THE UNIVERSITY OF CHICAGO

DOMAIN EFFECTS IN THE MORPHOLOGY AND PHONOLOGY OF TELUGU: BOUNDARIES BETWEEN DERIVATION AND REPRESENTATION

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ABSTRACT

In this dissertation, I consider the role of syntactic phases in mediating domain effects in the morphology and phonology of Telugu. This investigation is motivated by the predictions of the Cyclic Spell-Out by Phase hypothesis within a Minimalist/Distributed Morphology-based theoretical framework. I find that phase-correlated domains in Vocabulary Insertion (VI) and phonology are not epiphenomenal of cyclic Spell-Out: instead, phase heads mediate global, representational constraints. At VI, rules mediating insertion conditioned across a phase head have a different distribution than rules mediating insertion not conditioned across a phase head. In the phonology, phasal domains are mapped to prosodic stems whose boundaries affect phonological computation. VI and word-internal phonology are not cyclic by phase; instead, they are cyclic by insertion. Telugu, despite exhibiting phase-correlated domains, is compatible with a view on which cyclic Spell-Out by phase does not apply to Vocabulary Insertion or phonology.

With respect to phonology, my investigation focuses mainly on regressive and progressive harmony in Telugu nouns and verbs, with some consideration of other phonological effects like syncope which interact with harmony. In both nouns and verbs, reference to a representational, persistent prosodic stem is required to explain regressive harmony even under the assumption of cyclicity by insertion. With respect to morphology, my investigation focuses on outward-sensitive suppletive allomorphy in nouns and verbs. I find that suppletion at the root is subject to different constraints than suppletion at higher functional heads. I show that this is due to the root being within the complement of the n and v phase heads, such that rules of exponence targeting the root and conditioned across the phase heads must satisfy a constraint I dub Rule Support.

The dissertation provides insight into the role of phases in the morphology and phonology: while there is an assumption in much work that cyclic Spell-Out in the syntax means cyclic Spell-Out in the morphology and phonology, I show that phases and phase heads may play an entirely different kind of role in defining domains in the morphology and phonology than they do in the syntax. Additionally, I argue for a specific implementation of Vocabulary Insertion within a DM framework which not only captures the Telugu facts but also address many wider debates about the properties of suppletive allomorphy cross-linguistically.

For Sage – thanks for all the meows!

“The best dissertation is a done dissertation” – somebody, somewhere, probably

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ACKNOWLEDGMENTS

In writing this dissertation and over the last six years of graduate school, I have read (well, at least skimmed) many, many linguistics dissertations. One of the best parts of doing this, especially in the tougher moments, has been taking a peek at the acknowledgements. Especially in a field like theoretical linguistics, where personality is overshadowed in importance by clarity of explanation and quality of data and argumentation, it's always nice to remember that there is a real person behind the syntax trees, the OT tableaux, the glossed examples, and the denotations. Thence my first acknowledgement – to all acknowledgements sections past.

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The six years I've spent in Chicago have been marked by major tumult and uncertainty – the global COVID-19 pandemic started during my first year, and now as I write this in June 2025, the world seems to be teetering on many brinks. But through it all, Chicago has been there for me: its bricks, its grid, its parks, its beautiful, beautiful lake, and especially its people. I love you, Chicago – it may be good-bye for now, but definitely not for long!

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I'd like also to acknowledge that this work has been supported by the University of Chicago, an institution whose relationship with the Black community has been one of constant othering and perpetuation of inequities. The Old University of Chicago, a direct predecessor to the contemporary University of Chicago, was established in part using funds from Stephen Douglas, slave-owner and famed defender of slavery in the Civil War era. Even as the demographics of Hyde Park and the South Side of Chicago shifted over the course of the first half of the 20th century, University administration and faculty collaborated with the city to create and maintain racially-restrictive covenants, engage in redlining, and buy up Black-owned property in order to remove residents and business owners. The University continues to engage in efforts to gentrify Hyde Park and the surrounding neighborhoods, creating situations in which long-time South Side residents are suffering more and more from housing insecurity as increases in rent and property tax outpace increases in wage.

CHAPTER 1

INTRODUCTION

1.1 Overview and theoretical assumptions

At its heart, this dissertation engages in the debate concerning the relative roles of representation and derivation in the grammatical architecture, especially with regards to *domain effects* and related questions about *cyclicity*.

Specifically, working within a Minimalist syntactic and a Distributed Morphology (DM)-style morphological and phonological framework, I consider some predictions of the Cyclic Spell-Out by Phase (Uriagereka, 1999; Chomsky, 2000, 2001) hypothesis for the ontological status of domains in word-internal morphology and phonology, arguing that the derivational mechanisms built into the proposal cannot on their own explain the properties of the relevant domains, such that a separate, but still phase-correlated, representational component is needed.

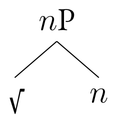
Empirically, I work in this dissertation with data from Telugu, a South-Central Dravidian language which is the majority and official language of the two Indian states of Andhra Pradesh and Telangana. Using a mixture of published reference materials and argumentative articles, my own judgements as a heritage speaker, work with consultants, and results from Internet search engines, I analyze word-internal phonological phenomena like vowel harmony, syncope, and stress assignment, as well as morphological phenomena like suppletion and portmanteaux in the language.

I assume a relatively standard version of phases in Minimalist syntax (Chomsky, 2000). Briefly, syntactic structure is built up through bottom-up, serial applications of the operation Merge. When certain heads, called *phase heads*, are Merged into the syntactic structure, they trigger an operation called Spell-Out. Given the Minimalist assumption that syntactic structure becomes the input to the morphological and phonological component of the grammar (collectively known as PF), Spell-Out's role is to transfer a chunk of syntactic structure to PF, where it will be processed, resulting in a linearized, pronounceable string. When a phase head is Merged, it triggers Spell-Out of its complement:[1]

1. Some work (Sande et al., 2020; Newell, 2021) takes the Spell-Out domain of a phase head to include the phase head

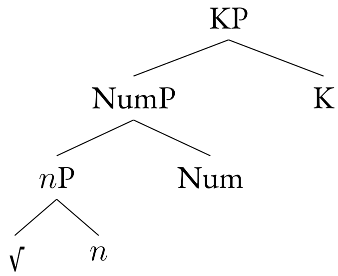
(1) **Cyclic Spell-Out by Phase: Nominals**

a. Merge √ and n:



b. Spell-Out to PF of n's complement: √

c. Merge Num, K:



d. Spell-Out to PF of K's complement: NumP

The derivation above assumes that n and K are the phase heads in the nominal syntactic structure posited (see Arad (2003) for n and other categorizer heads as phase heads, and see Bošković (2014) for arguments that the highest head in an extended projection (here K) is always a phase head).

Another basic assumption I make is that word formation occurs by head movement, and that the internal structure of a word corresponds to the internal structure of a complex head (Baker, 1988). A contingent assumption, then, is that Spell-Out occurs within complex heads in a parallel fashion to the way it occurs in other syntactic structures: a phase head which is incorporated into a complex head through head movement triggers Spell-Out of its complex head-internal complement:[2]

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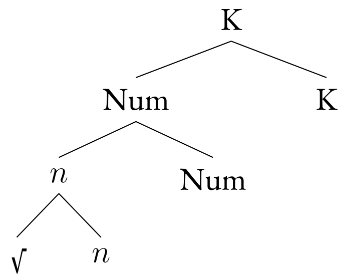
itself along with the complement (but not specifiers or adjuncts of/to that head), and still other work (Johnson, 2003; Fox and Pesetsky, 2005; Downing, 2010; Bošković, 2016) takes the domain to include the entire projection of the phase head along with its complement. The core arguments I make do not depend on this distinction, as I will show.

2. Merge is generally not considered to be an operation that occurs within complex heads; there is a tacit assumption here, then, that something Merge-like constructs complex heads in a serial, bottom-up fashion parallel to the construction of syntactic structure by Merge. Interestingly, while previous work coupling Distributed Morphology with phasal Spell-Out has also made this assumption (Marvin, 2002; Arad, 2003; Embick, 2010; Marantz, 2013; Bobaljik, 2012; Bobaljik and Wurmbrand, 2013; Moskal, 2015), it is generally assumed without comment that complex heads are constructed by Merge. More consideration of what this 'Merge-like' operation might be and where it lives in the grammatical derivation is certainly warranted; I leave this for future work. For this dissertation, it is important that this is an analytical assumption made in much work which then makes predictions which I evaluate.

(2) **Word-Internal Cyclic Spell-Out by Phase: Nominals**

a. Internal structure of complex head:

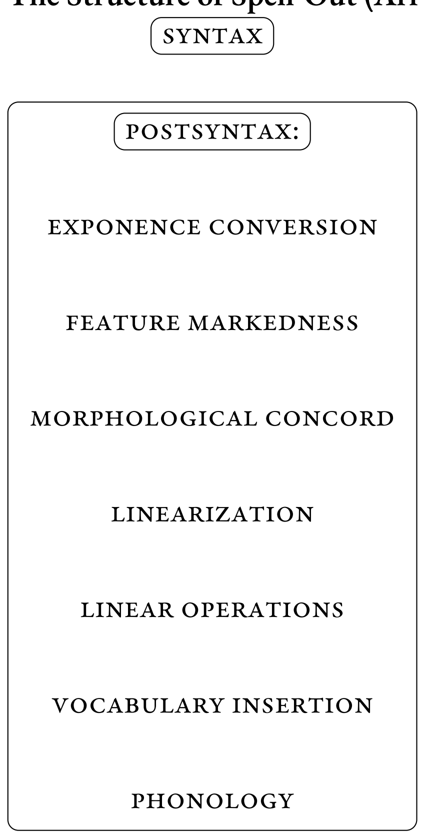


b. Spell-Out of n's complement: √

c. Spell-Out of K's complement: Num

The tree above is the same as the one in (4c), except that there are no phrasal nodes, reflecting the fact that the tree in (2) includes only heads, not their projections. In Distributed Morphology, PF, or the morphological and phonological component of the grammar, takes syntactic structure as input and consists of a complex, structured derivation (Arregi and Nevins, 2012):

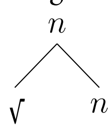
(3) **The Structure of Spell-Out (Arregi and Nevins, 2012)**



Putting together cyclic Spell-Out by phase and the structured PF of Distributed Morphology, the prediction is that word-internal derivations proceed as follows (using the tree in (2) as an example):

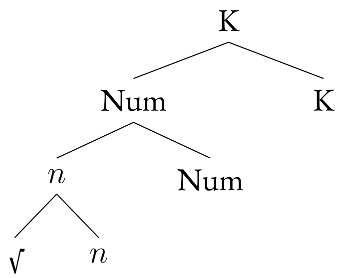
(4) **Word-Internal Derivations: Cyclic Spell-Out by Phase & Structured Spell-Out**

a. Merge √ and n:

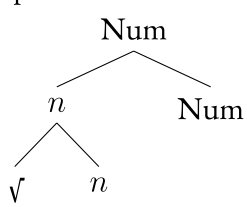


b. Spell-Out to PF of n phase (including all steps in (3)): √

c. Merge Num, K:



d. Spell-Out to PF of K phase (including all steps in (3):



Thus, the basic assumptions of cyclic Spell-Out by phase and structured Spell-Out predict that *all* operations in Arregi & Nevins' (2012) Postsyntax occur cyclically and serially at each phasal Spell-Out. In this dissertation, I argue that Telugu does not bear out these predictions – I show that they are instead compatible with the following structure for PF:

(5) **The Structure of Spell-Out (Arregi and Nevins, 2012): cyclicity**

SYNTAX

POSTSYNTAX:

EXPONENCE CONVERSION

FEATURE MARKEDNESS

MORPHOLOGICAL CONCORD

LINEARIZATION

LINEAR OPERATIONS

cyclic by phase

VOCABULARY INSERTION

PHONOLOGY

cyclic by insertion, phase-correlated domains

As reflected in (5), I argue in this dissertation that the domain effects found in Telugu phonology (Chs. 2-3) and in Telugu morphological exponence/Vocabulary Insertion (Chs. 4-5), while they do seem to be correlated in some way with phase heads, do not show any strong evidence of being keyed to cyclic domains. All of the relevant facts can be captured by instead assuming that phase heads mediate the construction of *representational* domains which are relevant for Vocabulary Insertion (VI) and phonology, and that the only kind of cyclicity we see in those two stages of the PF derivation is due to the inherently cyclic and serial nature of the VI operation – that is, cyclicity by insertion, but with phase-correlated domains.

The rest of this chapter is dedicated to summarizing the arguments I develop in favor of the view in (5). §1.2 goes through the logic of the arguments made in Chapters 2 and 3 that the phase-correlated domain effects found in the phonology of Telugu nouns and verbs do not constitute evidence for cyclic Spell-Out by phase. §1.3 does the same for the arguments in Chapters 4 and 5 that Vocabulary Insertion, though subject to a phase head-correlated constraint, is not actually cyclic by phase. §1.4 gives a few general notes on the Telugu language and the source of the data considered in this dissertation. Finally, §1.5 gives a brief summary of each of the chapters of this dissertation.

1.2 Phases, cyclicity, and domains in Telugu word-internal phonology

Chapters 2 and 3 of this dissertation focus on the word-internal phonology of nouns and verbs in Telugu, respectively. I find that the behavior of vowel harmony in both word classes is sensitive to the relative positions of potential trigger and target vowels. Specifically, I argue that the relevant facts diagnose the following domains in Telugu nouns and verbs:

(6) **Structure of the Telugu nominal word**

{ √-*n*}-NUM-AGR/K

(7) **Structure of the Telugu verbal word**

{ √-*v*}-CAUS-REFL-INFL-AGR

Given that categorizing heads like n and v are usually assumed to be phase heads in the syntax, both the domains in (6) are *phase-correlated*. However, I argue that correlation does not equal causation: while the domains are phase-correlated, they do not constitute a sufficient condition for positing serial, cyclic Spell-Out by phase in the phonology. Instead, I assume the domains to be prosodic constituents (PStems) (Nespor and Vogel, 1986) whose boundaries are mapped to phase domains but which do not necessarily correspond to cyclic domains in the phonology.[3]

The argument for this is as follows. The empirical phenomena diagnosing the domains in (6) can only be triggered by material outside the domains. I give an example below from nominal regressive harmony (see §2.4 for more), but this is true for all the relevant phenomena in Chs. 2 and 3:

3. The even-more-glaringly-obvious problem is, of course, that the domains depicted in (6) and (7) do not correspond to the Spell-Out domains of the relevant phase heads, because they include the heads themselves. Since there are implementations of phasal Spell-Out which do assume that phase heads are Spelled Out along with their complements, and because my critique stands even beyond this issue, I do not discuss it further.

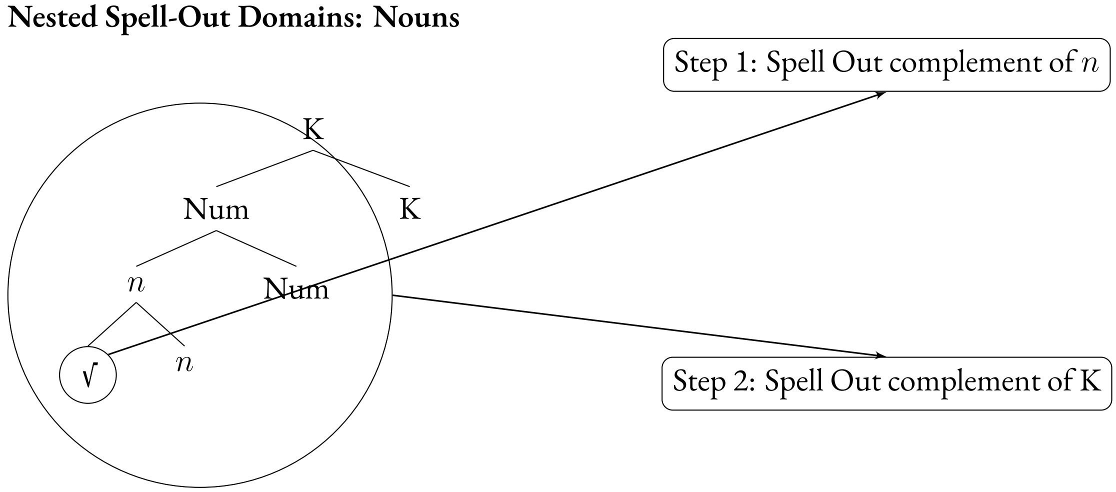
(8) **Nominal regressive harmony:**

a. {kolimi}-ḷu-ø 'forge-PL-NOM' → /kolumulu/

b. {taliru}-ḷu-ø 'sprout-PL-NOM' → /talirulu/, */talurulu/

In (8), I have used curly brackets to designate the domain boundaries. In Telugu nominals, /u/ is a trigger of regressive harmony, and /i/ is a target. Note, though, that harmony only actually occurs when the triggering /u/ is domain-external; the domain-internal /u/ in *taliru* both fails to trigger harmony on the preceding /i/ and blocks potential harmony triggered by the domain-external /u/ in the plural suffix. Since the plural suffix realizes the Num(ber) head in the morphosyntax, and assuming cyclic Spell-Out by phase, then, nominal regressive harmony must be part of the PF derivation of the second stage of Spell-Out, that triggered not by n but by the higher phase head – Num is higher than n, but within K's complement:

(9) **Nested Spell-Out Domains: Nouns**



Note that the Spell-Out domains are in a containment relationship with each other: the K phase's Spell-Out domain *contains* the n phase's Spell-Out domain. Given this, where should we expect to see domain effects which are a symptom of cyclic Spell-Out by phase? We certainly predict that there ought to be PF processes which are (i) restricted to the root and (ii) which are ordered before PF processes occurring or triggered outside the root. But since the K phase's domain includes the root as well, we do not automatically predict that PF processes occurring at K's Spell-Out would be sensitive to a domain corresponding to the earlier phase's boundary, as in Telugu nominal regressive harmony. The default assumption in this case is that PF processes occurring at the K phase should include the root in their domain as well, and should apply to phonological material within the domain of the earlier phase just the same as they do to material outside it.

Previous work has found that, regardless, this kind of domain effect in fact exists very commonly across the world's languages. Most of this work takes this kind of effect to be direct evidence for cyclic Spell-Out by phase (Marvin, 2002; Kahnemuyipour, 2004; Adger, 2006; Kratzer and Selkirk, 2007; Newell, 2009; Sande et al., 2020, (*a.o.*)), but in fact it is only evidence for some domain *correlated* to a phase: because the relevant Spell-Out domains are nested, the higher phase's Spell-Out domain includes the lower phase's domain, thus predicting that phonological phenomena occurring at the higher phase's Spell-Out should also affect the lower phase's domain. An analysis on which such a domain effect (one seen, using the nominal example, in (higher) K-phase phenomena but sensitive to the (lower) n phase's domain) is a direct result of cyclic Spell-Out by phase would need to posit some extra operation or principle such that the domain boundaries of an earlier step of Spell-Out persist in some way to the PF derivation occurring at a later step of Spell-Out.[4]

Work that takes this type of effect to be evidence for cyclic Spell-Out usually assumes something like this – either the Spell-Out domain of the lower phase itself, or something mapped to it, is visible during the Spell-Out of the higher phase (Kratzer and Selkirk, 2007; Newell, 2009; Newell and Piggott, 2014, (*a.o.*)). In a sense, thus, I follow much previous work on phases and phonology in arguing that the domain effects we see in Telugu are due to a phase-correlated, but representational (and thus persistent) prosodic constituent: a PStem, whose right boundaries in nouns and verbs correspond to the boundaries following n and v in (8), respectively. However, the crucial difference is that I do not necessarily take the existence of phase-correlated prosodic constituents to be evidence for or the result of cyclic Spell-Out by phase: previous work tends to assume that Spell-Out domains are directly mapped to prosodic constituents, such that phase-correlated domains are direct reflexes of cyclic Spell-Out by phase. Instead, I argue that

4. In the syntax, where similar domain effects have been found, this extra principle is the Phase Impenetrability Condition, or PIC, which states that syntactic operations occurring at later phases cannot affect or be affected by structure which has already been Spelled Out. However, work on phases and phonology (Newell, 2009; Sande et al., 2020, (*a.o.*)) has convincingly shown that there is no PIC in the phonology, so a PIC analysis will not work to explain phonological phase-correlated domain effects of this type.

the following mapping algorithm, which applies during PF, defines the boundaries of the PStem:

(10) **PStem mapping rule:**
Given a string of abstract morphemes including a phase head α, insert prosodic stem boundaries around the constituent headed by α.

Note that (10) only requires knowledge of the phasehood of heads, not cyclic Spell-Out by phase. In this way, I follow a much smaller thread of work (Cheng and Downing, 2016; Guekguezian, 2017) which also argues for the role of phases in the phonology as mediating the construction of prosodic constituents, but not necessarily as domains for cyclicity in the phonology.

Instead of assuming cyclic Spell-Out by *phase* for the phonology, I assume that phonology is instead cyclic by morphological insertion: each morphological exponent within a word corresponds to its own cycle of phonology (Inkelas, 1989; Kiparsky, 2020; Kalin, 2022) (but see Pesetsky (1979) and Kiparsky (1982) for the original intuition; in the latter, cycles correspond with *levels* (*e.g.* Stem and Word levels) instead of phases or insertions.). Relatedly, I assume that each of those insertion-triggered cycles is associated with its own phonological 'mini-grammar' (Scheer, 2011; Sande et al., 2020). Departing from standard DM (Halle and Marantz, 1993; Arregi and Nevins, 2012) but following more recent work in DM (Sande et al., 2020; Brodkin, 2025), I assume that each of these cycles of phonological computation involves a global, constraint-based grammar in the style of Optimality Theory (OT) (Prince and Smolensky, 1993).

The cyclic-by-insertion view, though not unprecedented, is far from standard in either DM or in alternative morphological theories like Lexical Phonology & Morphology (Kiparsky, 1982). I assume it for two reasons. First, it is, in a sense, *more* cyclic than a cyclic-by-phase view: throughout Chapters 2 and 3, I show that even this higher level of cyclicity does not suffice to capture the relevant patterns without the addition of the prosodic PStem boundary, driving home that point that domain effects are not (on their own) evidence for cyclicity, by phase or in general. In fact, the discussion in Chapters 2 and 3 is largely framed as a comparison of a cyclic-by-insertion analysis with no PStem vs. one with the addition of the prosodic constituent, with the conclusion that even on such a 'hyper-cyclic' view (intuitively more in line with the Distributed Morphology assumption of strictly serial morphological insertion), the representational PStem is still required.

Overall, I demonstrate that even when a given language shows evidence for a phase-correlated domain, this does not constitute evidence for cyclic Spell-Out by phase, and in fact one can build a full analysis of such effects by treating cyclicity in word-internal phonology as being tied to serial morphological exponence and not to phases: the domain effects are instead understood to be the result of the construction of prosodic constituents which are mapped from phasal domains (phase heads and their complements).

Second, in Chapter 2, I discover a clear ordering relationship between syncope and regressive harmony, both of which are triggered by material inserted as part of the plural suffix *-ḷu* (see §2.5):

(11) **Syncope and Harmony: Opacity**

Meaning	Singular	Plural
tiger	puli	pulu-lu
leg	kālu	kāḷ-ḷu

In disyllabic stems like both of those in (11), underlying final /u/ syncopates, but underlying final /i/ does not. However, final /i/ surfaces as /u/ due to regular regressive vowel harmony. This is a clear case of opacity (Kiparsky, 1971, 1976; Baković, 2011): the surface form for *tigers* looks like a context where syncope ought to have occurred, but it underapplies. This kind of opacity has long been taken to be evidence for ordering: we can understand this underapplication if we posit that syncope occurs before harmony, such that by the time harmony occurs and the context for syncope is created, it is too late for syncope to apply.

Assuming that each cycle of phonological computation is global and constraint-based (that is, non-derivational), these facts are impossible to capture under a cyclic Spell-Out by phase view, at least on the standard assumption that n is the only nominal-internal phase head – if there is only one cycle of phonological computation triggered by the Spell-Out of the K phase, then there is no way to understand the ordering effect between plural-triggered syncope and plural-triggered regressive harmony. Cyclicity by insertion saves the day: if we assume that there is always insertion at K (that is, that when there is no overt case marker, there is a null one which is inserted), then we can argue that syncope is a Num cycle effect, while harmony is a later K cycle effect.

Comparing the analysis of nouns in Chapter 2 to that of verbs in Chapter 3 helps us understand which parts of the system are part of the general grammar and which are lexically-specific. For example, even though nouns and verbs involve different functional heads of different categories and with different features, we still see a parallel between the size and location of the PStem across the two word classes: in both cases, the PStems consist of the string constituting the surface forms of the exponents realizing the root and the categorizing heads. Thus, the mapping algorithm in (10) seems to be a general property of the grammar and not tied to specific heads with specific properties – that is, it is not tied to specific lexical items, but instead to phases in general.

On the other hand, though size and location of the PStem domains are parallel, the actual phonological phenomena which diagnose them, while not completely dissimilar, certainly do not have the same behavior. For example, comparing nouns and verbs, regressive harmony involves different trigger vowels and different target vowels (see §3.3):

(12) **Regressive harmony: comparing nouns and verbs**

Gloss	**Underlying**	**Harmonized**
'forge-PL'	kolimi-ḷu	kol**u**m**u**lu
'wash-PRF'	kaḍugu-i	kaḍ**i**gi
'fall-IMPF-1SG'	paḍu-t-ānu	paḍ**a**tānu

The first example in (12) is a nominal one, and the latter two are both verbal. Bolded vowels are harmony targets. Comparing them, we can see that in nominal harmony, /u/ is a trigger and /i/ is a target; on the other hand, in verbal harmony, /u/ is a target, and /i/ and /a/ are both possible triggers. I assume that the differences in (12) can be captured by (i) assuming that insertion-triggered cycles of phonology can in principle have cycle-specific phonological grammars and that (ii) PStem boundaries themselves have category as part of their representations (that is, verbal and nominal PStems look different to the phonology). The distribution of parallel vs. non-parallel phenomena constitutes an argument that the PStem mapping algorithm in (10) ought in fact to make direct reference to the phasehood of n and v (§3.6): if it were instead the case that the PStem algorithm were arbitrarily tied to certain categories or lexical items, the fact that it is exactly the phase heads which are involved would become a coincidence or would require a different explanation.

1.3 Phases, cyclicity, and domains in Telugu morphology

In Chapters 2 and 3 of this dissertation, I show that there are phase-correlated domains within Telugu nominal and verbal words, but that the existence of those domains is not a sufficient condition for the assumption of cyclic Spell-Out by phase in the phonology. Instead, I argue, those phase-correlated domain effects can be explained on a view wherein phonology is cyclic by morphological insertion and not by phase, but wherein phasal domains are mapped to prosodic constituents by a PF mapping algorithm.

In Chapters 4 and 5, I make a similar argument, this time for morphological exponence within the nominal (Chapter 4) and verbal (Chapter 5) words. I repeat below the structure of Spell-Out argued for by Arregi & Nevins (2012) and which is considered the standard within contemporary work in DM:

(13) **The Structure of Spell-Out (Arregi and Nevins, 2012)**

SYNTAX

POSTSYNTAX:

EXPONENCE CONVERSION

FEATURE MARKEDNESS

MORPHOLOGICAL CONCORD

LINEARIZATION

LINEAR OPERATIONS

VOCABULARY INSERTION

PHONOLOGY

In Distributed Morphology, morphological exponence is governed by the operation known as Vocabulary Insertion. VI works by inserting morphological exponents (roots and affixes in the traditional sense, with underlying phonological representations) one-by-one into an already-linearized string of abstract morphemes corresponding to the syntactic heads within the complex head being realized:

(14) **Input to VI for nouns**
[[[[√]n]Num]K]

VI is usually (Bobaljik, 2000, *et seq.*) assumed to begin at the root and continue in a 'root-out' fashion, targeting each succeedingly higher head (in (14), n, then Num, then K) until no more heads remain to be exponed (realized). Thus, it must be the case that the input to VI includes both linear and hierarchical relations between abstract morphemes – I reflect this by including brackets in representations of inputs to VI as in (14).

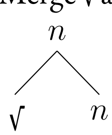
Vocabulary Insertion captures morphological suppletion by the application of rules of morphological exponence that look like the following:

(15) **Rule of exponence**
$n \rightarrow$ /exp1/ / _] Num.PL

The rule in (15) targets n for exponence; the rule only applies when the contextual restriction (a Num head bearing plural features) is met. n has to bear the right features to be targeted, and Num has to also be visible and bear the right features when the rule applies.

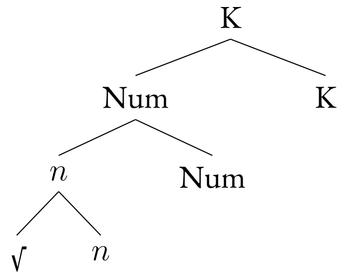
This is where cyclic Spell-Out by phase makes predictions: if it is on the right track, the amount of morphosyntactic structure available to condition Vocabulary Insertion should differ between n's Spell-Out and K's Spell-Out:

(16) **Cyclic Spell-Out by Phase & VI**
a. Merge √ and n:



b. Spell-Out – Input to VI: [√]

c. Merge Num, K:



d. Spell-Out – Input to VI: [[[√]n]Num]

The derivation in (16) reflects the fact that cyclic Spell-Out by phase predicts that the structure available for the conditioning of Vocabulary Insertion at the root is more limited than that which is available at n, Num, or K. Many previous proposals (Embick, 2010; Marantz, 2013; Bobaljik and Wurmbrand, 2013; Moskal, 2015) have observed various empirical properties of root suppletion and argued that they are in some sense direct results of cyclic Spell-Out by phase: VI at the root has less access to structure than later VI, because heads higher than n (or other categorizer heads like v in verbs or a in adjectives, which are generally all considered to be phase heads) have not yet been Merged.

I take a different tack – in a parallel fashion to the arguments made in Chapters 2 and 3 regarding domain effects in the phonology, I show that while suppletion possibilities *are* in fact mediated by phase heads in both nouns and verbs, this mediation is not a direct symptom of cyclic Spell-Out by phase: instead, there is a representational constraint applying to possible sets of rules of exponence targeting a given head (§4.1 for more):

(17) **Rule Support**
Given the configuration below (linear order irrelevant), assuming Y is a phase head and Z is some head higher than Y, a rule R targeting X whose structural description includes Z can only exist if a rule R' targeting X exists whose structural description includes Y but no higher head.

[[[X] **Y**] ... Z]

While my Rule Support proposal is largely inspired by (and captures the same generalizations as) Bobaljik & Wurmbrand's (2013) Domain Suspension proposal, the crucial difference is that Rule Support is a representational constraint and not a derivational one. In Chapter 4, I argue that Domain Suspension as-is suffers from a serious look-ahead problem, and that thus a representational constraint is a better explanation of the relevant generalizations, both cross-linguistically and in Telugu (§4.5).

Chapter 4 also presents another piece of evidence that restrictions on root suppletion in Telugu (and, I predict, cross-linguistically) cannot be due to the timing of Vocabulary Insertion at the root being before Merge/Spell-Out of heads higher than the categorizer (§4.5.2). I consider the timing of Impoverishment (a part of the FEATURE MARKEDNESS block of the PF derivational structure given in (13)) with respect to Vocabulary Insertion in Telugu nouns, and find that crucially, Impoverishment triggered by Num must occur *before* Vocabulary Insertion targets the root. Thus, it must be the case that VI is not part of phasal Spell-Out – instead, it must occur after all heads have been Merged and Spelled Out. This is very much in line with my assumption in Chapters 2 and 3 that phonology is cyclic by insertion: if Vocabulary Insertion is not cyclic by phase, then it makes sense that the only cyclicity that can be relevant at the derivational stage of phonology is cyclicity by insertion. Recall the proposal for cyclicity within PF from (5):

(18) **The Structure of Spell-Out (Arregi and Nevins, 2012): cyclicity**

SYNTAX

POSTSYNTAX:

EXPONENCE CONVERSION

FEATURE MARKEDNESS

MORPHOLOGICAL CONCORD

LINEARIZATION

LINEAR OPERATIONS

cyclic by phase

VOCABULARY INSERTION

PHONOLOGY

cyclic by insertion, phase-correlated domains

The arguments from look-ahead and Impoverishment along with the analysis of root suppletion in Telugu nouns (§4.4) and verbs (§5.3) as being subject to Rule Support come together to justify my proposal that Vocabulary Insertion is not cyclic by phase. If VI is not cyclic by phase, and occurs after cyclic Spell-Out by phase is completed for all phases, then it follows that phonology ought not to be cyclic by phase, either. Instead, as seen in Chapters 2 and 3, the behavior of vowel harmony and syncope in nouns (Chapter 2) and verbs (Chapter 3) corroborate a view on which phonology is cyclic by insertion (not by phase), but that phasal domains in the syntax are mapped to prosodic stems in the phonology.

Chapter 5 rounds out and bolsters the arguments made in Chapter 4. The crucial cases in Chapter 4 showing root suppletion were pronominal; while I argue that Telugu shows evidence that third-person pronouns do in fact have a root, this is not a standard analysis of pronouns. Chapter 5 (§5.3) shows that even verbs show root suppletion in cases where Rule Support is satisfied, thus strengthening the general argument for the proposal. Chapter 5 further demonstrates how certain other aspects of my proposal for Vocabulary Insertion in general are borne out (§5.2): I give further arguments that VI is constrained by adjacency (Embick, 2010; Bobaljik, 2012; Marantz, 2013) and that it occurs in a strictly root-out, serial fashion (Bobaljik, 2000; Paster, 2006; Embick, 2010).

1.4 Background on Telugu and Data Collection

As mentioned earlier, Telugu is the official and majority language of two Indian states, Andhra Pradesh and Telangana, as shown in Figure 1.1.

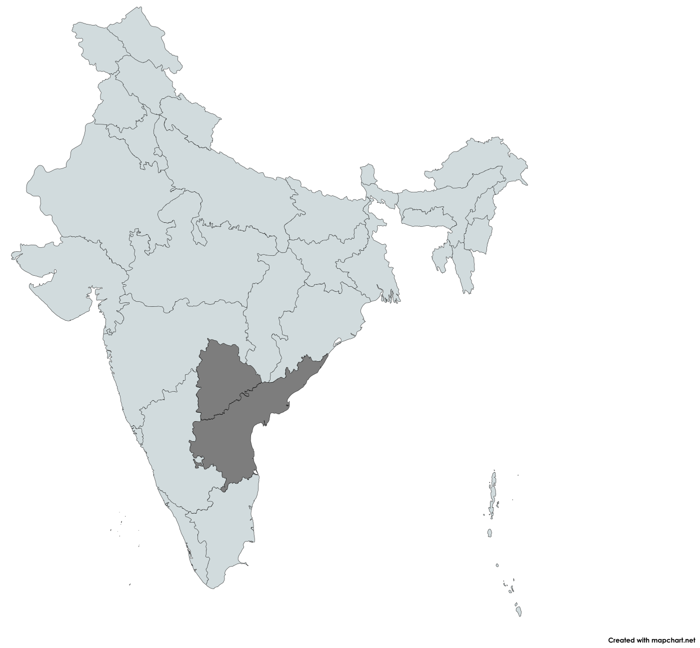


Figure 1.1: Map of India highlighting Telangana (north) and Andhra Pradesh (south) (created with mapchart.net)

There are sizable minorities of Telugu speakers in many other Indian states, either due to remnant populations, historical migration, or contemporary migration. As of the 2011 Indian Census, the total population of Telugu speakers in India is 95 million, including 81 million first-language speakers and 14 million second-language speakers (Registrar General of India, 2018). There are also sizable diasporic populations of Telugu speakers around the world who can roughly be placed into three categories: descendants of indentured servants living in the UK and its former colonies (Fiji, Burma, South Africa, Malaysia, etc.), recent white-collar immigrants to worldwide information technology hubs (USA, Canada, Australia, New Zealand, UK, etc.), and migrant workers, mainly to Arab countries (Saudi Arabia, Oman, UAE, etc.) (Murthy, 2017).

There is, thus, a vast amount of linguistic variation in Telugu, almost none of which I consider in this dissertation. This dissertation focuses on standard colloquial Telugu (*vyavahārika telugu*). This standard was developed during the 19th and early 20th centuries (Reddy, 2020) in an effort to vernacularize the Telugu language and its literature. It is based on the speech of educated and high-caste Telugu speakers from the Coastal Andhra region; it continues to be the standard in various contexts, such as newspapers, political speeches, and other formal textual communication. I'd like to make explicit that throughout this dissertation, when I refer to 'Telugu', I am in fact referring to this variety and the intuitions of its speakers, not to all Telugu speakers or all regional varieties of the language. I do not doubt that many of the generalizations given here will not apply to all varieties or all speakers, and I look forward to future research considering microvariation in Telugu with respect to morphology, phonology, and other aspects of linguistic structure. I recognize that the reason that this specific variety is the most accessible and best-studied is due to centuries of linguistic stigmatization of the speech of low-caste and otherwise-oppressed Telugu speakers; I consider this to be a baseline from which future descriptive, analytical, and theoretical work considering the diversity of Telugu can be built.

While not most Telugu speakers' native variety, educated Telugu speakers from all over the Telugu-speaking region are diglossic in *vyavahārika telugu* and their native/regional variety. The data sources for this dissertation come from a variety of published sources, most of which explicitly focus on *vyavahārika telugu*, and others of which either consider variation or are not explicit about the variety they consider. I have gotten much use from the two Telugu dictionaries (Brown, 1903; Gwynn, 1991) digitized in a searchable format by the Digital Dictionaries of South Asian Languages (DSAL) project at the University of Chicago. I have also leaned greatly on the work of Bhadriraju Krishnamurti, especially his 1961 tome *Telugu Verbal Bases* (Krishnamurti, 1961) and his 1985 grammar, written in collaboration with J. P. L. Gwynn (Krishnamurti and Gwynn, 1985). I also use data and generalizations from J. V. Sastry's (1987) PhD dissertation on the phonology of regional and social dialects of Telugu. My analysis of (especially nominal) vowel harmony in Telugu borrows much from Kolachina's (2016) MA thesis. Where these existing sources were insufficient, I corroborated or added data from my own judgements (I am a heritage speaker of the Telangana variety with some knowledge of *vyavahārika telugu*), work with consultants (including family members, friends, and former teachers), and finally searching for attestations of various forms on the Internet using Google's web search engine.

Finally, I would also like to point out that there is a long tradition of grammatical work on Telugu; some scholars date the first grammar of Telugu, *Āndhraśabdacintāmaṇi*, to the eleventh century AD, and early descriptive work on Telugu in the Western/colonial tradition borrowed greatly from the ongoing native tradition of linguistic description (Reddy, 2020); even to this day, Cinnaya Sūri's (1858) *Bālavyākaraṇamu* is considered a standard reference material for pedagogical material in the Telugu-speaking region of India. The considerations and perspectives of these scholars are so different to those of the tradition in which I work that I have found it difficult to know when to cite them directly, but I acknowledge that some of the ideas in this dissertation, especially at the level of descriptive generalizations, may have their original sources in this tradition.

1.5 Summary of Chapters

This dissertation consists of six chapters. The first, the current one, introduces the general theoretical questions, the empirical puzzles, and the results of the investigation. It also sets the theme and makes explicit the larger proposal argued for by the analyses in the body chapters (2, 3, 4, and 5).

Chapter 2 considers in detail word-internal phonological phenomena in Telugu nouns. Assuming cyclicity by insertion and phonological 'mini-grammars', I show that a persistent PStem boundary between n and Num is still required to understand the behavior of regressive harmony, progressive harmony, and syncope. I build an OT-style analysis wherein the cycle of phonology triggered by the insertion of the plural suffix *-ḷu* involves syncope of PStem-final high vowels /i/ and /u/ which is subject to a disyllabic exception: when the PStem consists of only two syllables, final /u/ is syncopated before *-ḷu*, but final /i/ is not. Since Telugu is a moraic language, I argue that this disyllabic exception requires representational PStem boundaries to be explained. The following cycle, triggered by the insertion of case markers (K) and nominal agreement suffixes (Agr), is the locus of progressive and regressive vowel harmony. Vowel harmony, I show, is sensitive to both stress assignment and the position of potential triggers and targets: only PStem-external /u/ can be a regressive harmony trigger, and only PStem-internal /i/ can be a target of regressive harmony.

Chapter 3 considers in detail word-internal phonological phenomena in Telugu verbs. Under the same assumption of cyclicity by insertion, I show that regressive harmony in verbs is a general property of all insertion-triggered cycles of phonology. I demonstrate that, like regressive harmony in nouns, regressive harmony in verbs is sensitive to a persistent PStem boundary. I use a similar sort of positional faithfulness (Beckman, 1998) logic to explain a harmony-blocking paradigm and thus argue for the existence of a parallel PStem boundary in verbs. Also in Chapter 3, I compare the analysis of verb-internal phonology with the analysis of noun-internal phonology in Chapter 2, arguing that they are parallel in involving PStem domains with similar sizes, locations, and properties, but that the alternations found in verbs are mediated by different constraint rankings than those mediating the nominal alternations.

Chapter 4 moves the discussion away from phonological phenomena and towards an analysis of outward-sensitive suppletion and portmanteaux in Telugu morphology. Throughout the chapter, I develop my system for root-out, serial Vocabulary Insertion which is constrained by head adjacency and allows insertion at, but not conditioning by, spans of contiguous heads. I demonstrate through my analysis of suppletion of nominalizing (n) suffixes in Telugu how my system naturally captures adjacency-blocking effects without being too restrictive. Crucially, I demonstrate that root suppletion is special in Telugu nouns such that, beyond root-out seriality, head adjacency, and spanning, it is additionally restricted by a principle I dub Rule Support. Rule Support is a representational constraint on rules of exponence targeting a head inside of a phase head's complement but include heads outside the phase in their structural descriptions; it is inspired by, but differs in a few key ways from, Bobaljik & Wurmbrand's (2013) Domain Suspension proposal. Crucially, while it is *phase-correlated*, it does not require, nor does it provide evidence for, cyclic Spell-Out by phase. I then argue from the timing of Impoverishment with respect to Vocabulary Insertion at the root that Vocabulary Insertion cannot occur on the same cycles as Impoverishment, providing further evidence that VI is not cyclic-by-phase, but only cyclic-by-insertion. Finally, I compare aspects of my proposal, especially head adjacency, against alternatives in the literature, especially that of Moskal (2015).

Chapter 5 shows that the behavior of outward-sensitive suppletion in verbal words corroborates the results from Chapter 4. First, I show that v can supplete with respect to the higher head Asp(ect), but only when intervening heads like Caus(ative) and Refl(exive) are not projected, thus rendering v and Asp adjacent. Next I show that the distribution and properties of root suppletion in verbs match those of root suppletion in nouns. That is, root suppletion is very rare, but when it occurs, it (i) never occurs across overt interveners (it obeys adjacency and is in line with an insertion-at-spans view) and (ii) must satisfy the Rule Support constraint. I also demonstrate that a prediction of root-out Vocabulary Insertion with respect to phonologically-conditioned suppletion (Bobaljik, 2000; Paster, 2006; Embick, 2010), while at first glance looks to be violated by the suppletion pattern of v in Telugu, becomes conducive to a different analysis on deeper consideration of the morphological contexts in which the suppletion occurs. This new analysis corroborates the predictions of root-out, serial VI.

Chapter 6 concludes.

