu	ṭiɾi**kk**-um	ṭiɾi**kk**-aan	ṭiɾiccu
para- 'fly'	para**kk**-uṇṇu	para**kk**-um	para**kk**-aan	paraṉṉu
ṭiir̠- 'finish$_{tr}$'	ṭiir**kk**-uṇṇu	ṭiir**kk**-um	ṭiir**kk**-aan	ṭiirṭṭu

The complementary behaviour of these affixes in the various inflectional contexts not only supports our analysis, but demonstrates how phonotactics and morphophonology often obscure morphology, causing some underlying morphosyntactic properties to become invisible on the surface.

We summarise the preceding discussion briefly. Unlike what has been averred in earlier analyses, *-kk* and *-N* are agentive and intransitive affixes, respectively. The v in Malayalam is covert and Voice can be unspecified or bear the features [±transitive]. While Voice$_{[+tr]}$ has no phonological exponent, it *always* induces phonological changes on the verb stem and the feature is made visible by such changes. Voice$_{[-tr]}$ is instantiated by the exponent -/N/. √AGENT which can adjoin at either v or Voice, at both or neither is realised by the exponent *-kk*. The presence or absence of overt exponents in v and Voice is directly correlated with the selection of the past tense exponent; when the categorised root is linearly adjacent to T at Spell-Out, the affix *-i* is selected. When any overt exponents at v and Voice intervene, the affix closest to T determines the past tense allomorph at T, which is uniformly *-Tu*.

We must also point out that the past tense affix *-Tu* has several surface phonetic variants (which contribute to the surface complexity of the past tense morphology) in two series: (a) those without a nasal [*-ṭṭu, -ccu, -ṭṭu, -ṭu, -ḍu,* and *-ttu*], and (b) those with a nasal [*-ṉṉu, -ɲɲu, -ṇḍu, -ŋu,* *-ṉu,* and *-ṇḍu*]. The variants are the result of a series of phonological accommodations that are driven by Malayalam phonotactics and that apply at morpheme boundaries after the insertion of the affixal material *-kk -N,* and *-Tu*. We do not discuss these variants of *-Tu* further in this paper, but simply note that the phonological accommodations follow straightforwardly given the underlying morphosyntax, which is our core concern here.

3 Malayalam verb forms and differences in past tense marking

In this section, we show how different combinations of v and Voice values together with the adjunction of √AGENT at each and both of these heads generate the verb structures in the morphosyntax and produce the actual verb forms or alternations. The tree diagrams provided within each subsection show the structures through which the verb forms are derived via specific combinations of root-v-Voice-T and √AGENT. In **Table 1**, we provide the eight such structures that are possible in Malayalam. We see that an adjunction of √AGENT at v is not compatible with Voice$_{[+tr]}$. As mentioned earlier in Section 2.1, the combinations involving √AGENT-v and Voice$_{[+tr]}$ are ruled out, and they are in complementary distribution. We will return to this

		v values	
		$\mathbf{v}_{\varnothing}$	$\sqrt{\text{AGENT}} + \mathbf{v}_{\varnothing}$
Voice values	$\textbf{Voice}_{\varnothing}$	Form 1 (type: ua, ue, tr) *aaḍ-* 'swing'	Form 2 (type: ue, tr) *ṇanakk-* 'water'
	$\sqrt{\text{AGENT}} + \textbf{Voice}_{\varnothing}$	Form 3 (type: caus) *ṇanayikk-* 'make wet'	Form 4 (type: caus) *ṇanappikk-* 'make water'
	$\textbf{Voice}_{[-\text{tr}]}$	Form 5 (type: ua) *ṇana[N]-* 'get wet'	Form 6 (type: ue) *irikk[N]-* 'sit'
	$\sqrt{\text{AGENT}} + \textbf{Voice}_{[-\text{tr}]}$		
	$\textbf{Voice}_{[+\text{tr}]}$	Form 7 (type: tr) *aaṭṭ-* 'swing'	
	$\sqrt{\text{AGENT}} + \textbf{Voice}_{[+\text{tr}]}$	Form 8 (type: caus) *aaṭṭikk-* 'make swing'	

Table 1: Combinations of functional heads and the resulting verb forms*.

*The representative verb types for each combination are given in the table; ua/unaccusative, ue/unergative, tr/transitive, and caus/causative. Cells in grey indicate impermissible combinations.

in Section 3.5. The corresponding past tense selection will demonstrate that linear adjacency determines contextual allomorphy in all verb forms.

There are roots in Malayalam that belong to a default class and range over several verb types (see discussion of Form 1 below). These roots may already incorporate agentive semantics and produce transitive and unergative verbs directly. Absent such agentive semantics, they produce unaccusatives. All the other roots differ from these default roots in that *agentivity* is not built into the root semantics, and the generation of unergative or transitive alternants requires an added agentive component, i.e., $\sqrt{\text{AGENT}}$ adjunction at v. For example, the root *maay-* 'fade' without $\sqrt{\text{AGENT}}$ at v can only combine with a $\text{Voice}_{[-\text{tr}]}$ to generate the unaccusative verb (26), but with $\sqrt{\text{AGENT}}$ at v, it can generate a transitive verb (27).

(26) akṣaraŋŋaḷ maay-uṇṇu   (unaccusative)
     letters.NOM fade-PRS.PROG
     'Letters are fading.'

(27) kuṭṭi   akṣaraŋŋaḷ maay**kk**-uṇṇu   (transitive)
     child.NOM letters.ACC erase-PRS.PROG
     'The child is erasing the letters.'

However, both kinds of roots can undergo $\sqrt{\text{AGENT}}$ adjunction at Voice to form low-causatives. It would appear, then, that unlike agentivity, 'cause' is never present in the core semantics of the root and always follows derivationally, with changes along the verbal spine. We also note

that, in Malayalam, a full phonetic interpretation of the string only happens after material at T is added, since the phonological word seems to require such T information. For example, the stems *minn-* 'strobe' and *minnikk-* 'make strobe' are not legitimate phonological words in Malayalam and become pronounceable only when tense suffixes are added as in *minni/minnum* 'strobed/will strobe' and *minniccu/minnikkum* 'made strobe/will make strobe'.

3.1 Form 1

Form 1 may be considered the *default* in Malayalam and includes unaccusatives, unergatives, and transitives. The semantics of the root is fixed when it merges with v, and varying argument structures (or valencies) are possible as seen in Section 2.2. The roots that have inherent agentive semantics can generate Form 1 unergatives and transitives. The sample sentences below range over unaccusatives (28) and (29), unergatives (30) and (31), and transitives (32) and (33), and the past tense marker that is selected is uniformly *-i*.

(28) kaal   ṭenn-i   (unaccusative)
      leg.NOM slip-PST
      'Leg slipped.'

(29) kaṭakɨ   anaŋŋ-i   (unaccusative)
      door.NOM move-PST
      'The door moved.'

(30) puucca   ooḍ-i   (unergative)
      cat.NOM run-PST
      'The cat ran.'

(31) kuṭṭi   kaar-i   (unergative)
      child.NOM screech-PST
      'The child screeched.'

(32) ammu   saikkaḷ   ṭaḷḷ-i   (transitive)
      Ammu.NOM cycle.ACC push-PST
      'Ammu pushed the cycle.'

(33) kuṭṭi   bukkɨ   kiir-i   (transitive)
      child.NOM book.ACC tear-PST
      'The child tore the book.'

The functional heads v and Voice are both null in Form 1 and, at Spell-Out, the categorised roots come to be linearly adjacent to T after pruning, and can directly condition the allomorphy at T. The tense feature [+pst] is realised by the vocabulary item *-i*. Typically, the root is spelled-out

with no change at all at TP, except for the intervocalic voicing of obstruents post-affixation as shown in the structure in (34).[6] Examples of Form 1 verbs are given in (35).

(34)   *aaʈ-* + *-i* → *aaɖi* 'swung_intr'

TP

T_[+pst] ⟶ [aaɖi]
-i

Voice ⟶ /aaʈ/
∅

√*aaʈ*   v
            ∅
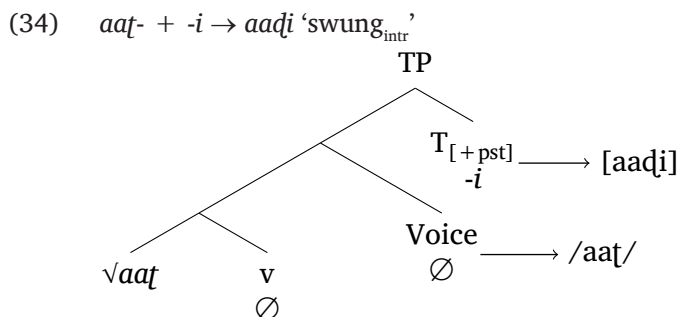
(35)   Form 1 verbs and past tense marking:

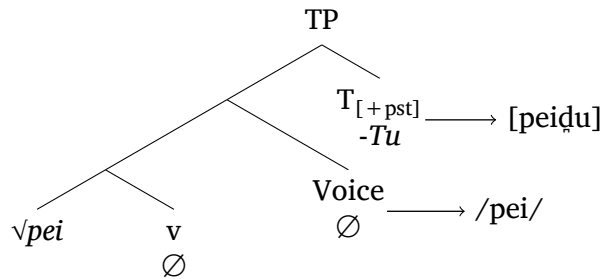| Verb + suffix	Past form
pook- + -i	pooyi 'went'
ʈeeʈ- + -i	ʈeeɖi 'searched'
minn- + -i	minni 'sparkled'
maŋŋ- + -i	maŋŋi 'faded'
ciɖar- + -i	ciɖari 'scattered'
ʈuɭumb- + -i	ʈuɭumbi 'brimmed'
ʈalooʈ- + -i	ʈalooɖi 'caressed'
ʈupp- + -i	ʈuppi 'spat'
opp- + -i	oppi 'wiped'
ɳakk- + -i	ɳakki 'licked'

Form 1 roots are, typically, phonologically heavy and, therefore, the selection of a vocalic affix is unsurprising. Open syllables are preferred in Malayalam and there is a strong tendency to break up heavy syllables by parsing a coda to a following onset as in (36).

