# A Distributed Morphology analysis of Kannada tense-aspect

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ABSTRACT

In this paper, we develop a comprehensive account of the realization and interpretation of tense-aspect morphology in Standard Kannada clauses within the Distributed Morphology framework. Our starting point is a contrast between affirmative and negative sentences, where the latter have been observed to contain non-finite verbal morphology yet give rise to specific temporal readings. In contrast to recent proposals, our account reverts to a crosslinguistically standard clause structure for Kannada that contains a TP projection, as well as a single infinitival morpheme in the language that is compatible with different temporal interpretations in different contexts. Instead, the non-finite morphology in past and non-past negative sentences are explained as a result of featural impoverishment – a standard operation within the DM framework, and homophony avoidance respectively. We argue that the proposed account is both theoretically more parsimonious and has greater empirical coverage compared to its predecessors.

## 1 Introduction

This project aims to provide a comprehensive account of the realization and interpretation of tense/aspect morphology in Kannada clauses within the Distributed Morphology (DM) framework (Halle & Marantz 1993). Our main point of departure is a puzzling observation pertaining to tense interpretation within negative clauses in Standard Kannada, depicted in (1) and analyzed extensively in Amritavalli (2000), Amritavalli & Jayaseelan (2005) and Amritavalli (2014):

(1) a. *Jayā patra bare-d-aḷu.*
Jaya letter write-PST-3.SG.F
'Jaya wrote a letter.'

b. *Jayā patra bare-al illa.*
Jaya letter write-INF NEG
"Jaya did not write a letter"

The source of the past interpretation in (1a) is ostensibly quite clear – the verb here seems to be straightforwardly inflected for tense (glossed as PST) alongside subject agreement. Surprisingly however, an identical past interpretation is obtained in the negative construction (1b) as well, despite the lack of overt tense marking on the verb. The verb in (1b) occurs instead with the canonically non-finite infinitive morpheme *-al*, raising a question about the source of the past interpretation.

In the analysis developed by Amritavalli & colleagues, the infinitival morphology is itself to be blamed. Specifically, it is claimed that *-al* carries a perfective aspectual feature, interpreted by default as past tense in a sentence like (1b). This leads into their more general claim that Kannada lacks a syntactic Tense category altogether, with syntactic Aspect being uniformly responsible for all temporal interpretations. The infinitive *-al* in (1b) is further distinguished from other occurrences of the morpheme, such as the embedded verb in (2), where a similar past interpretation is not available. In other words, *-al* (or *-alu*, where the *-u* ending is inserted as a phonological augment preceding consonants) is analyzed as an ambiguous morpheme, with more than one distinct underlying denotation.

(2) *Jayā nadi-alli īj-alu prayatnis-utt-āḷe.*
Jaya river-in swim-INF try-PRS-3.SG.F
"Jaya tries to swim in the river."

The goal of the current paper is to explore an alternative explanation for the past tense interpretation in (1b) that is couched within the broader DM framework, which allows some degree of decoupling of interpretation from morpheme realization. The proposal we seek to develop counters previous analyses of these data with respect to their two main claims: (i) that Kannada lacks a syntactic Tense projection, and (ii) that the infinitival *-al* has more than one distinct underlying representation. Instead, we defend the following theoretically simpler hypotheses: (i') that Kannada has a conventional clause structure containing a TP projection, and (ii') that the infinitival *-al* corresponds to a single underlying representation. We argue that such a move not only leads to a more parsimonious account of the Kannada data, but also has greater empirical coverage.

In service of this goal, the remainder of the paper is structured as follows. In Section 2, we introduce relevant recent proposals on Kannada tense and aspect in more depth and point out some of the empirical and conceptual challenges they face. Section 3 lays out the core data pertaining to tense-aspect realization in Kannada, defining the empirical scope of our proposal. The proposal is developed in Section 4. Individual pieces of our analysis are first independently motivated, then put together. The effectiveness of the analysis is demonstrated with the help of working examples. Finally, Section 5 summarizes the proposed analysis, and discusses its broader theoretical and empirical consequences.

## 2 Background

### 2.1 Existing ideas on Kannada tense/aspect

Amritavalli (2000), Amritavalli & Jayaseelan (2005) and subsequent work on clause structure in Kannada (and other Dravidian languages) by the same authors advances the main claim that Kannada clauses lack the syntactic tense projection TP. Instead, the functions standardly attributed to the TP – namely, temporal interpretation and "finiteness" signaling – are divided between the distinct syntactic projections Aspect phrase (AspP) and Mood phrase (MoodP) respectively, leading to a clausal structure along the lines shown in Figure 1.[1] MoodP is overtly realized as subject agreement marking in simple affirmative constructions like (1a), as the sentential negation marker *illa* in simple negative constructions like (1b), and as modal auxiliaries in modal constructions.

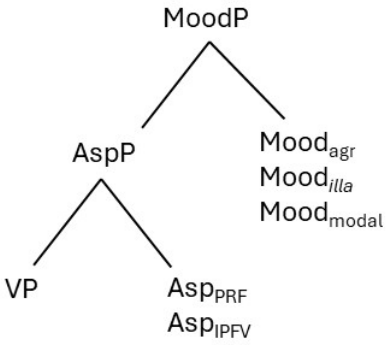


Figure 1. Kannada clause structure proposed in Amritavalli & Jayaseelan (2005).

[1] Figure 1 is a somewhat simplified version of the clause structure proposed by Amritavalli & colleagues, as it excludes the polarity phrase (PolP) intervening between MoodP and AspP. A positive polarity feature within PolP is realized as overt agreement morphology and selects a certain form of aspectual complement, a negative

In their proposal, the temporal affixes appearing alongside subject agreement markers on the verbs in simple affirmative sentences are not tense morphemes but aspectual ones. Accordingly, (3b) repeats (1a) with *-d* reglossed as perfective aspect (PRF). (3a) shows a simple non-past sentence containing imperfective aspect morphology *-u* on the verb root, glossed as IPFV.

(3) a. *Jayā patra bare-**u**(tt)*[2]*-āḷe.*
Jaya letter write-**IPFV**-3.SG.F
"Jaya writes/will write a letter"

b. *Jayā patra bare-**d**-aḷu.*
Jaya letter write-**PRF**-3.SG.F
"Jaya wrote a letter."

However, as noted in Section 1, the source of the temporal interpretations is less clear in negative sentences which diverge from the corresponding affirmative sentences in their realization of aspectual morphology. In (1b), for instance, repeated as (4b) below, the PRF affix on the verb root is traded for the non-finite infinitive morpheme *-al*. The resulting temporal interpretation in (4b) is nevertheless identical to its affirmative counterpart. The non-past negative sentence (4a) also differs from its affirmative counterpart with respect to the verbal morphology, though in a way that is arguably less surprising for its temporal interpretation. Here, the imperfective morpheme *-u* is still present, only realized alongside the additional nominalizing gerundive affix *-d* (which we assume is homophonous with but independent of the PRF affix *-d*).

(4) a. *Jayā patra bare-u(v)*[3]*-d illa.*
Jaya letter write-IPFV-GER NEG
"Jaya does not/will not write a letter."

b. *Jayā patra bare-al illa.*
Jaya letter write-INF NEG
"Jaya did not write a letter."

To account for the past tense meaning in (4b), Amritavalli & colleagues hypothesize that the infinitival morpheme here inherently instantiates perfective aspect. Consequently, perfective aspect in Kannada can be realized in two ways: by the canonical morpheme *-d* (3b), or by the infinitival *-al* (4b). Which of the two realizations occurs depends on the properties of the element in MoodP: that is, *-d* is selected by agreement marking in MoodP, whereas *-al* is selected by the sentential negation element *illa* in MoodP. The perfective infinitive is distinguished from a second type of "case-marked" infinitive in the language – so called because it can optionally occur with dative case-marking. The event denoted by the verb carrying the case-marked infinitival receives a future-oriented interpretation instead (relative to the matrix verb), as exemplified in (2), repeated below:

(2) *Jayā nadi-alli īj-alu / īj-al-ikke prayatnis-utt-āḷe.*
Jaya river-in swim-INF swim-INF-DAT try-PRS-3.SG.F
"Jaya tries to swim in the river."

To further justify the existence of two types of infinitives in Kannada, one of which is inherently associated with perfective aspect, Amritavalli & Jayaseelan (2005) – henceforth A&J – point to two independent observations. First, they note that a similar dichotomy seems to exist in

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polarity feature is realized as negation *illa* and selects a different form of aspectual complement. The presence/absence of PolP is only relevant in comparison with other Dravidian languages. It is not crucial to us here as we focus solely on Kannada, and hence omitted.

[2] Following Amritavalli & Jayaseelan (2005), we take *-u* alone to represent the imperfective morpheme, while the accompanying parenthetical *-tt* corresponds to a phonological augment.

[3] In (4a) as well, following Amritavalli & Jayaseelan (2005), the parenthetical *(v)* is taken to be an epenthetical augment.

English as well. Much like the Kannada perfective infinitive, the English "bare" infinitive *make* in (5a) necessarily denotes a completed event (i.e., Hamid is understood to have completed making dinner). No such inference arises in the future-oriented embedded infinitive in (5b), which is more akin to the Kannada "case-marked" infinitive.

(5) a. *We watched Hamid **make** dinner.*
b. *Hamid decided **to make** dinner.*

Second, A&J note that passivized Kannada verbs also occur with infinitival morphology. Once again, a parallel pattern is noted in English, where passivized verbs undergo the same inflection as perfective verbs – e.g., *built* in the English translation for (6). This is interpreted as evidence of a shared meaning between perfective and passivized verbs, realized by a shared form (infinitive *-al* in Kannada, the past participle in English).

(6) *Alli ondu mane kaṭṭ-al-āgide.*
there one house build-INF-AUX.
"A house has been built over there."

In sum then, we can surmise two main results from Amritavalli & colleagues' analysis of Kannada clauses. First, Kannada does not instantiate tense separately from aspect. Instead, all temporal interpretations are by virtue of aspectual specification. Second, there are at least two distinct types of the infinitival morpheme *-al* in this language, one of which inherently denotes perfective aspect and occurs in past tense denoting negative. In Section 2.2, we introduce some empirical and conceptual challenges to both of these results.

### 2.2 Challenges to existing proposal

In what follows, we discuss two types of challenges to the proposal from Amritavalli & colleagues.

#### 2.2.1 Challenges to aspect as the singular locus of temporal interpretation

Unlike the simple past and non-past constructions considered within past analyses, many common Kannada constructions in fact permit more than one temporal/aspectual marker to occur within the same clause:

(7) *Jayā patra bare-**u(tt)** id-**d**-aḷu.*
Jaya letter write-IPFV be-PRF-3.SG.F
"Jaya was writing a letter."

(8) *Jayā patra bare-**d** id-**d**-aḷu.*
Jaya letter write-PRF be-PRF-3.SG.F
"Jaya had written a letter."

(7) contains the imperfective aspectual marker *-u* immediately following the lexical verb, followed by a perfective aspectual marker *-d* to the right of an intervening auxiliary *id* (glossed "be"). Interpretively, the two aspectual markers convey different types of temporal information. The imperfective marker in (7) indicates that the event of writing denoted by the lexical verb *bare* was ongoing at the time under discussion (a.k.a *Reference time* or *Topic time*; Austin 1950), while the perfective marker leads us to understand that the time under discussion precedes the time of utterance. In (8), on the other hand, the perfective marker close to the lexical verb indicates that the event time precedes the time under discussion, which itself precedes the utterance time as indicated by the subsequent perfective marker following auxiliary *id*. The theoretical distinction between event time, reference time, and utterance time is encoded under the standard Klein-Reichenbachian approach to temporal interpretation, in which the semantic notion of aspect serves to relate event time to the time under discussion while tense relates the time under discussion to the utterance time. The morpheme *-d* following the auxiliary in (7)-(8) has been historically glossed as denoting PAST tense for precisely the reason that it relates the time of discussion to utterance time – a function of tense. This is

also the reason for the apparent homophony between tense and aspect in Kannada, which led Amritavalli & colleagues to reanalyze the relevant morphemes as uniformly marking aspect.