CHAPTER 2

CYCLICITY VS. DOMAIN-SENSITIVITY: PHONOLOGY IN THE NOMINAL WORD

2.1 Introduction

In this chapter, following the discussion in Chapter 1, I argue that there is a domain whose right edge corresponds with the right edge of the exponent of n (which I assume to be the right edge of a prosodic stem, or PStem, following Selkirk (1984) and Nespor & Vogel (1986)) which is not simply an epiphenomenon of cyclicity: instead, I argue that this domain edge is a representational object which is visible to the cycles of phonology occurring after the abstract node corresponding to n, as shown in (4) below: the Num cycle and the Agr/K cycle.

(1) **Domains in the Telugu Nominal Word**

$\underbrace{\{\sqrt{}\text{-}n\}}_{\textit{PStem}}$-NUM-AGR/K

Crucially, the PStem domain is defined morphosyntactically: it exists and is relevant for the Num and Agr/K cycles even if there is no overt exponent of n in a given nominal word. In this case, it occurs after the root exponent and before Num. I argue, following Cheng & Downing (2016) and Guekguezian (2017), that the boundaries of the nP phase are mapped to the boundaries of a prosodic constituent (in my case, the PStem). I assume also that this mapping occurs earlier than morphological exponence, so that all phonological computation(s) whose inputs include the PStem boundary should be able to make reference to it.

Following the discussion in Chapter 1, the main goal of the chapter is to show that the boundary effects which diagnose the PStem cannot be understood solely as an epiphenomenon of cyclicity; that is, simply assuming that n always triggers a cycle of phonology when it is inserted is not enough to explain the behavior of harmony and syncope in Telugu nouns. This is why an approach to Cyclic Spell-Out which assumes that phases directly correspond to phonological cycles (Marvin, 2002; Pak, 2008; Newell, 2009; Sande et al., 2020) is too restrictive, and we instead need an approach on which syntactic phases correspond to prosodic constituents in the phonology.

What I do find is that at least three true cycles (as diagnosed by opacity effects) are required to understand the data in this chapter. These appear to correspond to the insertion of exponents at the Num cycle and the Agr/K cycle, as well as a single cycle of post-lexical phonology. While this is not crucially important to the goal of diagnosing the PStem boundary, an approach which naturally captures this level of cyclicity is one which assumes that every insertion of a morphological exponent corresponds with a cycle of phonology (Inkelas, 1989; Kalin, 2022). Thus, I assume this kind of 'hyper-cyclic' view in both this chapter and in Chapter 3.

The chapter is structured as follows: first, I enumerate the phonemic inventory of Telugu (§2.2), and enumerate the exponents inserted at the n slot (§2.3) as essential background. Next, assuming that regressive and progressive harmony both occur at the Agr/K cycle, I give analyses of both phenomena which incorporate the visibility of the PStem boundary at that cycle as well as the step of prosodification which occurs at that cycle (§2.4).[1] Third, I analyze plural-triggered syncope, demonstrating using opacity effects that syncope (as well as an initial step of prosodification) must occur at an earlier cycle of phonology than harmony (*i.e.,* the Num cycle) (§2.5). Additionally, I consider a second instance of morpheme-specific phonology applying to the plural suffix *-ḷu*, positing that it must occur at a phrasal, word-external phonological cycle, in the process giving an argument via opacity that the Agr/K cycle is in fact a cycle (§2.6). Finally, I conclude with a short review of my results followed by a short discussion of its implications for various proposals for the morphology-phonology interface (§2.7).

2.2 Background: Telugu Phonemic Inventory

As background, here is the phonemic inventory of Telugu[2] (Bhaskararao and Ray, 2017):

1. While in §2.4, it will seem as if an analysis on which regressive harmony occurs at the Num cycle is plausible, in §2.5 I give evidence that this cannot be the case.

2. In many regional varieties, /t͡s/ and /d͡z/ have merged with /t͡ʃ/ and /d͡ʒ/, and /ʂ/ and /ʃ/ have merged as well (though whether they merge to /ʂ/ or /ʃ/ depends on the variety (Sastry, 1987)).

(2) **Consonant inventory of (standard) Telugu**

	Bilabial	Labio-dental	Denti-alveolar	Alveolar	Retroflex	Palato-alveolar	Palatal	Velar	Glottal
Plosive	p b (p b)		t d (t d)		ʈ ɖ (ṭ ḍ)			k g (k g)	
	pʰ bʱ (ph bh)		tʰ dʱ (th dh)		ʈʰ ɖʱ (ṭh ḍh)			kʰ gʱ (kh gh)	
Nasal	m (m)			n (n)	ɳ (ṇ)				
Tap				r (r)					
Fricative		f (f)	s (s)		ʂ (ṣ)	ʃ (ś)			h (h)
Affricate			t͡s d͡z (ts dz)			t͡ʃ d͡ʒ (c j)			
						t͡ʃʰ d͡ʒʱ (ch jh)			
Approximant		ʋ (v)					j (y)		
Lateral Approximant				l (l)	ɭ (ḷ)				

Because this work deals with issues at the morphology-phonology interface, I will often switch back and forth between IPA and IAST transcription. Specifically, I use IAST transcription to denote underlying representations of morphological exponents which have not yet gone through any step of phonological computation; as soon as they have been phonologized, they are represented in IPA. I have included the IAST equivalents for each of the IPA symbols in (2) in parentheses. IAST is relatively straightforward to read, though note that single letters <c> and <j> are used to represent palato-alveolar affricates, and that <y> is used for the palatal approximant, more similarly to English orthography than to IPA. The following is the corresponding vowel chart:

(3) **Vowel inventory of Telugu**

	Front ([-back])	Back ([+back])
High ([+high, -low])	i iː (i ī)	u uː (u ū)
Mid ([-high, -low])	e eː (e ē)	o oː (o ō)
Low (-high, +low])	æː (ǣ)	ɐ ɐː (a ā)

The /æː/ vowel is only phonemic in certain varieties. In speakers with high familiarity with English, /ɛ/ is also contrastive (Bhaskararao and Ray, 2017). These details will not be relevant for the analyses to follow; I include them for completeness's sake.

2.3 Defining the PStem: Nominal Categorizers

In this section, I define the borders of the PStem: In the string of abstract morphemes which serves as the input to morphological exponence in DM, the PStem boundaries are located to the left of the √ node and to the right of the n node.

(4) **Domains in the Telugu nominal word**

$$[\ \underbrace{[\ \sqrt{}\text{-}n]}_{PStem}\text{-Num-Agr/K}\ ]$$

Thus, the phonological material that ends up being PStem-internal during exponence is either just the root exponent (when there is no overt n) or the root exponent followed by the n exponent (when there is an overt n). While all Telugu nominal words feature a root exponent (and it should be relatively straightforward for the reader to identify these), not all feature an overt exponent of n; below, thus, I enumerate the class of n exponents found in Telugu and give evidence that they are parseable as their own exponents (as opposed to simply being part of the root).

A subset of Telugu nouns exhibit overt nominal categorizing (Arad, 2003), or n, exponents. These suffixes attach immediately to the right of the nominal root. While some n exponents correlate with noun class (masculine human, feminine human, non-human), there is not always a clear semantic contribution.

In some cases, pre-categorial roots can take either a nominal categorizing suffix (almost always *-am*) or a categorizing suffix corresponding to another lexical category; this is the main evidence that these suffixes ought in fact to be analyzed as n nominalizers – they turn pre-categorial roots into nouns:

(5) **Telugu categorizers**

Root	Noun	Adjective	Verb
santōṣ- 'happiness'	*santōṣ-am* 'happiness'	*santōṣ-apu* (rare) 'of happiness'	*santōṣ-incu* 'feel happy'
gaurav- 'respect'	*gaurav-am* 'respect (n.)'	–	*gaurav-incu* 'respect (v.)'
samudr- 'ocean'	*samudr-am* 'ocean'	*samudr-apu* 'of the ocean'	–

The data in (5) is also evidence that in fact *-am* is a parseable, separate exponent from the root exponent, as opposed to simply being the final segments of the root. A related piece of evidence that *-am* is in fact parseable and ought to be analyzed as a nominalizer is that it occurs in gerunds. We can diagnose this using the fact that Telugu features an overt singular suffix *-ni* which only occurs in the context of the nominalizer *-am* and which is deleted except in the accusative and dative. Gerunds in Telugu feature the sequence of suffixes *-aṭ-am*, where the second suffix is in fact the same *-am* as in *samudr-am* 'ocean'; as diagnosed by the fact that both license singular *-ni*:

(6) **Gerunds and *n***

Gloss	Form
ocean-n-SG-DAT	samudr-am-ni-ki
wash-GER-n-SG-DAT	kaḍugu-aṭ-am-ni-ki

The fact that the same exponent appears in a regular nominal and a deverbal noun evidences that the exponent in question is realizing n: it takes a verbal construction and turns it into a nominal, such that the final structure can appear with the distribution of a nominal.

The suffix *-am* is not the only possible n exponent. While the diagnostics above do not apply to the others, there are other diagnostics we can use to determine that the others are (i) in fact separate exponents from the root and (ii) ought to be analyzed as nominalizing n heads as opposed to something else. For the latter: since n is category-defining, it is usually considered to be derivational morphology (Arad, 2003). On the assumption that derivational morphology always occurs inside inflectional morphology (Greenberg, 1963), we expect n exponents to always be ordered closer to the root than inflectional morphology like number suffixes or case suffixes. This is borne out both for *-am* (as demonstrated above) and for the other items I consider to be n exponents, as below:[3]

(7) **Nominal categorizers vs. inflectional morphology: ordering**

Meaning of root	√-n-NOM	√-n-PL-NOM	√-n-DAT
mouth	nō-ru-ø	nō-**ru**-lu-ø	nō-**ṭi**-ki
hand	cē-yi-ø	cē-**tu**-lu-ø	cē-**ti**-ki
nest	gū-ḍu-ø	gū-**ḍu**-lu-ø	gū-**ṭi**-ki

The bolded exponents in (7) correspond to n. Note that the data in (7) also point to an argument that what I call n exponents ought in fact to be parsed as their own exponents and not be considered part of the root: as we can see in (7), n suffixes can supplete in the context of number and/or case. Besides the alternations above, the following are other basic/suppletive pairs for n (Krishnamurti and Gwynn, 1985):

3. Note that there is a process of syncope of the stem-final vowel which occurs in some of the plural forms in (7) which is not represented in the table.

(8) **Telugu nominal categorizers: suppletion**

Base Form/Example	**Suppletive Form/Example**
-lu: *il-lu* 'house'	*-ṭi*: *iṇ-ṭi-ø* 'house-GEN'
-li: *nāga-li* 'plough'	*-ṭi*: *nāga-ṭi-ø* 'plough-GEN
-ḍi: *kāva-ḍi* 'carrying pole'	*-ṭi*: *kāva-ṭi-ø* 'carrying pole-GEN
-u: *kāl-u* 'leg/foot'	*-i*: *kāl-i-ø* 'leg/foot-GEN
-ḍu: *mogu-ḍu* 'man'	*-ni*: *mogu-ni-ø* 'man-GEN'
-ru: *gor-ru* 'harrow'	*-ti*: *gor-ti-ø* 'harrow-GEN'

The vast majority of nouns, though, show no such alternations and thus show no evidence of any overt categorizing exponent. In some of these nouns, it may be the case that there is an overt categorizer which neither alternates with any other categorizer nor ever suppletes, but it is difficult to tell when the diagnostics don't apply. In this case, I assume that there is no n suffix at all, and that the PStem in these cases consists solely of the root exponent. Let's recall my proposal for the morphology-phonology interface in Telugu nouns:

(9) **Domains in the Telugu nominal word**

$[\ \underbrace{[\ \sqrt{}\text{-}n]}_{\textit{PStem}}\text{-Num-Agr/K}\ ]$

Given this setup, it ought to be the case that the sequence of abstract morphemes √-n defines the PStem, and that phenomena sensitive to said boundary, thus, should treat both root and n exponents as being inside the PStem if both exist. When there is no n exponent, the PStem should consist solely of the root exponent. In the next two subsections, I argue that phenomena occurring at both the Num cycle (prosodification and syncope) and at the Agr/K cycle (prosodification and harmony) are computed with reference to the right PStem boundary.

2.4 The Agr/K Cycle: Regressive & Progressive Vowel Harmony

Recalling that I assume a 'hyper-cyclic' view on which every morphological insertion triggers a cycle of phonology (Kalin, 2022), the posited cycles for nominal word-internal phonology in Telugu correspond to the abstract nodes in (4):

(10) **Cycles within the nominal word**

a. Root cycle

b. n cycle

c. Num cycle: triggered by insertion at Num; syllabification and syncope (sensitive to PStem boundary)

d. **Agr/K cycle: triggered by insertion at Agr/K; parsing and harmony (sensitive to PStem boundary)**

In this section, I will consider the phenomena occurring at the Agr/K cycle: metrical parsing, progressive harmony, and regressive harmony. I will show how, in order to derive the correct facts about these phenomena, the cycle of phonology triggered by insertion at Agr/K must in fact be able to take into account the PStem boundary between n and Num.

2.4.1 *What's in the Agr/K node?*

The following is an exhaustive list of exponents inserted at the Agr/K node:

(11) **Agr/K exponents**

Form	Gloss
-ø	NOM
-ø	GEN
-ni/nu	ACC
-ki/ku	DAT
-ni/nu	1SG
-vi/vu	2SG
-mi/mu	1PL

The usage of NOM, GEN, ACC, and DAT is straightforward. The agreement suffixes occur on nominal predicates whose subjects have the relevant ϕ-features.

(12) నేను గురువుని/ను.
nēnu guruvu-**ni/nu**
I.NOM teacher-1SG
'I am a teacher'

Note that here and in the rest of the dissertation, I provide Telugu orthography for glossed examples, but not for forms in tables. This is mainly to strike a balance between making sure that the native orthography is showcased in the text without making tables and other diagrams too cluttered to read. Agreement suffixes also occur in subject adnominal pronoun constructions (*i.e., we linguists* sentences):

(13)

మేము	తెలుగువాళ్లము	ఆయనని/ను	మోసం	చేసాము.
mēmu	teluguvāḷḷa-**mu**	āyana-ni/nu	mōsam	cēsāmu
We.NOM	Telugu.people-1PL	he-ACC	cheating	do.PST.1PL

'We Telugu people cheated him.'

It is due to this use that we can see that agreement and case exponents share the same morphological slot: when adnominal pronoun constructions occur in non-nominative contexts, the relevant case marker replaces the agreement suffix:

(14)

ఆయన	మా	తెలుగువాళ్లని/ను	మోసం	చేసాడు.
āyana	mā	teluguvāḷḷa-**ni/nu**	mōsam	cēsāḍu
He.NOM	we.OBL	Telugu.people-ACC	cheating	do.PST.3SG.M

'He cheated us Telugu people.'

Thus, I consider these to be one morphological node, insertion at which triggers the Agr/K cycle of phonological computation.[4]

2.4.2 Progressive vowel harmony

The following four suffixes (all inserted at the Agr/K node) show exactly the same harmonic behavior:

(15) **Progressively harmonic suffixes**

Gloss	Forms
ACC	-ni/nu
DAT	-ki/ku
1SG	-ni/nu
2SG	-vi/vu

4. One way to think about this may be that in fact the agreement suffixes are overt exponents of nominative case which have undergone ϕ-agreement. On this view, positing a null default NOM suffix is better-justified, as there is evidence for an abstract nominative morpheme (*i.e.,* nominative is not simply empty). However, more work needs to be done to understand all of the predictions this analysis would make and whether it is in fact justified.

When the vowel directly preceding the suffix is something other than /i/ or /iː/, the suffix vowel is in free variation between /i/ and /u/ (Krishnamurti and Gwynn, 1985; Kolachina, 2016):

(16) **Free variation in harmonic suffixes**

Gloss	Form(s)
dog-ACC	kukkani, kukkanu
pot-DAT	ginneki, ginneku
teacher-1SG	guruʋuni, guruʋunu
baby-2SG	pa:paʋi, pa:paʋu

On the other hand, when the noun ends in short or long /i(:)/, there is no longer free variation: the suffix vowel is locked to /i/ (Krishnamurti and Gwynn, 1985; Kolachina, 2016):

(17) **Harmony after /i/**

Gloss	Form(s)
sari-ACC	sa:ri:ni, *sa:ri:nu
sari-DAT	sa:ri:ki, *sa:ri:ku
crow-1SG	ka:kini, *ka:kinu
crow-2SG	ka:kiʋi, *ka:kiʋu

To analyze the behavior of these four suffixes, I take advantage of underspecification. I argue that the suffix vowel in all of the freely-varying suffixes is underlyingly [+high], but underspecified for backness:

(18) **Progressively harmonic suffixes**

Gloss	Forms
ACC	-nV_{+high}
DAT	-kV_{+high}
1SG	-nV_{+high}
2SG	-vV_{+high}

The following constraints then derive the observed behavior (note that I assume a spreading analysis of harmony (Kaun, 1995), following previous work on Telugu vowel harmony in OT (Kolachina, 2016)):

(19) SPECIFY (±BACK)
All output vowels must be specified for the [±back] feature.

(20) DEP (+BACK)
Do not insert a [+back] feature.

(21) DEP (-BACK)
Do not insert a [-back] feature.

(22) SPREAD-R (/i/)
For any instance of /i/ in the input,[5] assign a violation for every vowel slot to its right that it is not associated with in the output.

The constraints above are ranked as follows:

(23) **Constraint ranking for progressive harmony**
SPECIFY (±BACK) ≫ SPREAD-R (/i/) ≫ DEP (-BACK) ≫ / ≪ DEP (+BACK)

The first three constraints are rather standard OT markedness and faithfulness constraints. The basic case, in which the final vowel in the PStem is other than /i/, only requires us to consider the first three constraints above; I posit that the DEP (+BACK) and DEP (-BACK) are stochastically ranked (depicted in (23) by the opposite-oriented sets of double arrows between those two constraints) (Boersma, 1998). When the former is ranked higher than the latter, we get the /i/ form of the suffix, and when the latter is ranked higher, we get the /u/ form. Here is a possible tableau which will derive the form /kuk.ka.ku/ for *kukka-ki/ku* 'dog-DAT':[6]

(24) **Agr/K Cycle phonology: progressive harmony**

[{kuk.ka}]-kV$_{+high}$	SPECIFY (±BACK)	SPREAD-R (/i/)	DEP (-BACK)	DEP (+BACK)
a. [{kuk.ka}kV$_{+high}$]	*!			
b. [{kuk.ka}ki]			*!	
c. ☞ [{kuk.ka}ku]				*

Note the two sets of brackets in (24): the curly brackets represent the boundaries of the PStem, and the square brackets are placed around the part of the input which was phonologized at a previous cycle; that is, everything in the input which is not the exponent whose insertion has triggered this phonological

5. This is the standard way of stating SPREAD constraints in Kaun's approach. It is in fact crucial for me that these constraints be stated as such, and not as constraints only considering output representations; see (46) and the associated discussion for details.

6. Note that I assume that while inputs to Agr/K have already been syllabified, metrical parsing occurs at the Agr/K cycle. I am leaving out stress and foot boundaries in the output candidates for now for ease of reading; I will begin to include them when they become relevant in the following subsection on regressive harmony.

computation. This use of square brackets is akin to, but crucially not the same as, the use of square brackets to denote narrow transcription in IPA; it maintains the intuition that square brackets contain something more 'surface-y', but I use square brackets as the output to any cycle of phonology and not only the final, pronounced output. In this case, neither boundary is especially relevant to understanding the tableau, but as they will become more crucial as the discussion progresses, I have included them starting here.

In (24), inserting [-back] is more marked, so we insert [+back] and get /{kukka}ku/. Had the two DEP constraints had the opposite ranking, the optimal candidate would have been /{kukka}ki/ instead. Even in the latter case, there would be no violation of the SPREAD-R (/i/) constraint, as there are no vowel slots to the right of the inserted /i/. Additionally, SPREAD-R (/i/) would not apply because there is no instance of /i/ in the input. When the vowel directly preceding one of the relevant four suffixes is /i/, the stochastic ranking of the two DEP constraints becomes irrelevant, because it is more optimal to spread than to insert:

(25) **Agr/K Cycle phonology: progressive harmony**

[{ka:.ki}]-kV$_{+high}$	SPECIFY (±BACK)	SPREAD-R (/i/)	DEP (+BACK)	DEP (-BACK)
a. [{ka:.ki}kV$_{+high}$]	*!	*		
b. ☞ [{ka:.ki}ki]				*
c. [{ka:.ki}ku]		*!	*	

In this way, the harmonic behavior of the four suffixes considered above can be understood as due to the interaction of underspecification and a pressure to spread the vowel /i/ to its right.

2.4.3 Regressive vowel harmony & prosodification

Telugu nouns feature a regular process of regressive vowel harmony. This process is triggered at the Agr/K cycle, and involves the vowel from the plural suffix *-ḷu*[7] spreading to its left, into the PStem (Kolachina,

7. Note that in (26), the plural marker surfaces as non-retroflexed [lu]. Since this is the case whenever the plural suffix is preceded by a vowel, much previous work on Telugu assumes that the underlying representation of the plural is *-lu*. I, however, following Krishnamurti & Gwynn (1985), assume that the suffix is underlyingly retroflex but de-retroflexes following a vowel;

2016). The analytical choice of having harmony occur at a later cycle than the one in which the triggering suffix is introduced will seem arbitrary to the reader at this point, though it is a crucial part of my arguments that the representational PStem boundary must be visible to later cycles of phonological computation. I give explicit arguments for this set-up in §2.5, from data relating to plural-triggered syncope in nouns and its interaction with harmony.

In this subsection, I demonstrate (following Kolachina's (2016) analysis) that regressive harmony is sensitive to prosodic structure, and that the computation of said structure must be sensitive to the established PStem boundary. Specifically, Telugu parses its words into bimoraic trochees from left to right, and regressive harmony is blocked by stress. Furthermore, I argue from the (lack of) stem-internal harmony that the mechanism of regressive harmony itself must also be directly sensitive to the PStem domain.

Regressive harmony only affects PStem-internal underlying short /i/, which surfaces as /u/ in harmonic contexts. When the plural suffix is immediately preceded by PStem-final short /i/, that short /i/ always harmonizes:

(26) **Regressive vowel harmony in nouns**

Gloss	Input to Agr/K cycle	Output/Surface Form
limit-PL-NOM	[{pa.ri.miti**i**.}lu]-ø	[pa.ri.mi.t**u**.lu]
carpet-PL-NOM	[{ti.ʋaː.tʃ**i**.}lu]-ø	[ti.ʋaː.tʃ**u**.lu]
mountain-PL-NOM	[{gi.r**i**).}lu]-ø	[gi.r**u**.lu]
hand-*n*.PL-PL-NOM	[{ceː.t**i**.}lu]-ø	[tʃeː.t**u**.lu]

The table in (26)[8] reflects the syllabification of the already-phonologized Num cycle (whose edges are denoted by square brackets in this and in following examples), as well as the location of the PStem boundary (as a reminder, denoted by curly brackets). Bolded PStem-internal vowels are those which harmonize. In this and later tables, square brackets denote already-phonologized strings (also denoted by IPA transcription vs. IAST romanization). Given only the analysis in (25), we would expect the forms in (26) to all involve progressive harmony of PStem-internal /i/; as I discuss later in this subsection (43), the SPREAD-

this explains its behavior in syncope contexts, which will be detailed in §2.5.

8. I am leaving out metrical structure from this table to avoid inundating the reader with too much analysis all at once; however, note that I assume that metrical parsing also occurs at the Num cycle (and again at the Agr/K cycle)

L constraint relevant to the PStem-external /u/ in the plural suffix is ranked higher than the SPREAD-R constraint in (22).

Note that this generalization holds across all root-n combinations; regardless of whether there is clear evidence from alternations that a certain noun takes an overt n suffix, the behavior of regressive harmony of immediately-preceding /i/ is the same. For example, take *cē-yi* 'hand', which we know to have an overt n from suppletion facts; the suppletive n *-ti* undergoes harmony in (26). On the other hand, *giri* 'mountain' does not supplete, and thus does not show evidence of an overt n suffix – however, its final vowel still harmonizes the same way, as demonstrated in (26). Also note that I assume a null NOM suffix whose insertion triggers the Agr/K cycle. The harmony patterns in this subsection also extend to contexts in which an overt suffix is inserted at Agr/K, but there is a process of lowering at phrasal phonology of the suffix vowel which renders the triggering condition opaque; thus, for ease of reading, I only give nominative examples. This phrasal lowering will be considered in §2.6.

When the penultimate PStem vowel is also short /i/, this penultimate short /i/ can also in principle harmonize, but in a more constrained fashion (Kolachina, 2016):

(27) **Regressive vowel harmony in -CiCi PStems**

Gloss	Input to Agr/K cycle	Output/Surface Form
mountain-PL-NOM	[{gi.r**i**.}lu]-ø	[gi.r**u**.lu]
forge-PL-NOM	[{ko.l**i**.m**i**.}lu]-ø	[ko.l**u**.m**u**.lu]
yogi (f.)-PL-NOM	[{joː.gi.n**i**.}lu]-ø	[joː.gi.n**u**.lu]
fierce woman-PL-NOM	[{lan.ki.n**i**.}lu]-ø	[laŋ.ki.n**u**.lu]
limit-PL-NOM	[{pa.ri.mi.t**i**.}lu]-ø	[pa.ri.mi.t**u**.lu]

The table in (27) exhausts the relevant contexts for penultimate /i/ harmony. Note that the only context in which penultimate /i/ harmonizes is when there is a single syllable before it, and that syllable has the form CV, where V is short. If penultimate /i/ is (i) in the word-initial syllable, (ii) preceded by a syllable with either a long nucleic syllable or a coda consonant, or (iii) preceded by two CV syllables where V is short, it does not harmonize. These environments form a natural class if we assume that syllables with either long vowels or coda consonants are bimoraic, that Telugu words are parsed into bimoraic trochees from left to right, and that monomoraic/defective feet are disallowed (that is, some syllables are left unparsed). This algorithm, while not actually part of the final adopted analysis in that work, is taken from

Kolachina (2016).

The following table repeats (27) but includes stress and feet:

(28) **Regressive vowel harmony in -CiCi PStems**

Gloss	Input to Agr/K cycle	Output/Surface Form
mountain-PL-NOM	[{gi.r**i**.}lu]-ø	[{('gi.r**u**).}lu]
forge-PL-NOM	[{ko.l**i**.m**i**.}lu]-ø	[{('ko.l**u**).m**u**.}lu]
yogi (f.)-PL-NOM	[{joː.ˌgi.n**i**.}lu]-ø	[{('joː).(ˌgi.n**u**).}lu]
fierce woman-PL-NOM	[{lan.ki.n**i**.}lu]-ø	[{('laŋ).(ˌki.n**u**).}lu]
limit-PL-NOM	[{pa.ri.mi.t**i**.}lu]-ø	[{('pa.ri).(ˌmi.t**u**).}lu]

Now we can see a clear difference between the contexts where penultimate /i/ harmonizes and those where it does not: regressive harmony is blocked by stressed short /i/, as in the forms for 'yogis', 'fierce women', and 'limit'. The prosodification in (28) also explains why PStem-final short /i/ always harmonizes, as in (26): it never bears stress. Note, though, that plural *-ḷu* has been left out of the prosodification in (28) – had it been included, there would no longer be a clear prosodic natural class to describe the condition for harmony of penultimate /i/:

(29) ***What if the plural was included?**

Gloss	Input to Agr/K cycle	Output/Surface Form
mountain-PL-NOM	[gi.r**i**.lu]-ø	[{('gi.r**u**).}lu]
forge-PL-NOM	[ko.l**i**.m**i**.lu]-ø	*[{('ko.l**i**).(ˌm**i**.}lu)]
hand-n.PL-PL-NOM	[ceː.t**i**.lu]-ø	*[{('tʃeː).(ˌt**i**.}lu)]
yogi (f.)-PL-NOM	[joː.gi.n**i**.lu]-ø	[('joː).(ˌgi.n**u**).lu]
fierce woman-PL-NOM	[lan.ki.n**i**.lu]-ø	[('laŋ).(ˌki.n**u**).lu]
limit-PL-NOM	[pa.ri.mi.t**i**.lu]-ø	[('pa.ri).(ˌmi.t**u**).lu]

In most cases, Kolachina's (2016) analysis still makes the same prediction, but in cases where the portion of the word before the plural suffix (that is, the root and n) consists of three morae (three light syllables, or one heavy syllable followed by a light syllable), it falls short. Instead of predicting harmony in both non-initial syllables preceding the plural (as in the case where the root and n together are a sequence of three light syllables) or harmony in the final syllable preceding the plural (as in the case of a heavy-light sequence preceding the plural), it predicts no harmony at all. This is because in these cases, plural *-ḷu* would simply form a bimoraic foot with the preceding unparsed light syllable; that light syllable would have a left foot boundary directly preceding it, which we would predict to block harmony. While Kolachina (2016) does note this puzzle, the only possible solution he proposes is to say that plural *-ḷu* bears inherent/lexical stress. While this will likely work, it is somewhat stipulative: there is no corroborating empirical evidence that the plural suffix bears stress. While this does not mean that it in fact doesn't bear stress that is simply difficult to perceive/capture empirically, without such empirical evidence, the analysis boils down to just adding a diacritic to the suffix *-ḷu* which marks it as 'not parseable'. My analysis also involves diacritics (in my case the PStem itself), but since the PStem captures many different effects at once and derives the anomalous behavior of the plural suffix from a more basic principle (the Strict Layer Hypothesis, explained directly below), my analysis is preferable.

I argue, thus, that this effect is due to a high-ranking phonological constraint against the construction of a foot which spans both sides of the PStem boundary. Recall that the notion of PStem is borrowed from the Prosodic Phonology framework (Selkirk, 1984; Nespor and Vogel, 1986). This framework argues for a universal hierarchy of prosodic constituents, a portion of which is as follows:

(30) **Prosodic phonology: constituent hierarchy**

Phonological Phrase
|
PWord
|
PStem
|
Foot
|
Syllable

A core tenet of the model is what is known as the Strict Layer Hypothesis (SLH): constituents lower in the hierarchy must be completely within a higher-level constituent; that is, for example, a PStem should not cross a PWord boundary, a syllable should not cross a foot boundary, and so on and so forth. Since feet are at a lower level in the hierarchy than PStems, it is quite natural to posit a constraint as follows:

(31) SLH-PSTEM-FOOT
Assign a violation for every foot which spans a PStem boundary; that is, for every foot whose left edge is on one side of a PStem boundary and whose right edge is on the other.

At word-level phonology, given a standard implementation of metricality in OT, (Prince and Smolensky, 1993; Kager, 2007), and given that we know Telugu to be a language which only allows bimoraic, trochaic feet, I can say that the following constraints are active and their ranking is as they are listed:

(32) FT-BIN (μ)
Assign a violation for any metrical foot not consisting of two moras.

(33) FOOT-FORM (TROCHAIC)
Assign a violation for every disyllabic foot whose head is not the first syllable.

(34) ALL-FT-LEFT-PWORD
For each foot which does not stand at the left edge of the prosodic word, assign a violation mark for every unparsed syllable intervening between the left edge of the word and the left edge of the foot.

(35) PARSE-SYL
Assign a violation whenever some syllable is not parsed into a foot.

The SLH-PSTEM-FOOT constraint is ranked between ALL-FT-LEFT-PWORD and PARSE-SYL; the full ranking is as follows:

(36) **Constraint ranking for metrical parsing**
FT-BIN (μ) $\gg$ FOOT-FORM (TROCHAIC) $\gg$ ALL-FT-LEFT-PWORD $\gg$ SLH-PSTEM-FOOT $\gg$ PARSE-SYL

Taking the form *kolumu-lu* 'forges' as an example, the following is the tableau for prosodification at the Agr/K cycle:

(37) **Agr/K phonology: metrical parsing**

[{ko.li.mi.}lu]-ø	FT-BIN (μ)	FOOT-FORM (TROCHAIC)	ALL-FT-LEFT-PWORD	SLH-PSTEM-FOOT	PARSE-SYL
a. ☞ [{('ko.lu).mu.}lu]					∗∗
b. [{(ko.'lu).mu.}lu]		∗!			∗∗
c. [{('ko.lu).(ˌmu.}lu)]				∗!	
d. [{ko.('lu.mu).}lu]			∗!		∗∗
e. [{('ko.lu).(ˌmu).}(ˌlu)]	∗!				

Note that I abstract away from the de-retroflexing of the underlying /ɭ/ in the plural suffix due to the preceding vowel; I assume that this process occurs at the Num cycle and is thus already complete at the stage of the derivation depicted by the tableau in (37) and the ones immediately following. I am ignoring the vowel harmony-related constraints for now for simplicity's sake; assume that they are also active in (37) – they will be discussed in detail in §2.4 below. When we have a trimoraic stem where the first syllable is heavy/bimoraic, we get a similar result:

(38) **Agr/K phonology: metrical parsing**

	[{ka:.ki.}lu]-ø	FT-BIN (μ)	FOOT-FORM (TROCHAIC)	ALL-FT-LEFT-PWORD	SLH-PSTEM-FOOT	PARSE-SYL
a.	☞ [{('ka:).ku.}lu]					**
b.	[{('ka:).(ˌki.}lu)]				*!	
c.	[{('ka:).(ku).}(lu)]	*!				

Note that even though PARSE-SYL should militate against leaving syllables unparsed, the SLH constraint is ranked higher, so the optimal solution is to violate PARSE-SYL and only have one foot in the output. On the other hand, if we have a tetrasyllabic PStem, there is no problem with constructing a second foot, as it would still not cross the PStem boundary:

(39) **Agr/K phonology: metrical parsing**

	[{pa.ri.mi.ti.}lu]-ø	FT-BIN (μ)	FOOT-FORM (TROCHAIC)	ALL-FT-LEFT-PWORD	SLH-PSTEM-FOOT	PARSE-SYL
a.	☞ [{('pa.ri).(ˌmi.tu).}lu]					*
b.	[{('pa.ri).mi.tu.}lu]					**!*

Thus, assuming that the PStem boundary is visible to the phonological computation and assuming that SLH-related constraints are ranked relatively highly, we can explain the interaction of prosody and regressive harmony at the Agr/K cycle.

Next, I discuss the set of constraints relevant to derive the correct harmony facts, given the prosodification algorithm established above. Besides the harmony facts already introduced above, one more should be pointed out: no stem vowel other than short /i/ ever participates in regressive harmony.

(40) **No regressive harmony without /i/**

Gloss	**Input to Agr/K cycle**	**Output/Surface Form**
dog-PL-NOM	[{kuk.ka.}lu]-ø	[{('kuk).ka.}lu]
box-PL-NOM	[{peʈ.ʈe.}lu]-ø	[{('peʈ).ʈe.}lu]
punch-PL-NOM	[{gu.mi.kiː.}lu]-ø	[{('gu.mi).(ˌkiː).}lu]
shirt-PL-NOM	[{tʃok.kaː.}lu]-ø	[{('tʃok).(ˌkaː).}lu]

As we can see, neither short nor long /a/, short /e/, nor long /iː/ harmonize with respect to the plural suffix's /u/ vowel, unlike short /i/. No nouns with PStem-final long /eː/ or /o/ (long or short) were found in the consulted dictionaries (Brown, 1903; Gwynn, 1991).

The basic harmony facts, then can be derived with the following constraints (positional faithfulness constraints à la Beckman (1998)):

(41) IDENT-V (STR)
A [+stress] output vowel is identical in all features to its correspondent in the input.

(42) IDENT-V (+LOW)
A [+low] output vowel is identical in all features to its correspondent in the input.

(43) SPREAD-L (/u/, -NSTEM)
For all nominal PStem-external input instances of /u/, assign a violation for every vowel slot to its left to which it is not associated in the output.

The IDENT-V (STR) and IDENT-V (+LOW) constraints derive the fact that stressed vowels and non-high vowels (/a(ː)/, /e(ː)/) are not targeted by harmony, as we saw in (40). Since long vowels only occur in heavy syllables, and heavy syllables are always stressed, IDENT-V (STR) also covers blocking by long vowels. The SPREAD constraint mediates the harmony itself; it militates for spreading as much as possible. Recall from earlier that (43) is ranked higher than the SPREAD constraint in (22), which mediates progressive harmony. This is why regressive harmony is always preferred over progressive harmony when possible. Note that I have keyed the SPREAD constraint in (43) specifically to nominal PStems.[9] This is because /u/ is only a harmony trigger in nominal regressive harmony; as we will see in Chapter 3 (§2.5.1), verbal regressive harmony works differently. Importantly, note also that I define PStem-externality as follows:

9. Even though my system allows morpheme-specific mini-grammars, I argue that a mechanism for category-specific phonological grammars is still necessary. The main evidence for this will come in Chapter 3's discussion of verbal regressive harmony; since that phenomenon can be triggered by *any* PStem-external insertion, analyzing it as a part of every single possible triggering exponent's associated mini-grammar would create unwanted redundancy. I port that analysis here to nominals for consistency's sake.

(44) **PStem-externality:**
Any phonological material which is to the right of the right-edge boundary of a PStem within the same word is *external* to that PStem.[10]

PStem-internality, on the other hand, is defined as a property of phonological material which is between the left- and right-edge boundaries of a PStem. See Chapter 3 (§3.6) for some suggestive evidence that an approach like this is the correct one. The following is the relevant ranking for regressive harmony; I also include the progressive harmony-inducing constraint from 2.4.2, as its low ranking will help to rule out overgeneration of progressive harmony:

(45) **Constraint ranking for regressive harmony**
IDENT-V (STR) = IDENT-V (+LOW) $\gg$ SPREAD-L (/u/, -NSTEM) $\gg$ SPREAD-R (/i/)

This concludes the analysis of regressive harmony in Telugu nominals.

In the rest of this subsection, I demonstrate how the analysis makes the correct predictions for a variety of nouns with different prosodic shapes by giving tableaux for the Agr/K cycle of various nominal forms (recall that the Agr/K cycle is the one at which nominal regressive harmony is triggered). In the tableau below, which depicts the phonological computation occurring at the Agr/K cycle for /kolumulu/ 'forge-PL-NOM', I demonstrate how the mechanics of the SPREAD-L (/u/, -NSTEM), along with its relative ranking with respect to SPREAD-R (/i/), interact to correctly predict that regressive harmony is more optimal than progressive harmony in a case where the structural configurations for both are met. Note that, complementarily to the tableaux in (37)-(39), in the tableaux below I abstract away from prosodification-related constraints and focus on harmony-related constraint interactions:

10. Since Telugu nouns are exclusively suffixing, the definition in (44) suffices for my purposes. It would be natural to extend the definition to material to the left of the left-edge boundary as well, but since I have no positive evidence that this is required, I leave it out of the definition.

(46) **Agr/K phonology: regressive harmony**

	{ko.li.mi.}l̥u-ø	IDENT-V (STR)	IDENT-V (+LOW)	SPREAD-L (/u/, -NSTEM)	SPREAD-R (/i/)
a.	☞ {(ˈko.lu).mu.}lu			*	*
b.	{(ˈko.li).mi.}li			**!*	
c.	{(ˈko.li).mi.}lu			**!*	*
d.	{(ˈku.lu).mu.}lu	*!	*		*

Candidate c.) is suboptimal because it does not minimize violations of SPREAD-L (/u/, -NSTEM), while candidate d.) is suboptimal because it violates the higher-ranked IDENT-V (STR) despite having fewer violations of the SPREAD constraint. Candidate b.) deserves more discussion; it actually involves rightward spreading of /i/, which we saw in the outputs in §2.4.2. However, since (i) the rightward spreading constraint is ranked lower than the leftward one, and (ii) the SPREAD constraints are stated as a kind of ANTIFAITHFULNESS (Alderete, 1999) constraint (*i.e.,* they are specifically violated when some input element has *not* changed in the output), candidate b.) counts as a violation of the leftward spreading constraint and is thus ruled out. Essentially, the idea is that when the input contains an unstressed instance of /i/ followed by PStem-external /u/ in the immediately following vowel slot, we get regressive harmony, because the leftward-spreading constraint is ranked higher than the rightward-spreading constraint, and rightward spreading counts as a violation of the leftward-spreading constraint given an output where either could occur. Progressive harmony can only occur when there is no /u/ in the input as in the cases considered in §2.4.2, or in cases where the /i/ which precedes PStem-external /u/ is stressed, thus blocking regressive harmony (see §2.5.4 for an attested case).

In (46), candidate d.) violated both the IDENT-V (STR) and IDENT-V (+LOW) constraints; technically, then, only one of those faithfulness constraints was required to rule out harmony extending to the noun-initial syllable in that case. However, the effects of these two constraints can be teased apart. For example, the tableau in (47), for /girulu/ 'mountain-PL-NOM', demonstrates how stress blocks harmony even in a case where the stressed vowel in question is /i/, a vowel we know to be a potential harmony target:

(47) **Agr/K phonology: regressive harmony is blocked by stress**

{gi.ri.}lu-ø	IDENT-V (STR)	IDENT-V (+LOW)	SPREAD-L (/u/, -NSTEM)	SPREAD-R (/i/)
a. ☞ {(ˈgi.ru).}lu			*	*
b. {(ˈgi.ri).}li			**!	
c. {(ˈgi.ri).}lu			**!	*
d. {(ˈgu.ru).}lu	*!			

Candidate d.) is out because it violates the high-ranked IDENT-V (STR) constraint. Candidates b.) and c.) are both out because they have two violations of SPREAD-L (/u/, -NSTEM), more than the single violation of the optimal candidate, a.). Complementarily to the tableau in (47), the tableau in (48) below shows how [-high] vowels can block nominal regressive harmony even when they are not stressed:

(48) **Agr/K phonology: regressive harmony is blocked by non-high vowels**

{ta.la.}lu-ø	IDENT-V (STR)	IDENT-V (+LOW)	SPREAD-L (/u/, -NSTEM)	SPREAD-R (/i/)
a. ☞ {(ˈta.la).}lu			**	
b. {(ˈta.lu).}lu		*!	*	
c. {(ˈtu.lu).}lu	*!	**		

This tableau should be relatively straightforward after the explanation of the tableau in (47). Essentially, the output with no harmony, candidate a.), is the most optimal because harmonizing once will violate IDENT-V (+LOW), and harmonizing twice will violate both IDENT-V (+LOW) and IDENT-V (STR), both of which are ranked higher than the leftward-spreading constraint. Crucially, harmonizing a non-high vowel is ruled out even when that vowel is not stressed, as in candidate b.).

Finally, we have a tableau for harmony in a tetramoraic PStem with the form CVCiCiCi-. PStems of this form are important to understand because these forms show that unstressed /i/, when followed by a harmony-blocking vowel, may still fail to harmonize. Here is the computation for /parimitulu/ 'limit-PL-NOM':

(49) **Agr/K phonology: regressive harmony**

{pa.ri.mi.ti}lu-ø	nogap	ident-V (str)	ident-v (+low)	spread-l (/u/, -Nstem)	spread-r (/i/)
a. ☞ {(ˈpa.ri).(ˌmi.tu).}lu				* * *	*
b. {(ˈpa.ri).(ˌmi.ti).}lu				* * **!	*
c. {(ˈpa.ri).(ˌmi.ti).}li				* * **!	
d. {(ˈpa.ru).(ˌmi.tu).}lu	*!			**	*
e. {(ˈpa.ru).(ˌmu.tu).}lu		*!		*	*

As before, spreading minimizes violations of spread-l (/u/, -Nstem), so less spreading than possible (as in candidates b.) and c.)) is automatically ruled out. Spreading which violates ident-V (str) is ruled out because that constraint is ranked higher than the spread constraint (as in candidate e.)). For candidate d.), I assume a high-ranked nogap constraint militating against non-contiguous spreading (Itô et al., 1995). This is relevant because an output like candidate d.) would involve the suffixal /u/ spreading to the vowel slot in the second PStem syllable without also spreading to the vowel slot in the third PStem syllable.