(36)   *maar-* 'change' + *-i* → *maari* 'changed'
        C V V C   + V → C V V . C V
        m a a r   **i**   **m a a . r i**
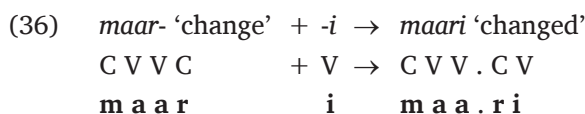
There is, however, a small set of about ten monosyllabic verbs with the same *default* morphosyntactic structure as in (34), but with the past tense allomorph *-Tu* instead of the predicted *-i* as shown in (37). These (C)VC roots and a few (C)Vi roots, all monosyllabic, show this exceptional pattern of past tense selection as in (38).

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[6] A notable exception to such intervocalic voicing is the root *pook-* 'go' which forms *pooyi* 'went'. The single obstruent coda [k] in *pook-* is an unstable segment and can undergo lenition yielding, in addition to *pooyi*, *poov-um* for *pook-um* 'will go' and *poov-aan* for *pook-aan* 'to go'. [k] undergoes lenition to a glide [y] with front vowels and [ʋ] with central and back vowels. Our thanks to the anonymous reviewer who directed our attention to this example.

(37)   *pei- + -Tu → peiḍu* 'showered'

```
                              TP
                 ╱─────────────╲
                ╱               T[+pst]  ⟶ [peiḍu]
               ╱              ╱  -Tu
              ╱         Voice ⟶ /pei/
             ╱           ╱  ∅
          √pei      v
                    ∅
```

(38)   Form 1 exceptions and past tense marking:

Syllable type	Verb + suffix	Past form
(C)VC	ṇaṭ- + -Tu	ṇaṭṭu 'planted'
	iṭ- + -Tu	iṭṭu 'put'
	viṭ- + -Tu	viṭṭu 'released'
(C)Vi	ei- + -Tu	eiḍu 'shot'
	pei- + -Tu	peiḍu 'showered'
	cei- + -Tu	ceiḍu 'did'
	nei- + -Tu	ṇeiḍu 'wove'
	koi- + -Tu	koiḍu 'reaped'

While the default roots that select *-i* may be either monosyllabic (e.g. *pook-* 'go') or bisyllabic (e.g. *ṭu.ḷumb-* 'brim'), none of them are of the syllable types (C)VC or (C)Vi. With no difference in terms of the values on the functional heads, the selection of the past tense allomorph is the only difference between the typical Form 1 verbs and these exceptions which also range over different verb types (as is typical for this Form) as shown in (39) to (41).

(39)   maɻa   pei-ḍu   (unaccusative)
       rain.NOM   cascade-PST
       'It rained.'

(40)   mukkuvan   vala   ṇei̤-du   (transitive)
       fisherman.NOM net.ACC   weave-PST
       'The fisherman wove the net.'

(41)   kuṭṭi   maɾam   ṇaṭ-ṭu   (transitive)
       child.NOM   tree.ACC plant-PST
       'The child planted the tree.'

The exceptional verbs demonstrate how phonology may interrupt morphology, and we offer here a brief discussion since it will help round out the analysis and provide some understanding of

this exceptional behaviour. First, while vowel length is contrastive in Malayalam, the language has very few diphthongised, native (C)ʋi roots. Second, the coda position is typically restricted to the sonorant consonants [m, n, ŋ, l, ḷ, r]. When other consonants occupy the coda slots, they are usually parsed into an onset through [ɨ]-epenthesis, as in the examples in (42).

(42) Examples of word-final coda and resyllabification:

Underlying form	Allowed	Disallowed
/miin/ 'fish'	miin	*miinɨ
/maŋam/ 'smell'	maŋam	*maŋamɨ
/ʋiiḍ/ 'home'	ʋiiḍɨ	*ʋiiḍ
/ṭaaɻ/ 'lock'	ṭaaɻɨ	*ṭaaɻ

As Kenstowicz (1994: p. 46) says, "The term diphthong is used more broadly to denote any sequence of tautosyllabic vowels. They need not necessarily share any phonological features and the entire sequence may count as a single time unit (mora)." Malayalam uses these distinctions in calculating syllabic weight as reflected, for example, in poetic metre Rajaraja Varma (1917). The behaviour of monosyllabic CVC and CVi roots shows that consonants other than [m, n, ŋ, l, ḷ, r] and the second element in the diphthongs (as opposed to long vowels) do not count as separate morae, and such syllables must be deemed to be light. The syllabic 'lightness' of these predicates is exceptional compared to the other roots of this class which, uniformly, are phonologically heavy/superheavy. This may be one reason to choose *-Tu* instead of *-i*. For the already /i/-ending CVi roots, a homophonous tense allomorph creates a morpheme identification problem. Further, a root final obstruent in CVC roots will become voiced in this context, effacing more of the root's already abbreviated form and making it homophonous with other words in the language. For example, the roots *ŋaṭ-* 'plant' and *iṭ-* form the past tense *ŋaṭṭu* and *iṭṭu*, respectively, with -Tu and not *-i*, possibly because *ŋaḍi* 'actress' and *iḍi* 'thunder' already exist in the language. This reasoning is also supported by the fact that disyllabic roots with the same final syllable shape choose the past tense marker *-i* as appropriate to their morphosyntax, as in *ŋeraḍ-i* 'mashed', *karuḍ-i* 'considered', and *peruɡ-i* 'multiplied'. These roots may have enough overall phonological material to support the choice of an *-i* while keeping the root's identity.

Finally, the CVi verbs trigger the intervocalic voicing property that is visible with the rest of the class (and more generally), and the CVC verbs show obstruent place-assimilation. That the shape of the past tense affix is *-Tu* is, thus, readily recoverable from the phonological shape of the verb with tense. It appears, then, that the exceptional roots being phonologically atypical for the class and not being driven by a phonological impetus to reset the syllable structure may have ended up selecting the affix *-Tu*, which is readily available in the vocabulary as a past tense exponent. In essence, this small set of monosyllabic predicates of Form 1 are the only true exceptions to our past tense selection account. We now return to a discussion of the other forms and the verbal features.

3.2 Forms 2–4

The structures of the verb spines that derive Forms 2–4 have a phonologically null v and Voice as in Form 1. The difference from Form 1 arises from the inclusion of √AGENT at different loci. √AGENT is adjoined at v in Form 2, at Voice in Form 3, and at *both* v and Voice in Form 4, presenting a continuum of verb building operations. In the examples (43) to (45), a single root *ṇanay-* 'to water' enters into each of these three different morphosyntactic combinations, building the verbs with different semantics. While (43) is transitive, (44) and (45) are both low causatives which are syntactically transitives. These low causatives can have a single agent which can be interpreted as both the 'agent' and the 'causer' (44). Alternatively, the external argument of the verb may only be the 'causer' and the 'causee' can be encoded by an oblique argument, an instrumental postpositional phrase (45) (similar to the by-phrase in English passives). We must point out that the phonological shape of each output verb form is different and systematically signals the structural differences. We discuss each structure with further examples in the following subsections.

(43) ammu   ceḍi-kaḷ   ṇanaccu   (Form 2: transitive)
      Ammu.NOM plant-PL.ACC water.PST
      'Ammu watered the plants.'

(44) maɻa   kriṣibʰoomi   ṇanayiccu   (Form 3: causative)
      rain.NOM farmland.ACC make wet.PST
      'Rain caused the field to get wet.'

(45) cinnu   [ammuʋi-ne koṇḍi] ceḍi-kaḷ   ṇanappiccu   (Form 4: causative)
      Chinnu.NOM [Ammu-ACC with]$_{PP}$ plant-PL.ACC   make water.PST
      'Chinnu made Ammu water the plants.'

3.2.1 Form 2

In Form 2, both v and Voice are null, and √AGENT is adjoined at v. The agentive affix *-kk* now sits between the root and T and, being linearly adjacent to T at Spell-Out, conditions the selection of the past tense allomorph, which is *-Tu*, as represented in (46).