Note, however, that a proposal along these lines which considers aspect to be the sole locus of all temporal interpretation risks confounding or overlooking the distinct meaning contributions made by the two temporal-aspectual morphemes in (7)-(8). In more structural terms, if it is true that there exists just a single position within a clause to host temporal features, we simply do not expect to see constructions like in (7)-(8) containing more than one temporal marker. A construction like (7) that instantiates both the purported perfective morpheme *-d* and imperfective morpheme *-u* is especially worrying. AspP presumably hosts one of these conflicting aspectual features, leaving no obvious way to explain the structural underpinnings of the remaining one. Positing an additional AspP to host the remaining feature is not quite an option, as there is nothing then stopping us from reanalyzing this additional projection as TP instead, greatly diminishing the force of the theoretical claim that Kannada clauses lack a temporal projection separate from AspP.[4] It would also violate the spirit of the proposal in Amritavalli (2014) to claim that MoodP is capable of hosting temporal features in addition to finiteness ones, as this would serve to weaken the separation between temporal and finiteness features.[5]

A different type of argument against the idea that Kannada lacks a TP projection comes from Swenson (2017), who examines a similar claim for Malayalam made in A&J. Swenson's argument targets A&J's claim that perfective and imperfective aspectual markers result in *default* past and present tense interpretations respectively. She observes that such default tense interpretations must be capable of being overridden upon cooccurrence with overt temporal adverbs, as seen in the following example from Mandarin (adopted from Swenson ex. 5a-b, who in turn adopts it from Lin 2010):

(9) a. *Wo zhu zai Lutedan.*
I live in Rotterdam
"I live / #lived in Rotterdam."

b. *Wo 1989 nian zhu zai Lutedan.*
I 1989 year live in Rotterdam
"I lived in Rotterdam in 1989."

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[4] A DM analysis involving a *fission* operation might be possible, wherein the Asp head – when it bears more than one temporal feature – splits into two smaller functional heads. The end state in this case would be the same as in our proposed analysis (with a separate head bearing each temporal feature). We do not pursue this alternative here.

[5] If constructions like (7)-(8) are indeed so productive in Kannada, as we have claimed, the question arises why they have not been addressed in previous studies. To the best of our understanding, this is due to no deeper reason than that these studies have only tended to focus on simple past/non-past clauses for analysis. The only exception we find is a brief suggestion made in footnote #26 in A&J, without further development, that such "compound tenses" must be analyzed as Serial Verb Constructions (SVCs). A canonical serial verb construction is given below:

(i) *Jayā patra bare-du ban-d-aḷu.*
Jaya letter write-PRF come-PRF-3.SG.F
"Jaya wrote a letter and came."

A key difference between the serial verb construction (i) and examples (7)-(8) in the main text, however, is that the former is composed of a sequence of event-denoting lexical verbs, while the auxiliary BE in the latter is purely functional. This leads to several distributional differences. For one, the sequence of verbs in (i) may be interchanged to still result in a grammatical, sensible sentence – as in (ii). This is not true of (7)-(8). We take such distributional differences as an argument against the treatment of (7)-(8) as true SVCs, and do not therefore pursue it here.

(ii) *Jayā ban-du patra bare-d-aḷu.*
Jaya come-PRF letter write-PRF-3.SG.F
"Jaya came and wrote a letter."

While the uninflected Mandarin verb in (9a) receives a default non-past interpretation, the occurrence of past-denoting adverb modifiers like in (9b) can force a past tense reading. We do not see this, however, with verbs in Kannada that are marked with *-d* (glossed as PRF above) or *-u* (glossed as IPFV). The former must receive past tense interpretations – they are incompatible with non-past adverbials (10a), and the latter must receive non-past interpretations (10b). This pattern continues to hold in the face of stronger contextual manipulations, indicating that the tense denotations associated with the PRF/IPFV markers in Kannada are more strongly encoded and not mere defaults.

(10) a. **Jayā mundina vāra bare-d-aḷu.*
Jaya next week write-PRF-3.SG.F

b. **Jayā nenne bare-u(tt)-āḷe.*
Jaya yesterday write-IPFV-3.SG.F

### 2.2.2 Challenges to the existence of an inherently perfective *-al*

Certain empirical observations pertaining to the infinitive *-al* further serve to weaken A&J's claim that Kannada instantiates two distinct *-al* morphemes – one inherently perfective and "bare" *a.k.a* unable to be case-marked, the other future-oriented and able to be case-marked. First, as A&J note as well, there is at least one type of occurrence of the infinitive *-al* that decidedly receives a future-oriented interpretation but fails to grammatically co-occur with dative case-marking. This is the infinitival complement selected by modal auxiliaries, shown in (11):

(11) *Avanu bar-al(*-ikk)- ē bēku.*
he come-INF(-DAT)-EMPH must
"He definitely must come."

The event denoted by *bar* "come" in (11) has not yet come to pass (i.e., it is future-oriented), but the verb is nonetheless unable to support an overt dative case marker. This casts considerable doubt on case marking as a diagnostic to track the presence of aspectual information in the infinitive, and by extension, on the proposed dichotomy between perfective and future-oriented *-al* in Kannada.

In fact, in (2) as well, there may be reason to believe that it is the entire complement clause that is case-marked, and not merely the embedded verb. As noted in Aikhenwald (2008), case markers with a dative, purposive or benefactive meaning tend to crosslinguistically function as clause-linkers. In (2), the dative case on the embedded verb could be marking a semantic notion such as *reason* or *purpose*. Somewhat more direct evidence that the dative case in (2) is not tied to the infinitive verb comes from the possibility of a grammatical paraphrase such as in (2'), where the dative marked embedded verb is associated with gerundive rather than infinitival morphology.

(2') *Jayā īj-u(v)d-ikke prayatnis-utt-āḷe.*
Jaya swim-GER-DAT try-PRS-3.SG.F
"Jaya tries to swim."

Taken together, the possibility of the dative case in (2) and (2') but not (4b) or (11) raises the possibility that the observed case-marking is correlated not with the aspectual specification of the embedded infinitival verb, but with an entirely different property: that of whether it appears as part of a purpose-denoting subordinate clause selected by a clause-embedding lexical predicate.

The parallel aspectual distinction purported to hold between English infinitives like in (5) also fails to hold up to further scrutiny. Recall that the bare infinitival verb *make* in (5a) is claimed to host perfective aspect, as the dinner-making event it denotes is necessarily complete, unlike the event denoted by *to make* in (5b). However, we observe that whether or not a completeness inference arises with the bare infinitive depends crucially on the aspectual specification of the embedding verb. In (5a), the embedding verb *watched* carries perfective aspect. When the embedding verb is instead imperfective, as in (5a'), it is no longer necessary that the dinner-making was complete. This is

confirmed by the felicity of the parenthetical continuation in (5a'), where it is wholly conceivable that Hamid did not continue making dinner due to his injury.

(5a') *We were watching Hamid$_i$ make dinner (when he$_i$ accidentally cut his hand).*

Finally, in response to A&J's suggestion that verbal passives and perfect participles share form across languages and therefore perfective meaning as well, we note that there is at least one claim in the literature that the *-en* suffix in English (which occurs with perfective and passive forms of the verb) is not associated with a consistent meaning across its uses. Specifically, Hallman (2021) observes that *-en* does not seem to contribute uniform distributional or interpretive properties in any of its uses (i.e., perfective assertions, verbal passives or adjectival passives), and thereby concludes that "the verbal passive/perfective participle is a default verb form in English" and "no meaning or function at all can be attributed to *-en*."[6,7] A similar argument extended to Kannada opens up an alternative proposal for the semantics of *-al*: that it is merely a default or "elsewhere" form, conveying no inherent semantic force of its own in any of its uses. It is precisely such a view that we defend in Section 4.

### 2.3 Taking stock

The discussion in this section has emphasized the lack of conclusive evidence against two key claims advanced in previous work on tense/aspect in Kannada clauses. We noted that getting rid of a structural tense projection altogether within the Kannada clause creates a dearth of syntactic positions to accommodate utterances conveying more complex temporal information. We have also called into question the justifications provided in favor of a perfective-carrying infinitival form in Kannada separate from a non-perfective one. In the face of the concerns highlighted above, attributing an inherently perfective meaning representation to *-al* in (4b) appears to be stipulative rather than explanatory. There is also the additional question of why the purportedly perfective *-al* appears only in past-tense conveying negative sentences but not affirmative ones in Kannada. A & J attribute this to the selectional properties of the selecting head, without further explanation.

In Section 4, we attempt to develop a more comprehensive and explanatory DM-based analysis of tense-aspect morphology in Kannada clauses. Our analysis reverts to a more standard view of the Kannada clause, as one that contains a TP projection in addition to AspP. We also defend a unified analysis for the infinitival *-al* where it is always devoid of independent temporal information, and provide a DM theory-internal reason for why it appears within a perfective-denoting context such as (4b) despite its tenselessness. But first, in Section 3, we turn towards the core data to be addressed by our analysis: the full tense-aspect inflectional paradigm in Kannada.

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[6] The three types of uses of English *-en* are illustrated below (adopted from Hallman 2021 ex. 1):
(i) *The vase was **broken** by the child.* [Verbal Passive]
(ii) *The vase looks **broken**.* [Adjectival Passive]
(iii) *The child has **broken** the vase.* [Perfect]

Hallman notes that the participle *-en* is verbal, eventive and has the aspectual profile of the underlying verb in (ii)-(iii) but not in (i) – where it is adjectival, stative and its aspectual contribution varies depending on whether the underlying verb is eventive or stative. Moreover, it is passive in (i)-(ii) but not in (iii). From these observations, he concludes "there is no semantic or syntactic function that can be consistently pinned on *-en*", and goes on to propose a semantically bleached analysis for these items.

[7] See also Aronoff (1994) who uses the semantic/syntactic disparity of the English participle as the prime example to motivate his concept of the "morphome". Thanks to an anonymous reviewer for bringing this to our attention.

## 3 Core data: The Kannada tense-aspect inflectional paradigm

Table 1 below displays the verbal inflectional paradigm in Kannada affirmative sentences. We restrict the verb root to *bare* "write", and the subject person-number-gender parameters to third person feminine singular, which are uniformly present in all entries of Table 1. As such, we will have little to say about them in the following discussion. Note *-āḷe* in 1A. is the 3.SG.F agreement form in non-past constructions, while *-aḷu* is its past counterpart.

| | | |
|---|---|---|
| 1A. | *bare-u(tt)-āḷe*<br>write-IPFV-3.SG.F | she writes (habitual) /<br>she will write |
| 1B. | *bare-d-aḷu*<br>write-PRF-3.SG.F | she wrote |
| 1C. | *bare-u(tt) id-āḷe*<br>write-IPFV be-3.SG.F | she is writing |
| 1D. | *bare-d id-āḷe*<br>write-PRF be-3.SG.F | she has written |
| 1E. | *bare-u(tt) id-d-aḷu*<br>write-IPFV be-PRF-3.SG.F | she was writing |
| 1F. | *bare-d id-d-aḷu*<br>write-PRF be-PRF-3.SG.F | she had written |
| 1G. | *bare-u(tt) ir-u(tt)-āḷe*<br>write-IPFV be-IPFV-3.SG.F | she will be writing |
| 1H. | *bare-d ir-u(tt)-āḷe*<br>write-PRF be-IPFV-3.SG.F | she will have written |

*Table 1: Temporal and agreement inflectional affixes in Kannada affirmative constructions*

(1A) and (1B) are familiar to us from the discussion in the previous sections (see 3a and 3b). In (1A), the verb is inflected with the imperfective/non-past suffix *-u(tt)*, glossed here as IPFV. As indicated in the accompanying English translation, this form may be interpreted to convey that the agent is a habitual writer, or that she is going to engage in a writing event at some point in the future. In (1B), the verb is inflected with the perfective/past suffix *-d*, glossed here as PRF. This conveys a simple past tense meaning.

Moving now to (1C) and (1D), which denote present progressive meaning (*is writing*) and present perfect meaning (*has written*) respectively, we observe the additional presence of the auxiliary root *id* "be" aside from the aspectual marker IPFV. A&J characterize the root *id* to be "unmarked" for temporal information in both form and meaning, informally dubbing it as conveying a "timeless" existential interpretation. This unmarkedness of the auxiliary receives a formal instantiation in our analysis developed in Section 4, where we also address why such an unmarked auxiliary needs to instantiated at all.