2.5 The Num Cycle: Syncope & Prosodification

Thus far, I have shown that in order to understand the behavior of regressive vowel harmony in Telugu, prosodification in the nominal word must be sensitive to a domain defined by the sequence of exponents of √-n. I have also shown that the facts are compatible with an analysis on which that domain is representational and not purely an epiphenomenon of cyclicity. However, it is the case that all of the facts considered so far could also be explained on a view where the stem is a purely cyclic domain. On such a view, the 'PStem' is simply the input to the Num cycle, and harmony is triggered at the Num cycle instead of the Agr/K cycle. The fact that plural *-ḷu* is ignored for the purposes of prosodification relevant to regressive harmony, on such a view, would be due to highly-ranked faithfulness constraints militating against re-prosodification at the Num cycle. Here is a sketch of the derivation of *kolumulu* 'forge-pl-nom' on this hypothetical analysis:

(50) **A possible purely cyclic analysis for *kolumulu* 'forge-PL-NOM'**

a. Root cycle: /kolimi/

b. n cycle: /kolimi/-ø→ /('ko.li).mi/ (syllabification, parsing)

c. Num cycle: /('ko.li).mi/-ḷu → /('ko.lu).mu.lu/ (syllabification/parsing faithful to input; harmony)

d. Agr/K cycle: /('ko.lu).mu.lu/-ø→ /('ko.lu).(ˌmu.lu)/

On this view, prosodification in the Telugu nominal word is highly faithful to an already-prosodified input; that is, there is a strong bias towards not re-prosodifying. Then, the facts explained by the SLH-PSTEM-FOOT constraint can be put down to the fact that (i) there is no plural suffix at the n cycle and that (ii) prosodification at the Num cycle must respect the parsing already established at the n cycle. In this way, no representational PStem boundary is required.

In this section, I give four arguments from plural-triggered vowel syncope that such a view cannot be correct. Firstly, syncope is blocked in certain disyllabic stems. Since Telugu parses its words into moraic feet, on a purely cyclic analysis, it is difficult to derive this kind of syllable-sensitive effect. On the other hand, including the PStem boundary in the representation allows us to derive the effect as a minimality restriction on the PStem domain. The second argument, briefly, is that harmony counterfeeds syncope; thus, it must occur at a later cycle than syncope. Since the earliest cycle at which syncope can occur is the Num cycle (where the syncope-triggering suffix is introduced), the only possible analysis is that harmony occurs at the Agr/K cycle, the only one following Num. Thirdly, stem-internal harmony does not occur. Given that harmony occurs at Agr/K, the only way to understand this fact is by saying that a representational PStem boundary is visible at Agr/K. Finally, the fourth argument brings in additional progressive harmony data. Recall that part of the analysis for regressive harmony involved the fact that PStem-final short /i/ is always unstressed, and thus never blocks harmony triggered by PStem-external /u/. In this section, I discuss a form in which PStem-external /u/ fails to trigger regressive harmony on a preceding /i/; instead, that /i/ triggers progressive harmony on the aforementioned /u/. I show that this is naturally explained on my view: the /i/ in question is PStem-external, such that (1) it can bear stress, and (2) it can trigger progressive harmony.

This section is structured as follows: I begin by laying out the most basic facts about syncope, giving an OT analysis (§2.5.1). Next, I demonstrate the sensitivity of syncope to the number of syllables in the PStem. Considering that Telugu parses its words into moraic feet, a condition defined by syllables can only be understood by assuming a representational PStem boundary (§2.5.2). In the process of understanding syllable-sensitive syncope, I contend that syncope must occur at an earlier cycle than harmony – the latter renders the former opaque on the surface, a state of affairs difficult to analyze without recourse to cyclicity. This also solidifies my assumption that regressive harmony occurs at the Agr/K cycle (even though it is triggered by the plural suffix) by showing that it cannot occur at the Num cycle (§2.5.3).

2.5.1 Plural-Triggered Syncope

As noted by Krishnamurti & Gwynn (1985), the plural suffix *-ḷu* triggers syncope of immediately preceding short /i/ and /u/ when the consonant preceding the syncopating vowel is /l/, /r/, /ʈ/, or /ɖ/. This is demonstrated in (51) below; the table reflects my analysis that syncope occurs at the Num cycle:

(51) **Num cycle: plural syncope**

Gloss	Input to Num Cycle	Output of Num Cycle
crore-PL	[ko:ʈi]-ḷu	[ko:ʈɭu]
tree-PL	[tʃeʈʈu]-ḷu	[tʃeʈɭu]
barber-PL	[mangali]-ḷu	[mangaɭɭu]
leg-PL	[ka:lu]-ḷu	[ka:ɭɭu]
canopy-PL	[pandiri]-ḷu	[pandiɭɭu]
town-PL	[u:ru]-ḷu	[u:ɭɭu]
school-PL	[baɖi]-ḷu	[baɭɭu]
backyard-PL	[peraɖu]-ḷu	[peraɭɭu]

Borrowing from Balusu (2009), we can derive this general propensity for syncope as a type of featural OCP. When two consonants are adjacent with no intervening vowel, then features shared between them can be associated with a single instance of that feature on the consonantal tier. On the other hand, when a vowel intervenes between two consonants, features that they share cannot be co-associated and must be separate instances of that feature. In that case, on the consonantal tier, there are two adjacent instances of the same feature, a violation of the OCP. In the Telugu case, syncope is triggered by the plural marker (underlying form /ɭu/) whenever the preceding consonant shares the features [-nasal], [+coronal], [-sibilant],

[-distributed], and [-spread glottis].[11] This can then be seen as a feature-sensitive OCP-violating configuration. If we abbreviate the set of features and call the relevant consonants T', then we can state the following constraint:

(52) *T'vT'
Assign a violation whenever two consonants in the category T' are adjacent in the output (*i.e,* no other consonant intervenes). Geminates count as a single consonant.

The restriction on syncope to short [+high] vowels (/i/, /u/) can be understood as being due to *T'vT' being ranked below MAX-V (-HIGH) and MAX-V ($\mu\mu$):

(53) MAX-V (-HIGH)
All input vowels bearing the feature [-high] should have correspondent vowels in the output.

(54) MAX-V ($\mu\mu$)
All input vowels which are associated with two morae should have correspondent vowels in the output.

As a demonstration of the action of (53), the following is a tableau for the Num cycle of the non-syncopating form *talalu* 'head-PL':

(55) **Num phonology: plural-triggered syncope**

[{tala}]-ḷu	MAX-V (-HIGH)	*T'vT'	MAX-V (+HIGH)
a. ☞ [{('ta.la).}lu]		*	
b. [{('taḷ).}ḷu]	*!		

In (55), since the constraint militating against the deletion of non-high vowels, MAX-V (-HIGH), is ranked higher than the OCP constraint, syncopating is less optimal than retaining the stem-final vowel, making candidate a.) the most optimal. The role of (54) can be demonstrated in a totally parallel fashion by giving a tableau for a plural form with a PStem-final long vowel, such as *gumikīlu* 'punches'; since (54) is

11. I use the featural system given in Odden (2005). The consonants in the T' set are essentially the coronals, excluding nasals, sibilants, dental stops, affricates (these last two share [+distributed]) and aspirates/breathy-voiced consonants (which share [+ spread glottis]). This natural class also includes retroflex lateral /ḷ/; there do not appear to be any nouns whose roots/stems underlyingly end in /ḷu/ or /ḷi/, but if such exists, I predict they should act the same with respect to syncope.

ranked higher than *TvT', long vowels do not syncopate, even if they are [+high]. Next, the following is the tableau for a form in which syncope *is* triggered at the Num cycle of phonology – *peraḷḷu* 'backyard-PL':[12]

(56) **Num phonology: plural-triggered syncope**

[{peraḍu}]-ḷu	MAX-V (-HIGH)	*T'vT'	MAX-V (+HIGH)
a. [{('pe.ra).ḍu}lu]		*!	
b. ☞ [{pe.('raḷ).}ḷu]			*

Since the voiced retroflex plosive /ḍ/ is one of the consonants in the category T', not syncopating (as in candidate a.) in (56)) violates the *T'vT' constraint. While syncopating still involves deleting an input vowel, thus violating MAX-V (+HIGH), candidate b.) is still the more optimal output. Note that I ignore the constraints relevant for the assimilation of underlying retroflex ḍ to the following retroflex lateral ḷ.

2.5.2 *Sensitivity to Syllables*

There is one exception to the aforementioned generalizations about syncope – when the PStem is disyllabic, and ends in either /ri/ or /li/, the final vowel fails to syncopate before the plural suffix[13] *-ḷu* (Krishnamurti and Gwynn, 1985):

(57) **Exceptions to plural syncope**

Gloss	Input to Num Cycle	Output of Num Cycle
tiger-PL	[{puli}]-ḷu	[{('pu.li).}lu], *[{('puḷ).}ḷu]
mountain-PL	[{giri}]-ḷu	[{('gi.ri).}lu], *[{('gir).}lu]
wind-PL	[{ga:li}]-ḷu	[{('ga:).li.}lu], *[{('ga:ḷ).}ḷu]
path-PL	[{da:ri}]-ḷu	[{('da:).ri.}lu], *[{('da:r).}lu]

12. Note that I treat Telugu geminates as sequences of identical consonants, as opposed to reflexes of a true length distinction in consonants, similarly to the long tradition of parallel analyses of Italian geminates (see Loporcaro (1996) and citations therein). Suggestive favorable evidence is that there are no word-initial or word-final geminates in Telugu – this is predicted if we assume that word-medial geminates are always heterosyllabic. Heterosyllabic parses are not available for word-initial or word-final geminates, so they are naturally disallowed.

13. The table in (57) shows the output to the Num cycle, not the final surface form of the word; in these cases, harmony occurring at the Agr/K cycle will change the quality of stem-final /i/ to /u/. I consider this interaction in the next subsection.

We need a constraint which captures the condition that syncope fails only when the stem is disyllabic. I posit the following:

(58) STEM-BIN-SYLL
Assign a violation if there is no syllable boundary properly contained (*i.e.,* not coinciding with either PStem boundary) within the PStem in the output.

Essentially, this constraint militates against outputs where the PStem is monosyllabic. Here are some abstracted examples which show how this is achieved:

(59) **Stems must be binary wrt syllables**

a. {.σ.}$\sigma\sigma$ (violates STEM-BIN-SYLL)

b. {.σ.σ}σ (does not violate STEM-BIN-SYLL)

In the examples above, syllable boundaries are denoted by periods, and PStem boundaries by curly brackets. In (59a), there are no syllable boundaries which do not coincide with PStem boundaries – the two periods surrounding the single PStem-internal syllable are in the same positions as the left and right PStem edges. However, in (59b), this is ameliorated: the syllable boundary between the first and second syllables is contained completely within the PStem, thus not violating STEM-BIN-SYLL. The point of introducing such a constraint is that its violation, as we will see shortly, can serve to block syncope in cases where it would result in a surface-monosyllabic PStem; ranking this constraint appropriately with respect to the OCP constraints will derive the desired facts.

Without STEM-BIN-SYLL, which crucially makes reference to a representational PStem boundary, it would be difficult to capture the syncope blocking effect demonstrated in (57). Let's take the inputs 'wind-PL' and 'tiger-PL':

(60) **The purely cyclic view: syncope blocking**

	wind-PL	tiger-PL
Output of n cycle	[(ˈgaː).li]	[(ˈpu.li)]
Input to Num cycle	[(ˈgaː).li]-ḷu	[(ˈpu.li)]-ḷu
Output of Num cycle	[(ˈgaː).li.lu]	[(ˈpu.li).lu]

For this attempt at a purely cyclic analysis, I assume that there is a step of prosodification at the n cycle whose result is visible to the Num cycle. Note that in (60), the square brackets denote portions of the input that have gone through a previous cycle of phonology, *not* boundaries that are directly visible to the phonological computation. At the input to the Num cycle, the phonology only has access to the prosodic structure determined at the n cycle. However, only given this structure, there is no obvious generalization about when to syncopate and when not to. It isn't the case that the stem boundary always coincides with a foot boundary when it's disyllabic, as Telugu parses its words into moraic feet, not syllabic ones. Thus, a 'faithfulness to input' story involving constraints militating against re-parsing will not work. The stem boundary always coincides with a syllable boundary, but that's too powerful: we would not expect syncope blocking to be specific to disyllabic stems, if we posited a general constraint against deleting stem syllables/re-syllabifying the stem. The only way to get around this problem would be to posit a global constraint which would militate against pluralized nouns that have fewer than three syllables total. While this would be a good description of the desired constraint, it is usually assumed that OT constraints should not be able to directly 'count' syllables in this way (McCarthy and Prince, 1999). Thus, given that Telugu has moraic feet, the best way to enforce a disyllabicity requirement is as I've done above, by taking advantage of the visibility of the PStem boundary to the phonological computation.

Recall that this disyllabicity effect only applies to stems ending in /ri/ and /li/: /ɖi/ and /ʈi/ trigger syncope regardless of the prosodic structure of the stem, and stem-final /u/ deletes after T' consonants regardless of prosodic structure as well. Thus, I posit that there is a separate OCP constraint *RR which prohibits two adjacent [+retroflex] consonants in the output; this will explain why prosodic structure is ignored when the final stem consonant is /ʈ/ or /ɖ/. We can also consider a more specific sub-constraint of the *T'T' markedness constraint which is keyed to the quality of the intervening vowel. This will explain the difference between stem-final /u/ and /i/:

(61) *RvR
Assign a violation whenever two [+retroflex] consonants are adjacent in the output (*i.e.,* no other consonant intervenes).

(62) *T'ʊT'
Assign a violation whenever two consonants in the category T' are adjacent in the output (*i.e.,*

no other consonant intervenes) and the only segment which intervenes is /u/.

Here are the relevant ranking relations to derive syncope blocking:

(63) **Constraint ranking for syncope blocking**
*RvR ≫ *T'uT' ≫ STEM-BIN-SYLL ≫ *T'vT'

Given the ranking in (63), here is a tableau for the Num cycle phonology of 'wind-PL':

(64) **Num cycle phonology: syncope**

[{ga:li}]-ḷu	*RvR	*T'uT'	STEM-BIN-SYLL	*T'vT'
a. ☞ [{ga:.li.}lu]				*
b. [{ga:ɭ.}ɭu]			*!	

Note that in (64) and the tableaux to follow, I abstract away from the harmony-related constraints, as well as those which derive the de-retroflexing of the plural marker *-ḷu*.The violation of STEM-BIN-SYLL in candidate b.) is enough to make it less optimal than a.), even though a.) violates the OCP constraint. On the other hand, here is the tableau for the near-minimal pair word 'leg-PL', whose PStem is two syllables but ends in /lu/ instead of /li/:

(65) **Num cycle phonology: syncope**

[{ka:lu}]-ḷu	*RvR	*T'uT'	STEM-BIN-SYLL	*T'vT'
a. ☞ [ka:ɭ.ɭu]			*	
b. [ka:lu.lu]		*!		*

In (65), the optimal candidate is the one with syncopation, because not syncopating would violate *T'uT', resulting in a more marked output than one which violates STEM-BIN-SYLL. Next, we consider the Num cycle phonology for 'barber-PL', where the PStem ends in /li/ but is longer than two syllables:

(66) **Num cycle phonology: syncope**

[{mangali}]-ḷu	*RvR	*T'uT'	STEM-BIN-SYLL	*T'vT'
a. ☞ [{man.gaḷ.}ḷu]				
b. [{man.ga.li.}lu]				*!

In (66), since the PStem is more than monosyllabic regardless of whether syncope occurs or not, STEM-BIN-SYLL is not relevant. Thus, the optimal candidate is the one with syncopation, because it ameliorates the violation of *T'vT'. Finally, let's consider 'school-PL', whose PStem is two syllables but ends in /ɖi/:

(67) **Num cycle phonology: syncope**

[{baɖi}]-ḷu	*RvR	*T'uT'	STEM-BIN-SYLL	*T'vT'
a. ☞ [{baḷ}ḷu]			*	
b. [{ba.ɖi.}lu]	*!			*

In (67), since the final consonant in the PStem is /ɖ/, any non-syncopating output would violate the highly-ranked *RR. Thus, regardless of the quality of the stem-final vowel or the number of syllables in the output PStem, syncopation will always occur, as in candidate a.).

2.5.3 Interactions between syncope & harmony

Thus far, I have shown that both syncope & harmony must make reference to the PStem. However, while I have been assuming that syncope occurs at the Num cycle and harmony at the Agr/K cycle, I have not been explicit about why things must be this way. While it is clear that progressive harmony must occur at the Agr/K cycle (because it involves exponents that are only inserted at the Agr/K node and not before), both regressive harmony and syncope are triggered by plural *-ḷu*. Thus, in principle, either could occur at either the Num cycle or the Agr/K cycle – the table in (68) enumerates the possible analyses with respect to the relevant processes and which cycles they can potentially occur at:

(68) **Possible orderings of syncope & harmony**

Num cycle	Agr/K cycle
a.) *syncope*	*regressive/progressive harmony*
b.) syncope, regressive harmony	progressive harmony
c.) regressive harmony	syncope, progressive harmony
d.) N/A	regressive/progressive harmony, syncope

The answer to this question is crucial for the overall analysis, as if it turns out to be the case that analysis d.), I no longer have evidence for the Num cycle as a separate cycle at all. Furthermore, if analysis b.) is correct, there is no strong argument that a representational PStem boundary is required. This is because on this view, both processes triggered by plural *-ḷu*, syncope and regressive harmony, are also triggered at the cycle at which the plural suffix is introduced. This, then, is amenable to an analysis on which both processes are simply a property of the Num cycle, and that their restricted domain falls out naturally from the fact that at the Num cycle, no later-inserted suffix is in the input to the phonology. At the Agr/K cycle, then, there is no representational PStem boundary, but this does not cause any problems because syncope and regressive harmony have already occurred.

The view I have been assuming, and which I will argue for in this subsection, is a.) in (68). My arguments for this view come from interactions between syncope & harmony. I first show that regressive harmony cannot occur at an earlier cycle than syncope, using the fact that syncope-triggered stress shift can affect the possibility of harmony, ruling out analysis c.). I then show that the two phenomena do not occur in the same cycle, arguing from the fact that harmony can render syncope-blocking environments opaque on the surface; this rules out analyses b.) and d.), leaving a.) as the only viable one, as desired.

*Harmony > syncope: syncope feeds harmony

In noun stems of the form CVCiCi, which generally allow harmony to extend to stem-penultimate /i/ (*cf. kolimi/kolumulu* 'forge/-PL'), syncope blocks harmony (Kolachina, 2016):

(69) **Syncope blocks harmony**

Singular	Plural
nemili 'peacock' usiḍi 'flying ant' jamili 'couple/pair'	/nemiɭɭu/ 'peacocks' /usiɭɭu/ 'flying ants' /dʒamiɭɭu/ 'couples/pairs'

I argue that this is evidence that harmony cannot precede syncope. Here is a comparative derivation of *ne-miḷḷu* 'peacock-PL-NOM' assuming that (70a) harmony precedes syncope, or that (70b) syncope precedes harmony:

(70) **Syncope & harmony: orderings**

a. **Harmony > syncope**

	Harmony > syncope
Input	[{nemili}ḷu]
Harmony	[{('ne.mu).lu.}lu]
Syncope	*[{ne.('muɭ)}ɭu]

b. **Syncope > harmony**

	Syncope > harmony
Input	[{nemili}ḷu]
Syncope	[{ne.('miɭ).}ɭu]
Harmony	[{ne.('miɭ).}ɭu]

As the table in (70) clearly shows, an analysis on which harmony precedes syncope is a non-starter: we would falsely predict harmony to not be affected by the later syncope process. On the other hand, an analysis on which harmony follows syncope predicts the blocking which we in fact see in these forms. This is because syncope deletes the PStem-final vowel, forcing re-syllabification of the PStem-penultimate consonant with the previous syllable. Since this creates a heavy syllable, that syllable is assigned stress; as predicted, this stress blocks harmony from occurring. In summary, syncope bleeds harmony (that is, syncope creates a representation which is no longer an environment for harmony, and harmony subsequently cannot occur) and thus cannot follow it.

*Harmony = syncope: harmony counterfeeds syncope

The fact that syncope can block harmony is enough to say that harmony cannot occur strictly before syncope (at an earlier cycle). However, it isn't enough to rule out an analysis under which syncope and harmony occur at the same time, along with the required syllabification and parsing. In order to show this, I turn to another fact – unsyncopated stem-final /i/ harmonizes with the following plural suffix vowel:

(71) **Harmonizing unsyncopated vowels: Agr/K cycle**

	wind-PL-NOM	tiger-PL-NOM
Input to Num cycle	[{ga:li}]-ḷu	[{puli}]-ḷu
Output of Num cycle	[{ga:.li.}lu]	[{pu.li.}lu]
Input of Agr/K cycle	[{ga:.li.}lu]-ø	[{pu.li.}lu]-ø
Output of Agr/K cycle	[{('ga:).lu.}lu]	[{('pu.lu).}lu]

Note that the final step of harmony in the last row of (71) renders syncope blocking *opaque*. We know that in general, noun stems ending in short /u/ preceded by one of the consonants in the category T' undergo syncopation. However, in these forms, the condition for this syncopation is met at the surface (due to harmony changing underlying /i/ to /u/), and yet no syncopation occurs. This is a counterfeeding relation: one in which a certain phonological rule A appears to underapply because a later-ordered rule B creates a surface environment for A (Kiparsky, 1976)[14]. Thus, I posit, syncope and harmony do not occur on the same cycle.

Since we have now demonstrated both that harmony cannot precede syncope and that harmony and syncope cannot occur in a parallel fashion, the only analytic path left to us is analysis a.) from the table in (68): syncope must precede harmony. Since syncope, at the earliest, occurs at the Num cycle, where the syncope-triggering suffix *-ḷu* is introduced, the only possible analysis is that syncope occurs at the Num cycle, followed by harmony at the Agr/K cycle.

2.5.4 Stem-internal harmony and progressive harmony

In the previous subsection, I argued from opacity that syncope must occur earlier than regressive harmony, and that thus, syncope occurs at Num and regressive harmony at Agr/K. The basic regressive harmony facts presented in §2.4, though, may still be captured by a purely cyclic analysis:

(72) **A(nother) possible purely cyclic analysis for *kolumulu* 'forge-PL-NOM'**

a. n cycle: [kolimi]-ø → [('ko.li).mi] (syllabification, parsing)

14. Baković (2011) draws a distinction between counterfeeding on environment and counterfeeding on focus; the Telugu interaction would be an example of the latter. Baković points out that counterfeeding on focus phenomena have been given alternative analyses in OT which avoid utilizing rule ordering (Gnanadesikan, 1997; Łubowicz, 2003). However, these kinds of approaches tend to require a more serious overhaul of the OT framework and may make undesirable predictions about typology; here, thus, I choose to avoid these approaches, though future work may decide that they are preferable to the current approach for Telugu or in general.

b. Num cycle: [(ˈko.li).mi]-ḷu → [(ˈko.li).mi.lu] (syllabification/parsing faithful to input)

c. Agr/K cycle: [(ˈko.li).mi.lu]-ø → [(ˈko.lu).mu.lu] (faithful parsing; harmony)

The intuition is that if regressive harmony is triggered whenever unstressed /i/ is followed by /u/, there is no need to make reference to a PStem boundary to derive the relevant facts. However, the two arguments in this subsection show that in fact whether or not regressive harmony is triggered must also depend on the *location* of the relevant vowels: (i) when both vowels in the marked sequence are PStem-internal, no harmony occurs, and (ii) when both vowels in the marked sequence are PStem-external, harmony is progressive instead of regressive.

First, there does not appear to be any stem-internal harmony. For example, the words *taliru* 'sprout', *danivu* 'meeting', and *anāgarikuḍu* 'uncivilized person' all have i…u sequences where /i/ ought to be unstressed based on the stress assignment algorithm I have established.[15] Given that on my analysis, regressive harmony is driven by a SPREAD constraint which is keyed to PStem-external vowels, my view captures the lack of stem-internal harmony very straightforwardly. To demonstrate, we can give a tableau for *taliru* 'sprout-NOM':

(73) **Agr/K phonology: No PStem-internal harmony**

[{ta.li.ru}]-ø	IDENT-V (STR)	IDENT-V (+LOW)	SPREAD-L (/u/, -NSTEM)	IDENT-V (+STEM)	SPREAD-R (/i/)
a. ☞ [{ta.li.ru}]					*
b. [{ta.lu.ru}]				*!	*
c. [{ta.li.ri}]				*!	

Since the final /u/ in the form *taliru* is PStem-internal, there is no pressure for it to spread left, ruling out the output **taluru*. Of course, this leaves the course open for the rightward spreading constraint SPREAD-R (/i/) to drive progressive harmony; however, this would predict the output **taliri*, contrary to fact. To rule this possibility out, I propose that the faithfulness constraint for PStem-internal vow-

15. Interestingly, the two examples given here were the only instances of native, non-compound nouns with the form CVCiCu across both dictionaries I searched (Brown, 1903; Gwynn, 1991); in both cases, there is a plausible argument to be made that the noun is deverbal in some sense. While I did not do an exhaustive search of nouns with non-final iCu sequences, they appear to be much more common, with the possible caveat that they are usually (i) Sanskrit borrowings and (ii) possibly morphologically complex beyond just the root and n. The upshot is that with some tweaks, it may actually be possible to build an analysis with the assumption that harmony *is* active within the nominal stem. More work is required to explore this possibility fully.

els (IDENT-V (+STEM)) is ranked higher than SPREAD-R (/i/). Crucially, though, it needs to be ranked lower than SPREAD-L (/u/, -NSTEM). Otherwise, the analysis would predict that regressive harmony is never triggered, contrary to fact, as PStem-internal faithfulness is ranked higher than the relevant SPREAD constraint.

On an alternative, PStem-less view, there would be no clear way to differentiate between the stem /u/ in *taliru* and the plural /u/ in, say, *kolumulu*: by default, one should predict that both instances of /u/ should spread the same way. The assumption of an interactionist framework (where every morphological insertion triggers a cycle of phonology, and that different exponents can be associated with different constraint rankings/phonological grammars) does not help, either. On the assumption made earlier that the Agr/K cycle is always triggered even in the absence of an overt agreement or case suffix, and on the view that regressive harmony is triggered at the Agr/K cycle of phonology, we should expect *taliru* to undergo PStem-internal regressive harmony. The input to the Agr/K cycle would simply be [(ˈta.li).ru] on this view – in principle, as we've seen, /u/ should be able to spread left onto an unstressed underlying /i/. Thus, a PStem boundary (or an equivalent) is required to differentiate the behavior of stem-internal and stem-external vowels with respect to regressive harmony.

A second set of facts showing that the 'representational PStem' analysis is clearly better than the purely cyclic one requires us to return briefly to progressive harmony. Besides the four suffixes considered in the previous section, there is one more suffix which can undergo progressive harmony – *-mi/mu* 'IPL', also inserted at Agr/K:

(74) **Behavior of *-mi/mu***

Gloss	Underlying form of exponents	Output of Agr/K cycle
three-HUM.PL-IPL 'we three (people)'	*mug-gura-mu*	*/muggurami/, /muggguramu/
child-PL-IPL 'we children'	*pilla-ḷu-mu*	*/pillalumi/, /pillalumu/
ten-HUM.PL-IPL 'we ten (people)'	*padi-mandi-mu*	/padimandimi/, */padimandimu/

Recall from §2.4.2 that all the other suffixes in the Agr/K slot feature optionality between final /i/ and /u/ when the preceding vowel is not /i/; this led me to posit that the final vowel in those suffixes is underspecified for backness. The same analysis cannot simply be ported to *-mu*, as there is no parallel optionality in the final vowel. Lacking such evidence, I default to assuming that the final vowel in *-mu* is fully specified as /u/. The data in (74) exhaust the possible contexts for the appearance of *-mu*. This suffix is only ever found following the plural suffix *-ḷu* or following the items *-mandi* and *-gura*. I assume that, since both of these items are inherently plural and are in complementary distribution with the standard plural suffix *-ḷu*, they both expone the Num head. Crucially, this means that they are outside the PStem. I am agnostic as to the realization of the numerals in (74); they certainly appear to be in the same word as the portmanteaux and the agreement suffix, but more work needs to be done on the syntax of numeral constructions before I can be ready to commit to whether or not they are within or outside the PStem. Since this doesn't make any difference for the analysis of progressive harmony, I leave the numerals out in what follows. The following is the derivation of *-mandi-mu* '-HUM.PL-1PL':

(75) **Domains in the Telugu nominal word**

$[\ \underbrace{[\ \sqrt{}\text{-}n\,]}_{\textit{PStem}}\text{-Num-Agr/K}\ ]$

(76) **Cyclic derivation:**

a. Root and *n* cycles: no insertion, no phonology → [{ }]

b. Num cycle: [{ }]-mandi → [{ }man.di] (syllabification)

c. Agr/K cycle: [{ }man.di]-mu → [{ }('man).(ˌdi.mi)] (parsing; harmony)

The derivation in (75) demonstrates the shape of the analysis and how it falls out from the assumptions I have made so far. Since there is no PStem boundary between *-mandi* and *-mu*, the SLH-PSTEM-FOOT constraint no longer applies. Thus, a second foot can be created which parses *-mu* with the final syllable of the previous exponent. This means that the syllable /di/ is assigned stress, blocking the following /u/ from spreading to its left. Finally, /i/ spreads to its right to minimize violations of SPREAD-R (/i/).

(77) **Progressive harmony and *-mi/mu***

[{ }man.di]-mu	SLH-PSTEM-FOOT	PARSE-SYL	IDENT-V (STR)	SPREAD-L (/u/, -NSTEM)	SPREAD-R (/i/)
a. [{ }('man).du.mu]		*!			*
b. [{ }('man).(ˌdu.mu)]			*!		
c. [{ }('man).(ˌdi.mu)]				*	*!
d. ☞ [{ }('man).(ˌdi.mi)]				*	

Since there is no PStem boundary intervening, violating PARSE-SYL is enough to make candidate a.) sub-optimal. Spreading left is sub-optimal because it violates IDENT-V (STR). Not spreading at all will violate both SPREAD constraints, but spreading right only violates SPREAD-L (/u/, -NSTEM), so candidate d.) is the winner. Like in the case of stem-internal harmony, without the PStem boundary, it would be unclear what differentiates an /i/.../u/ sequence like this one from one which is either completely stem-internal (as in *taliru*) or one in which spans the PStem boundary (as in *kolumulu*). It is important to point out here that even though this analysis of *-mi/-mu* harmony crucially does not make reference to the PStem boundary, when put together with the rest of the data in this chapter, it still serves as an argument to posit said boundary. Since on a PStem-less view, there would be nothing *a priori* different about the /i/ in the suffix *-mandi* when compared to the /i/ in, say, the the nominal PStem *kolimi* 'forge', one would be hard-pressed to explain why they do not have the same behavior when it comes to harmony: either both forms should show regressive harmony, or both should show progressive harmony. Since the PStem boundary allows the grammar to make reference to whether or not phonological material is internal or external to the PStem (a positional faithfulness effect à la Beckman (1998)), the PStem view is superior.

I have given several arguments that (i) nominal regressive harmony must occur at the Agr/K cycle and that (ii) it is positionally sensitive to whether or not a possible target vowel is to the left or the right of the PStem boundary I have posited (between n and Num). Together, these results form a strong argument in favor of the 'persistent PStem' view and against the purely cyclic view; on the latter view, we would expect that at the end of the Num cycle, the morphological bracket/boundary between n and Num is erased, such that at the following cycle (the Agr/K cycle), that boundary is not visible and thus cannot condition the behavior of regressive harmony, contrary to fact.

In the same way, the facts and arguments in this section serve as reasoning against an entirely different alternative – Late Bracket Erasure à la Kiparsky (1982) and Mohanan (1986) (though see Pesetsky (1979) for the original statement of Bracket Erasure) as a part of the Lexical Phonology & Morphology (LPM) framework. If morphological boundaries (brackets) are themselves represented in the phonology, then as long as those brackets themselves persist in the right locations to capture the positional faithfulness effects in Telugu, we can dispense with an additional representational PStem. The intuition behind Bracket Erasure is that morphological brackets are erased when phonological processing occurs; Late Bracket Erasure builds on this, arguing that if only certain morphological insertions trigger phonology, then sometimes morphological brackets can persist past the insertion at which they are introduced. Of course, since we know from the analysis of syncope and harmony above that both the plural suffix and case markers trigger separate, ordered cycles of phonology when they are inserted, Bracket Erasure predicts that the bracket between the stem and the plural suffix is erased by the time Agr/K is inserted. Thus, as I show below, assuming Late Bracket Erasure cannot replace the PStem. First, consider the following partial derivation (morphological brackets are represented by dashes):

(78) **LPM derivation I**

a. Root: puli- 'tiger'
b. Plural: puli-ḷu
c. Plural triggers phonological cycle, disyllabic exception means no syncope: /pulilu/ (bracket is erased)
d. Dative case marker: pulilu-kV$_{+high}$
e. Dative case marker triggers phonological cycle: pululuku[16]

The derivation in (78) shows that even Late Bracket Erasure does not predict phonology triggered by a case suffix to be able to see the boundary between the root and the following plural suffix. While this makes no difference for the form considered above, the reader may have already realized that this will not work for forms like *taliru-ku* 'sprout-DAT':

(79) **LPM derivation II**

a. Root: taliru- 'sprout'
b. No number suffix, no Num cycle
c. Dative case marker: taliru-kV$_{+high}$
d. Dative case marker triggers phonological cycle: */taluruku/

Since the phonological cycle triggered by the case marker cannot differentiate between /u/ in a Num suffix and /u/ which is part of the root, the only thing it can do is treat all /u/ as harmony triggers, thus deriving

16. It turns out that this is actually not the surface form; see §2.6 for information about a post-lexical phonological process which lowers plural /u/ to /a/.

the wrong output, one with stem-internal harmony. Similarly, the LPM/Late Bracket Erasure view will not work for basic cases like *kolumu-lu-ø* 'forge-PL-NOM':

(80) **LPM derivation III**

a. Root: kolimi- (forge)
b. Plural: kolimi-ḷu
c. Plural triggers cycle of phonology: /(ˈko.li).mi.lu/
d. Nominative suffix: /(ˈko.li).mi.lu/-ø
e. Case marker triggers cycle of phonology: */(ˈko.li).(ˌmi.li)/

The intuition behind this re-analysis would be that we ought to be able to replace PStem boundaries with morphological brackets. Thus, we can say that at the plural cycle of phonology, the bracket between *-ḷu* and the root serves the same purpose that the PStem boundary does on my view – it blocks the final root syllable from parsing with the plural suffix. At the K cycle, though, since there is no longer a bracket (it was erased at the plural cycle), the final root syllable will parse with the plural suffix at that point thus blocking regressive harmony from acting. Instead, we get the elsewhere/unmarked progressive harmony. That is, without the PStem boundary, we falsely predict a form like 'forge-PL-NOM' to act the same as a form like *-mandi-mi* '-HUM.PL-1PL', contrary to fact.

The essential logic is as follows: since we have evidence that both the plural suffix and case markers trigger their own cycles of phonology, Late Bracket Erasure will not predict a boundary in the correct locations to derive the right surface forms of various Telugu nouns. Thus, the PStem view is a better alternative than either the purely cyclic, boundary-less view or the LPM view on which the PStem boundary is replaced by morphological brackets.

2.6 Phrasal Phonology: Beyond the Agr/K Cycle

The final phonological alternation I will consider in this chapter is that between /u/ and /a/ in the plural suffix *-ḷu*. Most previous work (Krishnamurti and Gwynn, 1985) assumes the form with /a/ to be the oblique form of the plural suffix; *i.e.,* a suppletive form which occurs in the context of non-nominative cases. On first glance, this appears to be on the right track:

(81) **The -lu/la alternation**

Gloss	Form
dog-PL-NOM	kukka-lu-ø
dog-PL-ACC	kukka-la-ni/nu
dog-PL-DAT	kukka-la-ki/ku
dog-PL-GEN	kukka-la-ø

The most common intuition about suppletion is that it involves multiple different morphological exponents that can all appear in the same position given the right conditioning environment. The Distributed Morphology framework would implement this in the following way:

(82) **Plural alternation as suppletion**

a. NUM.PL → *-ḷu*

b. NUM.PL → *-ḷa* / _ [ACC],[GEN],[DAT]

Regardless of the specific framework, the suppletion view posits that in the derivation of *-la* forms, there is never at any point an instance of /u/ in the plural suffix. On this assumption, vowel harmony triggered by the plural should not occur. The following sketch derivation demonstrates, for 'forge-PL-DAT':

(83) **Plural alternation as suppletion: derivation**

Step of derivation	Form
Output of n cycle	[{kolimi}]
Input of Num cycle	[{kolimi}]-ḷa
Output of Num cycle	[{ko.li.mi.}la]
Input of Agr/K cycle	[{ko.li.mi.}la]-kV$_{[+\text{high}]}$
Output of Agr/K cycle	*[{('ko.li).mi.}(ˌla.ku)]

Since the input representation of the plural suffix on this analysis does not include a high vowel, my analysis of regressive harmony predicts that no harmony should occur in this derivation. However, this is not what we find. Harmonizing noun stems harmonize the same way regardless of what the surface vowel of the plural suffix is – take these examples based on *kolimi* 'forge' and *gāli* 'wind':

(84) **The plural alternation does not block harmony**

Gloss	Underlying Form	Surface Form
forge-PL-DAT	kolimi-ḷu-kV$_{[+\text{high}]}$	[{('ko.lu).mu.}(ˌla.ku)]
wind-PL-DAT	gāli-ḷu-kV$_{[+\text{high}]}$	[{('gaː).lu.}(ˌla.ku)]

This suggests that in fact the *-lu/-la* alternation is phonological in nature: Plural *-ḷu* is inserted, and is able to trigger harmony in the stem before becoming *-la* on the surface. Not only is it phonological, this alternation renders regressive vowel harmony opaque: that is, the triggering environment for harmony no longer exists on the surface, but harmony still occurs. This kind of opacity is clear evidence for cyclicity – there must be some step of phonological evaluation which occurs after the word-level phonology we have considered until now, at which the *-ḷu/ḷa* alternation is derived. Beyond rendering regressive harmony opaque, there is evidence that the conditioning factor for the alternation is not case, but instead the right edge of the phonological phrase (Selkirk, 1984; Nespor and Vogel, 1986), solidifying the phonological analysis for the alternation. The first piece of evidence is that the alternation occurs preceding not only non-nominative case suffixes, but also preceding the agreement suffix *-mu*:

(85) **The plural alternation is triggered by nominal agreement**

Gloss	Underlying Form	Surface Form
child-PL-IPL	pilla-ḷu-mu	[{('pil).la.}(ˌla.mu)]
teacher-PL-IPL	guruvu-ḷu-mu	[{('gu.ru).ʋu.}(ˌla.mu)]

Even on the view that agreement suffixes are in fact agreeing nominative case markers, it is still not clear that morphosyntactic case is what is conditioning the *-lu/-la* alternation, because it is only *overt* nominative suffixes which trigger the alternation in this case. Of course, appearing before an overt suffix, too, is not a necessary condition for the alternation to be triggered – as demonstrated in (81), the alternation also occurs in genitive forms, where there is no overt case suffix. In Telugu, though, unlike in English, there is no context where a genitive-marked noun is the final element within the larger noun phrase:

(86) అది కాకుల బొమ్మ.
adi kāku-la-ø bomma
that crow-PL-GEN toy
'That's the crows' toy'

(87) అది కాకులది.
adi kāku-la-ø-di
that crow-PL-GEN-one
'That's the crows''

The examples in (86) and (87) show that in a context where in English, a genitive-marked noun can appear phrase-finally, the Telugu genitive noun does not. Reasonably, then, we can describe the condition for the appearance of *-la* as 'being non-final within the noun phrase'. On the assumption that syntactic phrases map onto phonological phrases (Selkirk, 1984; Nespor and Vogel, 1986), this distribution (along with the opacity facts) may be taken as evidence that the *-lu/-la* alternation occurs at an even later cycle of phonology than the K cycle, and that this cycle must be phrasal (word-external) in nature:

(88) **Plural alternation as late-cycle phonology: derivation**

Step of derivation	**Form**
Output of n cycle	[{kolimi}]
Input of Num cycle	[{kolimi}]-ḷu
Output of Num cycle	[{ko.li.mi.}lu]
Input of Agr/K cycle	[{ko.li.mi.}lu]-kV$_{[+\text{high}]}$
Output of Agr/K cycle	[{('ko.lu).mu.}(ˌlu.ku)]
Input of Phrasal cycle	[{('ko.lu).mu.}(ˌlu.ku)]
Output of Phrasal cycle	[{('ko.lu).mu.}(ˌla.ku)]

The derivation in (88) demonstrates that if the *-lu/-la* alternation is triggered after the Agr/K cycle, we can derive regressive harmony as established in this chapter with no problems, and underlying *-lu* only becomes *-la* after regressive harmony has already occurred, at a late cycle of phonological computation. While I will not give a full analysis here, I assume that this phonological alternation is due to exponent-specific abstract phonological structure (Bye and Svenonius, 2012), as it does not seem to be part of the regular/non-lexically-specified phonology of Telugu.

2.7 Conclusion

In this chapter, I have shown that the Cyclic Spell-Out assumption (Uriagereka, 1999) on its own is not enough to capture the behavior of word-internal phonology in Telugu nouns. Instead, the categorizing phase head n is associated with a mapping rule which places the right edge of a prosodic constituent, the PStem, to the right of the abstract morpheme corresponding to n. This is in line with a variety of approaches to Cyclic Spell-Out (Cheng and Downing, 2016; Guekguezian, 2017) which assume that the correlation between phases and domains for phonological processes is mediated by a mapping algorithm along the lines of Prosodic Phonology (Selkirk, 1984; Nespor and Vogel, 1986).

(89) **Domains in the Telugu Nominal Word**

$[\,\underbrace{[\,\sqrt{}\text{-}n]}_{\textit{PStem}}\text{-Num-Agr/K}\,]$

The arguments for the representation in (4) come from the behavior of syncope and harmony in Telugu nouns; in the process of analyzing these phenomena, I find that there are at least two word-internal cycles of phonology in Telugu nouns. These correspond to insertion at abstract morphemes in the following way:

(90) **Overview of Cycles within the Nominal Word**

a. Num cycle: triggered by insertion at Num; syllabification and syncope (sensitive to PStem boundary)

b. Agr/K cycle: triggered by insertion at Agr/K; syllabification/parsing and regressive/progressive harmony (sensitive to PStem boundary)

In Chapter 3, I ask and answer complementary questions for Telugu verbs: what kinds of boundary effects can we see in morpho-phonological processes occurring within Telugu verbal words? Do the diagnosed boundaries correspond with phases? Can we explain all of these boundary effects as epiphenomena of cyclicity, or do we require a representational prosodic domain (the PStem) as well? I show that the answers to all of these questions are parallel to the answers I have given in Chapter 2 – there is a verbal PStem whose boundaries correspond to string of abstract morphemes which includes the verbal root followed by the categorizing v head.