(46)   *ṇana-* + *-kk* + *-Tu* → *ṇanaccu* 'watered'
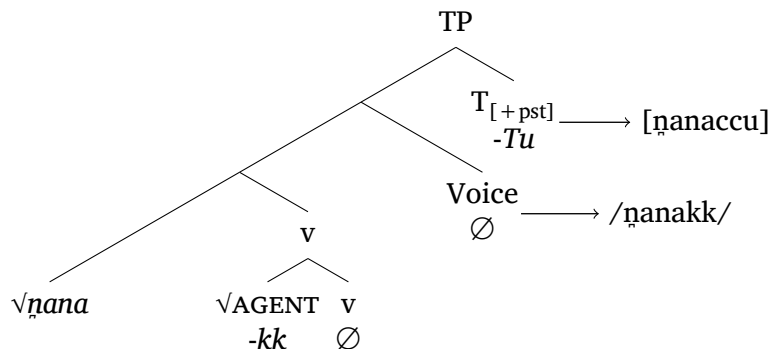
Form 2 verbs are typically transitives (47) or unergatives (48), but they never yield a causative interpretation. Examples of Form 2 verbs are given in (49).

(47) puucca eliy-e   kaḍiccu (transitive)
      cat.NOM rat-ACC bite.PST
      'The cat bit the mouse.'

(48) suuriya   ṇaṉṉaayi abʰinayiccu (unergative)
   Suriya.NOM well   act.PST
      'Suriya acted well.'

(49) Form 2 verbs and past tense marking:

Verb + suffixes	Past form
ṇana- + -kk + -Tu	ṇanaccu 'watered'
kuɻa- + -kk + -Tu	kuɻaccu 'mixed'
ṭiir- + -kk + -Tu	ṭiirṭṭu 'finished'
ciri- + -kk + -Tu	ciriccu 'laughed'
ḍaah- + -kk + -Tu	ḍaahiccu 'thirsted'

3.2.2 Form 3

Verbs that instantiate the Form 3 verbal spine are morphological causatives. Like the previous forms, both v and Voice are phonologically null. Here, √AGENT is adjoined at Voice as shown in (50). Again, the agentive affix -kk sits between the root and T at Spell-out, and determines the selection of the past tense allomorph -Tu.

(50)   ṇana- + -kk + -Tu → ṇanayiccu 'made water'
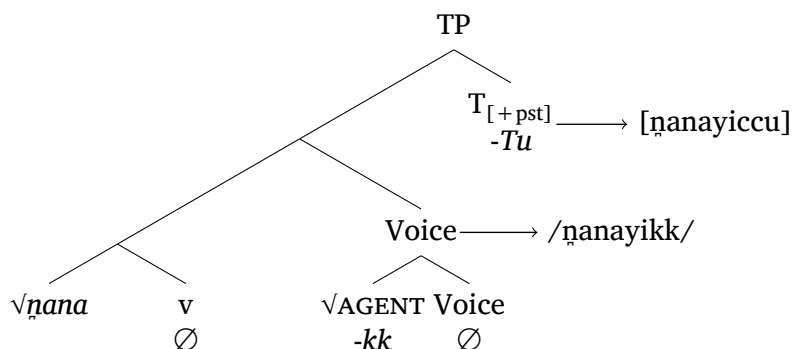
As discussed in Section 2.1, when √AGENT is adjoined at Voice, it invariably adds *cause* semantics to the verb, and the external argument is the causer (51). When the causer and causee are different entities, an oblique argument can encode the causee (52). Several examples of Form 3 verbs are given in (53).

(51) maɻa   ʋaɳḍi-kaḷ-e   ṭenniccu   (causative)
      rain.NOM   vehicle-PL-ACC make slip.PST
      'Rain caused the vehicles to slip.'

(52) amma   [kuʈʈiy-e   koɳḍɨ] kaakkay-e ooḍiccu   (causative)
      mother.NOM [child-ACC with]ₚₚ crow-ACC   chase.PST
      'The mother made the child chase away the crow.'
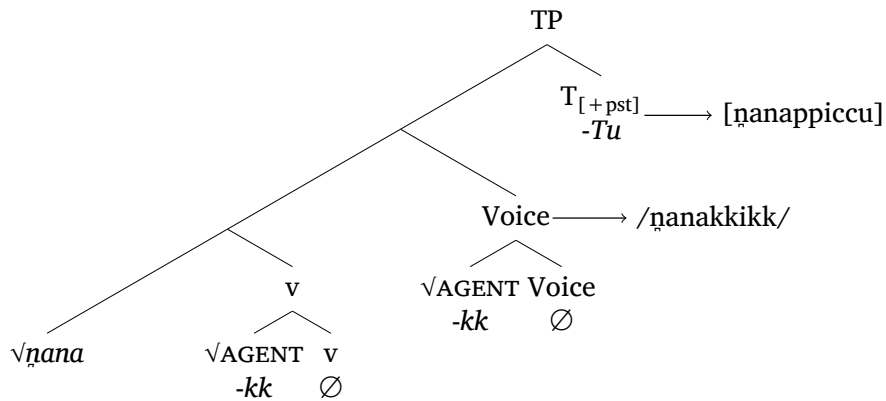
(53) Form 3 verbs and past tense marking:

Verb + suffixes	Past form
ṇana- + -kk + -Tu	ṇanayiccu 'made wet'
caɾi- + -kk + -Tu	caɾiyiccu 'made slanting'
ṭenn- + -kk + -Tu	ṭenniccu 'made slip'
paaḍ- + -kk + -Tu	paaḍiccu 'made sing'
ṭunn- + -kk + -Tu	ṭunniccu 'made sew'

3.2.3 Form 4

The Form 4 verbal spine, like that of Form 3, also yields morphological causatives. Both v and Voice are null, but √AGENT is adjoined at *both* heads resulting in the addition of two *-kk*s, one at v and another at Voice. In Forms 2 and 3, √AGENT is adjoined at only one locus, at v and at Voice, respectively. The adjunction of √AGENT at Voice instantiates the causative interpretation here as well (54). As in Form 3, when the causer and causee are different, an oblique argument can encode the causee (55). The past tense marker selected is *-Tu* as shown in (56). With the stacking of the two *-kk*s in the derivation, as we mentioned in Section 2.2, OCP applies to change the *-kk-kk-* sequence to *-pp-kk-*. This affix cannot recurse further not the least because a third *-kk-* will yield OCP violations with both potential sequences *pp-pp-kk* or *pp-kk-kk* and, more importantly, because v and Voice are the *only* loci available for the adjunction of the √AGENT. Other examples of Form 4 causatives are given in (57).

(54) maaḷu   maaʋɨ   puḷippiccu   (causative)
      Malu.NOM   batter.ACC make ferment.PST
      'Malu fermented the batter.'

(55) maayaaʋɨ   [kuʈʈuusan-e   koɳḍɨ] kuppi   ṭurappiccu   (causative)
      Mayavi.NOM [Kuttusan-ACC with]ₚₚ bottle.ACC make open.PST
      'Mayavi made Kuttusan open the bottle.'

(56) ṇana- + -kk + -kk + -Tu → ṇanappiccu 'made water'

```
                              TP
                            /    \
                          /       T[+pst] ⟶ [ṇanappiccu]
                        /          -Tu
                      /        \
                    /           Voice ⟶ /ṇanakkikk/
                  /            /    \
                v           √AGENT  Voice
              /   \          -kk      ∅
          √ṇana  √AGENT  v
                   -kk    ∅
```

(57) Form 4 verbs and past tense marking:

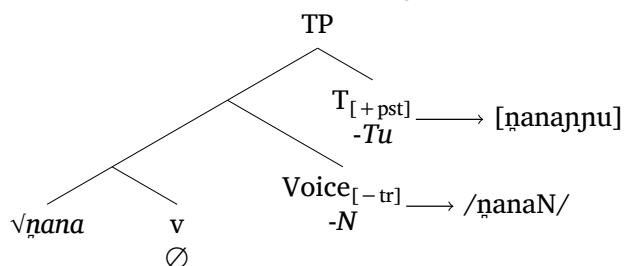| Verb + suffixes	Past form
ṇana- + -kk + -kk + -Tu	ṇanappiccu 'made water'
kuɻa- + -kk + -kk + -Tu	kuɻappiccu 'made mix'
aḍa- + -kk + -kk + -Tu	aḍappiccu 'made close'
ciɾi- + -kk + -kk + -Tu	ciɾippiccu 'made laugh'
ḍaah- + -kk + -kk + -Tu	ḍaahippiccu 'made thirsty'

3.3 Forms 5 and 6

Unlike the verb forms that we have discussed so far with phonologically null v and Voice, Forms 5 and 6 are different in that Voice has the feature [−transitive] that is instantiated by the exponent -*N*. In addition to a Voice$_{[-tr]}$, Form 6 also involves the adjunction of √AGENT at v.

3.3.1 Form 5

The Form 5 verb spine has a null v, but Voice bears the feature [−transitive]. It is the -*N* affix at Voice that conditions the affix selection at T, and the past tense affix selected is -*Tu* as shown in (58). Form 5 verbs are typically unaccusatives as shown in (59) to (61) and additional examples are provided in (62).