(1E)-(1H) contain not one but two instantiations of the aspectual morphemes PRF/ IPFV, each contributing a distinct temporal meaning. For example, in (1E), the IPFV marker following the lexical verb denotes that the writing event was ongoing or not yet complete at the time under discussion, while the PRF marker following the auxiliary *id* denotes that the time of discussion categorically precedes the utterance time. Explaining the morphosyntactic locus of the two semantically distinct aspectual markers (plus the intervening copula) forms a key goal of the current analysis. Per our discussion in Section 2, this is not straightforwardly anticipated under an analysis that posits a single structural position (AspP) within a clause to host any temporal information.[8]

[8] Notice that the form corresponding to the auxiliary "be" is *id* in (1C)-(1F), but *ir* in (1G)-(1H). We consider this a case of phonologically conditioned root allomorphy, where the root form varies based on the aspectual/agreement affixes attaching to it.

| | | |
|---|---|---|
| 2A. | *bare-u(v).d illa* OR *bare-alla*<br>write-IPFV.GER NEG write-NEG' | she does not write /<br>she will not write |
| 2B. | *bare-al illa*<br>write-INF NEG | she did not write |
| 2C. | *bare-u(tt) illa*<br>write-IPFV NEG | she is not writing |
| 2D. | *bare-d illa*<br>write-PRF NEG | she has not written |
| 2E. | *bare-u(tt) ir-al illa*<br>write-IPFV be-INF NEG | she was not writing |
| 2F. | *bare-d ir-al illa*<br>write-PRF be-INF NEG | she had not written |
| 2G. | *bare-u(tt) ir- u(v).d illa*<br>write-IPFV be- IPFV.GER NEG<br>OR<br>*bare-u(tt) ir-alla*<br>write-IPFV be-NEG' | she will not be writing |
| 2H. | *bare-d ir- u(v).d illa*<br>write-PRF be-IPFV.GER NEG<br>OR<br>*bare-d ir-alla*<br>write-PRF be-NEG' | she will not have written |

*Table 2: Temporal and agreement inflectional affixes in Kannada negative constructions*

The affirmative paradigm in place, we now turn to the realization of tense/aspect on the verb within negative sentences. These data are displayed in Table 2. (2A) and (2B) represent the negative counterparts of (1A) and (1B) respectively – the differences between them morphologically stark. Aside from the presence of the negation element *illa* and the absence of subject agreement marking, (2A)-(2B) crucially differ from (1A)-(1B) in terms of their temporal marking. First, as seen in (2A), the negative non-past construction may be realized in two alternative ways. One of these, discussed in previous work by Amritavalli & colleagues, is identical to the verb form in (4a), where the imperfective morpheme is further affixed by the nominalizing gerund morpheme. An identical interpretation also arises with a seemingly simpler form – one where the verb root is affixed by an alternative negation marker *alla*, glossed in (2A) as NEG'. What, then, should we make of *alla*, and how is it related to the standard sentential negation marker *illa*? The source of the non-past interpretation is further unclear from the surface form in this case, raising a question about how such an interpretation is nevertheless obtained. A comprehensive analysis of Kannada tense-aspect must address these questions. We attempt to do so in Section 4.

The simple past-denoting negative construction in (2B) is, of course, familiar to us by now. The verb here is affixed with the infinitive affix *-al*, prompting A&J's analysis that it is an alternative realization of perfectivity in the language (aside from *-d*). We have argued against such an analysis in Section 2, and as such, provide an alternative explanation in Section 4.

Let us now cast our gaze to (2C)-(2D), comparing them to their affirmative counterparts in Table 1. The aspectual morphology immediately following the lexical verb root is identical across rows C. and D. of the two tables, but there are other differences. As before, the negation marker *illa* replaces subject agreement marking. We further notice the absence of the unmarked auxiliary *id* "be" in (2C)-(2D), unlike in (1C)-(1D), deepening the puzzle around the auxiliary. Why does it occur in

(1C)-(1D), and why is it not retained in the negative constructions (2C)-(2D)?[9] Furthermore, we note that the auxiliary is reintroduced in (2E)-(2H) just preceding *illa*, and affixed with gerundive/ infinitival markers. These markers, as in (2A)-(2B), replace the canonical PRF/ IPFV morphemes found in the corresponding entries of Table 1.

Overall then, three main puzzles are raised by the data in Tables 1 & 2, taken together. First, why don't aspectual morphemes appear in their canonical PRF/ IPFV forms next to the negation marker *illa*, and how is temporal information read off these constructions despite the absence of these canonical forms? Second, how should we understand the syntax and semantics of constructions (1E)-(1H), which contain more than one instance of PRF/IPFV? Finally, what governs the presence or absence of the auxiliary *id*/*ir* "be" in Tables 1 & 2? Why is it sometimes absent – as in (A)-(B) across both tables or in (2C)-(2D), but present elsewhere? Only the first of these has been addressed in previous analyses, which focused primarily on data such as (A)-(B) in the tables above.

## 4 Analysis

In this section, we develop in piecewise detail our DM-based analysis of tense/aspect realization in Kannada, focusing first on the affirmative constructions in Table 1 followed by the negative constructions in Table 2.

### 4.1 Basic clause structure

We assume a basic clause structure for Kannada as represented in Figure 2, on which the remaining pieces of our analysis build:

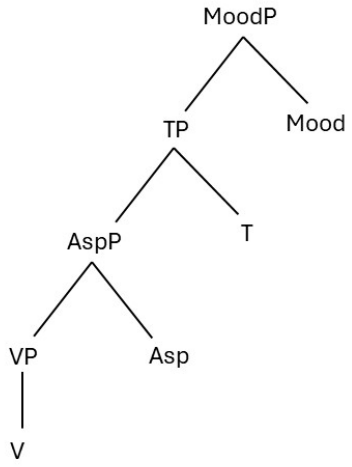


Figure 2: Basic Kannada clause structure

The structure in Figure 2 diverges from previous proposals by Amritavalli and colleagues in one major way, in that we assume a tense projection TP to be syntactically projected separately from the aspect phrase AspP. This is motivated by the possibility of occurrence of more than one semantically distinct, temporally informative marker in the same construction, as exemplified by several entries in Tables 1 & 2. We take this to strongly indicate the necessity for distinct structural

[9] A&J address this question, suggesting that the *illa* in (2C)-(2D) is distinct from the one in the remaining entries of Table 2. In particular, it is claimed that the existential *be* is built into the *illa* in (2C)-(2D), so that it comprises of *be* + *NEG*, but not elsewhere – where *illa* is simply *NEG*. This seems to us a stipulative response to the lack of the auxiliary in (2C)-(2D). We provide an alternative explanation in Section 4.

positions able to host the features associated with these markers. A secondary, somewhat less compelling reason to assume the TP projection in Kannada is that it is in some sense the unmarked case crosslinguistically. As such, we view an analysis that returns to a structure like in Figure 2 for Kannada to be more theoretically parsimonious.

This divergence notwithstanding, we adopt several other assumptions that are consistent with previous work. Following A&J and subsequent work by these authors, we assume the presence of a MoodP projection at the highest level that hosts subject agreement features in affirmative sentences, negation *illa* in negative sentences, and modal auxiliaries elsewhere.[10] We are also in agreement with the claim that the notion of finiteness in Kannada is not correlated with the presence or absence of temporal features hosted in TP or AspP, but with the nature of MoodP instead. Crucially, as Swenson (2017) also notes, it is possible to distinguish finiteness from tense within a language even without necessarily foregoing structural tense altogether.

Our assumptions about the basic clause structure in Kannada now in place, the following subsection takes up the task of motivating and defining a comprehensive set of abstract temporal features that are capable of being hosted on either $Asp^0$ or $T^0$, which lead to the various possible temporal interpretations in the language.

### 4.2 Formal temporal features

As depicted in Table 1, matrix verb forms in Kannada affirmative constructions may contain (a combination of) two types of temporal morphemes: *-d* and *-u*, glossed as PRF and IPFV respectively. We propose that these morphemes each map to a formal temporal feature, in addition to a third "unmarked" feature, described in the following subsections.

Importantly, these formal features are able to be hosted either on the Tense head $T^0$ or the Aspect head $Asp^0$. When in $T^0$ , they serve to relate the time under discussion to the time of utterance. When in $Asp^0$, they relate the event time to the time under discussion. In this way, the long-noted homophony between tense and aspect marking in Kannada is cashed out as a consequence of shared formal features between the two syntactic heads. This is crucially different from previous work, where the homophony was a result of a lack of any structural distinction between Tense and Aspect, having done away with the former projection altogether.

#### 4.2.1 Feature corresponding to *-d*

To understand the nature of the abstract feature corresponding to the overt morpheme *-d*, we begin by taking a closer look at the type(s) of meaning(s) it conveys in its various occurrences. In (1B), (1D), (1F) and (1H), where *-d* appears immediately to the right of the lexical verb *bare* "write", it serves to situate the writing event as one that entirely precedes the utterance time (in 1B) or a contextually salient time under discussion (in 1D, 1F, 1H). In (1E) and (1F), *-d* appears alongside the auxiliary, where it now serves to fix the contextually salient time under discussion as one that entirely precedes the utterance time. Thus, what is commonly conveyed across all of the occurrences of *-d* is the notion of precedence of a certain event or time interval relative to another interval. It is

[10] An anonymous reviewer questions the choice to host both negation and agreement features in $Mood^0$. They suggest an alternative wherein the complementary distribution of negation and agreement features in Kannada is captured by simply assuming that the two sets of features are incompatible with each other. We agree this is a possible option, but note the stipulative cost it entails. Our choice here to host negation/agreement features in $Mood^0$ is motivated by a desire to retain aspects of the earlier account from A&J that are not in conflict with the current proposal. A&J argue (following others in the Dravidian linguistic tradition: e.g., Steever 1988, Sridhar 1990) in favor of separating temporal features in Dravidian from finiteness/event-anchoring ones. Their arguments are based on the general observation that the absence of Tense in a language does not entail the absence of a finite/non-finite distinction in it or vice versa (see also Ritter & Wiltschko 2005) as well as the Dravidian-specific observation that the presence of overt temporal information is neither necessary nor sufficient to "anchor" a sentence and enable it to stand alone; it is the presence of agreement/negation/modal markers that is required to do so. As such, adopting their proposal on finiteness in Dravidian naturally groups together agreement/negation/modality under a single "finiteness" category (which they label $Mood^0$), while excluding temporal features from this category.

such precedence that is conveyed by the formal feature associated with *-d*, which we dub [Infl: precedence], and define as in (12). The prefix Infl: indicates we are dealing with an inflectional feature.

(12) a. $[\text{Infl: precedence}]_{\text{Asp}} = \lambda\varphi_{<\varepsilon,t>}.\ \lambda i_{\iota}\ .\ \exists j_{\varepsilon}.\ [\varphi(j)\ \&\ \tau(j) < i]$
b. $[\text{Infl: precedence}]_{\text{T}} = \lambda\varphi_{<\iota,t>}.\ \lambda i_{\vartheta}\ .\exists j_{\iota}.\ [\varphi(j)\ \&\ j < i]$

As stated above, [Infl: precedence] may be hosted on either the aspectual head $Asp^0$ or the tense head $T^0$. The formal denotation of [Infl: precedence] varies slightly depending on the category of the head that hosts the feature.[11] The denotations are nevertheless identical in essence, in that they both have to do with the "precedence" of one time interval relative to another. Per (12a), [Infl: precedence] hosted by $Asp^0$ applies to a predicate φ over eventualities (type: ε). It posits the existence of a φ-event j, and returns a reference interval i (type: ι) that is entirely preceded by j. Note that $<$ indicates a temporal precedence relation, and $\tau(j)$ is the time of occurrence of event j. When [Infl: precedence] is hosted within $T^0$, indicated in (12b), it applies to a predicate φ over intervals, and returns the utterance interval i that is entirely preceded by a φ-interval j. In both cases, (event or interval) j is understood to be complete by interval i.