CHAPTER 3

CYCLICITY VS. DOMAIN-SENSITIVITY: PHONOLOGY IN THE VERBAL WORD

3.1 Introduction

This chapter is in large part complementary to Chapter 2; I consider the same questions of cyclicity and domain-sensitivity in the word-internal phonology of Telugu. While the focus in Chapter 2 was on the nominal word, the focus in this chapter will be the verbal word. I argue that, in a parallel fashion, every concatenation of a morphological exponent in the verbal word triggers its own cycle of phonology. Furthermore, I argue that there exists a prosodic domain, the PStem, which always coincides with the string containing the verbal root exponent along with the exponent of v, if there is an overt one. The following is a (somewhat simplified) abstract morphological structure for the Telugu verbal word:

(1) **Structure of the Telugu verbal word**

$\underbrace{\{\sqrt{}\text{-}v\}}_{\textit{PStem}}$-CAUS-REFL-INFL-AGR

The reader will recall that I follow an interactionist, DM-style system of morphology and phonology, where morphological exponents are inserted into abstract morphemes whose ordering and features are determined partially by the underlying syntax and partially by earlier PF operations applying to the abstract morphosyntactic structure (cf. the approach taken by Kalin (2022)). I also assume that the boundaries of the prosodic stem domain already exist in the linearized string of abstract morphemes which serves as the input to the morphological concatenation/Vocabulary Insertion process. The general idea is that phasal domains in the syntax are mapped to prosodic (but not necessarily cyclic) domains in the phonology, along the lines of Cheng & Downing (2016) and Guekguezian (2017), as well as older work in Prosodic Phonology (Selkirk, 1984; Nespor and Vogel, 1986).

Similarly to Chapter 2, the main empirical focus of this chapter will be vowel harmony, with some short forays into other phenomena such as syncope to strengthen the analysis of harmony. Also, again similarly to Chapter 2, I give some positive arguments in favor of assuming a representational PStem boundary in the verb and over a view where cyclicity is enough to capture the relevant domain-sensitivity effects. Very briefly, the principal argument is that the set of harmony-triggering suffixes do not form a morphological or morphosyntactic natural class; instead, the generalization is that harmony-triggering vowels are always the linearly first PStem-external vowel. On the hypercyclic view that I have been considering, this is difficult to capture: they are not all inserted in the same morphological slot (as in nouns, where it was determined that harmony is always triggered by insertion at the Agr/K slot (§2.4)), nor do they share any other kind of defining feature. There is thus no non-stipulative way to limit harmony to a set of word-internal phonological cycles – thus, the fact that they all trigger harmony becomes coincidence, unless we take advantage of the PStem to create a *phonological* natural class for the vowels which trigger verbal regressive harmony.

Thus, an analysis which takes advantage of the PStem captures the data far better than and is much less stipulative than one which assumes that harmony is a property of the cycles triggered by specific exponents. In fact, I show that the data is compatible with the assumption that harmony is a property of *every* verbal phonological cycle, except that it only occurs on cycles whose inputs have the correct phonological structure. This becomes an additional argument in favor of the persistent PStem boundary, as it means that the boundary remains beyond the cycle at which it would correspond with a morphological bracket. These principal arguments are sharpened by considering possible exceptions and alternatives and giving evidence that (i) the exceptions are not real exceptions and that (ii) the alternatives face roadblocks that my analysis does not.

The data in this chapter is largely generated by me from my own intuitions, in all cases corroborated by various secondary sources (which are cited where relevant). In some few cases, the data reported is directly taken from one of those sources; in those cases, the sources are cited. In one case, I have taken forms from examples found through Google Search; this is mentioned when that data is presented.

The chapter is structured as follows: First, in §3.2, I give general background on Telugu verbal morphology, with the goals of (i) defining the empirical scope of this chapter's analysis and (ii) parallelly to Chapter 2, specifically enumerating the overt verbal categorizers (v exponents) occurring in the language.

Next, in §2.5.1, I consider the basic facts of verbal regressive harmony in Telugu, discussing possible triggers, possible targets, and giving an PStem boundary-sensitive OT analysis of the same. In the following section, §3.4, I investigate the relationship between regressive vowel harmony and stress assignment in verbs, concluding that there are both meaningful similarities and meaningful differences between verbal behavior and nominal behavior in this connection. I recap the analysis of regressive harmony in §3.5 I continue in §3.6 by analyzing progressive vowel harmony in verbs; observing its striking similarity to progressive vowel harmony in nouns (§2.5.4), I give deeper discussion of and an argument for my analysis of category-specificity in phonology, briefly touched on in Chapter 1 and assumed in this chapter. Finally, I conclude (§3.7).

3.2 Background: Telugu verbal morphology

In this section, I briefly go over some general properties of Telugu verbal morphology. Telugu is a highly-agglutinating language which is overwhelmingly suffixing; verbs are no exception to this general property of the language. I repeat the morphological structure proposed in (1):

(2) **Structure of the Telugu verbal word**

$\underbrace{\{\sqrt{}\text{-}v\}}_{\textit{PStem}}$-CAUS-REFL-INFL-AGR

I will save discussion of the root and v slots to the final subsection, as they are especially important to the definition of the verbal PStem. The only suffix which can be inserted in the REFL slot is the verbal reflexive/self-benefactive suffix *-kun*. The only suffix able to be inserted in CAUS is the causative suffix *-incu* (data & generalization from my own intuitions):[1]

1. Because the focus of these examples is to show ordering facts, I abstract away from the semantic subtleties of these suffixes; for example, while a straight causative meaning is possible, the more common meaning of *-incu* when affixed to *peṭṭu-* is something like a benefactive, *i.e.* 'put for someone'. Furthermore, the reader will notice that *-kun*, which I gloss as a reflexive, in this case (and in many others) has a meaning closer to a self-benefactive; see (Balusu, 2019) for deeper description of the possible meanings of *-kun*.

(3) **Causatives & reflexives: ordering/optionality**

a. పెట్టించి
pet̤t̤-inc-i
put-CAUS-PRF.PRT
'having caused to put'

b. పెట్టుకుని
pet̤t̤u-kun-i
put-REFL-PRF.PRT
'having put for oneself'

c. పెట్టించుకుని
pet̤t̤-incu-kun-i
put-CAUS-REFL-PRF.PRT
'having caused to put for oneself'

d. పెట్టి
pet̤t̤-i
put-PRF.PRT
'having put'

As suggested by (2), they can co-occur on the same verbal form, but *-incu* must precede *-kun* (3c). Each can occur without the other (compare (3a-3b) and they can also both be absent at the same time (3d). Not only do the data in (3) demonstrate the ordering and (co)-occurrence facts causative *-incu* and reflexive *-kun*, they also demonstrate that neither is a terminal affix; that is, they require at least one more exponent to form a complete word. The one used in (3), the perfective participial suffix *-i*, is one of a large set of suffixes marking tense, aspect, mood, and negtion and which never co-occur. This is the set which can be inserted into the INFL slot. A full enumeration follows (Krishnamurti, 1961):[2]

2. There is disagreement in the literature about the proper analysis of the future/habitual suffix, listed here with two alternants *-t* and *-tun*. Some (Kissock, 2010; Kolachina, 2016; Thornton, 2020) argue that *-t* is a truncated form of the imperfective suffix *-tū*, while others (Krishnamurti, 1961) assume *-t* and *-tun* to be alternants of the same underlying exponent which is different from the imperfective. I follow Krishnamurti (1961); I assume that some morpheme-specific phonological constraint (Pater, 2009) applies such that the two segments /un/ delete in the context of certain following exponents. This is not especially important for the analysis to come, so I ignore it from here on.

(4) **Inflectional suffixes**

Meaning	**Form**
Obligative	*-āli*
Infinitive	*-an*
Past	*-in*
Future/Habitual	*-t/-tun*
Future/Habitual Negative	*-a*
Irrealis	*-ti*
Hortative	*-d*
Imperative Negative	*-ak*
Concessive Participle	*-inā*
Conditional Participle	*-tē*
Perfective Participle	*-i*
Imperfective Participle	*-tū*
Negative Participle	*-aka*
Past Adjectivalizer	*-ina*
Future/Habitual Negative Adjectivalizer	*-ani*
Future/Habitual Adjectivalizer	*-ē*

Most of the glosses/meanings for these suffixes given in (4) are taken from Krishnamurti (1961).[3] I have tweaked a few of the names to modernize them. I use 'participle' to refer to suffixes which create forms which can serve as the head of a clausal modifier/adjunct, but cannot occur in finite/matrix clauses. I use 'adjectivalizer' to refer to suffixes which turn verbal forms into forms which can be used as the head of a nominal modifier/relative clause. Note that Telugu has neither dedicated present tense morphology (the habitual present is marked by the future/habitual suffix, and present progressive meanings require an auxiliary construction) nor a generalized negation exponent. Most of the suffixes in (4) are terminal suffixes; *i.e.,* they form a complete word when concatenated, and no further suffixes can be attached to them. The exceptions are past *-in*, future/habitual *-tun*, future/habitual negative *-a*, irrealis *-ti*, hortative *-d*, and imperative negative *-ak*. These are all obligatorily followed by a suffix inserted into the AGR slot:

3. In Chapter 5, I will show that most of the constructions in (4) are actually bimorphemic, and that the INFL morphological slot posited in this chapter ought to be split into two, ASP followed by INFL. As we will see later in this chapter, regressive vowel harmony in verbs is a general property of all insertion-triggered cycles of phonology, so this change makes no difference to the proposal or the core arguments in this chapter. The reasoning for splitting of an ASP slot is somewhat complex, so I use Krishnamurti's (1961) more standard analysis in this chapter for ease of understanding and to avoid a very long analytical tangent. See Chapter 5 for more.

(5) **Agreement suffixes**

Meaning	**Form(s)**
1SG	*-nu/-ānu*
2SG	*-vu/-āvu*
3SG.M	*-ḍu/-āḍu*
3SG.FN	*-di*
1PL	*-mu/-āmu*
2PL/3PL.MF	*-ru/-āru*
3PL.N	*-vu/-āyi*
Imperative singular	*-u*
Imperative plural	*-aṇḍi*

As in (4), the table in (5) contains a full enumeration of the suffixes which can occur in the AGR slot. There are three gender categories in Telugu: masculine (which refers only to humans adopting the male social gender), feminine (only referring to humans adopting the female social gender), and neuter/non-human (which refers always and only to non-human entities). As shown in the table, some of the agreement suffixes have two separate allomorphs which occur after different suffixes. The two imperative suffixes can optionally occur after the imperative negative *-ak*; in positive imperative constructions, they can occur without anything in the INFL slot. All of the suffixes in (5) are terminal suffixes.

3.2.1 What counts as the 'verbal word'?

Telugu has a diverse set of verbal constructions which occur in the gray area between inflection, auxiliary constructions, light verb constructions, and verbal compounding. Which ones involve multiple verbal words and which do not is an open question which is beyond the scope of this dissertation. Because of their complex properties, I exclude them from the current morphophonological investigation. These constructions can be diagnosed by the use of a 'linking suffix' occurring between the main verb and the auxiliary/light verb/non-initial element of the verbal compound; this is always infinitive *-an* or perfective participial *-i*; here is a selection of examples:

(6) **Non-inflectional verbal constructions**

Form/Meaning	**Example**	**Example gloss**
bō 'prospective/near future'	ceyy-**an** bō-tun-ānu	do-INF-PROS-FUTHAB-1SG
baḍu 'passive'	ceyy-**an** baḍu-in-di	do-INF-PASS-PST-3SG.FN
veyyu 'completive'	cēs-**i** vēs-in-ānu	do-PRF.PRT-CMPL-PST-1SG
peṭṭu 'benefactive applicative'	cēs-**i** peṭṭ-in-ānu	do-PRF.PRT-BEN-PST-1SG
lēdu 'past negative'	ceyy-**an** lēdu	do-INF-PST.NEG
lē- 'negative capabilitative'	ceyy-**an** lē-nu	do-INF-not.be-1SG

Importantly, it is the case that the second verbs in these constructions can all also serve as main verbs (in some cases with very minor phonological adjustments); for example, *peṭṭu-* is a main verb meaning 'put', *veyyu-* means 'toss/throw', *paḍu-* means 'fall', and *pō-* means 'go'. The form *lē-* can also serve as a main verb, where it has the meaning of a negative copula 'not be'. On the other hand, while one could possibly make the same argument for a couple of the inflectional suffixes in (4), in general this does not apply for that set. Also note that, as was mentioned above, the perfective participial suffix *-i* is a terminal inflectional suffix, but can be used as a linking suffix as shown in (6), suggesting that these constructions may consist of more than one word at some level of analysis.[4]

Finally, while this is not a perfect diagnostic, some of the non-inflectional constructions can be split by the emphatic clitic *-ē* (my own examples; generalization reported in various sources including Pelletier (1993)):

(7) **Intervention by *-ē***

a. నేను చెయ్యనే లేదు.
nēnu ceyy-an-ē lēdu
1SG do-INF-E PST.NEG
'I didn't even do (sthg.)'

b. నేను చెయ్యనే లేను.
nēnu ceyy-an-ē lē-nu
1SG do-INF-E NOT.BE-1SG
'I can't even do (sthg.)'

The examples in (7) show that at least in some cases, the multi-verbal constructions introduced in (6) can be split by the emphatic clitic. It is difficult to say without deeper investigation, but this may be

4. I also assume that infinitive *-an* is a terminal suffix, though since it only occurs in the context of the non-inflectional verbal constructions in (6), it is difficult to give independent evidence for this.

evidence that such constructions involve more than one word, and that the permissibility of cliticization is diagnosing a word boundary. On such an analysis, of course, these constructions fall out of the scope of this chapter, whose goal is to consider phonological phenomena within the Telugu verbal word.

Thus, while it is possible that some of the multi-verbal constructions in (6) will reveal themselves to be single-word constructions, without further analytical consideration (a possible topic of future work), I choose to leave out of this chapter all constructions which look to involve two separate verb roots linked by either infinitive *-an* or perfective participial *-i*.

3.2.2 Roots and v exponents

In this subsection, I give generalizations about the possible shapes of verbal root exponents, as well as the inventory of *v* exponents, giving evidence that the latter ought to be parsed separately from the root using an argument from suppletion. Telugu (simplex, native) verbal roots have a rather limited set of possible shapes (my own generalization based on Krishnamurti (1961)):

(8) **Possible root shapes**

Shape	**Examples**
(C)VCu-	paḍu- 'fall'; avu- 'become'; vinu- 'hear'
(C)VCVCu-	kaḍugu- 'wash'; tolagu- 'vanish'; bigisu- 'fit'
(C)VXCu-	kālu- 'burn'; āḍu- 'play/dance'; maṇḍu- 'burn (sensation)'; ekku- 'climb'

Verbal roots in Telugu may only contain one heavy syllable; if they do, it is always root-initial. Additionally, verbal roots are always either bimoraic or trimoraic, and also either disyllabic or trisyllabic – no smaller or larger prosodic sizes are allowed.

Kolachina (2016) also assumes other possible verbal shapes, but in fact (as Kolachina gestures at) all verbs with shapes other than those enumerated above are either compounds or are in fact affixed with *v* exponents (data from Kolachina (2016) and Krishnamurti (1961); parsings from Kolachina and myself):

(9) **More complex verb shape = compounds or derived forms**

Verb	Parsing
pōrāḍu- 'fight'	pōru 'quarrel'; āḍu- 'play'
kovvekku- 'get angry'	kovvu 'fat'; ekku- 'climb/increase'
tōsēyu- 'push off'	tōyu- 'push'; -ēyu 'completive; throw (as main verb)'
cimuḍucu- 'make rice boil'	cimuḍu 'boil (of rice)'; -cu 'transitivity suffix'
vardhillu- 'grow'	vṛdh- 'grow (Skt.)'; -illu 'verbalizer'
prayatnincu- 'try'	prayatna 'effort (Skt.)'; -incu 'verbalizer'
jēgurincu- 'become red'	jēguru 'redness'; -incu 'verbalizer'

As suggested by the data in (9), borrowed verbal roots can have shapes beyond those enumerated in (8), but borrowed verbal roots also never occur without an added native verbalizer like *-illu* or *-incu*. In this chapter, I will only be considering non-compound, native verb roots.

As with n in the nominal context, there is a set of verbal categorizing exponents which can (but do not have to) appear directly following the verbal root. These are the transitivity suffixes (Krishnamurti, 1961), as well as the verbalizers *-incu* and *-illu*. We have seen how the latter two clearly derive Telugu verbs from borrowed roots; below is some data which shows how the transitivity suffixes correlate with transitivity alternations in verb meanings (data and generalization from Krishnamurti (1961)):

(10) **Alternations of v**

Intransitive	Transitive
van-gu- 'bend (intr.)'	van-cu- 'bend (tr.)'
jaru-gu- 'move (intr.)'	jaru-pu- 'move (tr.)'
naḍu-cu- 'walk (intr.)'	naḍu-pu- 'drive (sthg.)'

The three alternations demonstrated in (10) are exhaustive. These alternations are not fully productive; many verbs alternate between transitive and intransitive without showing any morphological reflex: *ekku-* can mean 'climb' as in 'John climbed the mountain' or something like 'increase' as in 'The currency's value increased.'. Additionally, there are many obligatorily intransitive verb roots: for example, *navvu-* 'laugh'. Since Telugu is an object-drop language, it is difficult to diagnose whether or not there are any obligatorily transitive verb roots, but it would be reasonable to assume that a verb like *koṭṭu-* 'hit' always requires an external and internal argument underlyingly.

3.3 Triggers & targets of verbal regressive harmony: the role of the PStem

In this section, I lay out the basic facts about regressive verbal vowel harmony in Telugu, demonstrating generalizations about possible harmony triggers and targets, both phonologically (which vowels can trigger harmony? Which can be its target?) and morphologically (which vowels in which affixes can act as harmony triggers? Targets?). The analysis leads to the conclusion that only the first PStem-external vowel triggers harmony; I analyze this as a positional faithfulness effect (Beckman, 1998) sensitive to the PStem boundary.

3.3.1 Which vowels & vocalic features can act as triggers and targets?

Like in nouns, Telugu verbs feature regressive harmony. Unlike in nouns, where the triggering vowel is /u/ (26 in §2.4), in verbs, the triggering vowels are /a/, /i/, and /e/ (of either length) (generalization from various sources):

(11) **Regressive vowel harmony in verbs**

Gloss	Underlying Form	After Harmony
wash-OBLIG	kaḍ**u**gu-āli	[{ka.ḍ**a**.g}a:.li]
wash-COND	kaḍ**ugu**-tē	[{ka.ḍ**i**.g**i**.}te:]
wash-IRR	kaḍ**ugu**-ti	[{ka.ḍ**i**.g**i**.}ti]

Recall from Chapter 2 the different uses for square brackets and curly brackets in examples (§2.4.2). The former are used to denote the left and right edges of the already-phonologized string; that is, in a word-internal cycle of phonology triggered by exponent α, the square brackets denote the base of affixation/everything which was phonologized in a previous cycle to that triggered by α. In (11), we see that underlying stem-internal /u/ becomes /a/ when followed by /a/, and /i/ when followed by either /i/ or /e/. In the first example, the stem-final /u/ is deleted in the context of the suffix-initial vowel to resolve hiatus; this is a very general effect in Telugu. Thus, there is both regressive backness harmony (triggered by front vowels /i/ and /e/) and regressive /a/-harmony.

As we did for nouns (43 in §2.4), we can analyze these as being due to a set of SPREAD constraints keyed to the relevant vowels and features:

(12) **Spreading constraints for verbal regressive harmony**

a. SPREAD-L (-BACK, -VSTEM)
For every verbal PStem-external instance of [-back] in the input, assign a violation if there is a vowel slot to its left that is not associated with it.

b. SPREAD-L (/a/, -VSTEM)
For every verbal PStem-external instance of /a/ in the input, assign a violation if there is a vowel slot to its left that is not associated with it.

Note that I have specified the constraints in (12) to be relevant only for verbal PStems. Recall also that 'PStem-external' is defined as a property attributed to material to the right of the right edge of a PStem which is in the same word as that PStem (44). Since it is not the case that [-back] or /a/ ever spread in nominals, it must be the case that these constraints are keyed to verbal contexts. Short /u/ is the only harmony target; some verb stems have stem-medial /i/ and /a/, but they do not harmonize (my own data & generalization):[5]

(13) **Stem-medial /i/ and /a/ do not harmonize**

Gloss	Underlying Form	After Harmony
vanish-COND	tolagu-tē	[{tolagi}te:]
vanish-IRR	tolagu-ti	[{tolagi}ti]
fit-OBLIG	bigisu-āli	[{bigij}a:li]

In (13), we can see that the stem-final /u/ still harmonizes, but that stem-medial /i/ and /a/ are resistant to harmony. There are no verb stems with non-initial /e/ or /o/ – we will see shortly (§3.4) that PStem-initial syllables resist harmony due to blocking by stress, so there is no way to independently test whether or not the two mid vowels can be harmony targets. I will assume that these vowels, too, cannot undergo harmony.

We can also mostly replicate this result for PStem-external non-target vowels: the table in (14) below shows that PStem-external /i/, /a/, and /o/ do not harmonize, even when followed by a potential harmony-triggering vowel:

5. Kolachina (2016) points out that many of these verbs have variants whose stem-medial vowel is /u/, presumably assimilating with the following stem-final /u/. I assume that this is not vowel harmony in the same sense as that triggered across morphemes, but instead a reflex of diachrony: in varieties exhibiting these variants, some phonological change has occurred wherein root-medial /i/ and /a/ assimilated to root-final /u/.

(14) **Non-target blocking PStem-externally**

Gloss	Underlying form	After harmony
wash-CAUS-INF	{kaḍugu}-incu-an	{kaḍig}-**i**nc-an
wash-NEG.PRT	{kaḍugu}-ani	{kaḍag}-**a**ni
wash-REFL-INF	{kaḍugu}-kun-an	{kaḍugu}-k**ō**-(a)n

Note that the bolded PStem-external vowels in (14) do not harmonize, though in the first two cases, as expected, they can trigger harmony into the PStem. There are no cases of PStem-external /e/ followed by a harmony-triggering vowel.

It is impossible to tell whether or not /u/ is itself a harmony trigger; since /u/ is the only possible target, harmonizing with /u/ would be vacuous, but so would not harmonizing with /u/. I assume in this chapter that it is not, in fact, a possible harmony trigger, though as far as I can tell, it does not make much of a difference in terms of the analysis.

As was done in Chapter 2 for nouns (40), we can capture the facts about possible targets of regressive harmony by positing a relative ranking of IDENT-V and SPREAD constraints such that all vowels save /u/ block harmony:

(15) **Constraint ranking to derive nontarget blocking**
IDENT-V (-back) = IDENT-V (−high) ≫ SPREAD-L (-BACK, -VSTEM) = SPREAD-L (/a/, -VSTEM) ≫ IDENT (/u/)

Note that I assume /a/ to have the features (+back, +low, -high), that mid vowels bear both −low and −high, and that /i/ has the features (-back, +high, -low). Thus, /u/ is the only vowel which violates neither IDENT-V (-back) nor IDENT-V (-high) when it harmonizes, as it bears (+back, +high, -low). I can now give tableaux for the basic case of harmony; here is one for the form *kaḍigitē* 'wash-COND':[6]

(16) **Verbal regressive harmony**

[{ka.ḍu.gu.}]-tē	IDENT-V (-back)	IDENT-V (-high)	SPREAD-L (-BACK, -VSTEM)	SPREAD-L (/a/, -VSTEM)	IDENT (/u/)
a. [{ka.ḍu.gu.}te:]			∗∗∗!		
b. ☞ [{ka.ḍi.gi.}te:]			∗		∗∗
c. [{ka.ḍu.gi.}te:]			∗∗!		∗

6. In (16) and the rest of the tableaux in this section, I omit possible outputs involving harmony of the verb-initial vowel. These vowels never harmonize, but this is due to their being assigned primary stress; I save discussion of the interactions between verbal regressive harmony and stress until §3.4.

One can observe that in (16), candidate b.) is the most optimal, as desired. Candidate a.) has too many violations of SPREAD-L (-BACK, -VSTEM), and candidate c.) is less optimal than b.) because it involves one additional violation of SPREAD-L (-BACK, -VSTEM). Additionally, here is one for the form *tolagitē* 'vanish-COND':

(17) **Verbal regressive harmony: /a/-blocking**

[{to.la.gu.}]-tē	IDENT-V (-back)	IDENT-V (-high)	SPREAD-L (-BACK, -VSTEM)	SPREAD-L (/a/, -VSTEM)	IDENT (/u/)
a. [{to.la.gu.}te:]			* * *!		
b. ☞ [{to.la.gi.}te:]			**		*
c. [{to.le.gi.}te:]		*!	*		*

As shown in (17), it is better to harmonize (candidate b.)) than not to harmonize at all (candidate a.)), as it minimizes violations of SPREAD-L (-BACK, -VSTEM). However, harmonizing too far (candidate c.)) is out because it violates the high-ranked IDENT-V (-high) constraint.

3.3.2 The first vowel condition and the PStem

So far in this section, we have considered the possible vowels and features that can be triggers and targets of regressive harmony. But what about the role of morphology?

In Chapter 2, it was observed that harmony targets were vowels within either the nominal root or the categorizing exponent n. In this subsection, I confirm that the parallel generalization is true for verbs; targets of verbal regressive harmony are always and only those contained within the verbal root or v; that is, within the verbal PStem.

I also demonstrate that only the linearly first vowel external to the verbal PStem can trigger regressive harmony in verbs. Along with the OT analysis is detailed discussion explaining how this generalization can be seen as an argument in favor of the representational PStem over a hypercyclic view, as hypercyclic views cannot call on abstract morphological properties of an exponent concatenated at a previous cycle, only those of the exponent being concatenated at the current one.

I begin by demonstrating that, along with verbal root vowels (as seen in all data thus far reported), vowels within categorizing v exponents are also possible harmony targets (data from various sources; generalization my own):[7]

(18) *v* **suffix vowels harmonize**

Gloss	Underlying Form	After Harmony
move-*v*.TR-COND	jaru-pu-tē	[{d͡ʒa.ri.pi.}te:]
move-*v*.TR-IRR	jari-pi-ti	[{d͡ʒa.ri.p}i.ti]
move-*v*.ITR-COND	jaru-gu-tē	[{d͡ʒa.ri.gi.}te:]
move-*v*.ITR-IRR	jaru-gi-ti	[{d͡ʒa.ri.gi.}ti]

The table in (18) demonstrates that, in a verb stem pair like *jaru-gu-* 'move (itr.)' and *jaru-pu-* 'move (tr.)', where we have clear evidence of a parseable, overt *v* exponent, the vowel in *v* (along with the root vowels) harmonizes. Vowels outside of those contained within the PStem do not harmonize; there are only a few instances of PStem-external /u/ which can be followed by a possible trigger vowel. The rest of this subsection essentially considers these examples and their meaning for the overall analysis of verbal regressive harmony, so I avoid illustrating this generalization here.

We've considered the domain of harmony targets; what about the domain of possible harmony triggers? In Chapter 2, it was observed that the only vowel which could trigger regressive harmony in nominals was that of the plural suffix *-ḷu*. On the other hand, we have already seen that there are many different verbal suffixes which can trigger harmony, *e.g.* conditional *-tē* and irrealis *-ti* in (18) and causative *-incu* in (14). Especially since even suffixes inserted into different morphological slots (INFL for the first two, CAUS for the third) can trigger harmony, I assume that, unlike in nouns, regressive harmony in verbs is a property of *every* affixation-triggered phonological cycle.

Following descriptive work by Chekuri (1976), I posit that in verbs, the harmony-triggering vowel is always the linearly first PStem-external vowel. While Chekuri states the generalization as 'first suffixal vowel', he appears not to have considered transitivity suffixes to be parseable exponents. Having made this important tweak, though, this is true. In a lot of cases, it is trivially true – if the first PStem-external vowel is /i/, /e/, or /a/, then by definition (i) they can trigger harmony into the stem and (ii) they block any potential harmony which could be triggered by subsequent vowels, as they are not harmony targets.

7. The examples in (18) all feature backness harmony. Though I assume that *v* vowels are also in the domain for /a/-harmony, as I show in §3.4, (i) /a/-harmony is blocked by secondary stress and (ii) *v* vowels are generally assigned secondary stress and thus independently block /a/-harmony, so there is no positive evidence for this.

Where we can test whether or not it is non-trivially true is in contexts where the first PStem-external vowel is /u/, and that /u/ is followed by a trigger vowel /i/, /e/, or /a/. In this case, if the 'first stem-external vowel' generalization is true, we should expect no harmony, as the first stem-external vowel is /u/, which either does not trigger harmony or triggers vacuous harmony. If the generalization is not true, and stem-external vowels besides the first can trigger harmony, we should expect harmony to be triggered by the later trigger vowel and that the intervening stem-external /u/ also harmonizes. In (19), I test this using reflexive *-kun* and future/habitual *-tun*; the results corroborate the generalization (widely-reported data; my generalization):[8]

(19) ***-kun/-tun* blocking**

Gloss	**Underlying Form**	**After Harmony**
move-*v*.TR-COND	jaru-pu-tē	[{d͡ʒaripi}teː]
move-*v*.TR-REFL-COND	jaru-pu-kun-tē	[{d͡ʒarupu}kuɳʈeː]
move-*v*.TR-FUTHAB.ADJ	jaru-pu-ē	[{d͡ʒarip}eː]
move-*v*.TR-REFL-FUTHAB.ADJ	jaru-pu-kun-ē	[{d͡ʒarupu}kuneː]
move-*v*.TR-PRF.PRT	jaru-pu-i	[{d͡ʒarip}i]
move-*v*.TR-REFL-PRF.PRT	jaru-pu-kun-i	[{d͡ʒarupu}kuni]
move-*v*.TR-FUTHAB-3FN.SG	jaru-pu-tun-di	[{d͡ʒarupu}tundi]

As can be observed, suffixes like conditional *-tē*, perfective participle *-i*, and future/habitual adjectivalizer *-ē*, which trigger backness harmony when their vowels are the first to follow the PStem boundary, suddenly do not when the /u/ of reflexive *-kun* intervenes. I assume that the same thing is occurring such that future/habitual *-tun* blocks harmony from the agreement suffix *-di*; however, in this case, since *-di* cannot occur directly adjacent to the PStem, there is no minimal pair.

Given the pattern in (19), then, the 'first PStem-external vowel' condition is corroborated: when a non-triggering vowel intervenes between potentially harmony-triggering vowel and the PStem, harmony fails to occur. Stated in other words, PStem-external vowels do not regressively harmonize and are opaque to harmony.

The 'first PStem-external vowel' condition shows us that whether or not harmony occurs in a given

8. With respect to /a/-harmony: the form *-tun* only occurs before the agreement suffix *-di*, so there is no way to see whether it blocks /a/-harmony. The reflexive surfaces as *-kō* preceding /a/-harmony-triggering suffixes, so while it does block /a/-harmony, it does so trivially as /o/ is not a target vowel for regressive harmony.

form has more to do with properties of the input than with properties of the phonological grammar(s) associated with word-internal cycles of phonological computation. The logic is as follows: it cannot be the case that the constraint ranking(s) related to regressive harmony in verbs are nothing more than abstract properties of the suffixes which trigger it. If this were the case, we would have no explanation for why, for example, conditional *-tē* can trigger harmony when it is PStem-adjacent, but not when reflexive *-kun* intervenes. To clarify: recall the hypercyclic, PStem-less view which I have been comparing my view to throughout this chapter and the last. On this view, the input to a given cycle always has the following abstract structure:

(20) **Imaginaryese: input to a cycle on the hypercyclic view:**

[(ˈba.pa).(ˌga.na)]-pāt

In the Imaginaryese example above, we can see that the two parts of the input are the previously phonologized base (delineated by square brackets) and the unphonologized exponent which has just been concatenated (in this case *-pāt*), and whose concatenation is triggering the cycle at hand.

Potentially, the phonological grammar relevant to this cycle can make reference to any purely phonological property of the phonologized base. However, this cycle has no access to the internal morphological structure of that base; that is, it has no clue whether or not the phonologized base consists of a single exponent or multiple, and it cannot see any morphological boundaries between two previously-phonologized exponents within the base. This is due to the principle of Bracket Erasure (Pesetsky, 1979), on which morphological boundaries ('brackets') are erased before the following cycle of phonology. Abstract morphological properties of the newly-concatenated exponent (in the Imaginaryese example, *-pāt*), though, can be relevant at the cycle depicted in (20). For example, as I took advantage of in Chapter 2 in order to analyze nominal regressive harmony as a property of the Agr/K cycle (§2.4), the hypercyclic view still allows us to say that there is a special phonological grammar associated either with a specific exponent, or with a morphological slot or morphosyntactic category.

Let's now examine the analytical possibilities for *-kun/tun* blocking on the hypercyclic view:

(21) **Harmonizing vs. non-harmonizing cycles:**

a. [d͡ʒa.ru.pu]-i

b. [d͡ʒa.ru.pu.kun]-i

In both of the cycles in (21), the triggering suffix is perfective participial *-i*; whatever phonological grammar is associated with it, that same grammar should be relevant whenever it is concatenated, so the fact that the cycle in (21a) is a harmonic one and the one in (21b) isn't cannot be put down to differences in the phonological grammars relevant at those cycles. Thus, any analysis of *-kun/-tun* blocking (as depicted in (19)) must derive the effect from some property of those already-phonologized bases of affixation which are generated by the *-kun* and *-tun* cycles; since we are assuming Bracket Erasure, such a property can only be phonological.[9]

On my view, this is exactly the role that the phonological PStem plays: as soon as we include its boundaries into the phonological representation, a cycle like the one in (21b) can tell the difference between the /u/ in *-kun* and the preceding ones: the former is PStem-external, the latter are PStem-internal. This then captures the differences between harmonizing and non-harmonizing cycles which are both triggered by the same suffix, perfective participial *-i*: in the former, no PStem-external vowel intervenes between the perfective participial and PStem-internal target vowels; in the latter, there is such an intervening vowel.

In this way, the 'first PStem-external vowel' generalization for verbal regressive harmony is in and of itself evidence in favor of a representational PStem in the Telugu verb and against an analysis on which regressive harmony is purely a property of a (set of) phonological cycle(s).

We can state this 'first vowel' condition in terms of OT constraints by assuming that IDENT-/u/ (-STEM) is higher-ranked than IDENT-/u/ (+STEM), and that the SPREAD constraints from (12) are ranked between them:

9. More standard approaches within the Lexical Phonology & Morphology/Stratal OT program (Mohanan, 1986; Jaker and Kiparsky, 2020) employ *Late Bracket Erasure*; if one assumes that only some steps of affixation trigger phonological cycles, but not all, morphological brackets can persist past the step of affixation at which they are introduced. This can capture *-kun*-blocking: for example, if one were to say that perfective participial *-i* triggers a cycle of phonology, but reflexive *-kun* does not, the input to the cycle triggered by *-i* is as follows: jarupu]-kun]-i. One could then imagine a condition on regressive harmony such that it can only target vowels which are, say, to the left of all brackets. Distributed Morphology, though, does not have recourse to such persistent brackets baked in; also, the strictest versions of Cyclic Spell-Out, as discussed in Chapter 1, do not automatically predict such a phase-correlated persistent boundary. The PStem analysis, then, can be seen as a way to port Late Bracket Erasure into the Minimalist/DM framework. Importantly, too, Late Bracket Erasure will not work to explain the domain-sensitivity found in nominal harmony and syncope (see Chapter 2); there, clear evidence was found that NUM and AGR/K each triggered their own cycle of phonology; since the bracket between n and NUM must be deleted at the NUM cycle, it does not persist to the AGR/K cycle, forcing us to posit a PStem boundary.

(22) **Partial constraint ranking to derive first-vowel condition**
IDENT-/u/ (-STEM) ≫ SPREAD-L (-BACK, -VSTEM) = SPREAD-L (/a/, -VSTEM) ≫ IDENT-/u/ (+STEM)

Note that I have chosen not to key the IDENT (/u/) constraints to verbal PStems. In Chapter 2, I made use of an IDENT-V constrant which keyed to PStem-internality and which was crucially ranked higher than the rightward spreading constraint, SPREAD-R (/i/). As we will see in 3.6, the only context for progressive harmony in verbs is PStem-external, so even though the IDENT (/u/) constraint in (22) is not category-specific, it creates no analytical problems for either system; as in nouns, PStem-internal /i/ does not spread to PStem-internal /u/ (§2.5.4) (cf. the form *bigiyu* 'fit-IMP.SG').[10]

Using the modified constraint ranking in (22), I can now give a tableau for the form *jarupukuni*, which has the gloss ' move-*v*.TR-REFL-PRF.PRT':

(23) ***-kun* blocking**

[{d͡ʒa.ru.pu.}kun]-i	IDENT (/u/) (-STEM)	SPREAD-L (-BACK, -VSTEM)	SPREAD-L (/a/, -VSTEM)	IDENT (/u/) (+STEM)
a. ☞ [{d͡ʒa.ru.pu.}ku.ni]		* * **		
b. [{d͡ʒa.ri.pi.}ki.ni]	*!	*		**
c. [{d͡ʒa.ru.pu.}ki.ni]	*!	* * *		

Essentially, the candidate with no harmony at all (a.)) wins out because any spreading, while ameliorating violations of SPREAD-L (-BACK, -VSTEM), would violate the higher-ranked IDENT-/u/ (-STEM). We can contrast the result in (23) with the following tableau, for the form *jaripi* 'move-*v*.TR-PRF.PRT':

(24) **No *-kun* blocking**

[{d͡ʒa.ru.pu.}]-i	*VV	IDENT (/u/) (-STEM)	SPREAD-L (-BACK, -VSTEM)	SPREAD-L (/a/, -VSTEM)	IDENT-/u/ (+STEM)
a. [{d͡ʒa.ru.pu.}i]	*!		* * *		
b. [{d͡ʒa.ru.p.}i]			**!		
c. ☞ [{d͡ʒa.ri.p.}i]			*		*
d. [{d͡ʒa.ri.pi.}i]	*!		*		*

10. Technically, this 'first stem-external vowel' condition is also true for nouns. In nouns, the only vowels that can ever be the first post-PStem vowel are that of plural *-ḷu*, and those underspecified vowels of the case and agreement suffixes. Thus, assuming that the only possible regressive harmony trigger in nouns is /u/, and /u/ is only ever possible as the first vowel to the right of the PStem boundary, it is also the case that the first stem-external vowel is the only possible trigger for nominal regressive harmony. Thus, one could even say that, intuitively, the constraints in (22) ought to apply to nouns too, except that there is no nominal form which would make it directly relevant for phonological computation.

Note that I have added a high-ranked *VV which mediates the deletion of stem-final /u/ to resolve vowel hiatus. This is a very pervasive and regular phonological alternation in the language. Other than that, this is very similar to the tableau in (16); harmony occurs to avoid violations of SPREAD-L (-BACK, -VSTEM), and there is no PStem-external /u/ to block harmony, as we saw in (23). In (23) and (24), I avoid considering candidates where the PStem-initial vowel harmonizes; as mentioned earlier, I discuss below (§3.4) that this is due to blocking by stress.

To briefly wrap up the results of this section, I showed that there are two types of verbal regressive harmony in Telugu: backness harmony, which is triggered by PStem-external instances of the [−back] vowels /i/ and /e/, and /a/-harmony, which is triggered by /a/. For both types, the only possible targets are PStem-internal, non-initial /u/. In the former, PStem-internal /u/ surfaces as /i/, and in the latter, it surfaces as /a/. Crucially, only the linearly first PStem-external vowel can be a trigger of regressive harmony; that is, if there is a vowel intervening between the PStem and a potential trigger vowel, that trigger vowel fails to trigger harmony in that form. This 'first vowel condition' is difficult to understand on a PStem-less, hypercyclic view, as it means that whether or not harmony takes place at a given cycle is a property of the base of affixation, not the affix inserted at that cycle. Due to Bracket Erasure, the base of affixation has no morphological boundaries or other morphological properties; thus, the possibility of harmony must be conditioned by a phonological property of the base: on my view, this is the PStem domain. Finally, unlike in nouns, many suffixes can trigger regressive harmony in verbs; I take this to mean that verbal regressive harmony is not a property of any specific cycle but instead is a general property of word-internal phonology in Telugu which is mediated by structural configurations of the input to the relevant cycle.

3.4 Regressive harmony & stress

Until this point in the chapter, I have ignored the prosodic structure of verbal words and potential effects such may have on harmony possibilities. In Chapter 2, it was observed that stressed vowels both resisted and blocked regressive harmony in nouns (see (41) in §2.4), so it is a natural question to ask whether such an interaction also occurs in verbs.

In this section, I consider the relationship between verbal regressive harmony and stress assignment. I begin by observing that, like in nouns, verbal regressive harmony is blocked by primary stress on the PStem. I then observe that there is what looks like an exception to the 'first vowel condition' described and analyzed in §2.5.1; in stems of more than two syllables, /a/-harmony is anomalously blocked just when the PStem-final /u/ is not deleted to resolve hiatus, a phenomenon I dub 'PStem-final vowel blocking'. Recall that the first vowel condition was crucial to the argument in favor of the verbal PStem, as it laid the path for an analysis of '*-kun/-tun* blocking' as due to differences in the rankings of faithfulness constraints applying to PStem-internal and PStem-external vowels.

I argue that in fact 'PStem-final vowel blocking' does not obviate the argument for a verbal PStem, and is instead due to /a/-harmony's sensitivity to secondary stress. I propose an algorithm for primary and secondary stress assignment in the verbal PStem which predicts the distribution of PStem-final vowel blocking, giving independent evidence for it from PStem-internal syncope which targets unparsed vowels.

Finally, I compare /a/-harmony with backness harmony, demonstrating that if the former correctly diagnoses secondary stress in the verbal PStem, it must be the case that the latter is only blocked by primary and not secondary stress. This, in turn, reinforces the need for the PStem boundary, as stress on its own would not explain the blocking facts, but PStem domain-sensitivity will.

3.4.1 Primary stress blocks harmony

The first relevant generalization is that the initial vowel in the verb never harmonizes (widely-reported data & generalization):

(25) **Verb-initial vowels never harmonize**

Gloss	**Underlying Form**	**After Harmony**
settle-OBLIG	kuduru-āli	[{('ku.da).r}a:.li]
settle-COND	kuduru-tē	[{('ku.di).ri}.te:]
settle-PRF.PRT	kuduru-i	[{('ku.di).r}i]

The table in (25) demonstrates that the verb-initial vowel never harmonizes, even when it is short /u/, a vowel we know to be a possible harmony target. I argue that, as in nouns, harmony in verbs is blocked by stress. Due to the limitations on the shape of verbal roots, the (primarily)-stressed syllable in a verb (at least, a non-borrowed, non-compound, non-derived verb) is always the first, so saying that the verb-initial vowel does not harmonize is equivalent to saying that primarily-stressed syllables in verbs do not harmonize. We captured this in Chapter 2 with a general IDENT-V (STR) constraint; we will see below that a more fine-grained analysis is required for verbal regressive harmony.