(58) ṇana- + -[N] + -Tu → ṇanaɲɲu 'got wet'

```
                        TP
                      /    \
                    /       T[+pst] ⟶ [ṇanaɲɲu]
                  /          -Tu
                /        \
              /           Voice[−tr] ⟶ /ṇanaN/
            /            \      -N
        √ṇana            v
                         ∅
```

(59) ceḍi-kaḷ   ṇanaɲɲu   (unaccusative)
      plant-PL.NOM get wet.PST
      'The plants got wet.'

(60) kuʈʈi   ʋiiṇu   (unaccusative)
      child.NOM   fall.PST
      'The child fell.'

(61) keʈʈiḍam   ʈakarṇu   (unaccusative)
   building.NOM   destroy.PST
      'The building got destroyed.'

(62) Form 5 verbs and past tense marking:

Verb + suffixes	Past form
ṇana- + -[N] + -Tu	ṇanaɲɲu 'got wet'
kuɻa- + -[N] + -Tu	kuɻaɲɲu 'got mixed'
ʈiiɾ- + -[N] + -Tu	ʈiirṇu 'got finished'
ʋaɾ- + -[N] + -Tu	ʋaṇṇu 'came'
ʋee- + -[N] + -Tu	ʋeṇḍu 'got boiled'

3.3.2 Form 6

Form 6 too has a null v and, again, the Voice head bears the feature [− transitive]. √AGENT is adjoined at v as in (63). The past tense allomorph selected is *-Tu* as can be seen from the examples (64) to (66). Typically, these are unergative verbs as explained earlier in Section 2.2. (18) includes several examples of this class, and we do not repeat those here.

(63) *iɾi-* + *-kk* + *-[N]* + *-Tu* → *iɾiṇṇu* 'sat'
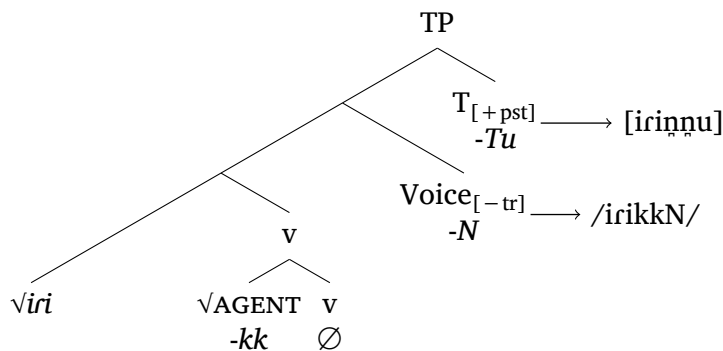
(64) haɾi   iɾiṇṇu (unergative)
      Hari.NOM   sit.PST
      'Hari sat.'

(65) miinu   ṇaḍaṇṇu (unergative)
      Meenu.NOM walk.PST
      'Meenu walked.'

(66) kiḻi   paraṇṇu (unergative)
      bird.NOM   fly.PST
      'The bird flew.'

3.4 Forms 7 and 8

In both Forms 7 and 8, the Voice head bears the feature [+transitive]. They differ in whether √AGENT is adjoined at Voice. The [+transitive] feature on Voice induces phonological changes on the verb stem. The adjunction of √AGENT provides the causative interpretation, as we saw in Forms 3 and 4. However, both these forms are syntactically *transitive*. While Form 7 always yields transitive verbs, Form 8 yields morphological causatives.

3.4.1 Form 7

In this structure, v is null, but Voice bears the feature [+transitive] which is not expressed by an exponent, but which induces phonological changes on the root to yield the transitive verbs. In (67), the root-final consonant [ʈ] in *aaʈ-* geminates yielding *aaʈʈ-* at VoiceP. With no intervening affixes between the root and T at Spell-Out, the past tense affix *-i* is selected.

(67)   *aaʈ-* + *-i* → *aaʈʈi* 'swung$_{tr}$'

$$
\begin{array}{c}
\text{TP} \\
\end{array}
$$

TP
  T$_{[+pst]}$ *-i* ⟶ [aaʈʈi]
  Voice$_{[+tr]}$ ⟶ /aaʈʈ/
  √*aaʈ*   v
           ∅

Many Form 7 transitive verbs have Form 1 intransitive counterparts. The difference in the two verbal spines is responsible for the phonological changes induced on the Form 7 verbs by the [+transitive] feature on Voice. The Form 1 (intransitive) counterparts, (68a) and (69a), do not show such phonological changes.[7] (70) provides further examples of Form 7 verbs with the specific phonological processes together with the Form 1 verbs for comparison.

---

[7] Form 1 verbs, we said, show intervocalic voicing which does not alter the underlying representation of the roots themselves, since voicing is not phonemic in Malayalam. Voicing is only phonemic, as it were, in words borrowed from Sanskrit and English, which are susceptible to nativisation, and is not found in the core Dravidian vocabulary.

(68)   *uraŋŋ-* 'sleep_{intr}' ~ *urakk-* 'sleep_{tr}'

    a.   kuʈʈi   uraŋŋ-i   (Form 1: intransitive)
        child.NOM sleep-PST
        'The child slept.'

    b.   amma   kuʈʈiy-e   urakk-i   (Form 7: transitive)
        mother.NOM child-ACC sleep-PST
        'The mother made the child to sleep.' (Lit. 'The mother slept the child.')

(69)   *kuruk-* 'thicken_{intr}' ~ *kurukk-* 'thicken_{tr}'

    a.   paal   kuruk-i   (Form 1: intransitive)
        milk.NOM thicken-PST
        'The milk thickened.'

    b.   aʋan   paal   kurukk-i   (Form 7: transitive)
        he.NOM milk.ACC thicken-PST
        'He thickened the milk.'

(70)   Form 1 and corresponding Form 7 verbs after phonological changes:

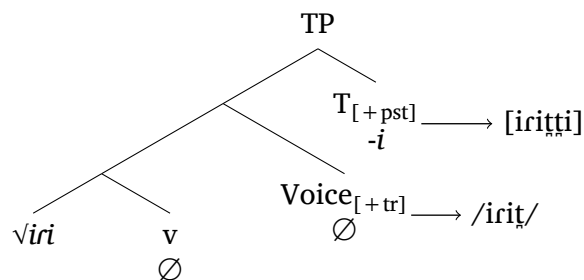| Form 1_{intr}	Phonological change	Form 7_{tr}
muŋŋ- 'sink'	denasalisation	mukk- 'sink'
kuuɲɲ- 'bend'	denasalisation	kuucc- 'bend'
ʈiinɖ- 'become infected'	denasalisation	ʈiiʈʈ- 'rub/irritate'
kuumb- 'join/close'	denasalisation	kuupp- 'join/close'
iɭak- 'stir'	gemination	iɭakk- 'stir'
oɻuk- 'flow'	gemination	oɻukk- 'flow'
kuuʈ- 'increase'	gemination	kuuʈʈ- 'increase'
aaʈ- 'swing'	gemination	aaʈʈ- 'swing'

As seen in (68b) and (69b) and listed in (70), the roots show phonological changes to their codas. Malayalam permits a maximum of two coda consonants in a monosyllabic root. When there are already two consonants in the root of the kind NC or NN, the stems undergo denasalisation to signal the changed spine. When the root only has a single obstruent coda, the consonant undergoes gemination, a kind of coda augmentation. The changes cause these roots to become phonologically heavy and, given the absence of exponents at v and Voice, the past tense marker *-i* is selected, and the second coda element can be suitably resyllabified to an onset position. The coda changes and resyllabification are demonstrated below for *mukk-* 'sink_{tr}' from the root *muŋŋ-* (71) and *kuuʈʈ-* 'increase_{tr}' from the root *kuuʈ-* (72).

(71) *muŋŋ-* 'sink_{intr}' → *mukk-* 'sink_{tr}' + *-i* → *mukki* 'sunk'
      C V C C   → C V C C   + V   → C V C . C V
      m u ŋ ŋ   **m u k k**   **i**   **m u k . k i**

(72) *kuuʈ-* 'increase_{intr}' → *kuuʈʈ-* 'increase_{tr}' + *-i* → *kuuʈʈi* 'increased'
      C V V C   → C V V C C   + V → C V V C . C V
      k u u ʈ   **k u u ʈ ʈ**   **i**   **k u u ʈ . ʈ i**

However, in roots that end in a vowel or a sonorant consonant like [ɻ] and [r] that do not geminate (Krishnamurti 2003: p. 166), one phonological change that is induced by the [+transitive] feature is to add the consonant [t̪] (with the default dental place) to the coda. This consonant also geminates, as we saw previously, to instantiate the $Voice_{[+tr]}$ feature as coda augmentation. Gemination serves the additional purpose of preserving the [−voice] feature of the consonant, a common strategy in Malayalam, particularly because obstruents are only tolerated in codas and their [−voice] feature conserved when they are a part of ambisyllabic geminates. Absent gemination, intervocalic voicing will apply by default and neutralise the morphological changes on the surface. The typical phonological changes are indicated in (73) and the structure is given in (74). As we already said, Form 7 verbs are transitives (75) and (76). Further examples of Form 7 verbs with vowel-final and (non-geminate) consonant final roots are provided in (77).