### 4.2.2 Feature corresponding to *-u*

It is somewhat more complicated to understand the nature of the feature corresponding to the morpheme *-u*, glossed IPFV. To see why, consider (1A) and (1C), repeated below:

(1A) *bare-u(tt)-āḷe*
write-IPFV-3.SG.F
"she writes" / "she will write"

(1C) *bare-u(tt) id-āḷe*
write-IPFV be-3.SG.F
"she is writing"

Suppose the auxiliary root *id* "be" in (1C) is indeed *unmarked* for temporal information, following prior analyses. In this case, we must conclude that (1A) and (1C) are identical to each other in the temporal morphology they overtly instantiate. Specifically, both contain one and only one temporally contentful morpheme IPFV, directly following the lexical verb root. Despite this, it turns out that (1A) and (1C) do not share the same temporal interpretations. (1A) is compatible with habitual/characterizing and futurate interpretations: that is, it can mean either that the agent writes habitually, or that she will write at some point in the future. (1C), on the other hand, is primarily used to express event-in-progress readings, where the agent is actively involved in a writing event at utterance time. (1C) is also additionally compatible with habitual and futurate readings, albeit in a more restricted manner compared to (1A).[12] Crucially, however, (1A) cannot be used to express an event-in-progress reading.

Two interrelated questions arise. First, given there is a difference in the temporal meanings they express, why is the temporal morphology (*-u*) identical between (1A) and (1C)? Conversely, if the temporal morphology is identical between (1A) and (1C), what is the source of the interpretive difference between them? Here, we explain the commonality in form between (1A) and (1C) as a result of a common formal feature in both constructions. The interpretive difference is due to a difference in the head ($T^0$ or $Asp^0$) that hosts this formal feature.

---

[11] An alternative way to conceptualize the difference in denotation between the feature residing in $Asp^0$ vs. $T^0$ is to posit a formal feature that is distinct between the two cases – e.g. [+/-Asp], with the further stipulation that Vocabulary Items are underspecified for this feature.

[12] Kearns (1991) notes something similar of futurate readings with English progressives, where the restriction is that "those events must be in some way planned, programmed, or fixed to occur". The contrast between (i) and (ii) illustrates this restriction:

(i) *Tomorrow, the Yankees are playing the Red Sox.* [planned/predictable event]
(ii) ??*Tomorrow, the Yankees are playing well.* [unplanned/unpredictable event]

On the other hand, notice that variants of (i) and (ii) containing the future modal "will" are equally felicitous to one another. See also Dowty (1977) for further discussion of the English futurate progressive.

To precisely formalize the semantic nature of the feature realized as *-u*, we take as our starting point the discussion in Deo (2009). Deo notices that habitual/characterizing and event-in-progress readings are commonly expressed by a single form across languages, pointing to a unified underlying "imperfective" semantics for both. A simplified version of the entry proposed in Deo (2009) is given in (13):[13]

(13) [imperfective] = $\begin{cases} \lambda\varphi.\ \lambda i\ .\ \exists j.\ [i \subseteq_{ini} j\ \&\ \forall k\ [k \in \mathscr{R}_j \rightarrow \exists e.\ \varphi(e)\ \&\ \tau(e)\ o\ k]] \\ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \text{when } \varphi \text{ is a predicate of events} \\ \lambda\varphi.\ \lambda i.\ \exists j.\ [i \subseteq_{ini} j\ \&\ \forall k\ [k \in \mathscr{R}_j \rightarrow \varphi(k)]] \\ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \text{when } \varphi \text{ is a predicate of intervals} \end{cases}$

(13) applies to either a predicate over eventualities or intervals, and returns an initial subinterval i of a larger interval j. The larger interval j is divided into a contextually provided regular partition $\mathscr{R}_j$ of j – which consists of non-empty, mutually exclusive, collectively exhaustive, equally sized sub-intervals of j – such that each element k in $\mathscr{R}_j$ overlaps with φ. Overlap is indicated by the operator o. The habitual/characterizing reading arises when i is a proper subinterval of j ($i \subset_{ini} j$). In this case, φ is guaranteed to hold every so often past i, depending on the size of each partition element k in $\mathscr{R}_j$. On the other hand, event-in-progress readings are produced when i=j, in which case φ is guaranteed to hold every so often only for the duration of i, and not beyond it. In this case, when the partition elements k are infinitesimally sized, an event-in-progress reading results. For bigger sizes of the partition intervals k, a temporally contingent habitual reading results. In languages like English, where the event-in-progress reading results from a morphological form (*be -ing*) distinct from the general imperfective form (*-s*), the feature in (13) is split into two – one where i is a proper subinterval of j and another where i=j. The split features nevertheless share a common interpretive kernel – in each case, the input event/interval φ is distributed over a regular partition of a suitable (super-)interval.

Building on Deo's (2009) analysis of imperfectivity, we propose that Kannada also realizes a formal inflectional feature [Infl: imperfective] that encodes distribution of the input event/interval over a regular partition. This interpretive property is maintained regardless of the head that hosts the feature ($Asp^0$ or $T^0$), and uniformly realized as the IPFV marker *-u*. However, other parts of its denotation may differ based on the identity of the head, as indicated in (14).

(14) a. $[\text{Infl: imperfective}]_{Asp} = \lambda\varphi_{<\varepsilon,t>}.\ \lambda i_{\iota}\ .\ \exists j_{\iota}.\ [i = j\ \&\ \forall k\ [k \in \mathscr{R}_j \rightarrow \exists e_{\varepsilon}.\ \varphi(e)\ \&\ \tau(e)\ o\ k]]$

b. $[\text{Infl: imperfective}]_{T} = \lambda\varphi_{<\iota,t>}.\ \lambda i_{\iota}.\ \exists j_{\iota}.\ [i < j\ \&\ \forall k\ [k \in \mathscr{R}_j \rightarrow \exists e_{\iota}.\ \varphi(e)\ \&\ e\ o\ k]]$

When [Infl: imperfective] occurs on $Asp^0$, it returns an interval i that perfectly overlaps with the interval j on which the regular partition is defined (i=j), so that each partition element overlaps with a φ-event. This gives rise to progressive and temporally contingent habitual meanings.[14] On the other hand, when [Infl: imperfective] occurs on $T^0$, the returned interval i precedes the interval j on which the partition is defined (i < j), so that φ necessarily holds at some future point(s) following i. Notice the change from $\subset_{ini}$ in (13) to precedence < in our proposal (14). This captures the possibility of the futurate reading with Kannada (1A) in addition to the habitual one, not observed in the case of languages discussed in Deo (2009). According to (14b), a futurate reading is obtained when $\mathscr{R}_j$ is a singleton partition containing a singular element k that overlaps with φ (so that j=k).

[13] (13) omits the intensional component of the entry provided in Deo (2009), building on the notion of branching time and inertia futures. This simplification is in the interest of simplifying exposition only, as the discussion of feature semantics in this section is only one of several pieces of the analysis developed in this paper. Nevertheless, to the best of our understanding, nothing we say here is incompatible with the complete system developed in Deo (2009).

[14] The entry in (14a) is unable to predict a futurate reading that is also available with the progressive construction in (1C) – a weakness we share with Deo (2009), as a similar futurate reading is available in English constructions with *-ing* as well (e.g., *I'm baking a cake for her birthday next week*).

Otherwise, we get the habitual reading. Crucially, an event-in-progress reading cannot be obtained, since i temporally precedes j but all instances of φ are only guaranteed to be contained within j.

In effect then, our proposal adds to the one in Deo (2009) by suggesting that the separation between imperfective denotations where the returned interval i is a proper subinterval of the partitioned interval j *vs.* where i = j can be motivated by a difference in the syntactic location of the feature, even while the feature is mapped to the same Vocabulary Item at Spell-out (reflecting presumably the shared interpretive property of being distributive over a temporal partition).

### 4.2.3 A default temporal feature

In each of (1A)-(1D) in Table 1, we see only one occurrence of a temporal morpheme (PRF or IPFV). Per our discussion thus far, the feature corresponding to this morpheme must reside either in $Asp^0$ or $T^0$. What, if any, temporal feature corresponds to the remaining head in these cases? Here, we propose that the remaining head is specified with a morphologically null, syntactically unspecified inflectional temporal feature [Infl: ]. The syntactically unspecified nature of this feature causes it to behave differently from the other two temporal features during syntactic derivation, as we elaborate in Section 4.3. We propose [Infl: ] is associated with a default *unmarked* temporal semantics as defined in (15), which returns an interval that simply overlaps with (or is simultaneous with) the input φ-event or interval.

(15) a. $[\text{Infl: }]_{Asp} = \lambda\varphi_{<\varepsilon,t>}.\ \lambda i_{\iota}\ .\ \exists j_{\varepsilon}\ .\ [\varphi(j)\ \&\ \tau(j) \circ i]$
b. $[\text{Infl: }]_{T} = \lambda\varphi_{<\iota,t>}.\ \lambda i_{\iota}\ .\ \exists j_{\iota}.\ [\varphi(j)\ \&\ i \circ j]$

With this, we now have an inventory of formal temporal features in Kannada along with their mapping to overt morphemes, as summarized in Table 3.

| | |
|---|---|
| [Infl: precedence] | *-d* |
| [Infl: imperfective] | *-u* |
| [Infl: ] | NULL |

*Table 3: Mapping from formal inflectional features to vocabulary items*

In Section 4.4, in addition to proposing the morphosyntactic derivations of the affirmative constructions in Table 1, we demonstrate how the featural semantics proposed in this section come together during meaning composition to convey the desired interpretations. Before this, in Section 4.3, we discuss the final piece of our analysis that will help us account for the distribution of the auxiliary *id* "be" in the constructions shown in Tables 1-2.

### 4.3 Auxiliary insertion

One main question we identified towards the end of Section 3 pertained to the distribution of auxiliary *id* "be" in the constructions shown in Tables 1-2. In this section, we establish the piece of our proposal that addresses this question. Following Bjorkman (2011), we adopt the view that the auxiliary is not part of the core syntactic component, but instead inserted as a sort of "last resort" repair move within the post-syntactic morphological component to rescue stranded inflectional affixes. In the remainder of this section, we elaborate on this idea as it pertains to the Kannada data.

A key observation motivating the analysis of the auxiliary in Bjorkman (2011), which also holds of the Kannada data, is what Bjorkman refers to as the crosslinguistically common "overflow pattern". In languages instantiating this pattern, the presence of the auxiliary verb is not perfectly correlated with the presence of specific inflectional categories, indicating that they are not a consequence of syntactic selection. Instead, auxiliaries appear only in certain combinations of inflectional features. We observe this in Kannada, where the copula is absent in the simple non-past and simple

past constructions (1A)-(1B) containing a single piece of temporal morphology, but present in the more complex constructions (1E)-(1H) which contain more than one temporal morpheme.[15] Bjorkman (2011) accounts for such an "overflow" pattern by way of an *Agree* operation, which we describe below and adopt with a few adjustments towards explaining the Kannada data.[16]

Bjorkman's *Agree* has the following main characteristics. An *Agree* relationship between two syntactic heads is triggered by the presence of an *unvalued* feature on one of them. The unvalued feature must receive a valuation in order to be well-formed. For this reason, the head hosting the unvalued feature establishes an *Agree* relationship with the closest syntactically higher, c-commanding head that carries a syntactically contentful, *valued* counterpart of the same type of feature.[17] We construe *Agree* as a post-syntactic operation, following Bobaljik (2008). We further assume that it involves a feature-sharing relationship, in the sense of Frampton & Gutmann (2000), where a single instance of the valued feature is shared across the two syntactic heads. Under this construal, the valued and unvalued features on the relevant heads coalesce into a single valued feature shared by both heads upon the establishment of *Agree*, in contrast to a view in which the features remain separate even after the valuation process.[18] As we will see in Section 4.5, the feature sharing view is crucial to our account of the infinitival morphology in the past tense negative constructions (2B), (2E) and (2F). Bjorkman (2011) does not herself explicitly adopt a post-syntactic notion of *Agree* nor a feature-sharing assumption, though as far as we can tell, neither of these is incompatible with her system. Following the morphological realization rule adopted by Bjorkman, we too assume the (shared) feature is overtly pronounced only on the structurally lowest head that bears it.[19]

To see how this conception of *Agree* works in tandem with the clause structure in 4.1 and the three temporal features described in 4.2, let us consider the example of (1A). The verbal head $V_0$ in (1A) is taken to carry an unvalued temporal feature upon merge, represented as [***u***Infl: ___] in Figure 3. $Asp^0$ and $T^0$ are further assumed to carry one temporal feature each, [Infl: ] and [Infl: imperfective] respectively. Recall our description of [Infl: ] above as a syntactically unspecified, default temporal feature. Owing to its unspecified nature, it is invisible to *Agree*, and therefore unable to value the unvalued feature on $V^0$. As such, $V^0$ looks towards the next higher c-commanding node that carries a syntactically visible temporal feature, $T^0$, with which it establishes an *Agree* relationship. The shared [Infl: imperfective] feature is morphologically realized on the structurally lowest head that bears it, namely $V^0$.