3.4.2 *Secondary stress blocks /a/-harmony*

The reader will recall that in nouns, both primary and secondary stress block regressive harmony. The situation is a bit more complex in verbs. I argue that in fact there is a split between backness harmony and /a/-harmony – the former is only blocked by primary stress (unlike nominal regressive harmony), but the latter is blocked by both primary and secondary stress (like nominal regressive harmony).

Primary evidence comes from the blocking of /a/-harmony by stem-final /u/ (blocking examples and generalization widely reported):[11]

(26) **PStem-final vowel blocking**

Gloss	Underlying Form	After potential harmony
move-*v*.TR-FUTHAB-ISG	jaru-pu-t-ānu	[{d͡ʒa.ru.pu.}ta:.nu]
move-*v*.TR-HORT-IPL	jaru-pu-d-āmu	[{d͡ʒa.ru.pu.}da:.mu]
settle-*v*.TR-FUTHAB-ISG	kuduru-cu-t-ānu	[{ku.du.ru.cu.}ta:.nu]
settle-*v*.TR-HORT-IPL	kuduru-cu-d-āmu	[{ku.du.ru.cu.}da:.mu]
burn-*v*.TR-FUTHAB-ISG	kālu-cu-t-ānu	[{ka:.lu.cu}ta:.nu]
burn-*v*.TR-FUTHAB-ISG	kālu-cu-t-ānu	[{ka:.lu.cu}ta:.nu]

I call the two instances of harmony blocking in (26), exemplified by the first two examples in the same, 'PStem-final vowel blocking' because it is triggered just when the PStem-final /u/ is not deleted to resolve vowel hiatus; *i.e.,* when the following segment is a consonant. At first glance, the first two examples in (26) could be considered an exception to the 'first vowel condition': PStem-final /u/ does not harmonize, even when the first PStem-external vowel is /a:/, a harmony-triggering vowel. This blocking also applies

11. Note that in the examples using the verb stems *kuduru-cu* 'settle-*v*.TR' and *kālu-cu* 'burn-*v*.TR', the final forms given in (26), [kudurucuta:nu] and [ka:lucuta:nu], are not the final surface forms, which reflects a later process of syncope: [kudurusta:nu] and [ka:lusta:nu]. This syncope is different from that which targets unparsed stem-internal vowels, as the former targets stem-final /u/ between /c/ or /s/ and a dental stop /t/ or /d/. We can tell that this is a late process, partially because /a/-harmony is still blocked in the surface form, and also because backness harmony (which I argue ignores secondary stress) is reflected even in forms undergoing this syncope: [kudiriste:] 'settle-*v*.TR-COND'.

to all of the other ϕ-agreement suffixes beginning in /aː/. These agreement suffixes are also never the first suffix following the PStem, as they are obligatorily preceded by a small set of exponents inserted in the INFL slot (see §3.2). If it is in fact the case that agreement suffixes across the board cannot trigger regressive harmony, the analysis presented in §2.5.1 may need to be changed: instead of a 'first vowel' condition, we may instead want a 'first vowel in the first suffix' condition, to rule out cases like the ones in (26), where the first PStem-external vowel is not in the first PStem-external suffix.

However, it turns out that in fact PStem-final vowel blocking is not across the board, and that ϕ-agreement suffixes beginning in /aː/ can in fact trigger regressive harmony. Specifically, when the PStem is disyllabic, PStem-final vowel blocking is ameliorated (non-blocking generalization from Sastry (1987) and other sources cited therein. Non-blocking examples from Google Search.):[12]

(27) **PStem-final vowel blocking: ameliorated in disyllabic PStems**

Gloss	Underlying Form	After potential harmony
sing-FUTHAB-1SG	pāḍu-t-ānu	[{paː.ɖa}.taː.nu]
fall-FUTHAB-1SG	paḍu-t-ānu	[{pa.ɖa}.taː.nu]
play-FUTHAB-1SG	āḍu-t-ānu	[{aː.ɖa}.taː.nu]
dry-FUTHAB-1SG	āru-t-ānu	[{aː.ra}.taː.nu]

In (27), we see that PStems of two syllables, regardless of the weight of the first syllable, feature harmony triggered by agreement suffixes. The fact that disyllabicity ameliorates PStem-final vowel blocking is strongly suggestive that this phenomenon is due to metrical parsing or stress assignment. I propose that there is a highly-ranked constraint which militates in favor of outputs where the PStem-final syllable is assigned stress, and that it is this PStem-final stress which serves to block /a/-harmony. In the case of disyllabic PStems, a higher-ranked *CLASH constraint (Alber, 2005; Kentner, 2015) blocks this, and no secondary stress is assigned, thus explaining why harmony is not blocked for the disyllabic stems in (27). The two OT constraints required to derive these generalizations are as follows; like the harmony constraints, I assume them to be general properties of the relevant phonological grammar and thus active at every cycle of verbal phonology:

12. In fact, PStem-final vowel blocking is only ameliorated in disyllabic PStems whose second consonant is one of /ʈ/, /ɖ/, /r/ or /l/ (the same set of consonants which trigger syncope in nominal PStems, interestingly). I leave this out of the analysis, as it is not relevant for the main point, which is that in fact harmony *can* occur across the suffixes *-t* and *-d*, making PStem-final vowel blocking not a true exception to the first-vowel condition.

(28) **Secondary stress constraints**

a. *CLASH (VSTEM)
Assign a violation if two syllables in a row bear stress within the verbal PStem.

b. (ˈV)} (VSTEM)
Any vowel immediately left-adjacent to the right edge of a verbal PStem must bear stress.

The table in (29) demonstrates the results of prosodic computation sensitive to the constraints in (28) for various verbal PStems:

(29) **Secondary stress in verbal PStems**

Gloss/Meaning	**Underlying form**	**Prosody**
fall-	paḍu-	[{(ˈpa.ɖu)}]
sing-	pāḍu-	[{(ˈpaː).ɖu}]
call-*v*.TR-	pilu-cu-	[{(ˈpi.lu).(ˌt͡ʃu)}]
breath-*v*.TR-	pīlu-cu-	[{(ˈpiː).lu.(ˌt͡ʃu)}]
settle-*v*.TR-	kuduru-cu-	[{(ˈku.du).ru.(ˌt͡ʃu)}]

As desired, disyllabic PStems, regardless of the weight of the first syllable, are not assigned PStem-final stress, so as to avoid a violation of *CLASH. The constraints in (28) generate rather different prosodic structures for verbal PStems than the ones we saw for nominal ones in Chapter 2, so these constraints are keyed to verbal PStems only. Note also that we must say that the (ˈσ)} (VSTEM) constraint is ranked higher than FT-BIN, because it can create degenerate feet (see a more detailed constraint ranking in (46)).

Independent evidence that this is the correct view of verbal PStem-internal secondary stress comes from the behavior of a process of stem-internal syncope which occurs preceding /t͡ʃ/ (data from Krishnamurti (1961) and my own intuitions):

(30) **Stem-internal syncope**

Gloss/Meaning	**Input to syncope cycle**	**Surface form**
call-*v*.TR-REFL	[{pi.l**u**.t͡ʃu}]-kun	[{pi.lu.t͡ʃu}.kun]
breath-*v*.TR-REFL	[{piː.l**u**.t͡ʃu}]-kun	[{piːl.t͡ʃu}.kun]
settle-*v*.TR-REFL	[{ku.du.r**u**.t͡ʃu}]-kun	[{ku.dur.t͡ʃu}.kun]

In (30), we can observe that the syncopated (bolded) vowel is always the penultimate PStem vowel. Syncope occurs when that penultimate vowel is preceded by either a heavy syllable or two light syllables. When the penultimate vowel is preceded only by a single light syllable, syncope is blocked. In other words, when the penultimate vowel is parsed into the first foot, it is retained, but when it is not, it syncopates:

(31) **Stem-internal syncope**

Gloss/Meaning	Input to syncope cycle	Surface form
call-*v*.TR-REFL	[{(ˈpi.l**u**).(ˌt͡ʃu)}]-kun	[{(ˈpi.lu).(ˌt͡ʃu)}(ˌkun)]
breath-*v*.TR-REFL	[{(ˈpiː).l**u**.(ˌt͡ʃu)}]-kun	[{(ˈpiːl).(ˌt͡ʃu)}(ˌkun)]
settle-*v*.TR-REFL	[{(ˈku.du).r**u**.(ˌt͡ʃu)}]-kun	[{ku.(ˈdur).(ˌt͡ʃu)}(ˌkun)]

(31) repeats (30), except with the prosodification predicted by the constraints in (28) represented. Since the PStems here end in a vowel, that vowel bears stress, in order to avoid a violation of the (ˈV)} (VSTEM) constraint. Otherwise, the standard stress algorithm applies, constructing moraic trochees from left to right and avoiding degenerate feet. Thus, in a tetramoraic PStem, the third mora remains unparsed, while in a trimoraic PStem, all morae are parsed. Taking a look back at (31), it is exactly vowels associated with the third mora of a tetramoraic PStem which are syncopated. Thus, the distribution of syncope falls directly out of the prosodification constraints in (28): unparsed PStem-internal vowels delete before /t͡ʃ/.

It is important to note that if the same secondary stress algorithm used for nouns (see (36) in Chapter 2) were to apply here, we would not expect this kind of behavior; in that case, it would precisely be those vowels deleted by stem-internal syncope which were *assigned* secondary stress. While this would technically create the same cut as in (31), it would be very unusual for a syncope rule to specifically target stressed syllables – a plethora of work has identified a connection between prosodically weak positions and syncope (McCarthy, 2008; Rose, 2019).

A prediction of the analysis that /a/-harmony is blocked by secondary stress assigned to PStem-final /u/ is that in cases where PStem-final /u/ is deleted, *e.g.,* to resolve hiatus, /a/-harmony should be free to extend into the PStem regardless its prosodic structure. The table in (32) shows that this is borne out – when the first suffix following the PStem boundary is vowel-initial (thus creating an underlying hiatus configuration), PStem-final /u/ deletes and there is no longer any secondary-stress-induced harmony blocking:

(32) **Suffixes triggering /a/-harmony**

Gloss	Input to harmony	Output of harmony
move-*v*.TR-OBLIG	[{('d͡ʒa.ru).(ˌpu).}]-āli	[{('d͡ʒa.ra).p}aː.li]
move-*v*.TR-INF	[{('d͡ʒa.ru).(ˌpu).}]-an	[{('d͡ʒa.ra).p}an]
move-*v*.TR-FUTHAB.NEG	[{('d͡ʒa.ru).(ˌpu).}]-a	[{('d͡ʒa.ra).p}a]
move-*v*.TR-NEG.PRT	[{('d͡ʒa.ru).(ˌpu).}]-aka	[{('d͡ʒa.ra).p}a.ka]
move-*v*.TR-FUTHAB.NEG.ADJ	[{('d͡ʒa.ru).(ˌpu).}]-ani	[{('d͡ʒa.ra).p}a.ni]
move-*v*.TR-IMP.NEG	[{('d͡ʒa.ru).(ˌpu).}]-ak	[{('d͡ʒa.ra).p}ak]
move-*v*.TR-IMP.PL	[{('d͡ʒa.ru).(ˌpu).}]-aṇḍi	[{('d͡ʒa.ra).p}aɳ.ɖi]

I remain agnostic as to how stress assignment works PStem-externally once hiatus resolution is completed; regardless, though, in all the cases in (32), there is no longer a stressed or PStem-external vowel intervening between PStem-external /a/ and PStem-internal /u/, so harmony is triggered as predicted on the PStem-medial vowel.

In this subsection, I showed that in verbal PStems, secondary stress is preferentially assigned to the PStem-final /u/, except in disyllabic PStems, where secondary stress is not assigned to avoid stress clash within the verbal PStem. I gave evidence for this by demonstrating that PStem-final /u/ blocks /a/-harmony, except (i) in disyllabic PStems, and (ii) when PStem-final /u/ is deleted to resolve vowel hiatus. In the next subsection, I return to backness harmony, showing that the analysis of secondary stress reinforces the argument in favor of the PStem, as secondary stress cannot be understood as the reason for *-kun/-tun* blocking.

3.4.3 Comparing /a/-harmony and backness harmony

In this subsection, I apply the secondary stress constraints to forms with backness harmony, showing that secondary stress does not block this type of harmony. Thus, while secondary stress is needed to understand /a/-harmony and PStem-final vowel blocking, the PStem boundary is still needed to understand backness harmony and *-kun/-tun* blocking. Given the new understanding of the relationship between verbal regressive harmony and stress, I provide an analysis, including tableaux, for various forms with and without backness and /a/-harmony.

If my proposed algorithm for secondary stress assignment in verbal PStems is correct, then we are forced to say that while /a/-harmony is blocked by secondary stress, backness harmony ignores it:

(33) **Backness harmony ignores secondary stress**

Gloss	Input to harmony	Output of harmony
wash-COND	[{(ˈka.ɖu)(ˌgu)}]-tē	[{(ˈka.ɖi).(ˌgi)}.(ˌteː)]
wash-IRR	[{(ˈka.ɖu)(ˌgu)}]-ti	[{(ˈka.ɖi).(ˌgi)}.ti]
wash-FUTHAB.ADJ	[{(ˈka.ɖu)(ˌgu)}]-ē	[{(ˈka.ɖi)g}eː]
wash-PRF.PRT	[{(ˈka.ɖu)(ˌgu)}]-i	[{(ˈka.ɖi)g}i]

The table in (33) demonstrates that backness harmony, unlike /a/-harmony, occurs regardless of whether or not stem-final /u/ is deleted (as in the third and fourth examples) or not (as in the first and second). Further, this is true for backness harmony triggered by both /e/ and /i/.

This difference between backness harmony and /a/-harmony crucially tells us that the analysis requires both kinds of blocking – the first being blocking by an intervening PStem-external vowel (as in the cases where harmony was blocked by the vowel in reflexive *-kun* and future/habitual *-tun*), and the second being blocking by intervening stressed vowels, as in the PStem-final vowel blocking discussed above. Neither is enough to capture all the facts.

To clarify, if we were to assume that all harmony blocking is due to stress assignment (either primary or secondary), we'd have a problem explaining the distribution of backness harmony; (34) demonstrates the problem using the form *kaḍigi-tē* 'wash-COND':

(34) **Secondary stress is not sufficient**

a. Conditional cycle: [(ˈka.ɖu).(ˌgu)]-tē → *[(ˈka.ɖu).(ˌgu).(teː)]

b. Conditional cycle: [(ˈka.ɖu).(ˌgu).(ˌkun)]-tē → [(ˈka.ɖu).(ˌgu).(ˌkuɳ).(ʈeː)]

The examples in (34) demonstrate the hypothetical inputs and outputs to the cycle triggered by conditional suffix *-tē* on a view where there is no PStem boundary and all harmony blocking is due to stress. While we get the right result for the example with reflexive *-kun*, which, due to its being a heavy syllable, is assigned stress and thus can block harmony, we do not get the right result for the example without *-kun*. Since the PStem-final syllable is assigned secondary stress by the action of the constraints in (28), one would expect that that secondary stress should block backness harmony, contrary to fact. Saying that backness harmony ignores secondary stress isn't enough either, because in that case we would overgenerate harmony in the *-kun* case. On the PStem view, though, the difference between non-blocking /u/ and blocking /u/ in (34a) and (34b) respectively is clear: the former is PStem-internal, the latter is

PStem-external. Thus, we need the PStem boundary to differentiate the behavior of the *-kun* vowel and the PStem-final vowel without depending on stress.

On the other hand, if we were to assume that the PStem boundary were sufficient to explain all harmony blocking, it's not clear why PStem-final vowel blocking should occur; (35) demonstrates using the form *kaḍugu-t-ānu* 'wash-FUT/HAB-1SG'

(35) **The PStem is not sufficient**

a. Agreement cycle: [{(ˈka.ɖu).gu}t]-ānu → *[(ˈka.ɖa).ga.(ˌtaː).nu]

b. Agreement cycle: [{(ˈka.ɖu).gu.}(ˌkuɳʈ)]-ānu → [{(ˈka.ɖu).gu.}(ˌkuɳ).(ˌʈaː).nu)]

The examples in (35) reflect the inputs and outputs of the cycle triggered by the first-person singular agreement suffix *-ānu* on a hypothetical view where there is no secondary stress within the PStem (or alternatively, that regressive harmony ignores it across the board), and that position with respect to the PStem is the only way to derive harmony blocking outside of blocking by primary stress. Note that in both cases in (35), the previously concatenated suffix is the alternant *-t* of the future/habitual suffix. As can be observed, while again we predict the right result for the cycle including *-kun*, because the vowel in that suffix is a PStem-external vowel intervening between a potential trigger and a potential target, we do not predict the right result for the example without *-kun*; in fact, the correct form for that input shows no harmony. The wrong prediction is because, on this view, there should be no way to block harmony from being triggered by the very first PStem-external vowel. On the view with both the PStem and secondary stress, though, the blocking by PStem-final /u/ in (35a) can be explained as being due to secondary stress. Thus, both blocking by secondary stress (for /a/-harmony) and blocking by intervening PStem-external vowels (across the board) is required to capture all the facts consistently.

In terms of the OT analysis, it is clear that the single IDENT-V (STR) constraint proposed for nouns will not be enough for verbs. Instead, we will need to use multiple constraints of the same style which are keyed to specific vocalic features:

(36) **Harmony blocking constraints: Mark II**

a. IDENT-BACK (PRIM-STR)
Assign a violation whenever a primary-stressed output vowel does not share the same value of [±back] as its input correspondent.

b. IDENT-HIGH (STR)
Assign a violation whenever a stressed output vowel does not share the same value of [±high] as its input correspondent.

c. IDENT-BACK (STR)
Assign a violation whenever a stressed output vowel does not share the same value of [±back] as its input correspondent.

I invoke the [±high] feature here because /a/-harmony can be seen as lowering of underlying PStem-internal /u/. Integrating the constraints in (36) with the relevant harmony-mediating SPREAD constraints, we have the following rankings:

(37) **Crucial constraint rankings for harmony blocking by stress**

a. IDENT-BACK (PRIM-STR) ≫ SPREAD-L (-BACK, -VSTEM) ≫ IDENT-BACK (STR)

b. IDENT-BACK (PRIM-STR) ≫ IDENT-HIGH (STR) ≫ SPREAD-L (/a/, -VSTEM)

The crucial move is that backness spreading is more optimal than maintaining a stressed vowel's quality in general, but is less optimal than maintaining a primarily-stressed vowel's quality. This captures the fact that backness harmony ignores secondary stress but is blocked by primary stress. On the other hand, maintaining stressed vowels' quality *in general* is more optimal than spreading /a/, capturing the fact that /a/-harmony is blocked by both primary and secondary stress. As far as I can tell, there is also no issue with assuming that the constraints in (36) are not PStem-sensitive, categorically or generally. In the nominal system, these more specific stress-related faithfulness constraints would all be ranked where IDENT-V (STR) was ranked in the tableaux in Chapter 2, and they would all interact with nominal forms together, acting as if they were a single IDENT-V (STR), as assumed in the analysis in the previous chapter. The following is a tableau demonstrating this final analysis of harmony for the form *kudiritē* 'settle-COND':

(38) **Only primary stress blocks backness harmony**

[{(ˈku.du).(ˌru).}]-tē	IDENT-BACK (PRIM-STR)	SPREAD-L (-BACK, -VSTEM)	IDENT-BACK (STR)
a. [{(ˈku.du).(ˌru).}(ˌte:)]		∗∗!∗	
b. ☞ [{(ˈku.di).(ˌri).}(ˌte:)]		∗	∗
c. [{(ˈki.di).(ˌri).}(ˌte:)]	∗!		∗∗

Candidate c.), in which the primarily-stressed syllable harmonizes, is ruled out due to its violation of the high-ranked IDENT-BACK (PRIM-STR) constraint. Candidate b.) is preferred to a.) because it has fewer violations of SPREAD-L (-BACK, -VSTEM); since IDENT-BACK (STR) is ranked so low, secondary stress is not enough to block harmony. Note that in (38), I have not included the constraints relating to harmony blocking by nontarget vowels, the constraint blocking PStem-external /u/ from harmonizing, nor the constraints relating to /a/-harmony, as they are not relevant to derive this form. A full ranking of constraints and associated discussion is given in §3.5. The following is a tableau for *kudurudāmu* 'settle-HORT-IPL' which demonstrates blocking of /a/-harmony by secondary stress:

(39) **Secondary stress blocks /a/-harmony**

[{(ˈku.du).(ˌru).}d]-āmu	IDENT-BACK (PRIM-STR)	IDENT-HIGH (STR)	SPREAD-L (/a/, -VSTEM)
a. ☞ [{(ˈku.du).(ˌru).}(ˌda:).mu]			∗ ∗ ∗
b. [{(ˈku.da).(ˌra).}(ˌda:).mu]		∗!	∗
c. [{(ˈka.da).(ˌra).}(ˌda:).mu]	∗!	∗∗	

In (39), candidate a.), in which no harmony occurs, is more optimal than b.) and c.) because it does not violate IDENT-HIGH (STR). To complete the trifecta, here is a tableau for the form *kudarāli* 'settle-OBLIG':

(40) **Vowel deletion licenses /a/-harmony**

[{(ˈku.du).(ˌru).}]-āli	*VV	IDENT-BACK (PRIM-STR)	IDENT-HIGH (STR)	SPREAD-L (/a/, -VSTEM)
a. [{(ˈku.du).(ˌru).}(ˌa:).li]	∗!			∗ ∗ ∗
b. ☞ [{(ˈku.da)r}(ˌa:).li]				∗
c. [{(ˈka.da)r.}(ˌa:).li]			∗!	
d. [{(ˈku.du)r.}(ˌa:).li]				∗∗!

Vowel deletion for hiatus resolution does not create a violation of IDENT-HIGH (STR); as there is no output correspondent of the relevant stressed input vowel, there is no violation. Thus, the most optimal candidate is b.), which has the fewest violations of SPREAD-L (/a/, -VSTEM) without incurring a violation of IDENT-HIGH (STR). Finally, it is worth showing a derivation for a case in which PStem-final vowel blocking does *not* apply, and we get /a/-harmony into the stem as predicted:

(41) **No secondary stress, no blocking**

[{(ˈpa.ɖu).}d]-āmu	*VV	IDENT-BACK (PRIM-STR)	IDENT-HIGH (STR)	SPREAD-L (/a/, -VSTEM)
a. [{(ˈpa.ɖu).}(ˌdaː).mu]				**!
b. ☞ [{(ˈpa.ɖa).}(ˌdaː).mu]				*

Recall that the *CLASH constraint blocks the second stem syllable from being stressed; thus, the harmonizing candidate (b.)) is the winner.

3.5 Analytical recap: comparison to nouns

Now that we have concluded the analysis of verbal regressive harmony in Telugu, it will be useful to enumerate the details of said analysis in a concise manner; for reasons of argumentation, I have so far presented the analysis in bits and pieces, but this may make it harder for the reader to keep the whole picture in their head. In this section, I go over the analysis of verbal regressive harmony step by step while comparing the results to those observed for nouns in Chapter 2. I also give a full ranking of the constraints relevant for the analysis in this chapter (50).

Let's recall the morphological structure for the Telugu verbal word:

(42) **Structure of the Telugu verbal word**

$\underbrace{\{\sqrt{}\text{-}v\}}_{PStem}$-CAUS-REFL-INFL-AGR

Recall that I assume that insertion at each of the abstract morphemes in (42) triggers its own cycle of phonology (Inkelas, 1989; Kalin, 2022), and that insertion occurs root-out; these cycles of phonology by default trigger computation by some default word-internal phonological grammar relevant for Telugu, but specific cycles or sets of cycles can also trigger irregular phonological computations (cf. Cophonology Theory (Inkelas, 1998)). Cycles occurring after v can also make reference to the PStem boundary, including the fact that it is a verbal PStem.

Next, we have the analysis of regressive harmony. I posit that, like in nouns (43 in §2.4), regressive harmony in verbs is mediated by SPREAD constraints that are keyed to verbal PStems (§3.3.1); spreading is blocked by vowels which, if they were to harmonize, would violate some higher-ranked faithfulness constraint. Unlike in nouns, where the triggering vowel was /u/ and the target /i/ (26 in §2.4), in verbs, the triggering vowels are /i/, /e/, and /a/, and the target vowel is /u/ (§2.5.1).

(43) **Verbal regressive harmony: basic alternations**

Gloss	Underlying form	After harmony
wash-COND	kaḍugu-tē	kaḍigi-tē
wash-IRR-	kaḍugu-ti-	kaḍigi-ti-
wash-INF	kaḍugu-an	kaḍag-an

In nouns, regressive harmony was always triggered by plural *-ḷu*; on the other hand, verbal regressive harmony can be triggered by many different suffixes; this is demonstrated already in (43), and the table below gives more examples of harmony-triggering verbal suffixes:

(44) **Verbal regressive harmony: possible triggers**

Gloss	Underlying form	After harmony
wash-FUTHAB.PRT	kaḍugu-ē	kaḍig-ē
wash-PRF.PRT-	kaḍugu-i-	kaḍig-i-
wash-FUTHAB.NEG-	kaḍugu-a-	kaḍag-a-

Like in nouns, verbal regressive harmony is blocked by intervening non-target vowels (§2.4, §2.5.1).

(45) **Verbal regressive harmony: blocking by non-target vowels**

Gloss	Underlying form	After harmony
vanish-COND	{tolagu}-tē	tolagi-tē
make.fit-INF-	{bigiyu}-an	bigiy-an
wash-CAUS-INF	{kaḍugu}-incu-an	kaḍig-**i**nc-an
wash-NEG.PRT	{kaḍugu}-ani	kaḍag-**a**ni
wash-REFL-INF	{kaḍugu}-kun-an	kaḍugu-k**ō**-(a)n

The first two examples in (45) show that PStem-internal /i/ and /a/ do not harmonize, even when followed by harmony-triggering vowels. The following three examples show that PStem-external /i/,/a/, and /o/ (bolded) do not harmonize either, even when followed by a harmony-triggering vowel. As predicted, though, non-harmonizing /i/ and /a/ can trigger harmony into the PStem. There are no cases of PStem-internal /e/ or /o/ except PStem-initially, where they are assigned primary stress and thus do not harmonize (see (§3.3.1) or below). There are no cases of PStem-external /e/ which can be followed by a harmony trigger, nor are there any cases of PStem-external /o/ followed by /e/ or /i/.

Like in nouns, regressive harmony in verbs is blocked by stress. However, stress assignment works slightly differently in nouns than in verbs. In general, I assume that parsing is similar in verbs: morae are parsed into trochaic feet from left to right, and heavy syllables must be stressed. However, irregularly, the PStem-final syllable in verbs is assigned stress, even if it creates a degenerate foot. The only exception is in disyllabic PStems, where assigning stress to the PStem-final syllable would violate a highly-ranked *CLASH constraint (§3.4), and so the PStem-final syllable remains unstressed. The following is the full ranking of constraints required to derive the correct stress assignment in verbal words:

(46) **Constraint ranking for metrical parsing: verbs**
*CLASH (+VSTEM) ≫ (ˈV)} (VSTEM) ≫ FT-BIN (μ) ≫ FOOT-FORM (TROCHAIC) ≫ ALL-FT-LEFT-PWORD ≫ SLH-PSTEM-FOOT ≫ PARSE-SYL

This is the same ranking as in (36) in Chapter 2, except with the addition of the two verb-specific constraints in (28), both of which are ranked higher than the general prosodification-related constraints. The following table gives the results of this constraint ranking for prosodification of all possible stem shapes as enumerated in (8).

(47) **Stress algorithm**

Stem shape	**Example**	**Stress**
CVCV	*paḍu-* ‘fall’	[{(ˈpa.ɖu)}]
CVCVCV	*kaḍugu-* ‘wash’	[{(ˈka.ɖu).(ˌgu)}]
CVCVCVCV	*kuduru-cu-* ‘settle-*v*.TR-’	[{(ˈku.du).ru.(ˌcu)}]
CVXCV	*din-cu-* ‘descend-*v*.TR-’	[{(ˈdin).cu}]
CVXCVCV	*kālu-cu-* ‘burn-*v*.TR-’	[{(ˈkaː).lu.(ˌcu)}]

The reader will recall that in nouns, regressive harmony is blocked by both primary and secondary stress. In verbs, the blocking possibilities are different between backness harmony and /a/-harmony. The former is only blocked by primary stress, while the latter is blocked by both primary and secondary stress (§3.4).

(48) **Verbal regressive harmony: blocking by stress**

Gloss	Underlying form with stress	After harmony
fall-FUTHAB-ISG	[{(ˈpa.ɖu)}]-t-ānu	[{(ˈpa.ɖa)}.(ˌtaː).nu]
wash-FUTHAB-ISG	[{(ˈka.ɖu).(ˌgu)}]-t-ānu	[{(ˈka.ɖu).(ˌgu)}.(ˌtaː).nu]]
settle-INF-	[{(ˈku.du).(ˌru)}]-an	[{(ˈku.da).(ˌr}an)]
collapse-COND	[{(ˈkuː).lu}]-tē	[{(ˈkuː).li}.(ˌteː)]
settle-COND	[{(ˈku.du).(ˌru)}]-tē	[{(ˈku.di).(ˌri)}.(ˌteː)]

The first three examples in (48) demonstrate how secondary stress blocks /a/-harmony. In disyllabic PStems, as in the first example, no secondary stress is assigned, so /a/-harmony is not blocked, as expected. In trisyllabic PStems, as in the second example, secondary stress is assigned to the PStem-final syllable, so /a/-harmony is blocked. When a stressed PStem-final vowel is deleted to resolve hiatus, as in the third example, there is no longer a secondary stress which can block /a/-harmony, and so it is not blocked. The final two examples demonstrate that secondary stress has no effect on backness harmony: for both disyllabic and trisyllabic PStems, the PStem-final vowel harmonizes. The final three examples in (48) demonstrate that primary stress blocks both /a/-harmony and backness harmony. When /a/-harmony proceeds past the PStem-final vowel, as in the third example, it is still blocked by the PStem-initial vowel, because it is stressed. In the last two examples, even though backness harmony is not blocked by secondary stress, the PStem-initial vowel still fails to harmonize, as it is assigned primary stress.

Even though backness harmony is not blocked by secondary stress, it can still be blocked when a PStem-external vowel intervenes (§3.3.2). We saw this in (45) for non-target vowels; the table below shows that this is true even for /u/:

(49) **Verbal regressive harmony: blocking by PStem-external vowels**

Gloss	Underlying form with stress	After harmony
wash-REFL-PRF.PRT	[{(ˈka.ɖu).(ˌgu)}]-kun-i	[{(ˈka.ɖu).(ˌgu)}.(ˌku.ni)]]
wash-REFL-FUTHAB.PRT	[{(ˈka.ɖu).(ˌgu)}]-kun-ē	[{(ˈka.ɖu).(ˌgu)}.ku.(ˌneː)]]
wash-REFL-COND	[{(ˈka.ɖu).(ˌgu)}]-kun-tē	[{(ˈka.ɖu).(ˌgu)}.(ˌkuɳ).(ˌʈeː)]
wash-FUTHAB-3SG.FN	[{(ˈka.ɖu).(ˌgu)}]-tun-di	[{(ˈka.ɖu).(ˌgu)}.(ˌtun).di]

The examples in (49) demonstrate that when a PStem-external /u/ intervenes between a backness harmony trigger and the PStem itself, harmony is blocked. The second example shows that even when that PStem-external /u/ is not assigned secondary stress, harmony is still blocked. Since /u/ is a possible harmony target, there is no straightforward way to understand harmony blocking without making reference to the PStem itself. Even if one were to tweak the stress algorithm such that the relevant PStem-external instances of /u/ were always stressed, this would not suffice to explain the blocking facts in (49): the data in (48) shows that secondary stress within the PStem does not block backness harmony, so the analysis would still need to make reference to the PStem boundary to capture the fact that PStem-external secondary stress unexpectedly blocks backness harmony.

The following gives the minimal required rankings for all of the harmony-related spreading and IDENT constraints introduced in this chapter:

(50) IDENT-BACK (PRIM-STR) = IDENT-V (-back) = IDENT-V (-high) = IDENT-HIGH (STR) = IDENT-/u/ (-STEM)
$\gg$ SPREAD-L (-BACK, -VSTEM) = SPREAD-L (/a/, -VSTEM)
IDENT-V (+back) = IDENT-V (+high) = IDENT-BACK (STR) = IDENT-/u/ (+STEM)

As we can see, in the end the ranking is actually quite simple. There are two constraints, SPREAD-L (-BACK, -VSTEM) and SPREAD-L (/a/, -VSTEM), which militate in favor of leftward spreading from PStem-external positions of the [-back] feature and of the vowel /a/, respectively. These are outranked by a set of IDENT constraints, such that a variety of vowels cannot be spread to. These include primary-stressed vowels (for both [-back] and for /a/), vowels other than /u/ (for both types of spreading), PStem-external instances of the vowel /u/ (for both types of spreading), and secondary-stressed vowels (only for /a/-harmony, which lowers underlying /u/ and is thus captured by the IDENT-HIGH (STR) constraint). On the other hand, the spreading constraints outrank certain faithfulness constraints, allowing spreading only to unstressed PStem-internal vowels for /a/-spreading, and to non-primarily-stressed PStem-internal vowels for [-back]-spreading. As far as I can tell, none of the prosodification constraints in (46) need to be ranked with respect to the harmony constraints in (50).

Finally, recall that in Chapter 2, it was shown that regressive harmony in nouns is triggered by affixation at the AGR/K cycle (§2.4). For verbs, on the other hand, there is no good evidence that harmony is triggered by affixation of a specific exponent or affixation at a specific slot; instead, it can potentially be triggered by any cycle of phonology, as long as its input has the right configuration of vowels to trigger harmony. Thus, I assume that the ranking in (50) is a general property of (word-internal) Telugu phonology and is thus relevant by default at every cycle of phonology.

3.6 Verbal progressive harmony & the mechanism for category-specificity

I argue that PStem boundaries can bear categorial properties: *i.e.,* phonological computations can tell the difference between a verbal and a nominal PStem boundary. Various constraints, as we've seen in this chapter and the previous, can make reference specifically to nominal or verbal PStems, thus restricting their action to the corresponding morphological context. However, this makes the prediction that constraints which make no reference to PStem boundaries should in principle be equally active in both nouns and verbs, though their effects may be invisible due to higher-ranked category-specific constraints in some cases.

A way to test this prediction would be to find some PStem-agnostic phenomenon that works in a parallel fashion in nouns and verbs. Especially if said phenomenon falls under the umbrella of vowel harmony (where the related constraints would otherwise be outranked by the category-specific ones), this would be good evidence that there is a single, general word-internal phonology which is active category-generally.

While there are many details yet to be worked out, in this section, I tentatively argue that progressive vowel harmony satisfies this prediction: unlike regressive harmony, progressive harmony has very similar behavior across nouns and verbs, suggesting that the relevant constraints do not make reference to a PStem boundary. Furthermore, the domain of progressive harmony in both nouns and verbs is restricted to environments where the target is PStem-external, so it makes sense that the related constraints would 're-emerge' in this context, where the higher-ranked category-specific constraints are not relevant.

The facts of progressive verbal vowel harmony are as follows: the only progressive harmony targets are agreement suffixes – specifically, those allomorphs of agreement suffixes which do not begin with long

/aː/. Whenever these agreement suffixes have the underlying form -Cu, and are directly preceded by the irrealis suffix *-ti*, the agreement suffix surfaces as -Ci (data from various sources):

(51) **Verbal progressive vowel harmony**

Gloss	**Before Prog. Harmony**	**After Prog. Harmony**
wash-IRR-2SG	[{(ˈka.ɖi)gi}ti]-vu	[{(ˈka.ɖi)gi}(ˌti.ʋi)]
wash-FUTHAB.NEG-2SG	[{(ˈka.ɖa).g}a]-vu	[{(ˈka.ɖa).g}a.ʋu]
wash-IRR-1PL	[{(ˈka.ɖi)gi}ti]-mu	[{(ˈka.ɖi)gi}(ˌti.mi)]
wash-FUTHAB.NEG-1PL	[{(ˈka.ɖa).g}a]-mu	[{(ˈka.ɖa).g}a.mu]

The same process also applies to first-person singular *-nu* and second/third-person human plural *-ru*, though these are not shown in (51). Recall the profile of progressive harmony in nouns: it only affects first-person plural *-mu*, and it involves rightward spreading from the portmanteau exponent *-mandi* 'HUM.PL', which, because it expones Num, is nominal PStem-external. Note, thus, the similarities between nominal and verbal progressive harmony: (i) both involve rightward-spreading of /i/ targeting underlying /u/ and (ii) both are restricted to environments where both the trigger and target vowel are stem-external.

I argue, thus, that we can analyze them exactly the same way, using a generalized SPREAD constraint which makes no reference to a PStem boundary, either nominal or verbal.[13]

(52) SPREAD-R (/i/)
For every PStem-external /i/ in the input, assign a violation for every vowel slot to its right that it has not associated with in the output.

If we assume that the constraint in (52) is ranked higher than the IDENT-/u/ constraint relevant to the underlying /u/ of the agreement suffixes, we derive the correct pattern. To demonstrate, here is a tableau for *kaḍigitivi* 'wash-IRR-2SG':

13. A possible counterexample: the /i/ of causative *-incu* does not appear to spread to the /u/ of singular imperative *-u*, or that of reflexive *-kun*. It's possible that the isomorphemic /u/ at the end of the causative (which does not harmonize, perhaps, due to being in a non-derived environment) is what's blocking this in the latter case, though when the causative precedes the singular imperative, that /u/ is deleted to resolve hiatus.

(53) **Progressive harmony in verbs**

	[{('ka.ḍi).(ˌgi)}ti]-vu	SPREAD-R (/i/)	IDENT-/u/ (-STEM)
a.	[{('ka.ḍi).(ˌgi)}(ˌti.ʋu)]	*!	
b. ☞	[{('ka.ḍi).(ˌgi)}(ˌti.ʋi)]		*

In this way, while the analysis of regressive harmony diverges between nouns and verbs, the analysis of progressive harmony does not. Thus, I argue, there is a general word-internal, acategorical phonological grammar in Telugu that is sensitive to a representational category diacritic that comes with nominal and verbal PStems. This is in addition to the generally-held assumption that cycles triggered by specific exponents can be associated with exponent-specific phonological 'mini-grammars' (Inkelas, 1998; Scheer, 2011).

3.7 Conclusion

This chapter was in large part complementary to Chapter 2. In a parallel fashion, I take a look at the properties and patterns of Telugu vowel harmony, this time in the verbal word as opposed to the nominal one. I find that by the simple analytical move of assuming a persistent prosodic PStem boundary, we can naturally explain a variety of facts about verbal vowel harmony, among which the distribution of possible triggers and targets and their positions within the word. While much of the data in this chapter could potentially be treated without assuming the prosodic boundary, the fact that (i) such a large set of data is all compatible with the PStem, and (ii) considering the parallelism with nominal harmony, I argue that my view is the most parsimonious. Furthermore, if my analysis is on the right track, we can see Telugu vowel harmony as a novel demonstration of how domains in (morpho-)phonology (the PStem) may correspond in a meaningful way with domains in (morpho-)syntax (the vP and nP phases). To reiterate, I assume that the PStem boundaries in Telugu are mapped to the relative positions of the abstract morphemes which realize the syntactic categorizing heads n and v, on a Distributed Morphology-style framework. Thus, these PStem boundaries are compatible with a strictly cyclic, interactionist view of the morphology-phonology interface: the phonological cycles which are interleaved with steps of Vocabulary

Insertion can see the PStem boundaries, as they are placed preceding Vocabulary Insertion.

As with nouns, I have found that the morpho-phonological patterns found in Telugu verbs are not compatible with a view on which all domain effects are purely due to cyclicity: it must be the case that even at later cycles of phonological computation, the PStem boundary must be visible to the phonological computation (*i.e.,* it persists in a way incompatible with morphological brackets, which on a strictly cyclic analysis should be erased at the end of each cycle of phonology).

In Chapters 4 and 5, I engage in a similar investigation of locality and domains in Telugu nominal and verbal words, this time focusing on the properties of morphological concatenation/insertion and suppletion.

CHAPTER 4

SPELL-OUT AND CONTEXTUAL ALLOMORPHY: NOMINAL MORPHOLOGY

4.1 Introduction

In Chapters 2 and 3, it was found that in both Telugu nouns (Chapter 2) and Telugu verbs (Chapter 3), there is strong evidence for a prosodic stem domain whose right boundary has observable effects on word-internal phonology and whose boundaries correspond to the contiguous string of abstract morphemes consisting of the root node followed by the categorizing node (n in nouns and v in verbs). Following the discussion in Chapter 1, this is evidence that while phase heads mediate domain effects in both the syntax and the phonology, they do so differently: in the syntax, they trigger cyclic Spell-Out of their complements, while in the phonology, they trigger the creation of a representational PStem.

In this chapter, I return my focus to the nominal word, this time considering domain effects as they apply to the conditioning of suppletion. I begin with a puzzle: in Telugu, suppletion of n with respect to number and case is relatively widespread (data a combination of forms from Krishnamurti & Gwynn (1985) and my own elicitation):

(1) **n suppletes with respect to number and case:**

Sing. Nom.	**Plur. Nom.**	**Sing. Dat.**
pē-nu 'louse-n'	pē-ø-lu 'louse-n-PL'	pē-nu-ku 'louse-n-DAT'
nāga-li 'plough-n'	nāga-ḷ-ḷu 'plough-n-PL'	nāga-ṭi-ki 'plough-n-DAT'
il-lu 'house-n'	il-lu-lu 'house-n-PL'	in-ṭi-ki 'house-n-DAT'
rā-yi 'rock-n'	rā-ḷ-ḷu 'house-n-PL'	rā-ti-ki 'rock-n-DAT'

Note that in (1), the alternation between /il/ and /in/ in the paradigm for *house* is not root suppletion; rather, the consonant is underlyingly an /n/ which assimilates to the following lateral in the nominative. In general, though, it is clear that there can be a difference in the form of n triggered by plural number (see the form for *lice*, where the n suffix found in the singular nominative/dative is missing in the plural) and separately by the dative case (see *nāga-ṭi-ki* 'plough (dat.)').

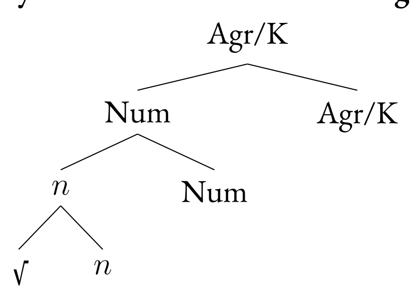
However, suppletion at the root in nominal contexts is vanishingly rare – this can already be seen in (1). in all cases, even when n suppletes, the root remains the same. The table in (2) below shows more examples of the same, with the addition of the sole exceptions: the non-human pronouns *adi* '3SG.N.PRO' and *avi* '3PL.N.PRO' (data: Krishnamurti & Gwynn (1985) & my elicitation):

(2) **Roots (mostly) do not supplete with respect to number or case:**

Sing. Nom.	Plur. Nom.	Dative
kukka 'dog'	kukka-lu 'dog-PL'	kukka-ki 'dog-DAT'
pilli 'cat'	pillu-lu 'cat-PL'	pilli-ki 'cat-DAT'
cēpa 'fish'	cēpa-lu 'fish-PL'	cēpa-ki 'fish-DAT'
āvu 'cow'	āvu-lu 'cow-PL'	āvu-ku 'cow-DAT'
adi '3SG.N.PRO'	–	dāni-ki '3SG.N.PRO-DAT'
–	avi '3PL.N.PRO'	vāṭi-ki '3PL.N.PRO-DAT'

The robust suppletion in (1) at n contrasts with the almost-unattested suppletion in (2) at the root; the backness alternation seen in the stem-final vowel of 'cat' in the plural nominative is a result of regular regressive vowel harmony (see Chapter 2 for a full analysis). I argue that this contrast can be explained by positing that the conditioning of suppletion is constrained by a phase-correlated domain, such that suppletion at the root is constrained in a way that does not apply to suppletion at n. Here is the structure proposed for the complex head corresponding to the Telugu nominal:

(3) **Syntactic structure of the Telugu nominal**



I assume that Agr(eement) and K (case) are separate functional heads which are mutually exclusive and always Merge in the same position directly outside of Num(ber). Recall that n is a phase head; I also assume that the highest head in the nominal extended projection (Bošković, 2014), Agr or K, is always a phase head.