(73) a. √*iri* 'sit' → iriʈ + i 'seat' → iriʈʈi 'seated'
      b. √*ṇaɖa* 'walk' → naɖaʈ +i 'walk/conduct' → ṇaɖaʈʈi 'walked/conducted'
      c. √*viɻ* 'fall' → viiɻʈ +i 'fell' → viiɻʈʈi 'felled'
      d. √*vaɭar* 'grow' → vaɭarʈ +i 'raise' → vaɭarʈʈi 'raised'

(74) *iri-* + *-i* → *iriʈʈi* 'seated'

                          TP
                         / \
                        /   \
                       /   T_{[+pst]} ———→ [iriʈʈi]
                      /   *-i*
                     / \
                    /   Voice_{[+tr]} ———→ /iriʈ/
                   /   ∅
                  / \
                 /   \
              √*iri*   v
                        ∅

(75) miira   paʈʈiy-e   ṇaɖaʈʈ-i   (transitive)
      miira.NOM   child-ACC   walk-PST
      'Meera walked the dog.'

(76) maṇtri   paṭaaka uyarṭṭ-i   (transitive)
      minister.NOM flag.ACC raise-PST
      'The minister raised the flag.'

(77) Examples of Form 7 verbs (V and non-geminate C final):

Verb + suffix	Past form
iɾi- + -i	iɾiṭṭi 'seated'
para- + -i	paraṭṭi 'flew'
ṇaḍa- + -i	ṇaḍaṭṭi 'walked'
keḍa- + -i	keḍaṭṭi 'laid down'
ṭaḷar- + -i	ṭaḷarṭṭi 'weakened'
amar- + -i	amarṭṭi 'pressed'
ʋiiɻ- + -i	ʋiiɻṭṭi 'felled'
aaɻ- + -i	aaɻṭṭi 'immersed'

The discussion above shows that *all* the phonological changes that are triggered by the [+transitive] feature on Voice at the morpheme boundary affect the coda position. Typical changes include denasalisation, coda augmentation via gemination, or the addition of a default coda consonant with subsequent gemination as summarised in (78).

(78)
$$\left\{ \begin{array}{l} \kappa_{NN} \rightarrow \kappa_{CC} \\ \kappa_{NC} \rightarrow \kappa_{CC} \\ \kappa_{C} \rightarrow \kappa_{CC} \\ \varnothing \rightarrow \kappa_{C} \rightarrow \kappa_{CC} \end{array} \right\} \; / \underline{\quad} \sigma]\text{Voice}_{[+tr]}$$
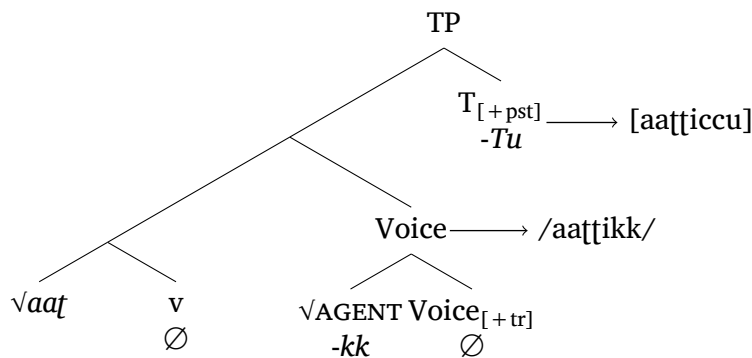
3.4.2 Form 8

In Form 8, Voice again bears the feature [+transitive], but unlike Form 7, √AGENT is adjoined at Voice. The [+transitive] feature on Voice triggers changes to the phonological form available at the preceding functional node v, but √AGENT *-kk* is added at Voice and is not itself subject to these changes. Voice$_{[+tr]}$ effects the same phonological changes such as denasalisation and coda augmentation to the stem at v as in Form 7, but the √AGENT adjoined at Voice adds the *cause* semantics as can be seen in (79) to (81). These verbs are morphological causatives and, as in all other similar cases, the causee may be encoded as an oblique argument when the two entities are distinct as in (80) and (81). Unlike Form 7, it is the exponent *-kk* of the √AGENT at Voice which comes to be linearly adjacent to T and which mediates the past tense affix selection. The past tense affix selected is *-Tu* as shown in (82). Further examples of Form 8 verbs are provided in (83).

(79) aaḷu-gaḷ   aanay-e   ṇaḍaṭṭiccu   (causative)
      person-PL.NOM elephant-ACC make walk.PST
      'People made the elephant walk.'

(80) ɖaakini   [maayaaʋiy-e koɳɖɨ] ʋimaanam   paraṯṯiccu   (causative)
      Dakini.NOM [Mayavi-ACC with]ₚₚ aeroplane.ACC make fly.PST
      'Dakini made Mayavi fly the plane.'

(81) kuʈʈi   [ammay-e   koɳɖɨ] paal   aatticcu   (causative)
      child.NOM [mother-ACC with]ₚₚ milk.ACC make cool.PST
      'The child made the mother cool the milk.'

(82) *aaʈ- + -kk + -Tu → aaṯṯiccu* 'made swing'

                              TP
                             / \
                            /   \
                           /   T[+pst] ———→ [aaṯṯiccu]
                          /   -Tu
                         /   \
                        /   \
                       /   Voice ———→ /aaṯṯikk/
                      /   / \
                     /   /   \
                  √*aaʈ*   v   √AGENT Voice[+tr]
                           ∅   -kk   ∅

(83) Form 8 verbs and past tense marking:

Verb + suffixes	Past form
aaʈ- + -kk + -Tu	aaṯṯiccu 'made swing'
keeʈ- + -kk + -Tu	keeṯṯiccu 'made climb'
kuuʈʈ- + -kk + -Tu	kuuʈʈiccu 'made increase/add'
mukk- + -kk + -Tu	mukkiccu 'made sink'
aatt- + -kk + -Tu	aatticcu 'made cool'
iɾi- + -kk + -Tu	iɾiṯṯiccu 'made seat'
ṉaɖa- + -kk + -Tu	ṉaɖaṯṯiccu 'made walk'
para- + -kk + -Tu	paraṯṯiccu 'made fly'

3.5 Discussion

In the preceding, we have shown in great detail how the features on v and Voice combine with √AGENT adjunction to generate each of the eight possible verb structures which build the various verb forms. We also demonstrated how the allomorphy for past tense marking at T can be directly linked to the properties along the verbal spine and, specifically, the exponents that may be expressed within it. We provided evidence for the argument that √AGENT may be adjoined at v or at Voice or at both loci with specific impact on the verb semantics. Specifically, we showed that the locus of adjunction of √AGENT determines whether the external argument

is an *agent* (adjunction at v) or a *causer* (adjunction at Voice). We also showed that when the causer and causee are two distinct entities, the causee may be present as an oblique (typically instrumental) argument.[8]

A single root can participate in derivations with different verbal spines and generate different verbs with varying syntax and semantics, as can be seen in (84) to (86) and the various examples that we have already presented and discussed. The root *ɟay-* 'win' derives the Form 2 transitive by the addition of √AGENT at v, and the Form 4 causative by the subsequent addition of √AGENT at Voice as shown in (84).

(84)   *ɟayikk-* 'win' ~ *ɟayippikk-* 'make win'
      a.   appu   kaḷi   ɟayiccu   (Form 2: transitive)
           Appu.NOM match.ACC win.PST
           'Appu won the match.'

      b.   appu   kaḷi   ɟayippiccu   (Form 4: causative)
           Appu.NOM match.ACC make win.PST
           'Appu caused the match to win.'

In (85), the root *muŋŋ-* absent v and Voice features in a Form 1 structure can build an unaccusative verb, while a Voice$_{[+tr]}$ of Form 7 will build a transitive verb from the same root. When a √AGENT is adjoined to Voice$_{[+tr]}$, the Form 8 low causative is built.

(85)   *muŋŋ-* 'sink$_{intr}$' ~ *mukk-* 'sink$_{tr}$' ~ *mukkikk-* 'make sink'
      a.   kappal   muŋŋ-i   (Form 1: unaccusative)
           ship.NOM sink-PST
           'The ship sank.'

      b.   aʋan   kappal   mukk-i   (Form 7: transitive)
           he.NOM   ship.ACC sink-PST
           'He sunk the ship.'

---

[8] The *agentivity* of the arguments can be detected by the use of adverbs. For example, in sentences (i) and (ii), the adverbs *kaṣṭappeṭṭɨ* 'with difficulty/effortfully' and *ʋeegam* 'quickly/fast' can have scope over either the causer (TP) or the causee (vP). Thus (i) can mean either 'With difficulty, he made her sing' or 'He made her sing with difficulty'. Likewise, (ii) can mean either that 'Quickly, the mother made the child eat' or that 'The mother made the child eat quickly'.

(i)   aʋan   [aʋaḷ-e   koɳḍɨ] kaṣṭappeṭṭɨ   paaḍiccu   (causative)
       he.NOM [she-ACC with]$_{PP}$ with difficulty make sing.PST
       'He made her sing with difficulty.'