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[15] Of course, in (1C)-(1D), the auxiliary is present even though these constructions contain just one overtly expressed, non-empty temporal feature. The overflow pattern nevertheless holds here, as the auxiliary is inserted to rescue the stranded agreement affixes. We elaborate on this point in Section 4.4.

[16] Though we have chosen to implement here a version of Bjorkman's system, this is not the only technical alternative capable of implementing the conceptual proposal we have advocated in this paper. In particular, we should mention Fenger (2020), who provides a movement-based analysis (instead of an agreement-based analysis) to account for the "overflow" pattern of auxiliation. In Section 5, we provide a brief sketch of what a Fenger-style analysis might look like for the Kannada data, including any additional stipulations that would need to be made.

[17] In allowing feature values to be passed *downward*, Bjorkman's formulation of *Agree* differs from Chomsky (e.g., Chomsky 1998). We direct the reader to Bjorkman (2011: p. 41) for a more extensive discussion of this issue.

[18] A reviewer worries whether positing a feature-sharing relationship undermines a key characteristic of our approach whereby one and the same feature leads to differing interpretations depending on its location in the grammatical spine ($T^0$ or $Asp^0$), as the presence of the same shared feature on multiple heads would prevent the LF from successfully reconstructing its original position. We note this worry does not arise under the standard assumption that the structure accessed by LF during interpretation is the one generated prior to any post-syntactic operations, including *Agree*. It is also worth noting that in the current proposal, features are only ever shared between $T^0$/$Asp^0$ and $V^0$, and crucially, never between the functional heads $T^0$ and $Asp^0$.

[19] The rule for the morphological realization of inflectional features is stated as follows in Bjorkman (2011): "If a sequence of inflectional features $[F_1]$, $[F_2]$, …, $[F_n]$ are related by *Agree*, such that each feature $[F_i]$ c-commands $[F_{i+1}]$, it is the last feature in the sequence (the structurally lowest) that is morphologically realized." We acknowledge this is a non-standard DM assumption, as a reviewer also points out, but nevertheless adopt it here following Bjorkman (2011), as our implementation closely builds on her proposal for *Agree*.

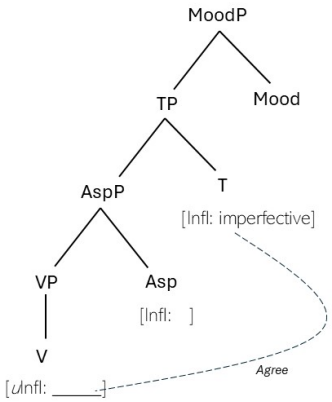


Figure 3: *Agree* between $T^0$ and $V^0$ in (1A)

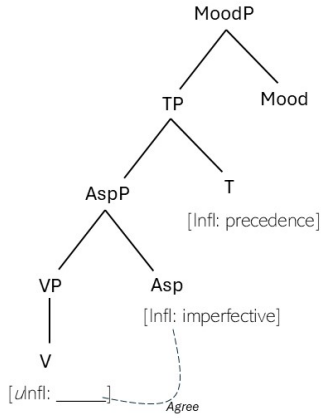


Figure 4: Agree between $Asp^0$ and $V^0$ in (1E)

The possibility of a semantically contentful yet syntactically unspecified feature invisible to *Agree* (such as our [Infl: ]) is explicitly acknowledged by Bjorkman (2011), though she does not distinguish these from syntactically invisible features that are also semantically contentless. We do make this distinction in the current analysis, and in doing so, introduce a divergence between our system and Bjorkman's. We revisit this point in Section 4.5 and explicitly justify the need for such a separation.[20] It is also worth noting Bjorkman's point here that syntactically unspecified and/or semantically empty features may nevertheless map to a morphologically overt (non-null) vocabulary item. From this perspective, the mapping of [Infl: ] to a null morpheme in Kannada must be considered a coincidence.

In contrast to (1A), consider the case of the past progressive construction (1E), represented in Figure 4. Here, $Asp^0$ does host a syntactically specified [Infl: imperfective] feature, able to value the unvalued temporal feature in $V^0$ via *Agree*. In this case, the aspectual head acts as an intervener between the verbal head and $T^0$, blocking the latter from establishing *Agree* with the verb despite hosting a syntactically specified temporal feature [Infl: precedence]. While the verb realizes the feature corresponding to the inflectional head that values it, the remaining inflectional features associated with overt vocabulary items that do not directly establish *Agree* with the verb still require a host in order to be expressed. It is this requirement that triggers auxiliary insertion.

In the following section, we put together the pieces developed in 4.1-4.3 to derive the constructions in Table 1 (and their associated interpretations). Notice that in addition to temporal markers, the data in Table 1 also consists of a second type of inflectional markers whose discussion we have thus far overlooked: namely, subject agreement markers. This is clarified below as well, where we describe how the two types of inflectional features interact during *Agree* and Spell-out.

### 4.4 Derivations: Affirmative sentences

This section brings together the morphosyntactic and semantic pieces developed above, using them to derive the various constructions in Table 1. We begin with (1A) and (1B), reproduced below.

[20] Logically, there may also exist syntactically visible but semantically empty features. Case features are presumably an example of this kind.

| | | |
|---|---|---|
| 1A. | *bare-u(tt)-āḷe*<br>write-IPFV-3.SG.F | she writes (habitual) / she will write |
| 1B. | *bare-d-aḷu*<br>write-PRF-3.SG.F | she wrote |

(1A) and (1B) share most morphosyntactic characteristics. Only one syntactically specified temporal morpheme is present in each case: [Infl: imperfective] and [Infl: precedence] respectively. We assume these features live on the tense head $T^0$, while the aspectual head $Asp^0$ carries the unspecified feature [Infl: ]. Following A&J, subject agreement features are taken to live on $Mood^0$. The verbal head is merged with an unvalued inflectional feature, as indicated in Figure 5A below.

The following derivational steps ensue. First, in a process of morphological merger followed by fusion (Marantz 1988), $Mood^0$ adjoins to the structurally closest terminal node $T^0$, resulting in a bundle of features on the complex head that are a combination of agreement and temporal inflectional features. This is depicted in Figure 5B (for the construction in 1A, specifically). Two observations motivate such a merger + fusion process. First, the overt realization of agreement is not constant across different values of temporal features on $T^0$. In (1A), where [Infl: imperfective] is specified on $T_0$ (and realized as *-u*), the 3rd person, singular, feminine agreement is realized as *-āḷe*. However, in (1B) containing [Infl: precedence] on $T^0$, the agreement marking takes the form *-aḷu*. By positing a fusion operation, we formally capture this dependence between the temporal and agreement features.[21] An additional motivation to posit fusion of tense and agreement features is the observation that these features always occur on the same host (i.e., lexical or auxiliary verb). In the absence of such an operation, something else would need to be said for why agreement features do not independently trigger auxiliary insertion in cases where $V^0$ enters into *Agree* with a syntactically specified Tense head (when $Asp^0$ is syntactically unspecified).

$T^0$ subsequently values the unvalued inflectional feature on the verbal head via *Agree*, as indicated in Figure 5C. Recall that the syntactically unspecified feature [Infl: ] on $Asp^0$ does not act as an intervener to *Agree*. This completes the derivation. The feature bundle [Infl: imperfective, 3-SG-F] in (1A) is realized during Spell-out as *-u(tt)āḷe* on the verb, while [Infl: precedence, 3-SG-F] in (1B) is realized as *-daḷu*.

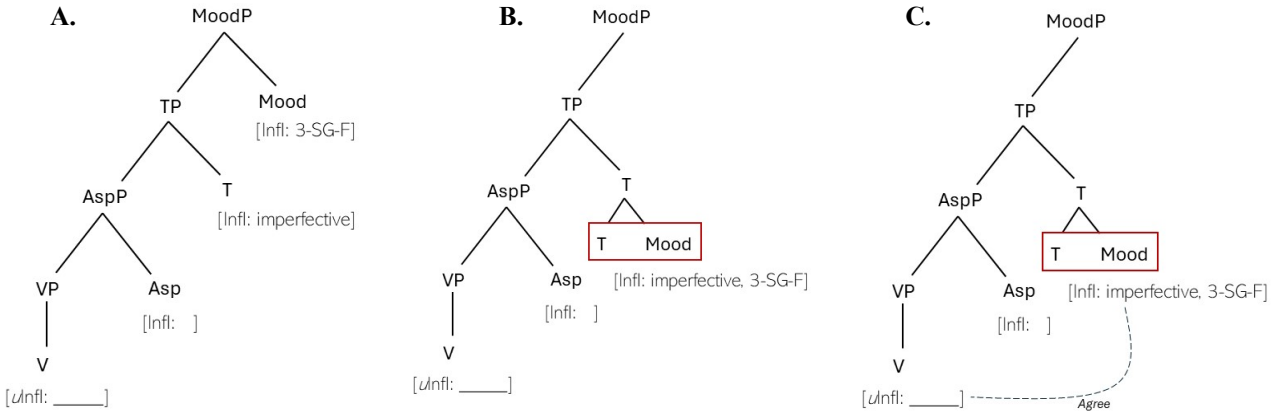


Figure 5: Steps in the morphosyntactic derivation of (1A)

Let us now turn our attention to how semantic composition proceeds at LF. Here, the verbal head in (1A)-(1B) first combines with the default temporal meaning denoted by [Infl: ] on $Asp^0$,

[21] An alternative way to capture such dependence is, as a reviewer notes, to posit contextual allomorphy of the agreement morphemes, depending on the co-occurring tense feature.

leading to the meaning representation in (16). According to (16), the reference interval under discussion i overlaps with a writing event j.

(16) [Infl: ] ([[*bare*]]) = $\lambda i_{\iota} . \exists j_{\varepsilon} .$ [write'(j) & $\tau$(j) o i]

(16) then combines with [Infl: imperfective] in (1A) and [Infl: precedence] in (1B) to lead to the following final denotations respectively:

(17) a. [Infl: imperfective] ([[16]]) = $\lambda i_{\iota} . \exists j_{\iota} .$ [i < j
& $\forall k$ [k $\in \mathscr{R}_j \rightarrow \exists e_{\iota} . \exists l_{\varepsilon} .$ [write'(l) & $\tau$(l) o e] & e o k]]

b. [Infl: precedence] ([[16]]) = $\lambda i_{\iota} . \exists k_{\iota} .$ [$\exists j_{\varepsilon} .$ [write'(j) & $\tau$(j) o k] & k < i]

(17a) effectively conveys that the speech time i precedes an interval j divided into a regular partition, such that each element of the partition overlaps with a writing event. A futurate reading is conveyed when the partition consists of only one interval (equal to j). A habitual reading is conveyed when the partition consists of more than one interval. (17b) conveys the speech time i is located past the time under discussion k that overlaps with a writing event. These denotations adequately capture the available readings for (1A) and (1B).

Moving on to (1C)-(1D) – repeated below – we observe a single overt temporal marker in each case, but the abstract syntactic feature corresponding to the overt morpheme is now taken to reside in Asp$^0$. Asp$^0$ in (1C) hosts [Infl: imperfective]. In (1D), it hosts [Infl: precedence]. In both cases, T$^0$ carries the syntactically unspecified feature [Infl: ]. The verbal head carries an unvalued inflectional feature. This starting state (for 1C) is indicated in Figure 6A.

| | | |
|---|---|---|
| 1C. | *bare-u(tt) id-āḷe*<br>write-IPFV be-3.SG.F | she is writing |
| 1D. | *bare-d id-āḷe*<br>write-PRF be-3.SG.F | she has written |

As before, Mood$^0$ undergoes morphological merger followed by fusion with T$^0$, leading to the feature bundle [Infl: 3-SG-F]: see Figure 6B. In this case, the closest c-commanding head to V$^0$ that is able to value its temporal feature is the aspectual head. An *Agree* relationship is thus established between these two nodes: see Figure 6C. The inflectional feature hosted by Asp$^0$ is shared with the verbal head, where it is also overtly realized. Asp$^0$ acts as an intervener between V$^0$ and T$^0$, preventing these nodes from establishing *Agree*.