I assume, following previous work in Distributed Morphology (DM) (Bobaljik, 2000; Paster, 2006; Embick, 2010, *a.m.o*), that Vocabulary Insertion occurs in a root-out, serial fashion. That is, considering the structure in (3), VI first targets √, and then each further head in the structure one by one from lowest to highest: first n, then Num, then K. Also standardly (Embick, 2010; Arregi and Nevins, 2012; Bobaljik, 2012, *a.m.o*), I assume that Vocabulary Insertion acts on a string of linearized abstract morphemes corresponding to the heads in the underlying syntactic structure:

(4) **Telugu nouns: Input to Vocabulary Insertion**

$$[[[[\surd]n]\text{Num}]\text{Agr/K}]$$

Importantly, even though Vocabulary Insertion acts on a linearized string of abstract morphemes, in order for it to occur root-out, it must still have access to hierarchical structure, including head-complement relations and phasehood; this is reflected by the square brackets in (4). I will argue that *all* exponence is constrained by head adjacency (Embick, 2010; Arregi and Nevins, 2012), but that putative violations of such can be explained by assuming that adjacency can be fed by insertion at Spans (Svenonius, 2012) and by operations such as Obliteration (Arregi and Nevins, 2012). However, crucially, there is an additional constraint on the conditioning of exponence which only applies to conditioning across a phase head (inspired by but not equivalent to Bobaljik & Wurmbrand's (2013) Domain Suspension proposal; see §4.5 for a full comparison):

(5) **Rule Support**
Given the configuration below (linear order irrelevant), assuming Y is a phase head and Z is some head higher than Y, a rule R targeting X whose structural description includes Z can only exist if a rule R' targeting X exists whose structural description includes Y but no higher head.

$$[[[\,\text{X}\,]\,\mathbf{Y}\,]\,\ldots\,\text{Z}\,]$$

Applying (5) to the string in (4), Rule Support applies to rules exponing the root: the rule in (6a) below must be *supported* by a rule like that in (6b); if the latter does not exist, the former cannot, either:[1]

1. I use brackets within the statements of rules of exponence to reflect my assumption that hierarchical structure is still

(6) **Rules conditioning root exponence across n must be supported**
  a. $\surd]n \rightarrow$ /exp1/ _] Num
  b. $\surd \rightarrow$ /exp2/ / _] n

Because the rule in (6a) involves conditioning across a phase head, it requires support. On the other hand, no such constraint applies to rules exponing n which are conditioned by K, as this does not constitute conditioning across a phase head:[2]

(7) **Rules not conditioned across n need not be supported**
  n]Num $\rightarrow$ /exp3/ / _] K

The rule in (7) can exist without being 'supported' by a rule whose structural description includes Num but not K. Even though the phase head n is itself targeted by the rule, since the rule is not conditioned *across* a phase head (that is, it is not the case that the rule targets a head inside the phase head's complement but is conditioned by a head higher than the phase head itself), Rule Support does not apply.

The contrast between (6) on one hand and (7) on the other is what explains the difference in distribution of suppletion at n versus at the root demonstrated by (1) and (2): In order for the root's exponence to be conditioned by number or case, it must also separately be conditioned by n itself; I will show in this chapter that this is a condition only met in pronouns, explaining why root suppletion is limited to the pronominal paradigm.

Observe that as stated, Rule Support is a constraint on possible sets of rules, *not* a condition on the application of a rule at a certain step of the derivation. This makes it a global, representational property of the system, not a derivational constraint. This is in contrast to the most standard assumptions and intuitions behind the role of phases in grammar and the conception of phase-correlated domains as epiphenomenal of cyclicity – instead, like the mapping of PStem boundaries to phase domains in the

visible at Vocabulary Insertion, both to mediate root-out VI and to mediate Rule Support. See Bobaljik (2012) and Bobaljik & Wurmbrand (2013) for a similar way of notating rules of exponence. On the other hand, I am more agnostic about whether or not constituent structure is retained until Vocabulary Insertion; thus, I leave in the left brackets when considering entire inputs to VI, but leave them out in statements of rules of exponence, where only hierarchical structure is relevant.

2. Note from the rule in (7) that I make no assumption that rules of exponence must target a constituent, only a contiguous sequence/span of heads (see §4.3 for more).

phonology, Rule Support makes crucial reference to the phasehood of n to constrain Vocabulary Insertion, but is not a consequence of cyclic Spell-Out.

The chapter is structured as follows: I first delimit the empirical domain of the current study, showing that lexical nouns and third-person pronouns in Telugu share the underlying syntactic structure in (3), but that local-person pronouns may not (§4.2). Then, I consider suppletion at n with respect to Num and K (§4.3); I argue for the Head Adjacency Constraint (Embick, 2010; Arregi and Nevins, 2012) and insertion at Spans (Svenonius, 2012). Next, I consider suppletion at the root (§4.4). I show that both the general rarity of suppletion at the root as well as the behavior of the exceptional pronouns can be understood by positing the Rule Support constraint on sets of rules of exponence. I then compare my proposal to a very similar one: Domain Suspension (Bobaljik and Wurmbrand, 2013), arguing that Rule Support is an improvement on the older proposal because it avoids a look-ahead problem (§4.5). Importantly, in this same section, I sketch a proposal for the timing of VI which is in line with Rule Support and which avoids the aforementioned look-ahead problem (see also Chapter 1 for more discussion of this). Finally, I evaluate various aspects of my proposal with respect to others on the market: I show that Moskal's (2015) evidence against the head adjacency constraint may be re-analyzable in a way that satisfies the same; I also briefly discuss the proposals of Embick (2010) and Marantz (2013) (§4.6). Section 4.7 concludes.

4.2 Telugu third-person pronouns have the same structure as lexical nouns

In this section, I argue that along with suppletion in regular lexical nouns, suppletive patterns in third-person pronouns ought also to be part of the testing ground for the predictions of my proposal. A plethora of work has argued for various ways in which the underlying syntactic structure of pronouns is categorically different from that of nouns (Postal, 1966; Elbourne, 2001; Moskal, 2015, *a.m.o*). On such an assumption, it is no longer clear whether or not the behavior of pronominal suppletion would be subject to the same kinds of constraints as the behavior of suppletion in lexical nouns; for example, if there is no n phase head in pronouns, then the phase-based locality constraint adopted in (5) would not apply to pronouns.

I argue, though, that third-person pronouns in Telugu are underlyingly 'pro-nouns'; that is, they are simply anaphoric versions of regular, lexical nouns. Following Déchaine & Wiltschko (2002), Telugu third-person pronouns are NP-pronouns, not DP-pronouns. The primary evidence for this is that in Telugu, unlike English, third-person pronouns can be modified freely by adjectives, demonstratives, and quantifiers. I additionally show, however, that local-person pronouns in Telugu appear to have a different syntax, as they are unmodifiable; thus, I leave them out of the current investigation.

I begin by giving a complete list of third-person pronouns in Telugu:

(8) **Third-person pronouns in Telugu**

<table>
<tr><th></th><th>Singular</th><th>Plural</th></tr>
<tr><td>Masculine</td><td colspan="2"></td></tr>
<tr><td>intimate
casual</td><td>vāḍu
atanu</td><td>vāḷḷu</td></tr>
<tr><td>formal
very formal</td><td>āyana
vāru</td><td>vāru</td></tr>
<tr><td>Feminine</td><td></td><td></td></tr>
<tr><td>intimate
casual</td><td>adi
āme</td><td>vāḷḷu</td></tr>
<tr><td>formal
very formal</td><td>āviḍa
vāru</td><td>vāru</td></tr>
<tr><td>Non-Human</td><td>adi</td><td>avi</td></tr>
</table>

Some background on gender and politeness before we continue. There are three grammatical gender categories in Telugu: masculine (glossed M), feminine (glossed F), and non-human (glossed N). These are not arbitrary; the first two are solely properties of nouns referring to humans of the masculine and feminine social genders, respectively, and the final is solely a property of non-human entities. I assume that the following feature geometry (Bonet, 1991; Harley and Ritter, 2002) applies to gender features in Telugu:

(9) **Feature geometry for gender: Telugu**

[HUMAN]

[MASCULINE] [FEMININE]

The feature geometry in (9) represents my analysis that the masculine and feminine features are more specified than and always entail the human feature (glossed H when relevant), but that the converse is not true: the human feature on its own does not entail either the masculine or feminine feature. I assume that non-human has no featural representation; it is simply the lack of any of the features in (9).

For politeness, following the terminology used in (8), I use I for intimate, C for casual, F for formal, and V for very formal. I assume that there are two binary politeness features [$\pm$P1] and [$\pm$P2] such that the four possible combinations of feature values generate the four politeness distinctions (see Alok (2020) for an analysis of politeness/honorificity akin to this one):

(10) **Featural analysis of politeness: Telugu**

	[+P1]	[-P1]
[+P2]	formal	very formal
[-P2]	casual	intimate

On the view in (10), we can state the difference between the four politeness distinctions found in singular pronouns and the two found in plural ones: both [$\pm$P1] and [$\pm$P2] are active in the singular, but only [$\pm$P2] is active in the plural. The details of this analysis will not be relevant right away, but we will return to them in §4.4 below. For now, it will suffice as a guide to the glossing of pronouns in Telugu.

A classic (Postal, 1966; Abney, 1987; Elbourne, 2001) analysis of English pronouns is that they are determiners, or D heads. An argument in favor of this analysis is that in English, pronouns appear to have a similar distribution to the definite article *the* when it comes to DP-internal modification. Specifically, DP-internal elements which cannot appear to the left of the article in a regular DP similarly cannot appear to the left of a pronoun:

(11) **Numerals and adjectives cannot occur to the left of articles or pronouns**
   a. The three red dogs barked
   b. *Three red the dogs barked
   c. We barked.
   d. *Three red we barked.

Déchaine & Wiltschko (2002) consider the distribution and properties of pronouns cross-linguistically, concluding that while some pronouns in the world's languages are in fact determiners, following the classic analysis, in other cases languages can have pronouns which are in fact nouns. They consider the Japanese pronoun *kare* as an example (Kuroda, 1965; Noguchi, 1997, via (Déchaine and Wiltschko, 2002)):

(12) **NP pronouns: Japanese *kare***

a. tiisai kare
small he
'he who is small'

b. watasi-no kare
I-GEN he
'my boyfriend'

c. kono kare
this he
'this guy right here'

Déchaine & Wiltschko argue that since Japanese *kare*, unlike English pronouns, can be modified by DP-internal elements like adjectives, possessors, and demonstratives, *kare* must be a noun as opposed to a determiner. Following their argument, Telugu third-person pronouns without fail behave like *kare* in allowing modification by DP-internal elements. Below are examples using the third-person pronouns *vāḍu* (3SG.MASC.I) and *vāḷḷu* (3PL.H.I/C); they can apply to the other third-person pronouns in (8) as well (my elicitation):

(13) **Telugu third-person pronouns can be modified**

a. వాడు తిన్నాడు.
vāḍu tin-n-āḍu
3SG.MASC.I.PRO eat-PST-3SG.MASC
'He ate.'

b. ఆ పెద్దవాడు తిన్నాడు.
ā pedda-vāḍu tin-n-āḍu
DEM.DIST big-3SG.MASC.I.PRO eat-PST-3SG.MASC
'That big guy ate.' (lit. 'That big he ate')

c. వాళ్లు తిన్నారు.
vāḷḷu tin-n-āru
3PL.H.I/C.PRO eat-PST-3PL.H
'They ate.'

d. అందరు పెద్దవాళ్ళు తిన్నారు.
andaru pedda-vāḷḷu tin-n-āru
all.H big-3PL.H.I/C.PRO eat-PST-3PL.H

'All the big people ate.' (lit. 'All big them ate')

The examples in (13) show that *vāḍu* and *vāḷḷu*, while they can function as standalone pronouns (13a,13c), they can also be modified by adjectives (13b,13d), demonstratives (13b), and quantifiers (13d).

On the other hand, local-person pronouns in Telugu act more like English pronouns in that they cannot be modified by adjectives, quantifiers, or demonstratives. I demonstrate below with *mēmu* '1PL.PRO.NOM', but this is also true for the other local-person pronouns (my elicitation):

(14) **Local-person pronouns are not modifiable**

a. మేము చదువుతున్నాము.
mēmu caduvu-tu-un-n-āmu
1PL.PRO read-IMPF-BE-NFUT-1PL
'We are reading.'

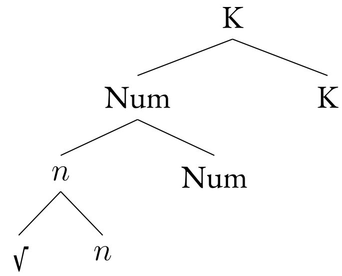
b. *ఆ మేము చదువుతున్నాము.
*ā mēmu caduvu-tu-un-n-āmu
DIST 1PL.PRO read-IMPF-BE-NFUT-1PL
Attempted: 'Those we are reading.'

c. *పెద్ద మేము చదువుతున్నాము.
*pedda mēmu caduvu-tu-un-n-āmu
*big 1PL.PRO read-IMPF-BE-NFUT-1PL
Attempted: 'Big we are reading.'

d. *అందరు మేము చదువుతున్నాము.
*andaru mēmu caduvutu-un-n-āmu
*all.H 1PL.PRO read-IMPF-BE-NFUT-1PL
Attempted: 'All of us are reading'

Taking the facts in (13) as evidence that Telugu third-person pronouns are in fact underlyingly nouns, the natural assumption is that they have the same internal structure as that which I have posited for lexical nouns in Telugu:

(15) **Syntactic structure of Telugu 3rd-person pronouns**



Essentially, I assume that Telugu third-person pronouns are something like *one*-anaphora in English (Déchaine and Wiltschko, 2002): they are syntactically nouns, and realize the same sequence of heads that lexical nominal words do; the only real difference is that the pronominal root has an anaphoric semantics, unlike regular lexical roots. Relatedly, I'd like to emphasize here that considering the level of syncretism seen across the pronominal paradigm in (8), I assume that there is a single pronominal root √PRO for third-person pronouns which corresponds with an anaphoric semantics and whose exponence is conditioned by (features on) the higher heads in the nominal extended projection as in (15). I also assume that gender features are housed at n (Kramer, 2015), and that third-person pronouns lack any person features (Harley and Ritter, 2002, *a.o.*). I assume a binary number feature [±PL] whose positive value corresponds to a plural interpretation and whose negative value corresponds to a singular one; I notate these feature values PL and SG throughout the chapter. Given this, we expect that third-person pronouns should be subject to the same constraints on suppletion that lexical nouns are: while n ought to be able to supplete with respect to Num or K, as long as the head adjacency constraint is satisfied, the root ought only to be able to supplete with respect to Num or K if it separately suppletes or forms a portmanteau with n.

4.3 Suppletion at n: Head Adjacency and insertion at Spans

Now that the empirical domain (lexical nouns and third-person pronouns) has been established, we can begin the investigation by considering the suppletion possibilities at n. The first subsection (4.3.1) discusses suppletion at n with respect to Num, analyzing it under the assumption of a Head Adjacency Constraint on outward-sensitive suppletion. The second (4.3.2) subsection discusses suppletion at n

with respect to K, arguing that while at first glance it looks to violate head adjacency, on a view that allows insertion at Spans, we can maintain head adjacency while also making sense of an adjacency-blocking effect seen in the plural. Finally, pronominal cases are discussed, wherein a putative adjacency violation is ameliorated through an operation of Obliteration (Arregi and Nevins, 2012) which deletes the intervening head before Vocabulary Insertion occurs.

4.3.1 Suppletion of n with respect to Num

As was previously discussed in Chapter 2: in Telugu, while most nouns do not feature an overt exponent of n, there is a small set of overt n suffixes which each select a list of nominal roots (data: Krishnamurti & Gwynn (?)):

(16) **Telugu nominal categorizers**

Suffix	**Examples**
-lu	il-lu 'house'; ol-lu 'body'
-li	nāga-li 'plough'; vāki-li 'threshold'
-ḍi	kāva-ḍi 'carrying pole'
-u	kāl-u 'leg/foot'; ūr-u 'town'
-ḍu	mogu-ḍu 'man'; sūryu-ḍu 'the Sun'
-ru	gor-ru 'harrow'
-yi	cē-yi 'hand'
-am	samudr-am 'ocean'; bangār-am 'gold'

Here are the rules of exponence which apply to the first two n suffixes in (16); the others have parallel rules:

(17) **Rules of exponence:** n

a. $n \rightarrow$ -lu / √HOUSE, BODY...] _

b. $n \rightarrow$ -li / √PLOUGH, THRESHOLD...] _

Recall that non-human gender corresponds to the lack of any gender features on n; since the pattern in (17) is restricted to non-human nouns, I do not specify any features on n in the rules.

The first and clearest case of suppletion at n triggered by Num is as follows: one of the n suffixes in (16), *-yi*, regularly suppletes to *-ti* in the context of the plural suffix *-ḷu* (data and generalization from

Krishnamurti & Gwynn (1985)):

(18) **Suppletion of n with respect to Num: *-yi***

Root	Singular	Plural
cē- 'hand'	cē-yi 'hand-n.SG'	cē-tu-lu 'hand-n.PL-PL'
gō- 'pit'	gō-yi 'pit-n.SG'	gō-tu-lu 'pit-n.PL-PL'
nū- 'well'	nū-yi 'well-n.SG'	nū-tu-lu 'well-n.PL-PL'

The data in (18) show that in the context of this set of three roots, n is exponed differently in the singular and plural: in the former case, it is exponed as *-yi*, but in the latter, as *-tu*. We can write rules of exponence which capture this pattern:

(19) **Rules of exponence: *-yi***
a. $n \rightarrow$ *-yi* / √HAND, PIT, WELL] _
b. $n \rightarrow$ *-tu* / √HAND, PIT, WELL] _] Num.PL

Before continuing the discussion, I define some terms relating to the structure of rules of exponence which will become crucial to understanding the proposal. The 'structural description' of a rule of exponence includes all information besides the exponent itself: the material before the arrow, as well as the material after the forward slash, both before and after the underscore. The 'target' of a rule, or that which is exponed by the rule, includes the abstract morphemes to the left of the arrow, but not those to the right of the forward slash. The 'contextual restriction' of a rule includes only the information to the right of the forward slash. The rules in (19) are a reflection of one of the basic (Embick, 2010; Arregi and Nevins, 2012) assumptions about VI which I adopt:[3]

(20) **The Head Adjacency Constraint**
VI at morpheme X can only be conditioned by the morphosyntactic features of a morpheme linearly adjacent to X.

3. Note that while this chapter will show that head adjacency clearly applies to outward-sensitive suppletion, I do not focus on cases of inward-sensitive suppletion and am somewhat more agnostic about whether or not head adjacency is required for them. If it turns out that inward-sensitive suppletion is subject to different constraints on locality of conditioning from outward-sensitive suppletion (Božič, 2019), head adjacency may need to be tweaked to reflect this.

Recall the sequence of abstract morphemes that makes up the input to Vocabulary Insertion in Telugu nouns:

(21) **Telugu nouns: Input to Vocabulary Insertion**

$$[[[[\sqrt{}]n]\text{Num}]\text{Agr/K}]$$

When Vocabulary Insertion begins, because the representation includes both linear ordering and hierarchical structure, head adjacency can make direct reference to linear adjacency. The constraint in (20) predicts that the contextual restriction (that is, the material to the right of the forward slash in a rule like those in (19)) of a rule of exponence exponing n can include Num or the root, but no higher or lower head. This condition is met by the rules in (19); the rules expone n and their contextual restrictions include only the root and/or Num. We will see later in this chapter how insertion at Spans (Svenonius, 2012) can result in what look like surface violations of head adjacency, and how Rule Support (5) captures when we expect and do not expect rules involving such Spans. However, for now, the constraint in (20) can be stated as is; since n and Num are already adjacent, (20) already rules in rules like those in (19), wherein rules of exponence of n include Num in their contextual restriction.

Besides the micro-class of nouns analyzed above, Krishnamurti & Gwynn (1985) report a number of 'irregular plurals' in the language:

(22) **Other irregular plurals**

Meaning	**Singular**	**Plural**
'stone'	rāyi	rāḷḷu
'marriage/wedding'	peḷḷi	peḷḷiḷḷu
'night'	rātri	rātriḷḷu
'rice paddy'	vari	vaḍḷu
'bullock'	eddu	eḍḷu
'thousand'	vēyi	vēlu
'louse'	pēnu	pēlu
'yoke'	kāḍi	kāṇḍḷu
'son-in-law'	alluḍu	alluṇḍḷu
'younger sister'	cellelu	celleṇḍḷu
'daughter'	kūturu	kūtuṇḍḷu
'sickle'	koḍavali	koḍavaṇḍḷu

For Krishnamurti & Gwynn (1985), the nouns in (22) are irregular because they are all 'one-offs': there are no other nouns which show the same pattern of stem alternation, even in cases where there are in fact other nouns in the language whose stems end in the same sequence of segments. Clearly, something lexically idiosyncratic is occurring here; one analysis could be that this is root suppletion with respect to number. However, note that in all cases in (22), all of the action of the irregularity is occurring in the final syllable of the string to which the plural suffix is attached; the root exponent appears to remain the same *modulo* phonological processes. Thus, I argue, in all of these cases the irregularity is due to suppletion at n with respect to Num.

Since the cases in (22) are all 'one-offs', it isn't trivial to determine what exactly the underlying forms of the exponents of n may be. In some cases, the analysis is straightforward. Let's take 'thousand' and 'louse' from the table above; we see that the alternation between the singular and plural is simply that the final syllable in the singular stem disappears in the plural stem. This is naturally explained by saying that that final syllable is an overt n suffix which alternates with a zero n suffix in the plural:

(23) **Parses: Irregular plurals I**

Meaning	Singular	Plural
'thousand'	vē-yi 'thousand-n'	vē-ø-ḷu 'thousand-n.PL-PL'
'louse'	pē-nu 'louse-n'	pē-ø-ḷu 'louse-n.PL-PL'

(24) **Rules of exponence: Irregular plurals I**

a. $n \rightarrow$ *-yi* / √THOUSAND] _

b. $n \rightarrow$ *-nu* / √LOUSE] _

c. $n \rightarrow$ *-ø* / √THOUSAND, LOUSE] _] Num.PL

For the rest, some knowledge of syncope triggered by the plural is useful in making educated guesses about the pattern of alternation in n. For example, Krishnamurti & Gwynn (1985) state generalizations which amount to the following: plurals ending in *-ḍḷu* are the result of syncope of stems ending in *-ḍḍu* or *-ḍḍi*; this does not appear to be specific to any set of roots or n suffixes, so we can assume it is a general property of Telugu phonology, or a feature of the plural suffix/the phonological cycle it triggers:

(25) **Plurals in *-ḍḷu***

Meaning	Singular	Plural (surface)	Plural (underlying)
'egg'	guḍḍu	guḍḷu	guḍḍu-ḷu
'Reddi'	reḍḍi	reḍḷu	reḍḍi-ḷu
'road'	rōḍḍu	rōḍḷu	rōḍḍu-ḷu

Assuming that the plural marker in the forms in (25) is the standard *-ḷu*, the condition for PStem-final syncopation (see Ch. 2 for a detailed analysis) is met: the PStem ends with a high vowel /u/ or /i/ and the preceding consonant is /ḍ/. I assume, thus, that the phonological processes leading from the underlying form to the surface form in (25) involve syncope as well as cluster reduction of the underlying geminate /ḍḍ/. The latter process, though it was not considered in Ch. 2, is quite plausible, as triconsonantal clusters are very limited in Telugu and /ḍḍḷ/ does not appear to be a possible one in the language.

Thus, in the cases of 'rice paddy' and 'bullock' from (22), we can say that while the singular stems are *vari-* and *eddu-* respectively, the plural stems are *vaḍḍi-* and *eḍḍu-*. These plural stems will derive the correct surface plural forms, as explained above. Now we can 'work backwards' one more step; assuming that the root remains unchanged, what must the underlying forms of the roots as well as all of the relevant n alternants be to derive the correct singular and plural stems?

The following gives the relevant parses, followed by the rules of exponence:

(26) **Irregular plurals II: parses**

Meaning	Singular	Plural	Plural surface form
'rice paddy'	va-ri 'rice.paddy-n.SG'	va-ḍḍi-ḷu 'rice.paddy-n.PL-PL'	vaḍḷu
'bullock'	ed-du 'bullock-n.SG'	ed-ḍu-ḷu 'bullock-n.PL-PL'	eḍḷu

(27) **Irregular plurals II: rules of exponence**

a. $n \rightarrow$ *-i* / √RICE.PADDY] _
b. $n \rightarrow$ *-ḍḍi* / √RICE.PADDY] _] Num.PL
c. $n \rightarrow$ *-du* / √BULLOCK] _
d. $n \rightarrow$ *-ḍu* / √BULLOCK] _] Num.PL

From here, we can parse out the root from the alternating n: In the case of 'bullock', we have a root *ed-* affixed with *-ḍu*, wherein the root-final dental /d/ assimilates to the following retroflex. While I do not have positive evidence that this stem-internal assimilation process is part of the regular phonology of the language, it is certainly very plausible; /dḍ/ clusters do not occur at all in Telugu, so it would be natural for there to be a repair process which applies to forms whose underlying representation includes such. In the case of 'rice paddy', I posit that the correct parse of singular *vari* is *va-ri*, where the first element is the root and the second element is the exponent of n inserted in the context of the singular. In the plural, *-ri* is replaced with the irregular n exponent *-ḍḍi*, such that the underlying form of the plural is *va-ḍḍi-ḷu*, which becomes *vaḍḷu* after regular syncope and degemination, as desired. Note that the choice of /u/ vs. /i/ for the final vowel of the plural alternants of n is arbitrary, as either would result in the same syncope and thus the same surface form.

The next set of irregular plurals which form a micro-systematic group are those involving a nasal in the plural: *allu(ḍu/ṇḍḷu)* 'son-in-law(s)', *celle(lu/ṇḍḷu)* 'younger sister(s)', *kūtu(ru/ṇḍḷu)* 'daughter(s)', and *koḍava(li/ṇḍḷu)* 'sickle(s)'. Krishnamurti & Gwynn (1985) note a generalization about plurals of nouns whose singular forms end in /ṇḍ(u/i)/; they all have plurals ending in /ṇḍḷu/:

(28) **Plurals in *-ṇḍḷu***

Meaning	Singular	Plural (surface)	Plural (underlying)
'cart'	baṇḍi	baṇḍḷu	baṇḍi-ḷu
'fruit'	paṇḍu	paṇḍḷu	paṇḍu-ḷu
'bullet'	guṇḍu	guṇḍḷu	guṇḍu-ḷu

As we did above, we can use this generalization to posit underlying forms and parses for the nouns with irregular plurals in *-ṇḍḷu*:

(29) **Irregular plurals in *-ṇḍḷu*: parses**

Meaning	Singular	Plural (underlying)	Plural (surface)
'son-in-law'	allu-ḍu 'son.in.law-n.SG'	allu-ṇḍu-ḷu 'son.in.law-n.PL-PL'	alluṇḍḷu
'younger sister'	celle-lu 'younger.sister-n.SG'	celle-ṇḍu-ḷu 'younger.sister-n.PL-PL'	celleṇḍḷu
'daughter'	kūtu-ru 'daughter-n.SG'	kūtu-ṇḍu-ḷu 'daughter-n.PL-PL'	kūtuṇḍḷu
'sickle'	koḍava-li 'sickle-n.SG'	koḍava-ṇḍu-ḷu 'sickle-n.PL-PL'	koḍavaṇḍḷu

(30) **Irregular plurals in *-ṇḍḷu*: rules of exponence**

a. $n \rightarrow$ *-ḍu* / √SON.IN.LAW...] _
b. $n \rightarrow$ *-lu* / √YOUNGER.SISTER...] _
c. $n \rightarrow$ *-ru* / √DAUGHTER...] _
d. $n \rightarrow$ *-li* / √SICKLE...] _
e. $n \rightarrow$ *-ṇḍu* / √SON.IN.LAW, YOUNGER.SISTER, DAUGHTER, SICKLE...] _] Num.PL

After 'undoing' syncope following the generalization in (31), we can again posit a special exponent of n which is inserted in the context of plural features as well as the relevant roots, as demonstrated by the rules of exponence in (30). Again, the choice of /u/ or /i/ for the final vowel of the plural-conditioned exponent of n is arbitrary, as either vowel would result in the same syncope and thus the same surface form.

Finally, the last set of irregular plurals in (22) all end in /ḷḷu/: *rā(yi/ḷḷu)* 'rock(s)', *rātri(ḷḷu)* 'night(s)', and *peḷḷi(ḷḷu)* 'wedding(s)/marriage(s)'. Taking a final look at the generalizations about surface plural forms in Krishnamurti & Gwynn (1985), there are many underlying stem forms which can result in a plural form ending in /ḷḷu/ after syncope and assimilation. Stems ending in /ḍ(u/i)/, /r(u/i)/, or /l(u/i)/ (the latter two only when the stem has more than two syllables (see Chapter 2 for an analysis) all result in plurals ending in /ḷḷu/:

(31) **Plurals in *-ḷḷu***

Meaning	Singular	Plural (surface)	Plural (underlying)
'school'	baḍi	baḷḷu	baḍi-ḷu
'backyard'	peraḍu	peraḷḷu	peraḍu-ḷu
'town'	ūru	ūḷḷu	ūru-ḷu
'doorway'	vākili	vākiḷḷu	vākili-ḷu

For the fourth and final time, we can 'work backwards' from the irregular plural forms in this set to posit parses and possible underlying forms for the plural-triggered irregular n exponent(s):

(32) **Irregular plurals in *-ḷḷu*: parses**

Meaning	Singular	Plural (underlying)	Plural (surface)
'rock'	rā-yi 'rock-n.SG'	rā-ḍi-ḷu 'rock-n.PL-PL'	rāḷḷu
'night'	rātri-ø 'night-n.SG'	rātri-ḍi-ḷu 'night-n.PL-PL'	rātriḷḷu
'wedding/marriage'	peḷḷi-ø 'wedding-n.SG'	peḷḷi-ḍi-ḷu 'wedding-n.PL-PL'	peḷḷiḷḷu

(33) **Irregular plurals in *-ḷḷu*: rules of exponence**

a. $n \rightarrow$ *-yi* / √ROCK...] _
b. $n \rightarrow$ *-ø* / √NIGHT, WEDDING...] _
c. $n \rightarrow$ *-ḍi* / √ROCK, NIGHT, WEDDING...] _] Num.PL

As before, the generalizations about syncope narrow the analytical space for the underlying forms of the irregular, plural-triggered n exponents. Since, by hypothesis, the plural stem for 'rock' is disyllabic, we know that the underlying form of the n exponent cannot be /ri/ or /li/, as that would trigger the disyllabic exception to syncope (see Chapter 2) and we would get **rārulu* or **rālulu* in the plural, contrarily to fact. Thus, any form such that either the final vowel is /u/ or the initial consonant is /ḍ/ will work. For consistency's sake, I have posited *-ḍi* for all of the forms in this subset of the irregular plurals.

The primary take-away from this subsection is the following: suppletion of n with respect to Num is robustly attested in Telugu. Both in the case of the small class of nouns exemplified by *cē-yi, cē-tu-lu* 'hand(s)' as well as the larger set of irregular plurals cited by Krishnamurti & Gwynn (1985), we can clearly analyze the alternations in form found in the plurals to be due to alternations in n; these analyses are supported by general phonological processes in the language found in regular plurals, like syncope and subsequent consonant assimilation. Since n and Num are adjacent, this is predicted by my proposal.

4.3.2 Suppletion of n with respect to case

In the previous subsection, I discussed Telugu patterns showing that n can supplete with respect to Num. In this subsection, I show that n can also supplete with respect to K: in particular, one form occurs in the nominative, while another occurs in all non-nominative cases (oblique cases). I also observe that this suppletion only occurs in the singular. I argue that this adjacency-blocking pattern is predicted by the combination of the head adjacency constraint in (20) and by my assumption that Vocabulary Insertion can target Spans (Svenonius, 2012): in principle, Spanning can feed adjacency (so a rule exponing n can be conditioned by K non-adjacently *as long as that rule also expones/targets Num*), but when intervening heads are exponed separately by overt suffixes (as in the plural), Spanning cannot ameliorate head adjacency violations.

As briefly discussed in Chapter 2, one of the main ways in which n suffixes in Telugu can be diagnosed as separable from the root is that they can supplete with respect to case in the singular; these suppletive forms are called 'obliques' in the descriptive literature (Krishnamurti and Gwynn, 1985):

(34) **Telugu nominal categorizers: suppletion with respect to case**

Root/Meaning	**Nominative**	**Oblique**
in- 'house'	il-lu-ø 'house-*n*.SG-NOM'	in-ṭi-ki 'house-*n*.SG-DAT'
nō- 'mouth'	nō-ru-ø 'mouth-*n*.SG-NOM'	nō-ṭi-ki 'mouth-*n*.SG-DAT'
nāga- 'plough'	nāga-li-ø 'plough-*n*.SG-NOM'	nāga-ṭi-ki 'plough-*n*.SG-DAT'
kāva- 'pole'	kāva-ḍi-ø 'pole-*n*.SG-NOM'	kāva-ṭi-ki 'pole-*n*.SG-DAT'
gū- 'nest'	gū-ḍu-ø 'nest-*n*.SG-NOM'	gū-ṭi-ki 'nest-*n*.SG-DAT'
mogu- 'man'	mogu-ḍu-ø 'man-*n*.SG-NOM'	mogu-ni-ki 'house-*n*.SG-DAT'
kāl- 'leg/foot'	kāl-u-ø 'leg-*n*.SG-NOM'	kāl-i-ki 'leg-*n*.SG-DAT'
gor- 'harrow'	gor-ru-ø 'harrow-*n*.SG-NOM'	gor-ti-ki 'harrow-*n*.SG-DAT'
cē- 'hand'	cē-yi-ø 'hand-*n*.SG-NOM'	cē-ti-ki 'hand-*n*.SG-DAT'

In all of the cases in (34), the pattern is exactly the same: the *n* suffix takes one form in the nominative, and a second in the context of all non-nominative (oblique) cases (in (34) and in the rest of the chapter, represented by the dative *-ki*). As in the alternations in §4.3.1, the root always remains the same/does not supplete.

The pattern in (34) presents a problem for my proposal as thus far stated. The input to VI for a singular form like *kāl-i-ki* 'leg-*n*.SG-DAT' above would look like the following:

(35) **Input to VI for *kāl-i-ki***
[[[[√LEG]*n*]Num.SG]K.DAT]

A priori, a rule of exponence targeting *n* but conditioned by K would violate the head adjacency constraint. I argue that rules of exponence can target contiguous sequences, or Spans (Svenonius, 2012, *et seq.*) of abstract morphemes.[4] I define contiguity in this context on linearized strings of abstract morphemes; given a string X]Y]Z], any span which includes X and Z must also include Y. I also assume that insertion at Spans feeds adjacency; that is, the head adjacency constraint applies with respect to the leftmost or rightmost head targeted by a given rule of exponence. Thus, rules like those below can be posited

4. Another posited solution to this kind of problem is the Pruning approach (Embick, 2010; Paparounas, 2024), on which abstract morphemes not exponed overtly by VI are deleted, such that this deletion can feed adjacency requirements for later steps of VI. While the fact that there is no separate singular suffix in (34) makes this approach look promising, it has been pointed out (Embick, 2010; Angelopoulos and Spyropoulos, 2025) that while Pruning works for inward-sensitive suppletion, there is a lookahead problem when it comes to outward-sensitive suppletion: if Pruning occurs after VI, then by definition it cannot feed adjacency for outward-sensitive conditions, as outward heads have not yet undergone VI. While Embick (2010) posits a pre-VI 'radical pruning' operation as a solution to the lookahead problem, such an operation would require the derivation to know that Num.SG will not be exponed overtly before VI begins. While for languages that never expone singular overtly, this is natural, in Telugu, this is not possible, as there is in fact an irregular class of nouns which take an overt singular suffix *-ni* (see Aitha (sion) for more).

to explain suppletion in oblique cases as shown in (34):

(36) **Oblique suppletion: rules of exponence**

a. n]Num.SG→ -i / √LEG,TOWN,...] _] K.OBL

b. n]Num.SG→ -ṭi / √PLOUGH,DOORWAY,...] _] K.OBL

In (36), I posit that the suffixes *-i* and *-ṭi* are inserted in the context of a K head bearing the feature OBL, which I assume is some feature common to all non-nominative cases (Caha, 2009). Since n and Num form a contiguous span in the string of abstract morphemes in (35), a rule of exponence can target them at the same time. Since K is adjacent to the rightmost morpheme targeted by the rules in (36), K can be in the contextual restriction of those rules.

A minor, but important, aside follows. A standard assumption of Distributed Morphology (Halle and Marantz, 1993) is that Vocabulary Insertion occurs 'one node at a time'. Of course, that cannot strictly be maintained if single exponents can be inserted at multiple heads at once, as in my Spanning proposal. However, I argue that in principle, nothing much has to change about the general algorithm for root-out VI to accommodate insertion at Spans:

(37) **Algorithm for root-out VI with insertion at Spans**

a. Input: [[[[√]n]Num]K]

b. Step 1: VI occurs at the root; rules exponing the root compete and one wins out wherein the target is the Span [[√]n].

c. Step 2: Exponence: [[[[√]n]Num]K] → /exp1/]Num]K]

d. Step 3: The VI algorithm identifies the head closest to the root which is unexponed, in this case Num. VI occurs at Num. Rules exponing Num compete and one wins out, etc. etc.

Thus, as long as the root-out VI algorithm is tweaked such that VI can only target unexponed heads (which *a priori* seems quite natural), we can maintain root-out VI even with insertion at Spans.

So far, I have shown how assuming serial, root-out VI which can insert exponents at Spans can explain how suppletion of n can be conditioned by K as seen in the singular forms in (34). Now, we move to plurals: across the board, when the same nouns as in (34) are pluralized, n no longer alternates (data from my elicitation; my generalization):[5]

(38) **Telugu nominal categorizers: no case-conditioned suppletion in the plural**

Root/Meaning	Nominative	Oblique
in- 'house'	il-lu-ḷu-ø'house-*n*-PL-NOM'	il-lu-ḷu-ki 'house-*n*-PL-DAT'
nō- 'mouth'	nō-ru-ḷu-ø'mouth-*n*-PL-NOM'	nō-ru-ḷu-ki 'mouth-*n*-PL-DAT'
nāga- 'plough'	nāga-li-ḷu-ø'plough-*n*-PL-NOM'	nāga-li-ḷu-ki 'plough-*n*-PL-DAT'
kāva- 'pole'	kāva-ḍi-ḷu-ø'pole-*n*-PL-NOM'	kāva-ḍi-ḷu-ki 'pole-*n*-PL-DAT'
gū- 'nest'	gū-ḍu-ḷu-ø'nest-*n*-PL-NOM'	gū-ḍu-ḷu-ki 'nest-*n*-PL-DAT'
mogu- 'man'	mogu-ḍu-ḷu-ø'man-*n*-PL-NOM'	mogu-ḍu-ḷu-ki 'house-*n*-PL-DAT'
kāl- 'leg/foot'	kāl-u-ḷu-ø'leg-*n*-PL-NOM'	kāl-u-ḷu-ki 'leg-*n*-PL-DAT'
gor- 'harrow'	gor-ru-ḷu-ø'harrow-*n*-PL-NOM'	gor-ru-ḷu-ki 'harrow-*n*-PL-DAT'

In (38), we see that in the plural, *n* always takes its nominative form, even in the context of an OBL-bearing case. My proposal in fact predicts that in cases like (38), where the intervening Num head is exponed overtly, *n* can never supplete with respect to K. The logic is as follows: under head adjacency, in order for a rule of exponence to include K in its structural description, the highest head it targets has to be, at the very lowest, Num. If Num is overtly exponed by a separable affix (in this case plural *-ḷu*), and assuming that an abstract morpheme can only be exponed once, then there is no way for the affix exponing *n* to also be exponing Num; that is, the following sequence of rules is an impossible one given the data:

(39) **An impossible rule sequence**

a. *n*]Num.PL→ -i / √LEG,TOWN,...] _] K.OBL

b. Num.PL→ -ḷu

Given root-out VI, when VI targets *n*, (39a) will apply; since *-i* would then expone both *n* and Num, its exponence can be conditioned by K. However, then the rule in (39b), which *also* expones Num, could not apply, as Num has already been exponed at the previous instance of VI. Root-out VI would then target K instead, and we would end up with a plural form without *-ḷu*, contrary to fact. Instead, rules of exponence for oblique suppletion have to look like those below, for the alternant pairs *-u/i* and *-li/-ṭi*:

5. The reader may recall from Chapter 2 that on the surface, plural *-ḷu* becomes *-ḷa* whenever it is not word-final. Since this is a (exponent-specific) phonological alternation not triggered by case, I do not reflect it in (38).

(40) **Oblique suppletion: rules of exponence**

a. $n \rightarrow$ -u / √LEG,TOWN,...] _

b. n]Num.SG→ -i / √LEG,TOWN,...] _] K.OBL

c. $n \rightarrow$ -li / √PLOUGH,DOORWAY,...] _

d. n]Num.SG→ -ṭi / √PLOUGH,DOORWAY,...] _] K.OBL

While the rules in (40) only cover two of the alternant pair sets, I assume parallel rule pairs for all of the alternant pairs in (34), as they all behave the same in the singular and plural.