(ii) amma   [kuṭṭiy-e   koɳḍɨ] ʋeegam   ʈiitticcu   (causative)
       mother.NOM [child-ACC with]$_{PP}$ quickly make eat.PST
       'The mother made the child eat quickly.'

  c. aʋaɾ [aʋan-e koɳɖɨ] kappal mukkiccu (Form 8: causative)
    they.NOM [he-ACC with]_{PP} ship.ACC make sink.PST
    'They made him sink the ship.'

The alternations in (86) show how the root can participate in a Form 5 structure with a Voice$_{[-tr]}$ to make unaccusative verbs, a Form 2 transitive verb with the adjunction of √AGENT at v, and the Form 4 low causative by the addition of √AGENT at both v and Voice.

(86) *aɾa-* 'blend$_{intr}$' ∼ *aɾakk-* 'blend$_{tr}$' ∼ *aɾappikk-* 'make blend'
  a. maaʋɨ aɾaɲɲu (Form 5: unaccusative)
    batter.NOM blend.PST
    'The batter blended.'

  b. aʋan maaʋɨ aɾaccu (Form 2: transitive)
    he.NOM batter.ACC blend.PST
    'He blended the batter.'

  c. aʋaɾ [aʋan-e koɳɖɨ] maaʋɨ aɾappiccu (Form 4: causative)
    they.NOM [he-ACC with]_{PP} batter.ACC make blend.PST
    'They made him blend the batter.'

The [±transitive] features on Voice are made visible by the exponent -/N/ for the feature [−transitive] (87), and by the phonological changes induced on the verb by the [+transitive] feature (88).

(87) ʋiiɻN- 'fall$_{intr}$' ∼ ʋiiɻtt- fell$_{tr}$'
  a. maɾam ʋiiɳu (Form 5: unaccusative)
    tree.NOM fall.PST
    'The tree fell.'

  b. aʋan maɾam ʋiiɻtt-i (Form 7: transitive)
    he.NOM tree.ACC fell-PST
    'He felled the tree.'

(88) *paɾakk-* 'fly$_{intr}$' ∼ *paɾaʈʈ-* 'fly$_{tr}$'
  a. paʈʈam paɾaɳṇu (Form 6: intransitive)
    kite.NOM fly.PST
    'The kite flew.'

  b. aʋan paʈʈam paɾaʈʈ-i (Form 7: transitive)
    he.NOM kite.ACC fly-PST
    'He flew the kite.'

From the examples above together with the data provided in the preceding subsections, we can establish that whenever there are exponents between the root and T, the past tense allomorph selected is uniformly *-Tu*. When there is no intervening affixal material between root and T, the past tense suffix selected is *-i*, which is also the *default* marker. The selectional difference of the past tense affix follows from this context driven allomorphy. The only true exceptions to these processes, as we discussed in Section 3.1 are the few light monosyllabic roots which select *-Tu* instead of the expected *-i*. Their exceptional behaviour, as we have already outlined in some detail, may be attributed to the atypical *light* syllable structure of these predicates, in contrast to the typically, phonologically heavy roots that participate in this structure. We have also seen that disyllabic verbs with the same final light syllable shape do not exhibit such exceptional behaviour and bear the expected vocalic affix *-i*.

We have seen that v is always covert in Malayalam and that Voice can be either unspecified or can bear the features [±transitive]. We have also shown that √AGENT can be adjoined to v and/or Voice and yield *agent* and/or *cause* semantics to the verb. The morphosyntactic difference is also underscored by the difference in the phonological shapes of Form 2 (√AGENT at v) and Form 3 (√AGENT at Voice) verbs. Though both verbal spines involve a single √AGENT which is instantiated on the surface as a single *-kk* exponent in both, Form 3 verbs (90) have an epenthetic *-i,* while Form 2 verbs (89) do not. This surface structure difference corresponds systematically to the difference in the loci of adjunction. The morphophonology, then, unambiguously represents the underlying morphosyntax. We also see similar effects in Form 4 with √AGENT adjoined at both loci (91).

(89) kuṭṭi   cakram   ṭirikk-uṇṇu   (Form 2)
      child.NOM wheel.ACC spin-PRS.PROG
      'The child is spinning the wheel.'

(90) kaatti   cakram   ṭiriyikk-uṇṇu   (Form 3)
      wind.NOM   wheel.ACC spin-PRS.PROG
      'Wind makes the wheel spin.'

(91) kuṭṭi   ammay-e   koṇḍi cakram   ṭirippikk-uṇṇu   (Form 4)
      child.NOM mother-ACC with   wheel.ACC spin-PRS.PROG
      'The child is making the mother spin the wheel.'

We provide the vocabulary insertion rules for the derivation of the various verb alternants in (92).

(92) a. Voice$_{[+tr]}$ ↔ $\varnothing$
      b. Voice$_{[-tr]}$ ↔ -N

c. √AGENT ↔ -kk

d. $T_{[+pst]}$ ↔ -Tu / $\left\{ \begin{array}{l} \text{root}_{CVC}]\underline{\quad} \\ \text{root}_{CVi}]\underline{\quad} \end{array} \right\}$

e. $T_{[+pst]}$ ↔ -Tu / $\left\{ \begin{array}{l} \text{root] kk]}\underline{\quad} \\ \text{root] kk] kk]}\underline{\quad} \\ \text{root] N]}\underline{\quad} \\ \text{root] kk] N]}\underline{\quad} \end{array} \right\}$

f. $T_{[+pst]}$ ↔ -i

From the features available, as given in **Table 1**, there is a potential combinatorial possibility of Voice$_{[-tr]}$ with √AGENT at Voice. Such a combination does not and in fact cannot be realised because the two features are semantically incompatible. The adjunction of √AGENT at Voice necessarily adds *cause* to the verb meaning and a verb cannot be *both* causative and intransitive at the same time.[9] Low-causatives are *always* transitive in Malayalam.

Table 1 also contains two blank cells where Voice$_{[+tr]}$ is incompatible with √AGENT at v and, by extension, at both v and Voice. We may recall that √AGENT at only Voice is compatible with Voice$_{[+tr]}$. However, adjunction of √AGENT at v is mapped to an exponent *-kk* which adds the same semantics of *agent* to an already agentive Voice$_{[+tr]}$. The semantic outcomes are the same, and with both present, unrealisable. These are two complementary and distinct strategies through which Malayalam can instantiate the semantic changes, creating what we earlier called *lexical vs morphological* causatives. A Voice$_{[+tr]}$ typically triggers sound changes on the v, while the √AGENT at v is realised by an exponent. The presence of both √AGENT at v and Voice$_{[+tr]}$ sets up a conflict between the need for Voice$_{[+tr]}$ to be adjacent to the root which it will be unable to accomplish with the presence of an exponent between v and Voice that will interrupt such adjacency. Valence change is instantiated through *either* the [+tr] feature on Voice (with phonological changes) *or* through the adjunction of √AGENT at v, but never both. Such an outcome is, therefore, impossible in Malayalam. Our analysis in fact rules out these semantically and syntactically incompatible combinations of [Voice$_{[-tr]}$ + √AGENT] and [v- √AGENT + Voice$_{[+tr]}$] and accounts fully for the two kinds of valence alternations that are found in Malayalam.

4 Synchronic Losses

We indicated in Section 1 that the feature combinations on the verb spine are synchronically becoming unproductive and somewhat opaque resulting in the overlap of verb types. It is the past

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[9] The verb is not assigning a case to its direct object but is, nonetheless, also requiring an external argument and this does not accord with Burzio's generalisation. The unavailability of this combination is not unexpected and is of a pattern with Malayalam grammar. Some languages allow for passives with a Voice$_{[-tr]}$ and permit an external, agent argument. In Malayalam, this is not permitted. Unaccusatives/passives and transitives/causatives are complementary structures, and √AGENT on Voice is compatible only with transitives/causatives, and not Voice [−transitive].

Verb type	Homophonous verbs	Past tense forms	Meaning
Form 1	ʋaaɾ-	ʋaaɾ-i	'scooped up'
Affix$_{pst}$: -i	uuɾ-	uuɾ-i	'removed'
Form 5	ʋaaɾ + -N	ʋaar-n̪u	'got cut into thin strips'
Affix$_{intr}$ + Affix$_{pst}$: -N + -Tu	uuɾ + -N	uur-n̪u	'slid down'

Table 2: Past tense in homophonous but morphosyntactically different roots.

tense morphology with its allomorphy and varied affixal forms that allow us to fully understand the verbal spine and recover the morphosyntax. In the next section, we discuss in some detail a few reasons for the synchronic loss of these features.