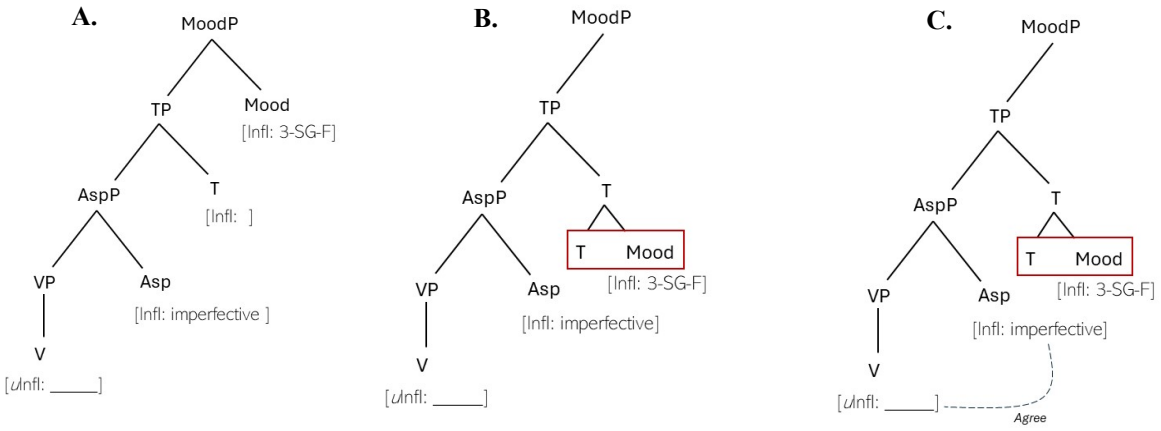


Figure 6: Steps in the morphosyntactic derivation of (1C)

The feature bundle in $T^0$ is associated with an overt affix *-āḷe* (as indicated in the table in Appendix A). In the absence of *Agree* with the verbal head, the affix is stranded without a lexical host. This triggers the insertion of the auxiliary root *id* "be", resulting in the final surface form *idāḷe* in $T^0$.

Turning now to the LF, (1C) receives the denotation in (18b), via the intermediate compositional step (18a). (18b) conveys that the speech time i overlaps with an interval that is divided into a regular partition $\mathscr{R}$ such that each partition element k in $\mathscr{R}$ overlaps with a writing event e. As discussed in Section 4.2.2, a progressive reading is obtained when the partitions are of infinitesimal size, a temporally contingent habitual reading is obtained when the partitions are non-infinitesimal.

(18) a. $[\text{Infl: imperfective}]_{\text{Asp}}([[\textit{bare}]]) = \lambda i\ .\ \exists j.\ [i = j\ \&\ \forall k\ [k \in \mathscr{R}_j \rightarrow \exists e.\ \text{write'}(e)\ \&\ \tau(e) \circ k]]$

b. $[\text{Infl: }]([[18a]]) = \lambda i.\ \exists m.\ [\exists j.\ [m = j\ \&\ \forall k\ [k \in \mathscr{R}_j \rightarrow \exists e.\ \text{write'}(e)\ \&\ \tau(e) \circ k]]\ \&\ i \circ m]$

The final denotation of (1D) is as indicated in (19b), which conveys that the speech time overlaps within a interval k under discussion that follows a completed writing event.

(19) a. $[\text{Infl: precedence}]_{\text{Asp}}([[\textit{bare}]]) = \lambda i_\iota\ .\ \exists j_\varepsilon.\ [\text{write'}(j)\ \&\ \tau(j) < i]$

b. $[\text{Infl: }]([[19a]]) = \lambda i_\iota.\ \exists k_\iota.\ [\exists j_\varepsilon.\ [\text{write'}(j)\ \&\ \tau(j) < k]\ \&\ i \circ k]$

The remaining entries (1E)-(1F), reproduced below, contain two overt temporal morphemes.

| | | |
|---|---|---|
| 1E. | *bare-u(tt)* *id-d-aḷu*<br>write-IPFV be-PRF-3.SG.F | she was writing |
| 1F. | *bare-d* *id-d-aḷu*<br>write-PRF be-PRF-3.SG.F | she had written |
| 1G. | *bare-u(tt)* *ir-u(tt)-āḷe*<br>write-IPFV be-IPFV-3.SG.F | she will be writing |
| 1H. | *bare-d* *ir-u(tt)-āḷe*<br>write-PRF be-IPFV-3.SG.F | she will have written |

In these constructions, both $Asp^0$ and $T^0$ are understood to host syntactically specified temporal features. The unvalued inflectional feature on the verbal head is valued by the feature in $Asp^0$ via *Agree*. As such, the temporal feature hosted by $Asp^0$ is overtly realized by $V^0$. As before, the agreement feature on $Mood^0$ undergoes fusion with $T^0$. This feature bundle is stranded without a lexical host, due to the intervening $Asp^0$, which triggers the insertion of the auxiliary in $T^0$. Figure 7 depicts these derivational steps for (1E).

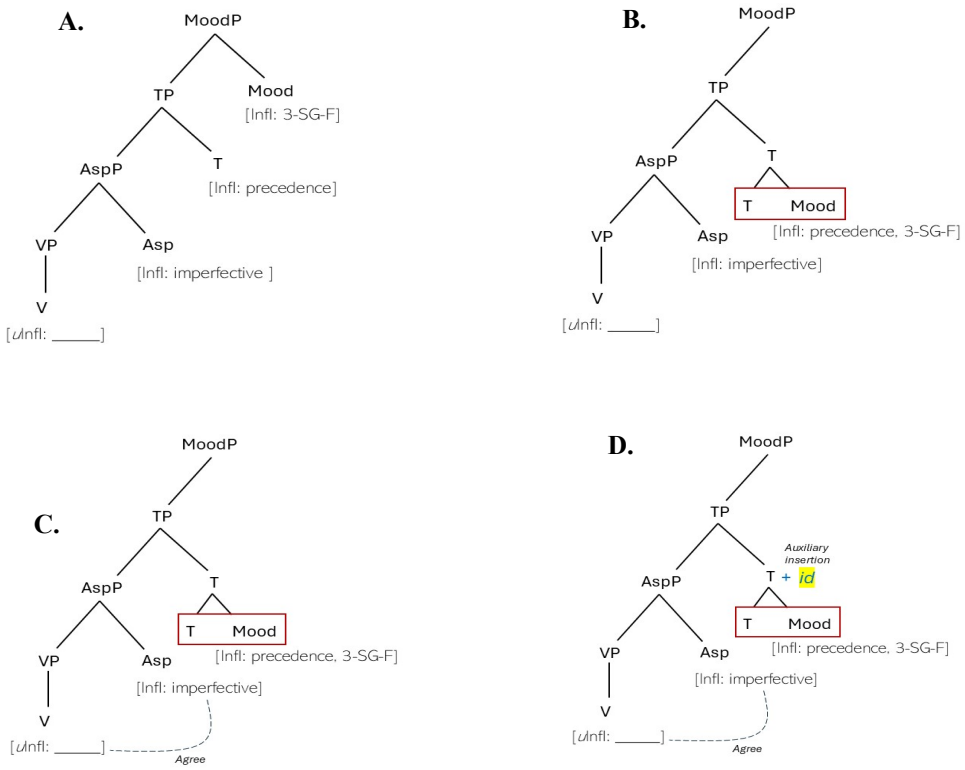


Figure 7: Steps in the morphosyntactic derivation of (1E)

The final semantic denotations of (1E)-(1H) are given in (20)-(23), along with informal paraphrases in words. In each case, the denotations correctly capture what is conveyed by the forms.

(20) a. $[\text{Infl: imperfective}]_{\text{Asp}}([[\textit{bare}]]) = \lambda i\,.\,\exists j.[i{=}j\ \&\ \forall k\,[k \in \mathscr{R}_j \rightarrow \exists e.\ \text{write'}(e)\ \&\ \tau(e) \circ k]]$

b. $[\text{Infl: precedence}]_{T}([[20a]]) = \lambda i\,.\exists m.\,[\exists j.\,[m{=}j\ \&\ \forall k\,[k \in \mathscr{R}_j \rightarrow \exists e.\ \text{write'}(e)\ \&\ \tau(e) \circ k]]\ \&\ m < i]$

In words: There is an interval m that precedes the speech time i, divided into a regular partition such that each partition element k overlaps with a writing event.

(21) a. $[\text{Infl: precedence}]_{\text{Asp}}([[\textit{bare}]]) = \lambda i_{\iota}\,.\,\exists j_{\varepsilon}.\,[\text{write'}(j)\ \&\ \tau(j) < i]$

b. $[\text{Infl: precedence}]([[21a]]) = \lambda i_{\vartheta}\,.\exists m_{\iota}.\,[\,\exists j_{\varepsilon}.\,[\text{write'}(j)\ \&\ \tau(j) < m]\ \ \&\ m < i]$

In words: There is an interval m that precedes the speech time i, that is itself preceded by a writing event.

(22) a. $[\text{Infl: imperfective}]_{\text{Asp}}([[\textit{bare}]]) = \lambda i\,.\,\exists j.\,[i = j\ \&\ \forall k\,[k \in \mathscr{R}_j \rightarrow \exists e.\ \text{write'}(e)\ \&\ \tau(e) \circ k]]$

b. $[\text{Infl: imperfective}]_{T}([[22a]]) = \lambda i_{\vartheta}.\,\exists l_{\iota}.\,[i < l\ \&\ \forall m\,[m \in \mathscr{R}_l \rightarrow \exists n_{\iota}.\,\exists j.\,[n = j\ \&\ \forall k\,[k \in \mathscr{R}_j \rightarrow \exists e.\ \text{write'}(e)\ \&\ \tau(e) \circ k]]\ \&\ n \circ m]]$

In words: There is an interval l that follows the moment of speech i, divided into a regular partition. Each element m of this partition overlaps with an interval n that is itself divided into a regular partition such that each element k of the partition overlaps with a writing event.

(23) a. $[\text{Infl: precedence}]_{\text{Asp}}([[\textit{bare}]]) = \lambda i_{\iota} . \exists j_{\varepsilon}. [\text{write'}(j) \ \& \ \tau(j) < i]$

b. $[\text{Infl: imperfective}]_{\text{Asp}}([[23a]]) = \lambda i_{\vartheta}. \exists l_{\iota}. [i < l \ \& \ \forall m [m \in \mathscr{R}_l \rightarrow \exists n_{\iota}. \exists j_{\varepsilon}. [\text{write'}(j) \ \& \ \tau(j) < n] \ \& \ n \circ m ]]$

In words: There is an interval l following the speech interval i, divided into a regular partition. Each element m of this partition overlaps with an interval n that is preceded by a completed writing event.

Together, the data points shown across Tables 1 and 2 instantiate sixteen out of eighteen possible feature combinations on $T^0$, $Asp^0$ and $Mood^0$. The two impossible combinations are those in which both $T^0$ and $Asp^0$ host the syntactically unspecified feature [Infl: ]. This possibility is ruled out by our analysis, as in this case, the verbal head under negation remains unvalued in the derivation, leading to a failure of *Agree*.

In sum then, the morphosyntax and semantics of the constructions in (1A)-(1G) are successfully accounted for by combining the pieces of the analysis developed in Sections 4.1-4.3, together with the sequence of steps described in this section. These are: (i) syntactic merger followed by fusion of the subject agreement features in $Mood^0$ with $T^0$, (ii) feature-sharing *Agree*, and (iii) auxiliary insertion to rescue any stranded inflectional affixes post *Agree*.

### 4.5 Extending the analysis to negative sentences

With the derivation of the affirmative constructions in place, we are now in a position to analyze the negative verb forms shown in Table 2. One type of contrast between affirmative and negative sentences is, of course, that the latter contain the negation marker *illa* and do not display any overt expression of subject agreement. The complementary distribution between *illa* and the agreement markers leads A & J to suggest that *illa* is hosted on the Mood head – a view we adopt here. In more formal terms, we assume that $Mood^0$ in negative sentences host the feature [negation], expressed overtly by *illa*, a lexical root in the sense that it can be used as a stand-alone denial response in appropriate discourse contexts.