At this point it is important to clarify another aspect of my assumptions regarding insertion at Spans. On my view, while *targets* of a rule of exponence (*i.e.,* the head(s) at which the exponent is inserted) can be spans, (outward-sensitive) contextual restrictions cannot be. So for example, the following rule is not a possible one on my view:

(41) **Targets can be spans, but conditions cannot be**

$n \rightarrow$ /exp/ / _] Num.SG] K.OBL

This marks a difference between my view and that of another thread of work (Merchant, 2015; Moskal, 2015; Božič, 2019), wherein conditions can consist of spans. The advantage of making this change is that those systems would rule in patterns wherein a head X's exponence is conditioned by non-adjacent head Z across a head Y which is exponed separately. Take the alternative ruleset below, which will capture the same Telugu facts as my view will:

(42) **What if conditions could be spans?**

a. $n \rightarrow$ -u / √LEG,TOWN,...] _

b. $n \rightarrow$ -i / √LEG,TOWN,...] _] Num.SG] K.OBL

The rules in (42) capture the fact that the form *-i* is restricted to contexts with both singular features on Num and oblique/non-nominative features on K. However, on a view allowing exponence to be conditioned by spans, there would be nothing disallowing the following ruleset:

(43) **A possible ruleset?**

a. Input to VI: [[[[√LEG]n]Num.PL]K.OBL]

b. $n \rightarrow$ -u / √LEG,TOWN,...] _

c. $n \rightarrow$ -i / √LEG,TOWN,...] _] Num.PL] K.OBL

d. Num.PL→ -ḷu

The ruleset in (43) would allow exponence of n to be triggered by K across an overt plural suffix; we'd get a nominative/dative alternation like **kāl-u-ḷu/kāl-i-ḷu-ki*, where *-i* is inserted at n in the context of the dative features on K, followed by a regular insertion of *-ḷu* at Num. Not only do we never see this kind of pattern in Telugu, adjacency blocking effects like the ones shown for Telugu are incredibly common cross-linguistically. Cases of 'adjacency non-blocking', in contrast, while they have been posited (Moskal, 2015; Merchant, 2015; Božič, 2019), are vanishingly rare. I take it to be the case, thus, that the right theory of the locality of suppletion should treat adjacency blocking as a core case and treat 'adjacency non-blocking' as exceptional in some way.[6]

So far, I have shown that exponence which looks to be conditioned by a non-adjacent, outward morpheme should be analyzed as insertion at a Span, just when none of the intervening heads/morphemes are separately exponed overtly. I now discuss another way in which potential head adjacency violations can be ameliorated: feature markedness operations like Obliteration (Arregi and Nevins, 2012). I will consider the the singular/plural human formal/very formal pronoun *vāru* '3SG/PL.H.F/V.PRO' and the plural human intimate/casual pronoun *vāḷḷu* '3PL.H.I/C'. I repeat the full paradigm of third-person pronouns below from (8) for ease of reference (data: Krishnamurti & Gwynn (1985)):

6. While I will not fully address the question of how to analyze 'adjacency non-blocking' effects in a system with strict adjacency in this dissertation, a promising direction could be to consider the attested patterns through the lens of the word-internal head/modifier distinction (Gouskova and Bobaljik, 2022; Fenger and Weisser, pear): if it can be shown that the interveners in the attested cases are actually adjuncts/modifiers within the word, then instead of loosening head adjacency altogether, we could tweak it such that modifiers do not count as interveners for head adjacency. For example, Moskal (2015) cites an example from Tamil pronouns (Schiffman, 1999) wherein the oblique alternant of the pronominal stem can be triggered even across the overt plural suffix *-(n)ga(l)*. However, elsewhere in his grammar, Schiffman (1999) points out that the plural suffix in Tamil is optional for inanimate nouns. Optionality has independently been argued to be evidence that a plural marker is a modifier and not a head (Wiltschko, 2008; Kim and Melchin, 2018). Further work will be required to confirm whether or not this kind of analysis works for Tamil or for the other reported cases of suppletion across overt interveners.

(44) **Third-person pronouns**

	Singular	**Plural**
Masculine		
intimate casual	vāḍu atanu	vāḷḷu
formal very formal	āyana vāru	vāru
Feminine		
intimate casual	adi āme	vāḷḷu
formal very formal	āviḍa vāru	vāru
Non-Human	adi	avi

Recalling the 'work backwards' strategy used to posit possible n exponents for the irregular plurals in §4.3.1, /ḷḷu/ is the expected result of syncope and consonant assimilation for underlying PStem-final /ru/ followed by /ḷu/ (cf. Chapter 2). Since both pronouns have the same gender specification, assuming that gender is housed at n (Kramer, 2015), it's a very natural assumption that *vāḷḷu* is underlyingly *vāruḷu*. Assuming the correct parses and glosses of the two pronouns to be, thus, *vā-ru* '√PRO-n.H.F/V' and *vā-ru-ḷu* '√PRO-n.H.I/C-PL', we can take a look at their suppletion behavior with respect to case through this lens:

(45) **Suppletion of n with respect to K: pronouns**

	vā-ru	**vā-ru-ḷu**
Nominative	vā-ru	vā-ru-ḷu (surface: vāḷḷu)
Dative	vā-ri-ki	vā-ru-ḷu-ki (surface: vāḷḷaki)

As with nouns, we can see in (45) that pronominal n can supplete with respect to K in exactly the same case: plural *-ḷu* in *vāḷḷu* blocks suppletion, but suppletion is not blocked when there is no separate exponent of Num intervening between n and K. In that case, we get an alternation between the exponents *-ru* and *-ri* for n.[7] However, there is one obvious difference between the pronominal case and the lexical nominal case: singulars of lexical nouns are unambiguous for number, but the pronoun *vāru* can refer to a plural or a singular referent, as long as they have the right politeness properties. This is true regardless

7. It is not the case that the *-ru/-ri* alternation is a result of vowel harmony: in nouns, the only target for harmony is PStem-internal /i/. We can see in (45) that when there is no overt PStem-external material, as in the singular nominative *vāru*, the n vowel is in its underlying form /u/. Thus, this vowel is not a possible harmony target, and the alternation between *-ru* and *-ri* must not be due to harmony.

of the case of *vāru*. Recall that for nouns, I assumed that the suppletive alternant of n in the singular was actually exponing the span n-Num.SG. This will not work for *vāru*: if *-ru* expones Num.SG in the dative form *vā-ri-ki*, it would be difficult to explain why *vā-ri-ki* can have a plural referent. Instead, I argue that the Num head is Obliterated (Arregi and Nevins, 2012) in the context of the politeness feature [+P2] (recall that this is the feature shared by formal and very formal pronouns) by the following rule, crucially before Vocabulary Insertion occurs at n:

(46) **Obliteration of Num by politeness**
In the context of a n head bearing [+P2], delete the Num head.

The rule in (46) explains the availability of suppletion at n for *vāru* but not *vāḷḷu*, while also explaining why *vāru* is ambiguous for number. The idea is that at the point at which VI occurs at n, we have the underlying structure vā-n.H.V-K.OBL; that is, n and K are already adjacent because Num has previously been Obliterated. Then, we can posit rules of exponence like the following:

(47) **Rules of exponence for pronominal oblique**
a. n.H→ -ru
b. n.H→ -ri / _] K.OBL

The rule in (47b) can simply make reference only to K without also referencing Num, as it applies when there is no Num in the structure. By hypothesis, Obliteration takes place before Vocabulary Insertion, but is still part of PF, not the narrow syntax. Thus, given the assumptions of the Y-model of grammar, Num is only deleted at PF, such that Num and its features are still available for LF interpretation. Thus, *vāru* can get either singular or plural interpretation in the normal way: whichever features it bears in a given derivation are those which are interpreted by LF.

4.4 Root suppletion: Phase Heads and Rule Support

In the previous section, I considered the suppletion behavior of n with respect to the outward heads Num and K. I argued for a core tenet of my proposal, the head adjacency constraint. While the constraint was straightforwardly satisfied by suppletion at n triggered by Num, it was less straightforward in cases where the exponence of n looked to be conditioned by K. I showed that on the assumption that rules of exponence can target spans (but crucially, that their contextual restrictions cannot include spans), head adjacency can be maintained and can help understand the adjacency blocking pattern we see in suppletion of n triggered by case. Additionally, I showed that deletion of intervening heads by Obliteration can also feed adjacency with respect to Vocabulary Insertion.

In this section, I argue, following the discussion in §4.1, that exponence at the root is subject to an additional restriction, repeated below from (5):

(48) **Rule Support**
Given the configuration below (linear order irrelevant), assuming Y is a phase head and Z is some head higher than Y, a rule R targeting X whose structural description includes Z can only exist if a rule R' targeting X exists whose structural description includes Y but no higher head.

[[[X] **Y**] ... Z]

This is done in two steps: first, I consider the most common pattern, wherein the root does not supplete at all, pointing out that among these roots, those which can vary in the choice of n do not show any variance in root exponence conditioned by n. Rule Support predicts, as is the case, that such roots' exponence should not be able to be conditioned by number or case. Next, I consider the exceptional non-human pronouns *adi* and *avi*, which do show root suppletion with respect to number and case, arguing that, as predicted, this is possible because the relevant rules are supported by separate ones wherein the pronominal root's exponence is conditioned solely by n. In the process, a more full analysis of exponence in third-person pronouns in general is undertaken.

4.4.1 *Most roots do not supplete at all*

One of the predictions of my Rule Support proposal is as follows: if, for a root √ROOTX, there is no rule targeting √ROOTX whose structural description (*i.e.,* target or contextual restriction) includes n but not Num or K, then there is no rule targeting √ROOTX whose structural description includes Num or K.

For the paradigms we have considered thus far, this is trivially true: *n* clearly suppletes with respect to Num/K, but just as clearly, the root does not:

(49) **Roots remain constant when *n* suppletes**

Sing. Nom.	**Plur. Nom.**	**Sing. Dat.**
kāl-u-ø 'leg-*n*-NOM'	kāl-u-ḷu-ø 'leg-*n*-PL-NOM'	kāl-i-ki 'leg-*n*.SG-DAT'
nō-ru-ø 'mouth-*n*-NOM'	nō-ru-ḷu-ø 'mouth-*n*-PL-NOM'	nō-ṭi-ki 'mouth-*n*.SG-DAT'
vā-ru-ø 'PRO-*n*.H.F/V-NOM'	vā-ru-ḷu-ø 'PRO-*n*.H.I/C-PL-NOM'	vā-ri-ki 'PRO-*n*.H.F/V-DAT'

Most roots do not supplete for features on *n*, so we cannot diagnose whether or not exponence of those roots is conditioned by *n*. Some roots, though, do occur in the context of different *n* heads with different feature sets. For example, there is a class of roots (usually Sanskrit borrowings) which can alternate between the masculine *n* suffix *-ḍu* and a feminine *n* suffix *-rālu*, with the expected difference in meaning (data: Brown (1903), Gwynn (1991)):

(50) **Roots showing alternation in *n***

Root/Meaning	**Masculine**	**Feminine**
snēhitu- 'friend'	snēhitu-ḍu 'friend (masc.)'	snēhitu-rālu 'friend (fem.)'
antaku- 'devil, demon'	antaku-ḍu 'he-devil, Yama'	antaku-rālu 'she-devil'
iṣṭu- 'favored'	iṣṭu-ḍu 'favored man'	iṣṭu-rālu 'favored woman, mistress'
pōṣaku- 'patron'	pōṣaku-ḍu 'patron (masc.)'	pōṣaku-rālu 'patroness'

The table in (50) shows that the exponence of this class of root does not appear to depend on the choice of *n*: regardless of if *n* has masculine or feminine features on it, the root exponent chosen is the same. Rule Support does make a prediction here. There is no rule of exponence targeting, say, √FRIEND whose structural description includes *n* but not Num or K, because even when *n* varies, the root does not vary with it. Thus, according to Rule Support, there is also no rule of exponence targeting √FRIEND whose structural description includes Num or K. This is borne out; while in some cases we see alternation of *n* with respect to Num or K, the root exponent itself remains constant:

(51) **Root exponence cannot depend on Num or K if the *n* domain is not suspended**

Sing. Nom.	**Plur. Nom.**	**Sing. Dat.**
snēhitu-ḍu-ø 'friend-*n*.MASC-NOM'	snēhitu-ø-ḷu-ø 'friend-*n*.H-PL-NOM'	snēhitu-ni-ki 'friend-*n*.M.SG-DAT'
snēhitu-rālu-ø 'friend-*n*.FEM-NOM'	snēhitu-rālu-ḷu-ø 'friend-*n*.FEM-PL-NOM'	snēhitu-rāli-ki 'friend-*n*.F.SG-DAT'
antaku-ḍu-ø 'devil-*n*.MASC-NOM'	antaku-ø-ḷu-ø 'devil-*n*.H-PL-NOM'	antaku-ni-ki 'devil-*n*.M.SG-DAT'
snēhitu-rālu-ø 'friend-*n*.FEM-NOM'	snēhitu-rālu-ḷu-ø 'friend-*n*.FEM-PL-NOM'	snēhitu-rāli-ki 'friend-*n*.FEM.SG-DAT'

It is clear from the data in (51) that while exponence of n appears to be in some sense dependent on Num and K, exponence of the root itself is not. [8]

4.4.2 Pronouns: when root exponence depends on number and case, it also depends on n

Where the correctness of Rule Support really can be tested is with patterns where exponence of an abstract morpheme is clearly outwardly conditioned across a phase head – in these cases, Rule Support makes the strong prediction that the exponence of that morpheme must also separately be conditioned solely by the phase head itself. In this subsection, I argue that this is borne out for Telugu nominals: the only time we ever see root exponence being conditioned by Num or K is in non-human pronouns; since the exponence of the pronominal root √PRO is clearly conditioned by n (the locus of gender and politeness features), this is predicted by Rule Support.

The table below gives the relevant paradigm for third-person non-human pronouns with respect to number and case:

(52) **Non-human third-person pronouns in Telugu**

	Nominative	**Dative**
Singular	adi '√PRO.n.SG'	dāni-ki '√PRO.n.SG-DAT'
Plural	avi '√PRO.n.PL'	vāṭi-ki '√PRO.n.PL-DAT'

As reflected in (52), recall that I am assuming that n for non-human nominals bears no gender or politeness features whatsoever. Below are the posited rules of exponence capturing the patterns in (52):

(53) **Rules of exponence for non-human pronouns**

a. √PRO]n]Num.SG→ adi
b. √PRO]n]Num.SG→ dāni / _] K.OBL
c. √PRO]n]Num.SG→ avi
d. √PRO]n]Num.SG→ vāṭi / _] K.OBL

8. As reflected in (51), the masculine suffix *-ḍu* is not compatible with plural *-ḷu* in the relevant paradigms. It is also the case that the interpretation of plural forms like *snēhitulu* and *antakulu* is gender-ambiguous: the referents still have to be human, but they do not necessarily have to be of the masculine social gender. I argue that in the context of a non-pronominal root and plural features on Num, the masculine feature is Impoverished, leaving behind the human feature, which, as I mentioned above in (9), is always entailed by the masculine.

The rules posited in (53), when they apply, expone the root and include n, Num, and K in their structural description. This is exactly the kind of pattern that Rule Support restricts: if the rules in (53) reflect the correct analysis of the relevant forms, then we expect the following to be true: there should be additional rules of exponence for the pronominal root √PRO whose structural descriptions include the same root and n but not Num or K. Let's take another look at the full paradigm of third-person pronouns in Telugu, this time with parsing and glossing reflecting my analysis:

(54) **Third-person pronouns (again)**

	Politeness	**Masc. Singular**	**Fem. Singular**	**Plural**
Human	intimate	vā-ḍu '√PRO-n.MASC.I'	adi '√PRO.n.SG'	vā-ru-ḷu '√PRO-n.H.I/C-PL'
	casual	atan-u '√PRO-n.M.C'	āme '√PRO.n.FEM.C'	
	formal	āyana '√PRO.n.MASC.F'	āviḍa '√PRO.n.FEM.F'	vā-ru '√PRO-n.H.F/V'
	very formal	vā-ru '√PRO-n.H.V'	vā-ru '√PRO-n.H.V'	
Non-Human	N/A	adi '√PRO.n.SG'		avi '√PRO.n.PL'

From the table in (54), it is very clear that in fact the pronominal root's exponence does depend on n independently from Num or K. The best example is the distribution of the exponent *vā-*: it appears to be conditioned by the human feature on n – it occurs in both of the human plural forms, which do not show masculine vs. feminine gender distinctions, but it also occurs in both the singular and the plural, as it occurs in the masculine intimate singular form *vā-ḍu*. To analyze its distribution, I begin by observing that the reduction in gender distinctions between the singular and plural is a classic case of Impoverishment (Arregi and Nevins, 2012) and posit the following rule to capture it:

(55) **Plural gender Impoverishment**
In the context of the pronominal root √PRO and Num.PL, delete masculine and feminine features on n.

Recall that I am assuming a feature geometry for gender in Telugu wherein both the masculine and feminine features entail a separate human feature on n (repeated below from (9)):

(56) **Feature geometry for gender: Telugu**

[HUMAN]

[MASCULINE] [FEMININE]

Given (55), the features MASCULINE and FEMININE are Impoverished, leaving behind the entailed HUMAN feature. Thus, we can posit the following rule of exponence for *vā-*:

(57) **Rule of exponence for *vā-***
√PRO → vā- / _] n.H

The combination of (57) and (55) serve to explain why *vā-* is the only root exponent found in the human plural. Since masculine and feminine features always entail the human feature, we expect that *vā-* can be inserted even in the singular just as long as (57) is not outcompeted by more specified rules of exponence; this is why *vā-* occurs in the masculine intimate singular *vā-ḍu* and the masculine/feminine singular very formal *vā-ru*. Furthermore, as we've seen (49), *vā-* can occur regardless of case; while oblique features on K can trigger suppletion of n, *vā-* remains the same in those cases. Thus, as reflected in (57), the exponence of the pronominal root depends on n (specifically, the human gender feature located on n) in a way which does not (directly) involve Num or K. The existence of an exponence rule like the one in (57), thus, serves to support rules like the ones in (53), which expone the pronominal root and whose structural descriptions include Num and K:[9]

(58) **Rule of exponence for *vā-***
a. √PRO → vā- / _] n.H
b. √PRO]n]Num.SG→ dāni / _] K.OBL

Since the two rules above both include in their structural descriptions the root and n, they count as comparable rules for the purpose of Rule Support. Thus, since (58a)'s structural description includes the pronominal root and the phase head n but no higher head, it is enough to support (58b), which conditions exponence of the pronominal root *across* n. At this point, it is important to make explicit an implicit assumption I have been making about Rule Support. I restate the condition below:

9. Comparing (57) to the rules in (53), it is actually not clear *a priori* what the result of competition for application would be when both can apply, as they are not in a subset-superset relationship with each other. Without going into too much detail, I assume that something like Choi & Harley's (2019) Local Allomorph Selection Theorem is involved such that (57), which is sensitive to a more local feature than (53), will win out when both can in principle apply.

(59) **Rule Support**
Given the configuration below (linear order irrelevant), assuming Y is a phase head and Z is some head higher than Y, a rule R targeting X whose structural description includes Z can only exist if a rule R' targeting X exists whose structural description includes Y but no higher head.

$$[[[\, \mathrm{X} \,]\; \mathbf{Y} \,]\; ...\; \mathrm{Z} \,]$$

When comparing two rules, when exactly is it the case that both rules include the heads/morphemes 'X' and 'Y'? I argue that the answer is tied to the notion of morphosyntactic category. For the purposes of Rule Support, n is always n, regardless of the features it may bear. The same is true for Num and K. On the other hand, since roots do not bear categorial features (Marantz, Marantz, 1997a; Arad, 2003, *et seq.*), each separate root counts as a 'different morpheme', such that R and R' must involve the same root(s) in order for R' to support R. Thus, a rule like (57) can support the rules in (53), even though they are specified for different features on n.

4.4.3 Completing the analysis of pronouns

In this subsection, I complete the analysis of pronouns by discussing all the feature markedness rules (Impoverishment and Obliteration) required to capture all of the syncretisms we see in the paradigm; while the rules in (55) capture the fact that the masculine/feminine distinction is lost in the plural, there is more work to do. To begin, I repeat below the full paradigm of third-person pronouns from (54):

(60) **Third-person pronouns**

<table>
<tr><th></th><th>Politeness</th><th>Masc. Singular</th><th>Fem. Singular</th><th>Plural</th></tr>
<tr><td rowspan="4">Human</td><td>intimate</td><td>vā-ḍu '√PRO-n.MASC.I'</td><td>adi '√PRO.n.SG'</td><td rowspan="2">vā-ru-ḷu '√PRO-n.H.I/C-PL'</td></tr>
<tr><td>casual</td><td>atan-u '√PRO-n.MASC.C'</td><td>āme '√PRO.n.FEM.C'</td></tr>
<tr><td>formal</td><td>āyana '√PRO.n.MASC.F'</td><td>āviḍa '√PRO.n.FEM.F'</td><td rowspan="2">vā-ru '√PRO-n.H.F/V'</td></tr>
<tr><td>very formal</td><td>vā-ru '√PRO-n.H.V'</td><td>vā-ru '√PRO-n.H.V'</td></tr>
<tr><td>Non-Human</td><td>N/A</td><td colspan="2">adi '√PRO.n.SG'</td><td>avi '√PRO.n.PL'</td></tr>
</table>

Observe that within the human portion of the paradigm, there are four politeness distinctions in the singular (intimate, casual, formal, very formal), but only two in the plural, where *vāḷḷu* (underlying *vā-ru-ḷu*) is ambiguous between intimate and casual, while *vāru* is ambiguous between formal and very formal. To explain the reduction in politeness distinctions in the plural, recall my proposal for a featural analysis of politeness in Telugu (repeated below from (10)):

(61) **Featural analysis of politeness: Telugu**

	[+P1]	[-P1]
[+P2]	formal	very formal
[-P2]	casual	intimate

If we posit that one of the features in (61) is Impoverished in the plural, that will naturally lead to the result that there are only two politeness distinctions in the plural, corresponding to the positive and negative values of the remaining feature:

(62) **Plural politeness Impoverishment**
Delete the [$\pm$P1] feature in the context of Num.PL.

The rule in (62) makes the cut we need: we are left with only the binary feature $\pm$[P2], where [+P2] corresponds with formal/very formal, and [-P2] corresponds with intimate/casual. There are two more syncretisms for which we need to posit two more feature markedness operations. First, the fact that *vāru* is ambiguous for number – recall the Obliteration rule posited in (46) for this purpose:[10]

(63) **Obliteration of Num by politeness**
In the context of a n head bearing [+P2], delete the Num head.

Secondly, the pronoun *adi* is ambiguous between a feminine intimate and a non-human singular interpretation. In order to capture this, I posit that the entire set of features corresponding to a feminine intimate interpretation is deleted in the context of singular Num:

(64) **Feminine intimate Impoverishment**
Delete all of F, [-P1], and [-P2] when all three features occur on the same n head.

Since, by assumption, a non-human n is one not bearing any gender features, the rule in (64) predicts the insertion of a non-human exponent in the feminine intimate context. All together, the rules in (55), (62), (63), and (64) are enough to generate the entire distribution of root exponents in (60).

10. A minor consideration: Obliteration of Num must occur after Impoverishment of gender in the plural, to ensure that no gender distinctions ever survive in the plural.

4.5 Rule Support as an alternative to Domain Suspension: look-ahead and timing

In this section, I compare my Rule Support proposal with Domain Suspension (Bobaljik, 2012; Bobaljik and Wurmbrand, 2013), a proposal which captures a similar generalization about the locality of suppletion using the same intuition as Rule Support, but with some important differences which I argue make Rule Support a stronger alternative. The major difference between Rule Support and Domain Suspension, as I have stated, is that the former is a representational constraint on sets of possible rules, while the latter is a condition stating whether or not a certain derivational step occurs at a specific point in the derivation.[11]

The main reason I argue that Rule Support is an improvement on Domain Suspension is that the latter, as stated, involves a look-ahead problem such that a set of rules of exponence which will apply at VI needs to be evaluated for Domain Suspension in the narrow syntax, at the point at which Merge of a phase head triggers Spell-Out of its complement. In this section I begin by demonstrating the look-ahead problem, and continue by sketching an alternative on which VI is not part of cyclic Spell-Out by phase; I wrap up by giving a corroborating argument for this alternative view from the behavior of Impoverishment in pronouns as analyzed in §4.4.

4.5.1 Domain Suspension and look-ahead

At first glance, Domain Suspension appears to be treading exactly the same ground as Rule Support (or, better stated, Rule Support appears to be treading the same ground as Domain Suspension): I repeat below Bobaljik & Wurmbrand's (2013) (henceforth B&W) statement of Domain Suspension for VI:

(65) **Domain Suspension for VI: B&W**
In the following configuration (linear order irrelevant), if X is a cyclic head, then Y^n is a spell-out domain, unless Y depends on X for its interpretation.

11. In fact, in his book, Bobaljik (2012) posits a similar, representational version of Domain Suspension, but doesn't develop it. Rule Support can be seen as a further developed version of this alternative with the added reference to phasehood, which Bobaljik does not include.

$$[\mathrm{X}[_{Y n}\ \mathrm{Y}]]$$

The generalization which is argued to be explained by Domain Suspension is the *AAB constraint (Bobaljik, 2012) on suppletion in adjectives cross-linguistically, which can be phrased in the following way:

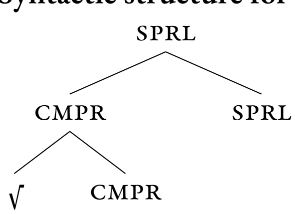
(66) ***AAB Constraint**
If an adjective suppletes with respect to the superlative, it must also supplete with respect to the comparative.

B&W are looking to rule in paradigms like Latin *bon-us∼mel-ior∼opt-imus* 'good/better/best' (in Bobaljik's (2012) terms, an ABC pattern) while ruling out paradigms like **bon-us∼bon-ior∼opt-imus* (an *AAB pattern). B&W assume that there is a cyclic CMPR head such that Domain Suspension is relevant to understanding the *AAB generalization in adjectives. Note how similar this is to my generalization about root suppletion in Telugu nouns; if we replace 'superlative' with Num/K, and 'comparative' with n, I can restate my generalization as a *AAB constraint. Recall, though, that Rule Support captures this *AAB generalization by positing a representational constraint on possible sets of rules of exponence:

(67) **The *AAB constraint under Rule Support**
a. √GOOD] CMPR → opt- /] _ SPRL
b. √GOOD → mel- / _] CMPR

On the Rule Support proposal, since by hypothesis CMPR is a phase head, it is simply the case that the first rule in (67) cannot exist without the second. For B&W, on the other hand, Domain Suspension is a condition on the triggering of Spell-Out. The following is the syntactic structure assumed by B&W (and by its predecessor Bobaljik (2012)) for comparatives and superlatives:

(68) **Syntactic structure for adjectives**



Recall that B&W are looking to rule in ABC paradigms like Latin *bon-us∼mel-ior∼opt-imus* 'good/better/best' while ruling out *AAB paradigms like **bon-us∼bon-ior∼opt-imus*. They assume that since CMPR is a cyclic head (by hypothesis), it triggers Spell-Out of the root as soon as it is Merged. This Spell-Out includes Vocabulary Insertion; thus, the root is targeted for exponence at a point in the derivation when SPRL has not been Merged yet and is thus unavailable to condition exponence:

(69) **Derivation: B&W**
 a. Merge √ and CMPR
 b. Spell Out [√]
 c. VI at √: heads up to CMPR are available for conditioning

This is the basic case – we can see how in the derivation above, a rule like (67a) above could never apply, as neither is the required target available for VI nor is its required context available for conditioning, capturing the negative half of the *AAB generalization. On the other hand, they argue that when a rule of exponence like the one below exists (as in Latin), Spell-Out is suspended:

(70) √GOOD → /mel/ / _] CMPR

In this case, Spell-Out does not occur as soon as CMPR is Merged; instead, the narrow syntax continues:

(71) **Derivation with Domain Suspension**
 a. Merge √ and CMPR
 b. (70) exists, so do not spell out the root
 c. Merge SPRL
 d. Spell out [[√]CMPR]; SPRL is available for conditioning
 e. Rule of exponence: √]CMPR → opt- / _] SPRL

On the assumption (shared by B&W) that SPRL is also a cyclic head, Domain Suspension means that instead of spelling out the root, the derivation continues by Merging SPRL; at that point, Spell-Out is triggered and the complement of SPRL is spelled out. Since Vocabulary Insertion at the root only occurs during this stage of Spell-Out, both CMPR and SPRL are available to condition exponence. Thus, a rule like

(71e) can apply, and the half of the *AAB generalization which involves crucially ruling in ABC patterns is captured.

However, Domain Suspension introduces a problem – in order to decide whether or not to trigger Spell-Out after a Merger of a phase head in the narrow syntax, the derivation needs to look ahead to Vocabulary Insertion, a PF operation, and evaluate the set of rules that may apply at that point in the derivation. On the other hand, Rule Support, while it completely lets go of the idea that *AAB is epiphenomenal of cyclicity, captures the same facts that B&W do without creating any look-ahead problems.

4.5.2 Corroborating evidence: the timing of Merge, Impoverishment, and VI

In this subsection, I sketch an alternative version of the morphological component of PF which avoids the look-ahead problem of Domain Suspension; essentially, I argue that Vocabulary Insertion cannot be part of the PF cycles triggered by cyclic Spell-Out by phase; instead, it must occur after all phase-triggered PF cycles have been completed. I show that evidence from Impoverishment in Telugu pronouns corroborates the predictions of this ordering of VI.

If we want to understand the Telugu facts in this chapter as well as the *AAB constraint in adjectival suppletion, but also avoid look-ahead within a Minimalist/DM view of the syntax-morphology interface, we cannot maintain the most standard version of cyclic Spell-Out to PF by phase – the one emerging from the two-way assumption of cyclic Spell-Out (Chomsky, 2000) and the structured Spell-Out of Arregi & Nevins (2012):

(72) **Cyclic Spell-Out by phase with structured Spell-Out**
  a. Merge √ and n
  b. Spell-Out n's complement: √
  c. Spell-Out (including Vocabulary Insertion) of √: √ is the target of VI; {√, n } can be part of structural description; Num, Agr/K cannot be.

Instead, the timing of VI with respect to Merge must be like the following:

(73) **The timing of VI with respect to Merge**

a. Merge $\sqrt{}$ and n

b. Spell-Out n's complement: $\sqrt{}$

c. Merge Num, K

d. Spell-Out K's complement: $n]$Num

e. Vocabulary Insertion: target = $\sqrt{}]n]$Num; $\sqrt{}$, n, Num, K can be part of structural description

That is, all heads up to K must be Merged before VI can occur at the root, such that (as long as the rule is adequately supported) a rule of exponence targeting the root can in principle be conditioned by K. In other words, assuming cyclic Spell-Out by phase, Vocabulary Insertion cannot be part of the step of Spell-Out corresponding to the complement of the phase head n. On standard assumptions within Distributed Morphology (Arregi and Nevins, 2012), Vocabulary Insertion is the final step in a complex PF derivation also including, for example, Linearization, Impoverishment, and Obliteration:

(74) **The Structure of Spell-Out (Arregi and Nevins, 2012): cyclicity**

SYNTAX

POSTSYNTAX:

EXPONENCE CONVERSION

FEATURE MARKEDNESS

MORPHOLOGICAL CONCORD

LINEARIZATION

LINEAR OPERATIONS

VOCABULARY INSERTION

PHONOLOGY

cyclic by phase

In (74), Impoverishment is a feature markedness rule and is thus crucially ordered before Vocabulary

Insertion. If we maintain this claim while also incorporating the claim that Vocabulary Insertion is *not* part of cyclic Spell-Out by phase as reflected in (73), we get the following prediction for the timing of Impoverishment:

(75) **The timing of Impoverishment**

a. Merge √ and *n*
b. Spell-Out *n*'s complement: √ (**including Impoverishment**)
c. Merge Num, K
d. Spell-Out K's complement: *n*]Num (**including Impoverishment**)
e. Vocabulary Insertion: target = √]*n*]Num; √, *n*, Num, K can be part of structural description

In (75), I have reflected using bold text the relevant prediction: Given cyclic Spell-Out by phase and the structure of Spell-Out in (74), we predict that Impoverishment should take place twice: once at each step of cyclic Spell-Out by phase. Crucially, we predict that all Impoverishment across the entire structure should take place before Vocabulary Insertion – that is, even Impoverishment triggered by Num or K should occur before Vocabulary Insertion at the root.

I argue that this prediction is in fact borne out: the behavior of pronouns forces us to conclude that plural gender and politeness impoverishment occurs before VI at the root; otherwise, we would (contrary to fact) insert the singular-only exponents *atan-*, *āme-*, *āyana-*, and *āviḍa-* even in the plural. To aid in explaining, I repeat the full pronominal paradigm below:

(76) **Third-person pronouns**

	Politeness	**Masc. Singular**	**Fem. Singular**	**Plural**
Human	intimate	vā-ḍu '√PRO-*n*.MASC.I'	adi '√PRO.*n*.SG'	vā-ru-ḷu '√PRO-*n*.H.I/C-PL'
	casual	atan-u '√PRO-*n*.M.C'	āme '√PRO.*n*.FEM.C'	
	formal	āyana '√PRO.*n*.MASC.F'	āviḍa '√PRO.*n*.FEM.F'	vā-ru '√PRO-*n*.H.F/V'
	very formal	vā-ru '√PRO-*n*.H.V'	vā-ru '√PRO-*n*.H.V'	
Non-Human	N/A	adi '√PRO.*n*.SG'		avi '√PRO.*n*.PL'

An obvious assumption given the analysis of pronouns done in §4.4 is that *vā-*, the generalized human-feature-triggered exponent of √PRO, is blocked in the singular by rules with more specified conditions:

(77) **Rules of exponence for singular-only pronominal root exponents**

a. √PRO → atan- / _] *n*.MASC.C

b. √PRO → āyana- / _] n.MASC.F
c. √PRO → āme- / _] n.FEM.C
d. √PRO → āviḍa- / _] n.FEM.F

Now, in order for the rules in (77) to only apply in the singular, we need it to be the case that the Impoverishment rules in (55) and (62) (repeated below) have already occurred by the time VI targets the root:

(78) **Plural gender Impoverishment**
In the context of the pronominal root √PRO and Num.PL, delete masculine and feminine features on n.

(79) **Plural politeness Impoverishment**
Delete the [±PI] feature in the context of Num.PL.

This way, at the point in the derivation where VI targets the root, the features on n heads underlyingly specified with masculine/feminine and casual/formal features (corresponding to [+PI]) will have been Impoverished, leaving behind the entailed HUMAN feature and [±P2]. Then, *vā-* can be inserted as the exponent of the root, because none of the more specified rules in (77) would apply. Otherwise, the rules in (77) would apply in the plural as well, contrary to fact.

Thus, it must be the case that all Impoverishment occurs before VI at the root, corroborating the version of PF sketched in (75) wherein Vocabulary Insertion is not part of cyclic Spell-Out by phase.

4.6 Evaluating the proposal

In this final section, I take a big step back and evaluate my proposal with respect to the larger DM literature on Vocabulary Insertion, cyclic Spell-Out, and locality domains for suppletion. First, I consider the approach of Moskal (2015), who does not assume the kind of strict head adjacency constraint that I do; I show that some of the core data from Ket (Yeniseian) that she argues to be evidence for root suppletion with respect to Num across n (but with no spanning, obliteration, pruning, or other method of creating adjacency) may in fact be conducive to a reanalysis as suppletion occurring at n itself. Finally, I very briefly discuss the proposals of Embick (2010) and Marantz (2013).

4.6.1 *Maybe roots are not always roots: a re-analysis of suppletive plurals in Ket*

Moskal's (2015) approach to Vocabulary Insertion is different from mine in a number of aspects; a major one is that she does not assume that VI is constrained by head adjacency; thus, on her view, a derivation like the following is licit:

(80) **Hypothetical derivation: Moskal (2015)**
   a. Input to VI: [[[√]n]Num]
   b. Rule of exponence: √ → /exp/ / _ (...)] Num

The parenthesized ellipses in (80b) denote the fact that the condition for the application of said rule is met as long as Num is somewhere within the accessibility domain for the root. Moskal, thus, predicts that in principle, a root should be able to supplete with respect to number in such a way that n is irrelevant/not part of the structural description of the rule of exponence. Moskal (2015) points out that many languages exhibit what looks like a root suppleting with respect to number; her canonical example comes from Ket (Yeniseian; Krasnoyarsk region, Russia) (Moskal, 2015, p. 16):

(81) **Suppletive plurals in Ket**

Meaning	Singular	Plural
'tree'	o·ks'	aˀq
'child'	dɨ·l'	kʌˀt
'man'	kεˀt	dεˀ-ŋ

The first two examples in (81) feature 'complete suppletion'; neither form shows any overt number-marking morphology. The third example, on the other hand, features the regular plural suffix *-ŋ*. While the forms above certainly look suppletive, with no overt n suffix, to what extent can we be sure that they are exponing just the root? If in fact n is being exponed by these forms (either in conjunction with the root or not), then the data in (81) do not constitute an argument against strict head adjacency.

I will not give a full counter-proposal here; however, some data reported by Georg (2007) may be enlightening in this connection. The word for 'tree' above can be used as what Georg calls a 'semi-suffix', which can be added to roots as a derivational suffix which changes the meaning of the root in somewhat unpredictable ways:[12]

(82) ***-oks* as a semi-suffix (Georg, 2007)**

Root	Root-*oks*
dédaŋ '?'	dédaŋ-oks 'trap'
duud 'light'	dúd-oks 'torch'
qɨˀt 'bow'	qɨt-oks 'wood for bow'

Georg (2007) notes, based on data like those in (82) that suffixal *-oks* tends to create nouns referring to wood or wooden objects. Plurals of nouns in *-oks* always replace *-oks* with *-aˀq*, the plural of 'tree' from (81). Given (82), the distribution of *-oks* looks a lot like the distribution of a nominalizing derivational suffix – a n exponent. Perhaps, then, the suppletion of 'tree' in (81) is not root suppletion at all, but suppletion of n:

(83) **Re-analysis of suppletive plurals in Ket**

a. $n \rightarrow$ -oks / √BOW, LIGHT,...] _

b. $n \rightarrow$ -aˀq / √BOW, LIGHT,...] _] Num.PL

I remain relatively agnostic as to what the correct analysis of the standalone forms in (81) might be; either they involve a null root affixed with semi-suffixal 'tree', or they involve insertion at a Span of the root and n. Either option would be compatible with my proposal and would satisfy Rule Support and head adjacency. As long as n is involved in the rule of exponence mediating the suppletion, though, Moskal's (2015) assumption that the data (81) bear out her prediction about root suppletion with respect to number and the contingent arguments against head adjacency is cast into doubt.

Besides *-oks*, the only plural form for *dɨ·l'* 'child' found in Georg's (2007) grammar is not *kʌˀt* but actually *dɨ·l'-kʌˀt*. Georg cites standalone *kʌˀt* as meaning not exactly 'children' but something more like 'siblings' or 'co-descendants'. Elsewhere in the language, suffixal *-kʌˀt* occurs as the plural form of suffixal diminutive *-kit*:[13]

12. Note that there is a minor difference in pronunciation between standalone 'tree' and semi-suffixal 'tree'; as long as this is a post-VI/phonological or phonetic effect, it is fully compatible with the hypothesis that semi-suffixal and standalone 'tree' are the same exponent.

13. The forms in the rightmost column of (84) are constructed from the generalizations given in Georg (2007) and not directly cited forms.

(84) **Diminutive *-kit***

Root	Dim. Sing.	Dim. Pl.
kùn 'wolverine'	kún-kit 'wolverine-DIM.SG'	kún-kʌˀt 'wolverine-DIM.PL'
sèl 'reindeer'	sél-kit 'reindeer-DIM.SG'	sél-kʌˀt 'reindeer-DIM.PL'
èd 'sable'	éd-kit 'sable-DIM.SG'	éd-kʌˀt 'sable-DIM.PL'

Diminutives have also been argued to be located at n cross-linguistically (Gouskova and Bobaljik, 2022). Again, then, the data in (84) leads to an analysis on which *-kʌˀt* is suppletion of n with respect to number, not suppletion of the root:

(85) **Re-analysis of suppletive plurals in Ket**

a. n.DIM → -kit / √WOLVERINE, REINDEER,...] _

b. n.DIM → -kʌˀt / √WOLVERINE, REINDEER,...] _] Num.PL

Similarly to what we saw for 'tree', the analysis of standalone *-kʌˀt* could either involve null/no exponence of the root, or a situation wherein *-kit* and *-kʌˀt* are exponing a Span of the root and n. Again, either option is compatible with head adjacency (as well as Rule Support) and either is a problem for Moskal's (2015) analysis of these forms as purely roots suppleting with respect to number.

Of course, the rules in (83-85) are far from a full analysis of plurals in Ket; there are certainly still many open questions. There is the case of *man*: while it's not unreasonable that the suppleting item in this case, too, is exponing n, we don't have the same kind of suggestive evidence that we do for the other two items. Also, Ket is not the only language which has been reported to have noun suppletion with respect to number. The re-analysis above is meant as something of a proof of concept: it is striking that when we snoop around the grammar of Ket, we find that exactly those nouns which have suppletive plurals can also double as n exponents. Could this be the case cross-linguistically? And if we do find that in some cases, suppletive plurals are truly suppletion at the root, would we find that said suppletion satisfied Rule Support and also showed suppletion of the root with respect to n? I leave these questions as possible directions for future research.

4.6.2 Other proposals for locality of root suppletion

Evaluating the proposal from the other direction, I am far from the first to propose a system by which Vocabulary Insertion is constrained in some way by phases. As far as I can tell, all previous attempts (Embick, 2010; Bobaljik and Wurmbrand, 2013; Marantz, 2013; Moskal, 2015) argue that phase-correlated domains for locality of conditioning of Vocabulary Insertion are in some sense the direct result of cyclic Spell-Out by phase; that is, when a certain morphosyntactic feature or head is not local enough to trigger suppletion, that means it is not accessible during the current phase's stage of Spell-Out. However, on my view, Rule Support is not a result of cyclic Spell-Out by phase; instead, it is a representational constraint on possible sets of rules of exponence which takes into account the phasehood of heads.

Embick's (2010) proposal argues that roots do not undergo Vocabulary Insertion; that is, unlike other heads, they enter the derivation with their phonological exponents. Of course, this predicts that there is no such thing as 'root suppletion': Embick argues that all purported cases of such are either morpheme-specific phonological processes (Readjustment) or involve exponents which are not inserted at the root at all. In Telugu, of course, we have evidence that there is such a thing as a pronominal root which is dominated by a n head, at least in third-person pronouns, and that that pronominal root's exponence can be conditioned by n, Num, and K (*i.e.,* this root can supplete). Following much other work which argues that root suppletion does in fact exist (Moskal, 2015; Bobaljik and Harley, 2017, *a.o.*), I conclude that Embick's proposal is insufficient for Telugu.

Marantz's (2013) proposal, on the other hand, assumes that the same cases argued by Embick to be due to readjustment are actually true root suppletion: for example, tense-triggered alternations in English verbs like *teach - taught*. Observing that, on a standard analysis of English clausal structure, the v phase head intervenes between the root and T, Marantz proposes that Spell-Out of the v phase does not occur as soon as v is Merged: instead, it only occurs when the following phase head is Merged (along the lines of Chomsky's (2001) second version of cyclic Spell-Out). Thus, at the point when the root undergoes Vocabulary Insertion, all heads up to the second phase head in the verbal extended projection (usually assumed to be C) are available to condition its exponence. This proposal seems a bit too powerful: it predicts that (as long as the head adjacency constraint is satisfied) roots should be able to freely supplete with respect to any word-internal head up to the second phase head (C in verbs, K or D in nouns) cross-linguistically. That is, it does not predict anything like Rule Support or any other kind of general restriction on the locality of suppletion at the root beyond adjacency and word-internality. Since in Telugu (and in many other languages) root suppletion, though it exists, is rare and restricted, I argue that Marantz's proposal, too, is not natural for Telugu.