The morphosyntactic contexts (Forms 1–8) in which the vocabulary insertion rules apply have become synchronically somewhat opaque. Reanalysis through overextension and semantic change have obfuscated the underlying morphophonological specifications of many roots. Despite such synchronic opacity of the morphosyntax, there is robust evidence for our proposed morphosyntactic specifications at v and Voice which in turn determine the observed past tense patterns. First, if the past tense formation in verbs were to be determined by the phonological features of the verb roots (as opposed to the morphosyntactic features of agentivity/intransitivity), any root that has -kk in it (e.g., *cirikk-* 'smile') should automatically be deemed to be heavy, else the syllabic weight constraint will be violated. Consequently, we should expect the selection of the default past tense marker -i. *cirikk-* 'smile' forms the past tense *ciri-ccu* and not **cirikk-i*. We may recall that there are Form 1 verbs like *pokk-* 'lift' and *maḍakk-* 'fold' with the geminate sequence -kk- integral to the roots and these form the past tense by adding *-i*, as we expect, producing *pokki* 'lifted' and *maḍakki* 'folded', respectively.

Second, the past tense patterns of homophonous verbs such as *ʋaar-* and *uur-* (summarised in **Table 2**) also support our analysis. With a Voice$_{[-tr]}$ realised by the affix *-N*, *ʋaar-/N/-* 'get cut into thin strips' and *uur-/N/-* 'slide down' (Gundert 1872) are Form 3 intransitives. These verbs together with the past tense marker *-Tu* and after phonological accommodations, yield *ʋaar-n̪u* and *uur-n̪u*, respectively. The Form 1 counterparts with null v and Voice features are transitive verbs meaning 'scoop up' and 'remove' which form *ʋaar-i* and *uur-i* with the past tense marker *-i*, respectively. This dual behaviour of homophonous verbs is inexplicable in other accounts and makes it very clear that different principles (and verbal spines) are in operation in building each member of the homophonous pair.

Finally, a single root, *ʋaaŋŋ-* 'buy', is seen to occur with and without the suffix *-kk* and forms the past tense correspondingly differently in two distinct, regional dialects of Malayalam. Speakers of dialects in Northern Kerala (e.g., in and around Kozhikode) treat the verb as a Form

1 member and produce the past tense *vaaŋŋi* 'bought', while speakers of Southern Kerala dialects (e.g., in and around Kollam) treat it as a Form 2 verb that is affixed with *-kk* and, consequently, produce the past tense form *vaaaŋŋiccu* 'bought'.[10] The verb is then generated differently in each of the two dialects, as is made visible by both the agentive affix and the past tense forms.

A question that remains to be answered is what caused (or is still causing) the synchronic loss of feature specifications leading to the generation of the default Form 1 verb structure where both v and Voice are phonologically null. One reason is semantic reanalysis which follows as a by-product of structural reanalysis (Eckdart 2011). A second reason is analogical levelling (Fischer 2007). These are at least two sources of the semantic shifts in Malayalam.

Certain semantic shifts to the root impact the argument structure. For example, *vaaɻ-* originally meant 'flourish' (Burrow & Emeneau 1984) and was an intransitive verb generated via *-N* affixation, with the past tense marker *-Tu*, as we predict and expect. In Modern Malayalam, *ʋaaɻ-* means 'rule' and has the semantics of a transitive verb. Yet, it retains the intransitive nasal, visible in its past tense form *vaaɳu*. A very recent example of such semantic change involves the verbs *poɻikk-* 'dismantle' and *ʈakarkk-* 'destroy'[11] which are transitives formed via *kk*-affixation. Increasingly and especially among younger speakers both these verbs are being used intransitively to mean 'to have a blast'. Semantic shifts like these with the attendant morphosyntactic feature mismatches cause an appearance of irregularity on the surface and make the morphosyntax more opaque. Such opacity also makes acquisition of these different verbal spines more difficult.

Phonological levelling has also contributed to the collapse of the morphosyntactic differences. In Proto-Dravidian, most verb roots to which the intransitive suffix *-N* was added were also sonorant-final. With *-N* affixation to instantiate $\text{Voice}_{[-\text{tr}]}$, the past tense marker selected was *-Tu*. However, some sonorant-final *transitive* verbs synchronically select the nasal with the past tense marker forming the sequence *-N + Tu*. For example, *eri-* 'throw' forms the past tense *eriŋŋu* though, given its morphosyntax, we expect it to be *ericcu*. The phonology, as it were, interferes with the morphology, overriding the extant morphosyntactic rules of insertion. Over time, Malayalam speakers are being pushed to match the tense rule to the phonological features of the verb root instead of attending to the underlying morphosyntactic differences. Thus, synchronically, the *-N* suffix (whose already precarious phonetic existence is contingent on having a supporting consonant which is possible only with a few affixes) can occur with sonorant-ending verbs and has come to straddle different morphosyntactic verb types.

Driven by the increasing synchronic unproductivity of the vocabulary insertion rules, Malayalam seems to be on its way to collapsing the morphosyntactic differences in past tense

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[10] These variations have been confirmed with native speakers from these areas.

[11] The forms are easily found in social media usage and are confirmed by native speakers.

marking and settling on a default pattern. This tendency can be clearly seen in the past tense formation patterns exhibited by certain *N*-affixed verb forms which have not one but two past tense forms – one the default, and the other determined by the morphosyntactic specifications at v and Voice. In modern Malayalam, the default past tense forms have displaced the *-Tu* counterparts for some predicates. The verbs *vell-* 'challenge' and *coll-* 'say' are two such *N*-derived verbs which have two past tense forms each – *veṇṇu* and *velli* 'challenged', and *coṇṇu* and *colli* 'said', respectively. This pattern is already reported by Rajaraja Varma (1917) and treated as *special* behaviour. He, however, does not consider the underlying nature of the verbs. These Form 5 verbs are generated through the addition of the intransitive suffix *-N* forming *vell-/*N/- and *coll-/*N/- and select the past tense marker *-Tu*, which is as predicted by the (diachronically transparent) verbal spine. These *-Tu* attached past tense forms have become archaic, and the past tense forms with *-i* are in current use. We may note that these roots are also phonologically heavy, which enables their identification as 'typical' Form 1 verbs. The existence of these double past tense forms makes the different kinds of morphosyntactic structures visible and captures the synchronic shift towards the default past tense marking with *-i*.

Unsurprisingly, when the morphosyntactic information begins to be less transparent, a phonological levelling is to be expected. *vell-* and *coll-* are susceptible to such levelling (or regularisation) because they are also low-frequency verbs.[12] In direct contrast, the past tense forms of a few high-frequency, *N*-affixed roots ending in lateral geminates (and therefore heavy) such as *cell-* 'go' and *koll-* 'kill', are *ceṇṇu* 'went' and *koṇṇu* 'killed', respectively, instead of **celli* and **kolli*, which we might expect given a) their phonological shape, and b) the loss of morphological information. Unlike the earlier discussed *vell-* and *coll-*, which are phonologically similar to *cell-* and *koll-*, the latter being high-frequency verbs have escaped phonological levelling as is true of most irregular but high-frequency morphological forms as, for example, the inflected forms of the English verb 'be'. Interestingly, acquisition data shows overgeneralisation errors involving the Form 5 verbs *koll-* 'kill' and *koḷ-* 'hit' despite their frequency in the input, as shown in the utterances (93) and (94) (Krishnan 2019: p. 118–119).

(93) caanam cooṇ-e iccɨ ***koll-i** (H, 2;10.7)
   saaḍʰanam fooṇin-e iḍiccɨ **koṇṇu** [expected form]
   thing.NOM phone-ACC hit.PTCP kill.PST
   [aa] saaḍʰanam fooṇin-e iḍiccɨ koṇṇu [full form]
   [that] thing.NOM phone-ACC hit.PTCP kill.PST
   'That thing killed the phone.'

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12 The verb *coll-* meaning 'say' has been replaced by the verb *paray-* 'say' in current use and is a low frequency verb.

(94) bukkɨ   ʋaaycc-appam   kaɳɳ-ii   ***koɭɭ-i** (A, 2;3.16)

       bukkɨ   ʋaaycc-appam   kaɳɳ-il   **koɳɖu** [expected form]

       book.ACC read.PST-ADV   eye-LOC hit.PST

       [ammu]   bukkɨ   ʋaaycc-appam [bʰaɖɾay-uɖe] kaɳɳ-il koɳɖu [full form]

       [Ammu.NOM] book.ACC read.PST-ADV [Bhadra-GEN] eye-LOC hit.PST

       'The book hit (Bhadra) in the eye when (Ammu) read it.'

Lightfoot & Westergaard (2007) demonstrate that the underlying structures of target grammars can be illuminated by the patterns of acquisition and language change. The past tense commission errors produced by the Malayalam-acquiring children are similar to the overgeneralisation errors produced by English-speaking children such as *breaked and *singed (Marcus et al. 1992). Children's overgeneralisations underscore the observed tendency towards morphological levelling with a default affixal process when morphosyntactic specifications become difficult to retrieve. This is further evidenced in the coexistence of doublets such as *dreamt – dreamed* and *learnt – learned* where the former irregular forms are slowly being replaced by the latter default forms (Pinker 1999). This kind of morphological levelling in English is similar to the levelling that Malayalam appears to be undergoing, as we have seen in the preceding. Moreover, the default past tense marker *-i* may be used to form the past tense forms of recently borrowed English words that are POS indeterminate. When used as verbs, the English words *text, message*, and *speech* form the corresponding Malayalam past tense forms *ʈeksti, messeeɟi,* and *spiicci*. The outputs are novel and, therefore, odd-sounding but are attested nonetheless, for example, in social media usage. We may also note that these borrowings are phonologically heavy and fit readily into the Form 1 pattern. These patterns offer further support to the identification of *-i* as the default past tense affix in Malayalam.