The analytical components already introduced in the preceding sections suffice to account for (2C) and (2D), reproduced below:

| | | |
|---|---|---|
| 2C. | *bare-u(tt) illa*<br>write-IPFV NEG | she is not writing |
| 2D. | *bare-d illa*<br>write-PRF NEG | she has not written |

As in the case of their affirmative counterparts, $Asp^0$ in (2C) and (2D) hosts the inflectional temporal feature [Infl: imperfective] in (2C), [Infl: precedence] in (2D). $T^0$ hosts the syntactically invisible feature [Infl: ], which is not associated with an overt realization. The verbal head is merged with an unvalued inflectional feature, which is valued via *Agree* with $Asp^0$. $Mood^0$ carries [negation], realized as *illa*. Unlike in the affirmative cases, $Mood^0$ does not host any inflectional features, and therefore merger followed by fusion with $T^0$ no longer occurs. Auxiliary insertion does not occur, as no inflectional affixes are stranded. This sequence of steps for (2C) is shown in Figure 8.

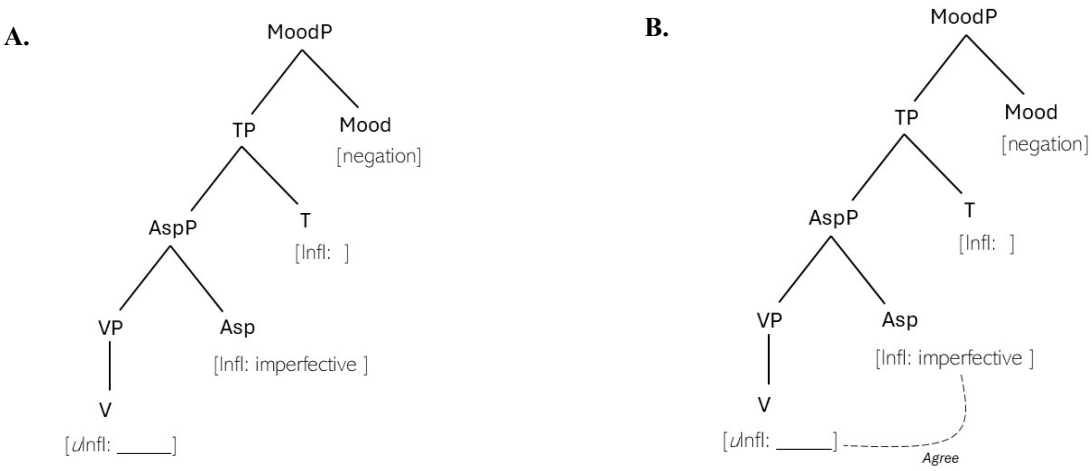


Figure 8: Steps in the morphosyntactic derivation of (2C)

For the remaining entries in Table 2: (2A), (2B), and (2E)-(2H), there are some morphological puzzles that we have yet to resolve. In particular, the temporal morphemes directly preceding *illa* in these constructions are unexpected, given their affirmative counterparts. In (2A), (2G) and (2H), the imperfective affix is augmented with a nominalizing gerundive morpheme not present in the affirmative constructions. Even more puzzlingly, in (2B), (2E) and (2F), *illa* is immediately preceded by a (lexical or auxiliary) verb carrying infinitival morphology, instead of the perfective affix as in the affirmative constructions. In what follows, we describe the last two pieces of our proposal, with the goal of explaining these seemingly exceptional data.

### 4.5.1 Impoverishment

| | | |
|---|---|---|
| 2B. | *bare-al illa*<br>write-INF NEG | she did not write |
| 2E. | *bare-u(tt) ir-al illa*<br>write-IPFV be-INF NEG | she was not writing |
| 2F. | *bare-d ir-al illa*<br>write-PRF be-INF NEG | she had not written |

As noted above, the infinitival morpheme in (2B), (2E) and (2F) replaces the PRF morpheme *-d* in their affirmative counterparts. In previous work, it was proposed that the infinitival *-al* is inherently specified for perfective aspect, much like *-d*. Mood$^0$ is claimed to select *-d* in affirmative sentences, and perfective *-al* in negative sentences. While this move is empirically satisfactory for the data at hand, we noted some challenges it faces in Section 2, including the lack of conclusive independent evidence that Kannada instantiates an inherently perfective *-al* in addition to a non-perfective one.

In this section, we argue for an alternative explanation for the presence of *-al* in negative constructions. We propose that the infinitival morphology is a consequence of *feature impoverishment*, where the most marked temporal feature [Infl: precedence] deletes upon co-occurrence with negation. This raises some questions that need independent motivation. First, what makes [Infl: precedence] the most marked feature, and why does it delete only upon co-occurrence with negation? Second, why does the deletion of the temporal feature result in infinitival morphology? We address each of these in turn.

In Section 4, we hypothesized three temporal features in Kannada: [Infl: precedence], [Infl: imperfective], and [Infl: ]. We have described the first two of these as being both syntactically and semantically specified or contentful. By contrast, [Infl: ] is semantically but not syntactically specified, with the consequence that it is not visible to *Agree* in syntax proper. Based on this characterization, it seems relatively uncontroversial to characterize [Infl: ] as the least marked feature of the three, though it is less clear how [Infl: precedence] and [Infl: imperfective] should be ranked. As it turns out, it is possible to marshall some evidence for the markedness of [Infl: precedence] over [Infl: imperfective]. First, let us observe that the semantic denotation associated with [Infl: precedence] is more specific than in the case of [Infl: imperfective]. While there is one and only one sense in which any interval precedes another, imperfectivity could refer to more than one kind of ongoing or incomplete event – leading to an event-in-progress reading, a futurate reading, or a habitual one.[22] Further typological and behavioral pieces of evidence also favor the markedness of [Infl: precedence] over [Infl: imperfective]. Crosslinguistically, Dahl & Velupillai (2013) note that it is "generally the past rather than the present that is overtly marked. Based on these considerations, we adopt the following markedness ranking for inflectional features in Kannada (least to most marked from left to right):

(24) [Infl: ] < [Infl: imperfective] < [Infl: precedence]

We further propose that when the marked temporal feature [Infl: precedence] appears on $T^0$ alongside a second marked feature [negation] on the neighboring head $Mood^0$,[23] the temporal feature on $T^0$ is deleted. This is an instance of *feature impoverishment*, a standard post-syntactic operation within the DM framework that is driven by markedness considerations (Bonet 1991). The specific deletion rule can be expressed as in (25):

(25) [Infl: precedence] → [ ] / _____ [negation]

Our construal of *Agree* as feature-sharing has an important consequence here. In constructions where $V^0$ has received its inflectional feature valuation via *Agree* with $T^0$, the deletion of [Infl: precedence] on $T^0$ naturally causes $V^0$ to become devoid of this feature as well. In other words, once (25) has applied, all nodes that shared the now-deleted feature now carry no feature at all. This featureless state [ ] is overtly realized during Spell-out by way of the "elsewhere" infinitival morpheme, *-al*.[24]

Importantly, [ ] is understood to be both syntactically and semantically empty, and therefore pointedly different from [Infl: ], which is syntactically unspecified but nevertheless carries a temporal interpretation of simultaneity. We take the semantic emptiness of [ ] to be a crucial factor in explaining the empirical fact that *-al* is compatible with a variety of semantic interpretations across its occurrences. We further elaborate on this point in Section 5.

To see how the derivational steps described in Section 4 interact with the feature impoverishment proposed here, let us consider the case of (2B). Prior to *Agree*, $Asp^0$ hosts the unmarked temporal feature [Infl: ], $T^0$ carries [Infl: precedence], and $V^0$ is merged with an unvalued inflectional feature [*u*Infl: _____]. The unmarked feature on $Asp^0$ is syntactically unspecified and therefore invisible to *Agree*. As such, the unvalued feature on $V^0$ is valued by $T^0$ via feature-sharing *Agree*. A single instance of [Infl: precedence] is shared by $V^0$ and $T^0$ at this stage. In the post-syntactic phase of derivation, [Infl: precedence] undergoes deletion or impoverishment as it is c-commanded by

[22] A similar meaning-based argument is often made to justify the markedness of the English past tense form over the present tense form: see e.g., Battistella (1996).

[23] The claim that negative sentences are more marked than their affirmative counterparts is relatively uncontroversial, though see de Swart (2010) for explicit arguments to this end.

[24] A reviewer worries about the interaction between the impoverishment operation and feature-sharing *Agree*, in that the combination of these assumptions allows the deletion of extremely non-local features. Note, however, that feature-sharing as described in our proposal is highly constrained, in that features can be shared only between certain inflectional heads and the verb. As a result, feature impoverishment can only ever have a non-local effect on features on the verb, and no other non-local elements.

[negation]-carrying Mood$^0$. After deletion, V$^0$ and T$^0$ are wholly devoid of any inflectional features. That is, they now carry the feature specification [ ], realized by the infinitival morpheme *-al* on the structurally lowest head V$^0$.

One additional step applies in (2E) and (2F). In these constructions, Asp$^0$ does carry a syntactically specified inflectional feature, capable of valuing the unvalued feature on V$^0$. The marked feature [Infl: precedence] on T$^0$ deletes as in the case of (2B) due to co-occurrence with [negation]. This featurelessness must be realized via infinitival *-al*. However, the infinitival affix cannot appear on the verbal head, causing it to be effectively stranded. This triggers auxiliary insertion in T$^0$.[25]

### 4.5.2 Homophony avoidance

| | | |
|---|---|---|
| 2A. | *bare-u(v).d illa* OR *bare-alla*<br>write-IPFV.GER NEG write-NEG' | she does not write /<br>she will not write |
| 2G. | *bare-u(tt) ir- u(v).d illa*<br>write-IPFV be- IPFV.GER NEG<br>OR<br>*bare-u(tt) ir-alla*<br>write-IPFV be-NEG' | she will not be writing |
| 2H. | *bare-d ir- u(v).d illa*<br>write-PRF be-IPFV.GER NEG<br>OR<br>*bare-d ir-alla*<br>write-PRF be-NEG' | she will not have written |

In comparison with their affirmative counterparts, a difference arises in the verbal morphology within negative constructions (2A), (2G), (2H) in one of two ways. In one type of construction, a nominalizing gerundive marker *-d* is tacked on to the end of the verb, preceding *illa*. Such nominalization is absent in the affirmative sentences. In the second, more opaque construction, the expected combination of the IPFV marker and *illa* seems to be replaced with an alternative form *alla* instead. At least two questions arise. First, similar to the data in 4.5.1, the question of why there is a difference between the affirmative and negative constructions. The second question – specific to the data in this section – asks why there is more than one form variant to express an identical imperfective meaning in negative constructions.

We conjecture an explanation for these questions that is motivated by considerations of homophony avoidance. To see how, consider the following. With the elements of our analysis developed thus far, we would expect the form corresponding to the meaning conveyed in (2A) to be as in (26), derived as follows. Identical to its affirmative counterpart, Asp$^0$ and T$^0$ in (2A) are merged with the features [Infl: ] and [Infl: imperfective] respectively. V$^0$ is merged with an unvalued inflectional feature. This must be valued by the feature on T$^0$, as the feature on Asp$^0$ is invisible to *Agree*. Post *Agree*, [Infl: imperfective] is shared by T$^0$ and V$^0$, and morphologically realized as *-u* (plus the phonological augment *tt*) on the structurally lower V$^0$. The [negation] feature in Mood$^0$ is realized as *illa*, resulting in (26).

(26) *Bare-u(tt) illa*
write-IPFV NEG
Intended: "does not write" / "will not write"

[25] A reviewer wonders about an alternative analysis in which the negation marker *illa* simply selects for a nominalized complement and where the only ways to satisfy this would be for the complement clause to take an infinitival or gerundive form. We agree this is a seemingly simpler alternative that avoids positing mechanisms such as feature impoverishment and homophony avoidance. However, it does not provide an explanatory response to why the infinitival complement is interpreted as conveying past tense, nor does it explain the grammaticality of datapoints 2C and 2D in Table 2, where *illa* occurs with complements that are neither infinitival nor gerundive/nominal. As such, we do not pursue this alternative here.

Notice, however, that (26) is exactly identical to the form in (2C) where [Infl: imperfective] is hosted by $Asp^0$ and not $T^0$, despite conveying different meanings. This results in a potential homophony in the negation paradigm in Kannada.[26] We suggest it is precisely to avoid such homophony that the morphological realization of the imperfective is altered in cases where [Infl: imperfective] is hosted on $T^0$. Such homophony avoidance may be analyzed as a synchronic/functional process, formally captured by way of some sort of morphological *readjustment* rules (Halle & Marantz 1993). The readjustment could either take the form of augmenting the IPFV morpheme with a nominalizing gerundive marker, or a more complex rearrangement leading to the alternative *-alla* form where the imperfective marker and the negation marker undergo some sort of phonological sandhi process.[27] Alternatively, the homophony avoidance could be a diachronic phenomenon, formally analyzed using Vocabulary Insertion rules within DM. We leave the question of whether the homophony avoidance must receive a synchronic/functional or diachronic explanation currently unresolved, as a matter for future research.

Some degree of independent evidence for the general semantic equivalence of a verb affixed with the imperfective gerundive marker and one affixed with *-u(tt)* comes from the observation that the two forms can convey the same meanings across contexts and across different varieties of the language. For example, consider the constructions in (27a-b) that belong to different varieties of Kannada but convey the same past habitual interpretation:

(27) a. *ā* *kāla-dalli* *avaḷu* *namma* *mane-ge* *bar-u(tt)* *id-d-aḷu.*
That period-in she our house-DAT come-IPFV be-PRF-3.SG.F
"In those days, she would come to our house (habitually)." (Standard variety)

b. *ā* *kāla-dalli* *avaḷu* *namma* *mane-ge* *bar-u(v)-d* *ittu.*
That period-in she our house-DAT come-IPFV-GER be.PRF.3.SG.N
"In those days, she would come to our house (habitually)." (Coastal variety)

In (27a), which belongs to the so-called standard variety of Kannada that has been our focus in this article, the verb carries the habitual (imperfective) marker *-u(tt)*, while the past interpretation is conveyed on the auxiliary verb along with subject agreement. This is as expected in our analysis. A similar meaning is conveyed using the verb form in (27b) in certain coastal varieties of Kannada. Here, the verb appears alongside the imperfective gerundive affix. Agreement marking is somewhat impoverished as well, with person and number matching the subject but gender neutralized. A full morphological analysis of the verb in (27b) is beyond the scope of the current article, but we bring up this datapoint here solely to make the point that *-u(tt)* and the imperfective gerund are semantically interchangeable in this context.

The two types of constructions are also found in free variation in Standard Kannada in certain contexts, see for instance (28a-b):

(28) a. *Avanu* *bar-u(tt)* *iddare* *bar-ali.*
He come-IPFV BE.IF come-HOR
"If he is coming / wishes to come, let him."

[26] A similar issue does not arise in affirmative sentences, where the presence of a stranded agreement affix in $T_0$ necessitates auxiliary insertion when [Infl: imperfective] resides in $Asp_0$. But there are no stranded affixes in $T_0$ in (2A).

[27] We assume this *-alla* is distinct from the independent negation marker *alla* that appears with nominal predicates, like in (i). We acknowledge such an assumption might warrant further evidence, though we do not provide any here.

(i) *Avanu* *doctor* *alla.*
he doctor $NEG_2$
"He is not a doctor."

b. *Avanu* *bar-u(v)-d* *iddare* *barali.*
He come-IPFV-GER BE.IF come-HOR
"If he is coming/wishes to come, let him."

We take these points of data to indicate there is a deep similarity at the featural level between the two types of constructions, while the presence or absence of the nominalizing gerund is influenced by more superficial factors – such as dialectal differences in accompanying agreement marking in (27a-b), homophony avoidance in (2A), (2G), (2H), or free variation in (28a-b).

## 5 Discussion

In the preceding sections, we have developed a DM-based account of tense/aspect marking in Standard Kannada, wherein well-defined combinations of standard DM operations apply within specific environments to account for the Kannada tense/aspect constructions – including some of their more puzzling characteristics such as the occurrence of seemingly exceptional non-finite verbal morphology in negative constructions and the distribution of the auxiliary verb across contexts. In this section, we briefly summarize the proposed analysis and discuss how the main issues raised in Section 3 are addressed within it.

In our analysis, the observed distribution of tense/aspect marking in Kannada arises as a result of the interaction between the inflectional features residing on the functional heads in the Kannada clause and post-syntactic operations standard within the Minimalism/DM literature. In particular, we propose three types of inflectional temporal features in Kannada: two syntactically and semantically specified ones ([Infl: precedence], [Infl: imperfective]), and one that is semantically specified though syntactically null ([Infl: ]). These features are hosted either on $T^0$ or $Asp^0$, where the identity of the hosting head determines the specific compositional denotations carried by the features, while retaining their common semantic core. It is this possibility of the same formal features residing across multiple syntactic heads that explains the long-noted homophony between Kannada tense and aspect markers in our analysis, rather than a syntactic neutralization between the aspectual and tense projections proposed in previous accounts.

Chief among the post-syntactic operations that these features participate in, in our account, is that of feature valuation via *Agree*. Here, we have adapted Bjorkman's (2011) construal of *Agree* with the following noteworthy divergences. First, in a move fully compatible with Bjorkman's system, we have claimed that *Agree*ment occurs via feature sharing. Second, while Bjorkman assumes without qualification that syntactically unspecified features are necessarily associated with some default semantics, here we distinguish between two types of syntactically unspecified features – those that are also semantically unspecified *vs.* those that are semantically specified. This choice is motivated by a need to differentiate between morphemes that contribute a default (simultaneous) tense interpretation at LF *vs.* the lack of any meaning contribution at all. Third, we take auxiliary insertion in Kannada to be a repair mechanism triggered by the presence of stranded *affixes* rather than *features*. Accordingly, auxiliary insertion does not occur in the case of a phonologically null vocabulary item, even when associated with syntactically or semantically specified features. Conversely, if an unspecified set of features is nonetheless mapped to an overt vocabulary item, auxiliary insertion is triggered.[28]

Note that an *Agree*-based account of auxiliary insertion is to some degree only an implementational choice made in the current paper; it does not rule out the possibility of alternative technical implementations to capture the key conceptual contributions of our proposal. We briefly discuss one such alternative based on Fenger (2020), who relies on movement rather than *Agree*ment to supply appropriate hosts for inflectional affixes. Specifically, Fenger proposes post-syntactic movement of the verbal head motivated by certain heads requiring hosts of a particular (verbal) type. Post-syntactic verb movement is phase-bound, meaning it is blocked by phase boundaries (such as

[28] More generally, we lean towards the view that the trigger for auxiliary insertion is crosslinguistically parameterized: in some languages, stranded affixes act as the trigger; in other languages, stranded features; in yet others, both.

AspP) that contain syntactically specified features. Auxiliary insertion is triggered when verb movement is blocked, to rescue any stranded affixes. However, if a head is syntactically unspecified or empty, it is deleted, and the verb is allowed to then move further and combine with higher affixes. It is straightforward to see how such a movement-based account would work for the patterns observed in Kannada. Just as in the *Agree*-based analysis, auxiliary insertion would need to occur in order to rescue stranded affixes in $T^0$ in all cases except those where $Asp^0$ hosts [Infl: ] and is therefore syntactically unspecified, allowing further verb movement to (rather than verb *Agree*ment with) $T^0$. To its credit, such an account would further allow us to forego the feature sharing assumption, albeit some stipulation is nevertheless still needed – for example, that $T^0$ and $Asp^0$ may not be simultaneously syntactically unspecified, as such data points are not observed to occur in the language.[29]

Our current analysis further addresses the differences in verbal temporal morphology between Kannada affirmative and negative sentences – which has served as the main puzzle in previous work on this topic. The presence of infinitival morphology on the verb rather than a canonical perfective-denoting morpheme in past-tense conveying negative constructions is explained as a result of impoverishment of the marked temporal feature [Infl: precedence] when it occurs alongside the negative root *illa*. The featurelessness resulting from the deletion of [Infl: precedence] is morphologically realized by the infinitival morpheme *-al*.

A welcome consequence of construing the Kannada infinitival as the syntactically and semantically unspecified "elsewhere" case is that it allows us to explain the observation that *-al* does not contribute a uniform temporal meaning across all its occurrences without hypothesizing multiple underlying representations. Aside from the past interpretation in negative constructions (Table 2), the infinitival verb can receive a future-oriented interpretation in embedded clauses like in (2) or alongside modal verbs like in (11), as well as a true tenseless interpretation in passive constructions like (29), where tense is expressed on a separate light verb (glossed LV).

(29) *Alli mane kaṭṭ-al āyitu.*
there house build-INF LV
"A house was built there."

Under a view where the infinitival is the *elsewhere* morpheme, the apparent temporal interpretation in each case is to be traced to a different syntactic or semantic source. In our analysis of negative constructions, for instance, the infinitival morpheme is merely a phonological consequence of feature impoverishment, but the underlying LF does still bear the feature [Infl: precedence] responsible for past interpretation. On the other hand, structural factors might underlie the future-oriented interpretation in embedded infinitival clauses like (2). Wurmbrand (2007) analyzes analogous constructions in English as a result of a silent functional projection *wollP* selected by the matrix predicate, which is separate from the syntactic position bearing the *tenseless* infinitival verb. Though we do not here provide an analysis for constructions with modal auxiliaries, it is plausible that the unvalued inflectional feature on the verb in constructions like (11) is valued by a modal feature in $Mood_0$. If this feature is not mapped to a specific vocabulary item, it is realized as the underspecified, elsewhere, infinitival morpheme. The specificities of individual analyses notwithstanding, our point here is that an elsewhere analysis for the infinitival is well-placed to anticipate the diversity of temporal readings with *-al* in the language. On the other hand, positing an inherently perfective infinitive is not only not independently well-justified in Kannada, but is also odd from a crosslinguistic perspective.

It is further worth noting that a paradigmatic asymmetry between affirmative and negative constructions is crosslinguistically common, occurring in 30% of the world's languages per Miestamo (2005, 2007). Miestamo characterizes this asymmetry in terms of markedness, in that certain distinctions that are overtly made in unmarked contexts (affirmative constructions) are observed to disappear in a marked context (negative constructions). The loss of finiteness in negative constructions is specifically pointed to as being a crosslinguistically common occurrence, indicating

[29] This type of analysis also makes additional wordhood predictions for Kannada. In particular, per Fenger (2020), constructions such as (1A)-(1B) would be said to involve a single *phonological word* but multiple *syntactic words* (as the verb movement up to $T^0$ occurs in two separate syntactic phases). By contrast, the issue of wordhood is orthogonal to a Bjorkman-style *Agree*-based analysis.

the possibility that the current proposal based on feature impoverishment could potentially be extended as a crosslinguistic solution – though this needs further investigation.

Admittedly, our explanation for the morphological distinction between affirmative and negative constructions that convey non-past temporal information remains tentative. In these cases, to account for the observation that the negative counterparts alone involve gerundive morphology on the verb (in addition to imperfective morphology) or the alternative form *alla* replacing both IPFV and *illa*, we have suggested that considerations of homophony avoidance are at play. The fact that more than one alternative morphophonological variant exists to convey the very same interpretation that would have potentially been homophonous with another construction within the paradigm provides one line of support for this idea. The observation that the imperfective and gerundive constructions are semantically interchangeable across varieties of Kannada in more than one context provides another. Many open questions nonetheless remain – the controversial status of homophony avoidance in the morphophonology literature not the least of them. The relationship between *alla* on the one hand and the imperfective gerund + *illa* construction on the other also needs further clarification under this proposal.

In sum, at the cost of introducing intricacies compatible with the DM framework into the post-syntactic component of the grammar, the current analysis offers a concrete and comprehensive morphosyntactic and semantic analysis of the Kannada tense/aspect constructions compared to existing alternatives. In particular, with the proposed account, we are able to unravel some of the syntactic oddities inherent to its alternatives – including successfully avoiding a multiply ambiguous infinitival morpheme (by treating the morpheme as an underspecified, *elsewhere* case instead) as well as avoiding a crosslinguistically non-standard clausal structure lacking a Tense projection where Tense is subsumed into Aspect (by attributing any similarities between tense and aspect realization to shared inflectional features instead).

## Appendix A: Mapping from feature bundles to Vocabulary Items

| | |
|---|---|
| [Infl: precedence, Infl: 3-SG-F] | *-daḷu* |
| [Infl: imperfective, Infl: 3-SG-F] | *-u(tt)āḷe* |
| [Infl: 3-SG-F] | *-āḷe* |
| [Infl: precedence] | *-d* |
| [Infl: imperfective] | *-u* |
| [Infl: ] | NULL |
| [ ] | *-al* |
| [negation] | *illa* (root) |

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