Verb alternation	Phonological changes	Adjunction
	Voice$_{[+tr]}$	√AGENT-v (**-kk** affix)
Unaccusative ~ transitive	ʈirumba → ʈiruppa 'turn'	oɖaiya → oɖaikka 'break'
	muŋŋa → mukka 'sink'	aɻiya → aɻikka 'destroy'
	aara → aaʈra 'cool'	ṉanaya → ṉanaikka 'wet'
Unergative ~ transitive	paɻaga → paɻakka 'used to'	asaya → asaikka 'move'
	ooɖa → ooʈʈa 'run'	meeya → meeykka 'graze'
	ṉaɖa → ṉaɖaʈʈa 'walk/conduct'	seera → seerkka 'gather'

Table 3: Valence change patterns in Tamil.

Verb alternation	v + √AGENT-Voice	√AGENT-v + √AGENT-Voice
Transitive ~ low causative	seiyya → seivikka 'do'	paḍikka → paḍippikka 'read'
	aṇiya → aṇivikka 'wear'	piɻaikka → piɻaipikka 'survive'

Table 4: Transitive ~ causative alternation in Tamil.

A cross-linguistic comparison with Tamil, a close sister language, is particularly informative of the processes we have discussed so far. The separation between the two languages (from the common ancestor Middle Tamil) began circa 9th century CE and was complete some 500 years later (Rajaraja Varma 1917; Krishnamurti 2003). The Malayalam pattern of adjunction of √AGENT at v or at Voice yielding morphological transitive and low-causative verbs is visible in older varieties of Tamil, as are also the systematic morphophonological changes (denasalisation, consonant doubling etc.) triggered by Voice$_{[+tr]}$. That is, Tamil grammar used the same strategies to differentiate between *lexical* and *morphological* causatives. **Table 3** provides different examples of these patterns and many of the forms are, in fact, identical to those we have already seen for Malayalam. These patterns continue to be robustly present in Modern Tamil.[13]

The transitive to low-causative alternations with √AGENT at only Voice or both at v and Voice are also visible as in **Table 4**. We see the addition of the *cause* semantics to the verb and the overt presence of two *-kk* affixes with similar OCP effects. We provide sample triples (Ramakrishnan 2008) that evidence both patterns in (95) and (96).

(95)   √AGENT at v and Voice
   a.   *maraya-* 'disappear' → *maraikka-* 'hide' → *maraivikka-* 'make hide'
   b.   *aṇaya-* 'get extinguished' → *aṇaykka-* 'extinguish' → *aṇayppikka-* 'make extinguish'

(96)   √AGENT at Voice and Voice$_{[+tr]}$
   a.   *viiɻa-* 'fall' → *viiɻta-* 'fell' → *viiɻtivikka-* 'make fell'
   b.   *ṇiramba-* 'got full' → *ṇirappa-* 'fill' → *ṇirappikka-* 'make fill'

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[13] Sundaresan & McFadden (2017) present an analysis of valence changes in Tamil with a primary focus on phonological alternations. They do not consider valence alternations involving the *kk-* affix as we do here. When they discuss the *-kk-*forms, they treat the affix as a transitiviser. The analysis of Tamil verbs that we present here is different from theirs. We find that the verbal spine and the structure building in Tamil and Malayalam are very similar. In fact, so is the past tense marking, but we do not enter that discussion here. Not only are we using the Tamil data to offer support for our analysis, but, more crucially, the comparison shows us the grammatical continuum in verb structure building across these two very closely related sister languages. When a grammatical process is lost, it is replaced by the development of an alternative process. Thus, while Malayalam has retained the older verb-building processes, Tamil has shifted some of the morphological burden (specifically, the transitive-causative alternation) towards periphrastic representation. This continuity is quite important in a discussion of morphosyntax.

However, Modern Tamil grammar retains only the adjunction of √AGENT at v enabling the production of transitives from unaccusatives and unergatives. The Malayalam pattern of √AGENT at Voice forming morphological causatives is synchronically unproductive (99) and has been replaced by periphrastic causatives (in a pattern similar to English) as in (100).

(97) ņeruppu aņay-ņḍ-aḍu   (Unaccusative)
      fire.NOM extinguish-PST-3SG.N
      'The fire got extinguished (went out).'

(98) raaman   ņerupp-ai aņay-ṭṭ-aan   (Transitive)
      Rama.NOM fire-ACC   extinguish-PST-3SG.M
      'Rama extinguished (put out) the fire.'

(99) *raaman   siiṭaʋ-aala ņerupp-ai aņayppi-ṭṭ-aan   (Low causative)
      Rama.NOM Sita-INS   fire-ACC   extinguish-PST-3SG.M
      'Ram had Sita extinguish (put out) the fire.'

(100) raaman   siiṭaa-ʋai ņerupp-ai aņaykka   ʋei-ṭṭ-aan   (Periphrastic causative)
      Rama.NOM Sita-ACC   fire-ACC   extinguish make-PST-3SG.M
      'Ram made Sita extinguish (put out) the fire.'

Tamil is a diglossic language. While morphological causative forms still survive in literature, textbooks, dictionaries, and in the vocabulary of the formally educated, they sound distinctly odd when used in finite sentences (99) and have been replaced by the periphrastic causative (100), practically everywhere. Such a change in the morphosyntax is accompanied by corresponding shifts to the argument structure and the case features. The higher predicate *vei-* in periphrastic causatives assigns the accusative case to the *causee* argument (which is now an internal argument rather than an oblique as in Malayalam), and we find overt *accusative* case marking on both the erstwhile external argument and the internal argument of the lower predicate. This structure is wholly unavailable in Malayalam. The difference (here the unavailability of Voice as a locus for √AGENT adjunction) and the similarity (here the availability of v as a locus for √AGENT adjunction and the effect of the [+transitive] feature on Voice) between the two sister languages allow us to show how small diachronic changes in the grammar yield significant differences on the surface and also allow us to further substantiate our analysis of the verbal spine.

5 Conclusions

In this paper, we presented an analysis of the Malayalam verbal spine which enables us to develop a uniform account of verb alternations. We have seen that roots enter into various morphosyntactic combinations and build different verb structures using the features of v and

Voice together with √AGENT adjunction at these heads. We showed that valence alternations in Malayalam deviate from the general cross-linguistic pattern of forming affixally instantiated valence increases through the realisation of Voice as either a transitive or a causative morpheme. Instead, Malayalam forms morphological causatives by the adjunction of √AGENT at v or Voice or at both, and the difference in the loci of adjunction yields different syntactic and semantic outcomes. The analysis presented in the paper brings together the morphosyntactic and morphophonological properties of Malayalam verbs while distinguishing between the effects of the two domains.

We also showed how the allomorphy in the past tense morphology can be correlated with the linear adjacency relations between the root or v-Voice exponents and T at Spell-Out, though the root or the exponents may be non-adjacent on the verbal spine. We demonstrated how past tense affixation (a complex phenomenon in the language) dovetails neatly with the discussion of the verbal spine, and that it is possible to offer a unified explanation of both aspects of Malayalam grammar. The derivation of the past tense forms in Malayalam not only makes the morphosyntactic specifications at v and Voice visible, but also shows us that such feature specifications have a critical role to play in conditioning the allomorphy on Tense. Since the other verb inflectional affixes (including the markers for the future and the present tenses) apply across-the-board, the complex past tense morphology remains our only key to unlock the access to the underlying verbal pathways. This is particularly relevant for the intransitive exponent. A purely phonological account without the morphosyntax or a purely morphological account that does not reference the morphophonology cannot successfully explain the past tense marking patterns in Malayalam.

The analysis is novel both cross-linguistically and within the study of Malayalam grammar, since the specific pattern by which Malayalam builds morphological causatives is quite different from patterns that have been discussed in the literature. In this respect, it is interesting how Tamil synchronically shows divergence in this strategy in specifically ruling out Voice as the locus for adjunction and compensating for such 'loss' with a periphrastic pattern of causative formation. As part of the shifts in grammar, we have also discussed several reasons for why the features on the verb spine are becoming synchronically opaque in Malayalam, and how, as a result, the past tense morphology is steadily moving towards a default and more uniform past tense affixation pattern, not the least in new loanwords, but also in many verbs as they currently exist, with visible impact on early language acquisition.

Abbreviations

ACC = accusative, ADV = adverb, CAUS = causative, DAT = dative, DM = Distributed Morphology, F = feminine, FUT = future, INF = infinitive, INS = instrumental, INTR = intransitive, LOC = locative, MOD = modal, N = neuter, NOM = nominative, OCP = Obligatory Contour Principle, POS = parts of speech, PST = past, PTCP = participle, T = tense, TR = transitive, V = verb , κ = coda.

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Competing interests

The authors have no competing interests to declare.

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