Moskal's (2015) proposal diverges from mine at a variety of points. She argues that the accessibility domain for suppletion is not the same as the phase domain: instead, suppletion can in principle always be conditioned by any head up to the head which immediately c-commands the closest phase head; a 'one-head-up' condition on locality. Furthemore, she does not assume a head adjacency constraint for suppletion; for her, a rule exponing only n can in principle be conditioned by K, even across (overt) Num. Finally, she assumes that the underlying syntactic structure of pronouns is different from that of lexical nouns across the board, arguing that differences in suppletion possibilities between the two word classes are due to the fact that pronouns lack a n phase head. I have shown that for Telugu (and possibly a large range of the world's languages), (i) head adjacency seems to be crucial for suppletion, (ii) third-person pronouns do have a phasal n projection, and that (iii) root suppletion is constrained by Rule Support.

4.7 Conclusion

In this chapter, I have argued that, like in the phonology, the operation of Vocabulary Insertion is constrained by the n phase head. The constraint, which I take to be general to phase heads cross-linguistically, is stated as follows:

(86) **Rule Support**
Given the configuration below (linear order irrelevant), assuming Y is a phase head and Z is some head higher than Y, a rule R targeting X whose structural description includes Z can only exist if a rule R' targeting X exists whose structural description includes Y but no higher head.

[[[X] **Y**] ... Z]

I show that my proposal is borne out for Telugu: while n can supplete with respect to the outward heads Num or K as long as head adjacency is satisfied, the root can only supplete with respect to Num or K if it also suppletes independently with respect to n. I consider first suppletion at n, showing that only adjacency is required to understand its distribution. I then consider suppletion at the root, showing that it is restricted only to pronouns, and arguing that this is borne out naturally by the Rule Support proposal: assuming that n is the locus of gender (Kramer, 2015) (and politeness) features, it is clear that the pronominal root's exponence is conditioned by n separately from its conditioning by Num or K. Finally, I complete the analysis of Telugu pronouns by proposing a set of Impoverishment and Obliteration rules to explain certain irregularities and syncretisms in the paradigm. The chapter ends with a short discussion of the current proposal as compared to existing ones in the literature which also argue that phases constrain Vocabulary Insertion in some way. I emphasize in this final discussion, as well as throughout the chapter, that while Rule Support makes direct reference to the phasehood of heads, it is not a principle of accessibility which falls out directly from cyclic Spell-Out by phase: instead, it is a purely representational, global constraint on possible sets of rules of exponence.

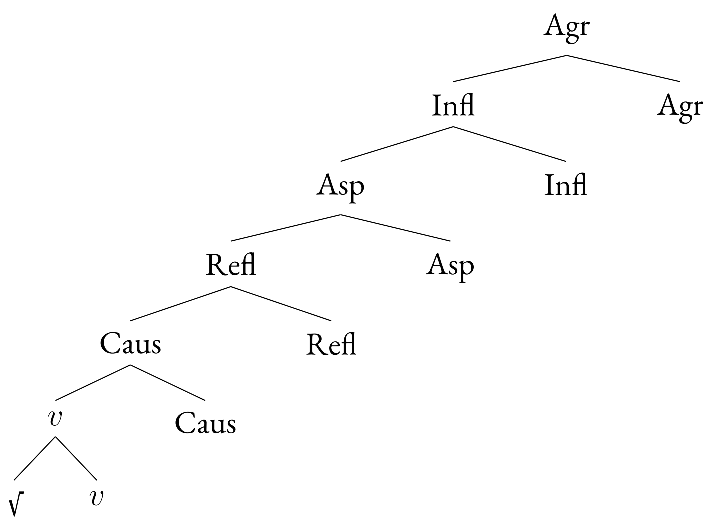
CHAPTER 5

SPELL-OUT AND CONTEXTUAL ALLOMORPHY: VERBAL MORPHOLOGY

5.1 Introduction

Similarly to the relationship between Chapters 2 and 3 of this dissertation, this chapter is largely complementary to the discussion in Chapter 4. In this chapter, I argue that the domains relevant for Vocabulary Insertion in the verbal word are mediated by phase heads. The following is the syntactic structure I assume for verbs:

(1) **Syntactic structure of the verbal word**



The reader may note the difference between the extended projection assumed in (1) and the one assumed in Chapter 3 – here, I have split off an 'Asp' head from the larger 'Infl' category. None of the arguments or analysis in Chapter 3 or in the current chapter hinge on this difference; I explain in §5.2 the reasoning for this changed assumption.

In this chapter, I argue that (in a parallel fashion to the arguments made for nouns in Chapter 4) conditioning of VI in verbs is constrained by phasal domains, but that those domains are not epiphenomenal of cyclic Spell-Out; instead, phase heads are relevant for the following global, representational restriction on possible sets of rules of exponence:

(2) **Rule Support**
Given the configuration below (linear order irrelevant), assuming Y is a phase head and Z is some head higher than Y, a rule R targeting X whose structural description includes Z can only exist if a rule R' targeting X exists whose structural description includes Y but no higher head.

$$[[[\,\mathrm{X}\,]\,\mathbf{Y}\,]\,...\,\mathrm{Z}\,]$$

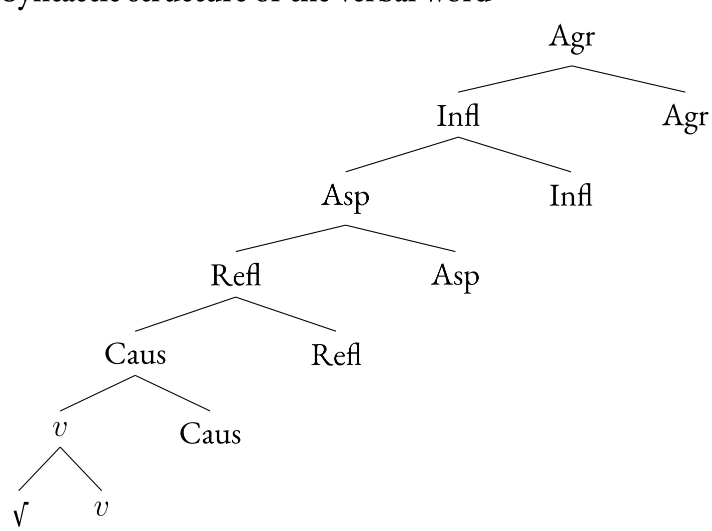
The same way that the constraint in (2) was argued to apply to exponence at the root in Telugu nominals, here I argue that it also applies to exponence at the root in Telugu verbs, given that v is a phase head.

The goal of the chapter is to consider patterns of (outward-sensitive) suppletion within verbal words in Telugu and argue that they provide further evidence for, or are compatible with, the approach to Vocabulary Insertion developed in Chapter 4. In Section 5.2, I consider exponence at v with respect to Asp, showing that it constitutes a further (in some senses more classical) argument in favor of the head adjacency constraint – that is, this is a case where the lack of an overt exponent can be treated as evidence for the lack of the corresponding abstract morpheme, such that that abstract morpheme (in this case, Refl, which when it occurs, intervenes between v and Asp) does not intervene for adjacency just when there is no overt exponent of it. I also show that while at first glance suppletion at v with respect to Asp appears to be a case of outward-sensitive, phonologically conditioned suppletion (predicted to be impossible on a view with strictly root-out Vocabulary Insertion (Bobaljik, 2000, *et seq.*)), it turns out that a closer look at the data reveals that the conditioning is in fact morphosyntactic. Next, I consider exponence at the root in verbs (§5.3). I show that roots' exponence in some cases can be conditioned solely by v. The crucial cases, though, are the two irregular verbs *avu-* 'be' and *vaccu-* 'come', which show true suppletion of the root with respect to heads higher than v. In these cases, I argue, this suppletion is possible because Rule Support is satisfied; the analysis of these two verbs is parallel to the analysis of third-person pronouns in Chapter 4. Finally, Section 5.4 concludes.

5.2 Suppletion at v with respect to Asp: adjacency and morphosyntactic conditioning

In this section, I show that exponence at v can be conditioned by the outward head Asp(ect). I show in detail how the two relevant suppletion patterns satisfy some of the assumptions of the Distributed Morphology framework used in this dissertation. I begin by giving a basic description of the two patterns, which I dub 'glide suppletion' and the '*see* alternation' respectively. Then, I show that both of these patterns are constrained, as expected, by the head adjacency constraint: the alternations are blocked whenever the Caus and/or Refl heads intervene between v and Asp. I then consider the patterns with respect to another prediction of a strictly root-out, serial Vocabulary Insertion: outward-sensitive suppletion ought only to be conditioned by the abstract morphosyntactic features of the conditioning head/abstract morpheme, not by exponents of that head or by their phonological properties (Bobaljik, 2000; Paster, 2006; Embick, 2010). I show that, while at first glance the patterns considered in this section appear to violate this prediction, careful consideration of the morphological contexts which trigger the alternations shows that in fact the condition *is* morphosyntactic: glide suppletion and the *see* alternation are triggered by *default* aspect. In the process, I define the inventory and distribution of exponents of the Asp head, establishing its position in the syntactic structure of the verb given below in (3) (repeated from (1)):

(3) **Syntactic structure of the verbal word**



5.2.1 *Glide suppletion and the* see *alternation: basic generalizations*

First, given the inward context of a list of roots, *v* sometimes alternates between *-cu/-su* and a glide, which choice is made by the outward morphological context – here and until I clarify the Asp analysis, I use the infinitive construction as a stand-in for the whole set of triggers (my own data, elicited following generalizations from Krishnamurti (1961)):

(4) **Glide suppletion**

Root/Meaning	**With perfective *-i***	**With imperfective *-tū***	**With infinitive *-a(n)***
olu- 'peel'	oli-c-i 'peel-*v*-PRF'	olu-s-tū 'peel-*v*-IMPF'	ola-v-a(n)- 'peel-*v*-INF'
ēḍu- 'cry'	ēḍi-c-i 'cry-*v*-PRF'	ēḍu-s-tū 'cry-*v*-IMPF'	ēḍa-v-a(n)- 'cry-*v*-INF'
kalu- 'accrue'	kali-s-i 'accrue-*v*-PRF'	kalu-s-tū 'accrue-*v*-IMPF'	kala-v-a(n)- 'accrue-*v*-INF'
cē- 'do'	cē-s-i 'do-*v*-PRF'	cē-s-tū 'do-*v*-IMPF'	cē-y-a(n)- 'do-*v*-INF'
vā- 'swell'	vā-c-i 'swell-*v*-PRF'	vā-s-tū 'swell-*v*-IMPF'	vā-y-a(n)- 'swell-*v*-INF'
bigi- 'fit'	bigi-s-i 'fit-*v*-PRF'	bigi-s-tū 'fit-*v*-IMPF'	bigi-y-a(n)- 'fit-*v*-INF'

Note that the forms in the second and fourth columns above reflect the results of regular regressive harmony triggered by perfective *-i* and infinitive *-a(n)*. The second and fourth columns show regular deletion of stem-final /u/. In the third column, we see deletion of stem-final /u/ in the context of following /t/, as well as assimilation of /c/ to /s/ before /t/.

I take these to be phonological phenomena independent of suppletion (see §2.5.1 for more on harmony, and see the brief discussion in §3.3.2 for more on deletion for hiatus resolution). The table in (4) demonstrates a number of generalizations. For verbs which exhibit glide suppletion, the infinitive is always one of the triggers; the others will be enumerated shortly. The choice between the back glide *-v* and the front glide *-y* depends on the phonological shape of the preceding root exponent: CVV- roots correspond with *-y*, non-CVV-roots whose root-final vowel is /i/ corresponding with *-y*, and all other roots correspond with *-v*. We know that the alternation is not purely phonological (which would remove it from under the umbrella of suppletion caused by conditions on Vocabulary Insertion) because it is incomplete: there are instances of roots which take *-c(u)* in the context of the perfective, but still have *-c(u)* in the context of the infinitive(my own data, elicited following generalizations from Krishnamurti (1961)):[1]

1. There are some unusual phonological generalizations about which roots do and do not show glide suppletion that I

(5) **Some roots have no glide suppletion**

Root/Meaning	With perfective *-i*	With infinitive -a(n)
cā- 'stretch'	cā-c-i 'stretch-*v*-PRF'	cā-c-a(n)- 'stretch-*v*-INF'
kālu- 'burn'	kāli-c-i 'burn-*v*-PRF'	kāla-c-a(n)- 'burn-*v*-INF'
kuduru- 'be settled'	kudiri-c-i 'be.settled-*v*-PRF'	kudara-c-a(n)- 'be.settled-*v*-INF'

Combining the patterns in (4) and (5), we can give the following tentative rules of exponence to model the distribution of glide suppletion:

(6) **Rules of exponence for glide suppletion (to be modified)**

a. $v \rightarrow$ -cu / √PEEL,CRY,STRETCH,BURN,...] _

b. $v \rightarrow$ -su / √ACCRUE, DO,...] _

c. $v \rightarrow$ -C_{glide} / √PEEL, CRY, ACCRUE, DO,...] _] Inf

I assume that there is some post-VI phonological process which results in the distribution of the back vs. the front glide. Another potentially viable analysis of the same facts may be that *v* in the glide suppletion cases actually alternates between *-cu/-su* and a null exponent. Then, the glide we see on the surface would be due to a phonological process of hiatus resolution by epenthesis. In terms of the big picture of this chapter, the choice between the analysis given in (6) and the aforementioned alternative is not especially important; as long as the relationship between the glide stems and the non-glide stems is at its core mediated by differences in Vocabulary Insertion, then the alternation remains relevant. One argument that the glides are actually underlying/part of the phonological representation of a *v* exponent, though, is that CVV root exponents which do not have a stem in *-cu* or *-su* do not show the same behavior in the context of the *default* aspect suffix *-a*: *pō-* 'go' gives *pō(v)-an-* in the infinitive, and *tē-* 'bring' gives *tē(v)-an-*. If the *-y* found in the forms in (6) were due to phonologically-regular/non-exponent-specific epenthesis, the difference is difficult to explain.

Additionally, there is a single root *cū-* 'see' which features a special *v* suffix *-ḍ* occurring in the same context (I give an example with the infinitive below, but the rest of the set of contexts triggering this

have yet to understand. CVV- and CVVCV- roots can be in either category, but CVCV- roots *always* show glide suppletion (as long the non-glide alternant of *v* is *-cu* or *-su*), while CVCVCV- roots *never* do. It may be the case that, to some extent, glide suppletion's left context is not just a list of roots, but has some phonological component as well. However, since this chapter focuses on the outward-sensitive part of exponence, I leave this be for now and assume the inward context for glide suppletion to consist simply of an unstructured list of roots.

alternation is exactly the same as the set of contexts triggering glide suppletion, as we will see shortly) (my own data, elicited following generalizations from Krishnamurti (1961)):

(7) **Alternation of *see***

Gloss	Form
see-v-PRF	cū-s-i
see-v-IMPF	cū-s-tū
see-v-INF	cū-ḍ-a(n)

And the following gives the corresponding tentative rules of exponence for the alternation in (7):

(8) **Rules of exponence for *see* (to be modified)**

a. $v \rightarrow$ -su / √ACCRUE,DO,SEE,...] _

b. $v \rightarrow$ -ḍ / √SEE] _] Inf

The first rule in (8) is a repetition of the second rule in (6), only now I have specified that √SEE is one of the roots in its left context.

One important generalization about the two alternations discussed above is that, as expected, they are both subject to the head adjacency constraint (see Chapter 4 for an explicit statement). In forms where reflexive *-kun* intervenes between v and the infinitive, neither glide suppletion nor the *see* alternation occur:

(9) **Reflexive *-kun* intervenes for suppletion at v**

Without reflexive	With reflexive
vā-y-a(n)- 'swell-v-INF'	vā-cu-kō-a(n)- 'swell-v-REFL-INF'
cē-y-a(n)- 'do-v-INF'	cē-su-kō-a(n)- 'do-v-REFL-INF'
pila-v-a(n)- 'call-v-INF'	pilu-cu-kō-a(n)- 'call-v-REFL-INF'
kala-v-a(n)- 'accrue-v-INF'	kalu-su-kō-a(n)- 'accrue-v-REFL-INF'
cū-ḍ-a(n)- 'see-v-INF'	cū-su-kō-a(n)- 'see-v-REFL-INF'

In the table in (9), we can see that *-kun* (which, in a separate alternation, surfaces as *-kō* before the infinitive) blocks alternation of v with respect to the infinitive: instead of their glide forms or the *-ḍ* form, we get the default *-cu* and *-su* in these cases. This is a clear 'adjacency blocking' effect and constitutes basic evidence that the head adjacency constraint is relevant for verbs the same way it is for nouns.

I assume that the lack of an overt reflexive exponent corresponds with the underlying lack of a Refl head/abstract morpheme; thus, v is underlyingly adjacent to Inf(initive) when no Refl intervenes:

(10) **Input to VI: no Refl**

$$\sqrt{}\text{-}v\text{-Inf}$$

(11) **Input to VI: with Refl**

$$\sqrt{}\text{-}v\text{-Refl-Inf}$$

(12) **Tentative rules of exponence (repeated):**
a. $v \rightarrow$ -C$_{glide}$ / √PEEL, CRY, ACCRUE, DO,...] _] Inf
b. $v \rightarrow$ -ḍ / √SEE] _] Inf

The two rules in (12) (repeated from (6) and (8), respectively) can apply in (10), because the v and Inf abstract morphemes/heads are adjacent, but crucially cannot apply in (11), where they are not.

Recall that in Chapter 4, we saw putative adjacency violations in cases where the exponence of n was conditioned by K across an intervening Num head. In those cases, suppletion only occurred in forms which were obligatorily interpreted as singular; thus, it was natural to assume that the singular Num head/abstract morpheme was still present underlyingly and thus needed to be exponed in order to maintain adjacency. On the other hand, there is no sense in which verbal forms lacking an overt reflexive retain a 'reflexive interpretation', so I assume that the Refl head is simply missing underlyingly when it is not overt. Thus, this is a third, and in some ways more basic, way of understanding cases which involve surface violations of head adjacency: that is, in some cases, the intervening head is simply not obligatorily projected and is thus missing underlyingly – that is, it does not intervene for adjacency because it isn't there at all. This means that, unlike for n, outward-sensitive suppletion at v never involves true conditioning by a non-adjacent head.

So far, I have used the infinitive as a representative morphological context to demonstrate the basic alternations and properties involved in the suppletion phenomena focused on in this subsection. However, the infinitive is not the only morphological context in which glide suppletion and the *see* alternation occur. Let's take a look at the entire list:

(13) **Contexts triggering suppletion at** v

Meaning	Form
Obligative	-āli
Infinitive	-a(n)
Future/Habitual Negative	-a
Imperative Negative	-ak
Negative Participle	-aka
Future/Habitual Negative Adjectivalizer	-ani
Imperative singular	-u
Imperative plural	-aṇḍi

With some minor tweaks, the list in (13) is the same as the list of what Krishnamurti (1961) calls 'C suffixes'; in that work, the defining characteristic of C suffixes is that they begin with a back vowel /a/ or /u/. If it is really the case that this generalization corresponds to the condition for glide suppletion and the *see* alternation as Krishnamurti (1957) assumes, this presents a serious problem for the analysis so far given the theoretical assumptions I make in this dissertation. On the assumption that Vocabulary Insertion occurs root-out, outward-sensitive suppletion cannot be phonologically conditioned (Bobaljik, 2000; Paster, 2006; Embick, 2010) – since no exponent has been inserted at outward heads, there simply is no phonological content for VI to be conditioned by. I argue that even though it looks as if the condition for glide suppletion and the *see* alternation is phonological, it is actually morphosyntactic in nature. Observe that all of the partial forms in (13) specifically begin with short /a/, except for the imperative singular *-u* and obligative *-āli*. I argue that in fact there is a common exponent *-a* that is part of all of the constructions in (13):

(14) **Contexts triggering suppletion at** v

Meaning	Form
Obligative	-āli
Infinitive	-a-(n)
Future/Habitual Negative	-a
Imperative Negative	-a-k
Negative Participle	-a-ka
Future/Habitual Negative Adjectivalizer	-a-ni
Imperative singular	-u
Imperative plural	-a-ṇḍi

Even for the two forms that do not already include a short /a/, an underlying one can be posited. Obligative *-āli* is a modal auxiliary; other modal auxiliaries in Telugu feature a suffix *-a-* in between the main verb and the auxiliary (my own data):

(15) **Modal constructions in Telugu**

Meaning	Example
Non-permissive	cē-y-a-kūḍadu 'do-*v*-A-NON.PERM'
Capabilitative	cū-ḍ-a-gala-nu 'see-*v*-A-CAP-1SG'
Non-capabilitative	cē-y-a-lē-nu 'do-*v*-A-NCAP-1SG'

Note from the forms in (15) that this *-a* suffix, too, triggers glide suppletion and the *see* alternation. It is also separately the case that word-internally, short vowels elide preceding long vowels (Bhaskararao and Ray, 2017). Thus, a reasonable analysis of the obligative is that there is an underlying *-a* exponent which has been elided on the surface due to the following vowel of the obligative auxiliary: *cē-y-a-āli* → *cēyāli*.

The other form in (14) which does not begin with a short /a/ is the imperative singular *-u*. Telugu features a set of allocutive clitics which can occur at the right edge of a finite verbal form. Chekuri (1976) (cited via Sastry (1987)) points out that, in the cases where such a clitic follows the imperative singular form in *-u*, harmonizing verb stems exhibit /a/-harmony (see Chapter 3 for a full analysis of /a/-harmony). The table in (16) below gives the relevant paradigm for the harmonizing stem *kadulu-* 'move, shake'. Recall that the imperative singular form for this stem without any clitics would be *kadul-u* 'shake-IMP.SG'; I take this to have the underlying form *kadulu-a-u*. *-a* triggers deletion of stem-final /u/, and is then deleted itself by the following imperative suffix *-u*. In (16), I demonstrate that the presence of a clitic blocks imperative *-u* from deleting *-a*, such that it surfaces:

(16) **/a/-harmony with allocutive clitics**

Clitic/Meaning	Imp. w/ Clitic (underlying)	Imp. w/ Clitic (surface)
-rā 'masculine intimate (sg.)'	kadulu-a-u=rā	kadalarā
-ē 'feminine intimate (sg.)'	kadulu-a-u=ē	kadalavē
-ayya 'masculine (sg.)'	kadulu-a-u=ayya	kadalavayya
-amma 'feminine (sg.)'	kadulu-a-u=amma	kadalavamma
-aṇḍi 'plural (human)'	kadulu-a=aṇḍi	kadalaṇḍi

In (16), the forms in the rightmost column are those reported by Chekuri (1976), while the underlying forms in the middle reflect my analysis, which deviates from Chekuri's in a number of ways. Chekuri assumes that the /a/-harmony found in these forms is triggered by the allocutive clitics themselves; at first glance, this makes sense, as most of the clitics feature initial /a/, a trigger for /a/-harmony. However, I argue that this is not the right analysis. First, the generalization that clitic /a/ triggers /a/-harmony does not extend to the feminine intimate clitic *-ē*, which does not have an /a/; the /a/-harmony found in that case must be triggered by something else. Secondly, note the distribution of the /v/ found in the surface forms: this /v/ occurs (i) whenever the clitic begins with a vowel and (ii) in the singular. I argue that this /v/ is actually the reflex of underlying imperative singular *-u*: it is simply missing in the plural, where we have imperative plural *-aṇḍi* instead, and it is deleted before consonant-initial *-rā*, but it becomes the glide /v/ when followed by a vowel-initial clitic. If this is correct, though, that means that the /a/-harmony found in these forms is not triggered by the clitic itself, but by an underlying /a/ occurring *before* imperative *-u*.[2]

I posit that this is exactly the same suffix *-a* that seems to be parseable from the other suppletion contexts in (14). Thus, the underlying parses for the suppletion contexts are as follows:

(17) **Contexts triggering suppletion at** v

Meaning	**Form**
Obligative	-a-āli
Infinitive	-a-(n)
Future/Habitual Negative	-a
Imperative Negative	-a-k
Negative Participle	-a-ka
Future/Habitual Negative Adjectivalizer	-a-ni
Imperative singular	-a-u
Imperative plural	-a-aṇḍi

This is suggestive of a possible alternative analysis to the outward-sensitive, phonologically conditioned suppletion implied by Krishnamurti's (1961) original analysis but which is problematic for certain views within the framework of Distributed Morphology (Bobaljik, 2000; Paster, 2006; Embick, 2010): perhaps it is not that glide suppletion and the *see* alternation are triggered by the backness of the following

2. There is an interesting question here regarding the timing of vowel deletion and harmony in these forms. The hypothesis would be that even when there is no clitic, imperative singular *-u* is always preceded by *-a* underlyingly. When there is no clitic, though, it must be the case that *-a* is elided *before* it can trigger harmony. On the other hand, the deletion/gliding of *-u* before the allocutive clitics bleeds elision of underlying *-a*, allowing it to trigger harmony in those cases. Thus, the order must be Deletion/gliding of *-u* $\rightarrow$ Elision of *-a* $\rightarrow$ /a/-harmony. This may be suggestive evidence that /a/-harmony occurs once on the last cycle of word-internal phonology, as opposed to at every morphological Insertion as posited in Chapter 3.

vowel, but by the adjacent abstract morpheme which corresponds to this specific *-a* exponent which I have revealed to potentially be involved in all of the triggering contexts.

5.2.2 *What's going on in Asp?*

Showing that it is plausible for a single exponent *-a* to be present in all the constructions in (17), though, is only half the puzzle: the strictly root-out view of Vocabulary Insertion I espouse predicts that outward-sensitive suppletion is triggered by the (features of) a head/abstract morpheme, not a specific exponent which may be inserted at that head/abstract morpheme. So the question becomes: what exactly could this *-a* be exponing? While I do not have as knock-down of an argument here, I posit that there is enough suggestive evidence to assume that this *-a* is an aspect suffix contrasting with perfective *-i* and imperfective *-tu* and which occurs (roughly) in non-eventive contexts; that is, a *default* or unmarked aspect (glossed DEF). Below, I give updated rules of exponence related to glide suppletion and the *see* alternation reflecting this analysis:[3]

(18) **Rules of exponence for glide suppletion (final)**

a. $v \rightarrow$ -cu / √PEEL,CRY,STRETCH,BURN,...] _
b. $v \rightarrow$ -su / √ACCRUE, DO, SEE,...] _
c. $v \rightarrow$ -C_{glide} / √PEEL, CRY, ACCRUE, DO,...] _] Asp.DEF
d. $v \rightarrow$ -ḍ / √SEE] _] Asp.DEF

In the way outlined in (18), then, glide suppletion and the *see* alternation can be seen to be in line with my basic assumptions about the locality of conditioning of exponence at VI: both of these outward-sensitive alternations (i) require satisfaction of the head adjacency constraint to apply and (ii) the outward portion of their structural description is strictly abstract and morphosyntactic in nature – it is default aspect which triggers them, not a following back vowel or even a following *-a* exponent. The rest of this section is dedicated to giving evidence for and fleshing out the default aspect analysis for *-a*.

3. Note that I assume a set of binary aspect features [±prf], [±impf], where perfective aspect corresponds to ([+prf], [−impf]), imperfective aspect corresponds to ([−prf], [+impf]), and default aspect corresponds to ([−prf], [−impf]). These feature sets are abbreviated PRF, IMPF, and DEF throughout this chapter. See also the similar analysis of number as a binary feature in Chapter 4.

First, it is the case that just as I have shown *-a* to form the first part of various inflectional constructions, it can be shown that the other aspectual suffixes *-i* (perfective) and *-tu* (imperfective) have a similar distribution. The following table re-organizes the list of inflectional suffixes/constructions from Chapter 3:

(19) **Inflectional constructions**

Perfective	**Imperfective**	***-a* Aspect**
Perfective Participle *-i*	Imperfective Participle *-tū*	Future/Habitual Negative *-a*
Past *-i-(n)*	Future/Habitual *-tu-(n)*	Infinitive *-a-(n)*
Past Adjective *-i-na*	Conditional *-t-ē*	Future/Habitual Negative Adjective *-a-ni*
Concessive Participle *-i-nā*	Irrealis *-t-i*	Negative Participle *-a-ka*

The table in (19) is meant to show that perfective *-i* and imperfective *-tu*, though they can show up on their own, also seem to form part of more complex inflectional constructions in Telugu. For example, *-i* is part of the past tense construction and *-tu* is a part of the future/habitual tense construction. It has previously been argued that Dravidian languages mark aspect but not tense (Amritavalli, 2008); in such a language, it would be natural that a 'past tense' construction would involve perfective aspect. Similarly, the most common use of the imperfective participle *-tū* is to give a progressive meaning – it is certainly natural to assume that the same item found in these participial constructions is also found in the 'future/habitual tense' construction and contributes a core imperfective aspectual meaning in both. There has also been much work discussing the correlation between counterfactuals (*i.e.,* irrealis) and morphology marking imperfective aspect cross-linguistically (Iatridou, 2000; Anand and Hacquard, 2010; Ferreira, 2011; Karawani and Halpert, pear). The connection between perfective aspect and a concessive (*even if...*) is less clear, and is left for future work. The general point, though, is that *-a*, at least partially, overlaps in distribution with *-i* and *-tu*, which act much more like canonical aspect suffixes. The suffix *-a* never co-occurs with either, and all three always occur directly following the 'Refl' slot in the morphological structure of the verb.

Next, both perfective *-i* and imperfective *-tu* can head non-finite adjunct clauses, and the choice between them determines the relationship between the matrix event and the event denoted by the adjunct (data: my elicitation):

(20) **Aspectual adjuncts**

a. చదివి నవ్వాడు.
cadiv-i navv-(i)-āḍu
read-PRF laugh-PRF-3SG.M
'He read and laughed (reading before laughing)'

b. చదువుతూ నవ్వాడు.
caduvu-tū navv-(i)-āḍu
read-IMPF laugh-PRF-3SG.M
'He read and laughed (reading and laughing at the same time)'

The distinction we see in (20) is exactly what we would expect for an aspectual one: it seems that *-i* adjuncts denote events that, at the occurrence time of the matrix event, are completed, whereas *-tū* adjuncts denote events that are incomplete or ongoing at the time of the matrix event. On the flip side, the constructions in which we find *-a* are exactly those where, at first approximation at least, this distinction is in some sense missing (data: my elicitation):

(21) **Distribution of *-a***

a. చెయ్యవచ్చు.
cē-y-a-vaccu
do-*v*-AspASP.DEF-know.how
'knows how to do (sthg.)'

b. చెయ్యసాగాడు.
cē-y-a-sāg-(i)-āḍu
do-*v*-ASP.DEF-continue-PRF-3SG.M
'(He) continued to do (sthg.)'

c. చెయ్యు.
cē-y-a-u
do-*v*-ASP.DEF-IMP.SG
'Do (sthg.)!'

While (21) is not a full enumeration of the constructions in which *-a* can occur, it consists of a rough representation of the kinds of constructions which allow it. Specifically, it can be observed that *-a* shows up when the verb it marks either does not denote a completed or incompleted event (as in the 'know how' construction and in the imperative) or when there is no sense in which the *-a*-marked verb and the matrix verb denote separate events which can have a temporal relationship with each other (as in the 'continue to do' construction, which looks more like a single complex predicate/event and not two separate events).

Finally, there is a connection between *-a* and negation, as depicted below (data: my elicitation):

(22) ***-a* and negation**

(22) నేను చెయ్య లేదు.
nēnu cē-y-a lē-du
I do-v-ASP.DEF not.be-AGR.DEF
'I didn't do (sthg.)'

(23) నేను చెయ్యను.
nēnu cē-y-a-nu
I do-v-ASP.DEF-ISG
'I won't/don't do (sthg.)'

We can see the examples in (22) as parallel to those in (21). Negated sentences, like imperatives, do not correspond to actual events, so it makes sense that negative would interact with aspect in some way as to result in a default aspect specification.[4] Unlike in imperatives, though, we do see an actual aspectual distinction with negated sentences: the past/perfective and future/imperfective negative involve different constructions, though neither correlates with the occurrence of the regular perfective/imperfective suffixes *-i* and *-tu*. While I do not give a full analysis here, a possible way to understand these constructions may be that they are underlyingly like modal constructions like the 'know how' construction seen in (21): negation is mediated by an auxiliary, and that auxiliary can be marked for imperfective or perfective aspect, but the main verb is obligatorily marked with default aspect.

Returning to the main points about suppletion at v, I summarize the results of this subsection by repeating the ruleset from (18) in (24) below:

(24) **Rules of exponence for glide suppletion (final)**

a. $v \rightarrow$ -cu / √PEEL,CRY,STRETCH,BURN,...] _
b. $v \rightarrow$ -su / √ACCRUE, DO, SEE,...] _
c. $v \rightarrow$ -C_{glide} / √PEEL, CRY, ACCRUE, DO,...] _] Asp.DEF
d. $v \rightarrow$ -ḍ / √SEE] _] Asp.DEF

4. See Lam (2022) for previous work connecting negation to certain kinds of aspectual meanings and morphology (for Lam, negation in Cantonese is only compatible with 'indefinite aspect' à la Ramchand (2008)).

I have shown that two different suppletive phenomena at v, glide suppletion and the *see* alternation, both involve rules exponence at v whose structural descriptions include the morphosyntactic features of the outward Asp head (not its exponent or the phonological features thereof) and whose application is subject to the head adjacency constraint. This is predicted by the basic assumptions of my proposal.

5.3 Suppletion at the root: when adjacency is not enough

Parallel to what we did in Chapter 4 with n, we began this chapter by looking at alternations which were clearly occurring at v, as they always involved an invariant root exponent. In this section, I move to alternations which involve 'complete suppletion'; *i.e.,* that which does not involve any invariant root. I organize the section by dividing it into three subsections: the first considers a small set of verbs which involve root suppletion with respect to v, but no higher head. The second and third subsections correspond to the two verbs exhibiting root suppletion across v, with respect to Asp: *avu-* 'be' and *vac-* 'come'. I analyze the behavior of both verbs in detail and conclude that both, as predicted, satisfy the Rule Support constraint. Specifically, in both cases, it can be observed that the relevant roots separately show suppletion with respect to v in a way which is context-free with respect to heads higher than v; the relevant rules, thus, are enough to support the rules mediating root suppletion across v with respect to Asp.

5.3.1 Root suppletion with respect to v

As was the case for the overt n suffixes seen in Chapter 4, v suffixes (or more accurately, the v heads which those suffixes expone) all select for a (somewhat arbitrary) set of roots, and there are also many roots which occur without overt v suffixes. Krishnamurti (1961) points out that in some forms, the shape of the root depends on which v suffix is attached:

(25) **Root suppletion with respect to v**

Meaning	**Root**	**Intransitive**	**Transitive**
'snap'	te-	te-gu-	ten-cu-
'tear'	ciru-	ciru-gu-	cin-cu-
'snap'	tunu-	tunu-gu-	tun-cu-
'turn'	tiru-	tiru-gu-	tip-pu-
'die'	cac-	cac-cu-	cam-pu-
'go'	pō-	pō-	pam-pu-

It is certainly the case that in all the cases in (25), the two alternants of the root do not look completely phonologically unrelated. At first pass, this may suggest that an analysis on which the alternations are phonological is better than one on which they are treated as suppletion, but I argue that the alternations are not regular enough to be relegated to the phonology. For example, while the root √TEAR alternates between *ciru-* in the intransitive and *cin-* in the transitive, there is also a near-minimal pair which does not have a parallel alternation: the root √BREAK is pronounced *viru-* regardless of the choice of v suffix: we have *viru-gu-* 'break-v.ITR' and *viru-cu-* 'break-v.TR'. Additionally, while the root forms *pō-* and *pam-* for √GO do share initial /p/, it is unclear what phonological process could change /o:/ to /am/ or vice versa. Thus, I assume that the alternations in (25) involve suppletion at the root with respect to v. Here are some rules of exponence which derive the relevant alternations:

(26) **Rules of exponence for root suppletion with respect to v**

a. √TEAR → ciru-
b. √TEAR → cin- / _] v.TR
c. √GO → pō-
d. √GO → pam- / _] v.TR

Certainly there are many approaches on which the go-to analysis for alternations like those described by the rules in (26); for example, on Embick's (2010) approach (see Chapter 4 for more discussion), similar alternations in English verbs (*e.g.,* teach t̄aught) were analyzed as post-VI, exponent-specific phonology (Readjustment). There are also other approaches (Marantz, 2013) where those exact English alternations were treated as suppletion. In light of the data which will be considered in the following two sections, as well as the pronominal data in Chapter 4, I argue that the patterns above are better treated as part of the general phenomenon of root suppletion in Telugu.

5.3.2 *Suppletion of avu- 'be'*

The basic suppletion pattern for the verb *avu-* is simple: the suppletive alternant *kā-* occurs in the outward context of the default aspect suffix *-a*, and *avu-* occurs elsewhere (data: my elicitation following generalizations from Krishnamurti (1961)):

(27) ***avu-* suppletes with respect to *-a***

Gloss	Form (underlying)	Form (surface)
be-ASP.DEF-IMP.SG	kā-a-u	kā
be-ASP.DEF-OBLIG	kā-a-āli	kāvāli
be-IMPF-1SG (future construction)	avu-tu-ānu	avutānu
be-PRF-1SG (past construction)	avu-i-ānu	ayyǣnu

While I have not given a full paradigm for the verb in (27), the distribution of the alternants *avu-* and *kā-* is, conveniently, the same as that of glide suppletion and the *see* alternation: we get one alternant before default aspect suffix *-a*, and the other elsewhere. We know from the discussion of the allocutive markers in (16) and modals in (15) that the imperative singular and obligative constructions always underlyingly involves default *-a* which is deleted in the context of the following vowel. Further, deletion of a short vowel following a long vowel is a standard hiatus resolution strategy (explaining why we get *kā* in the imperative singular and not **kā-u*), and the glide in *kāvāli* is the result of regular epenthesis to resolve hiatus in the case of two adjacent long vowels (*e.g.*, other verb stems with final long vowels also show this pattern: *pō-* 'go', *pōvāli* 'go-OBLIG', *lē/lēv-āli* 'rise(-OBLIG)'). Note also that there is what I assume to be phonologically regular glide assimilation to the following front vowel in the past form *ayyǣnu* – we see it across the board in forms where the root glide is followed by a front vowel (*e.g., ayy-ē* 'be-IMPF.ADJ', *ayy-i* 'be-PRF').

From the data in (27), we can give a plausible ruleset capturing the exponence of this root:

(28) **Plausible ruleset for *be***

a. √BE]v → avu-
b. √BE]v → kā / _] Asp.DEF

The major difference between the alternation described by (28) and glide suppletion/the *see* alternation, of course, is that here we no longer see an invariant root preceding the alternating element: this appears to be suppletion of the root itself and not of a separable v suffix. This is exactly the kind of conditioning of exponence that is subject to Rule Support: conditioning *across* a phase head. I have written the ruleset in (28) such that it satisfies the constraint: the rule conditioning the root across v, (28b), is supported by another rule, (28a), which conditions exponence of the root with respect to the phase head v but not any higher heads. However, so far, I have not given any positive evidence or any arguments that (28a) must be stated with reference to v – the two rules below would capture the alternation just the same, but would be an illegal (exhaustive) ruleset under Rule Support:

(29) **Plausible (but illegal) ruleset for *be***
  a. √BE → avu-
  b. √BE]v → kā / _] Asp.DEF

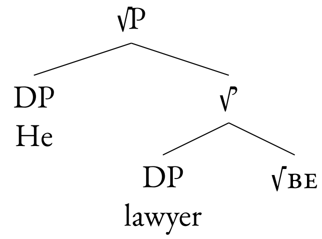
The only difference between (28) and (29) is that (29a) does not make reference to v, while its corresponding rule above does. (29) is an illegal ruleset under Rule Support because there is a rule which conditions exponence of the root across v, but no separate rule conditioning exponence of the root with respect to v but no higher head.

I argue that in fact there is evidence that a ruleset like (28) is more accurate than the one in (29). Specifically, I argue that the zero-copula construction in Telugu, reflected by the example below, underlyingly involves the copular root √BE alone, without any of the morphosyntactic structure associated with verbal extended projections (data: my elicitation):

(30) ఆయన న్యాయవాది.
  āyana nyāyavādi ø
  3SG.M.F.PRO lawyer be
  'He is a lawyer'

In (30), I have reflected my analysis by assuming that there is an unpronounced copula in the sentence which I have glossed as 'be'. Also recall the glossing abbreviations used for pronouns (see Chapter 4 for more): M.F in (30) means 'masculine formal'. The idea behind the analysis is that a sentence like (30) has the following structure:

(31) **Syntactic structure of copular construction**

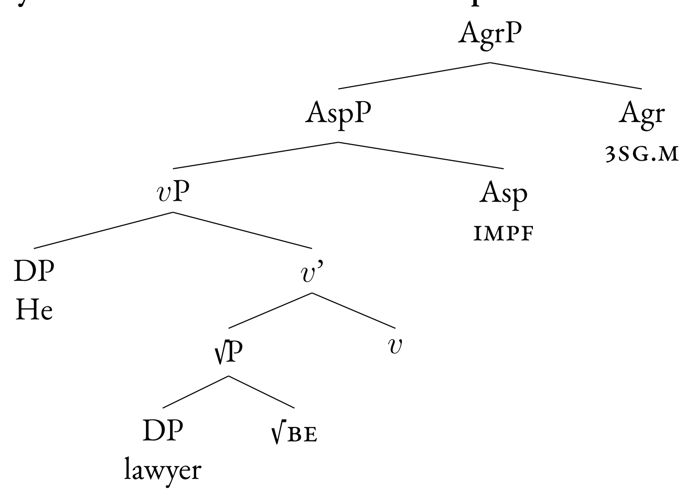


On the other hand, unlike in (31), where there is no categorizing or inflectional structure past the root, sentences like the following, involving (verbally) inflected forms of the copula, require the root to be categorized as a verb (data: my elicitation):

(32) ఆయన న్యాయవాది అవుతాడు.
āyana nyāyavādi avu-t-āḍu
3SG.M.F.PRO lawyer be-IMPF-3SG.M
'He will be(come) a doctor'

The following is the corresponding syntactic structure for (32):

(33) **Syntactic structure with inflected copula**



A basic assumption in work on extended projections (Abney, 1987; Grimshaw, 1991) is that lexical projections are what license functional sequences. Within a DM-style view with category-less roots, (Panagiotidis, 2014) has phrased this intuition in the following terms: categorizing heads like v are what license extended projections; that is, in order to have any verb-specific functional heads in the structure, you also need v. On this assumption, then, it makes sense that a totally uninflected copula would lack v, but an inflected would would include it. And of course, if this analysis is correct, then, we do in fact have a difference in exponence which is conditioned by the presence or absence of v, as desired:[5]

(34) **Adjusted rules of exponence for *be***

a. $\sqrt{\text{BE}} \rightarrow \varnothing$
b. $\sqrt{\text{BE}}]v \rightarrow$ avu-
c. $\sqrt{\text{BE}}]v \rightarrow$ kā- / _] Asp.DEF

The ruleset in (34) is essentially one which maintains the intuition in (28), but with extra justification that in fact the ruleset is truly Rule Support-satisfying. If it's the case the the copula root is unpronounced in the absence of a v head, then the alternation between a null copula and *avu-* is a clear example of the root's exponence being conditioned by v without requiring reference to higher heads. Thus, (34c) is clearly a legal rule because it is supported by (34b).

Corroborating evidence that in fact the zero copula is an uninflected version of *avu-* comes from a morphosyntactic correlation. Telugu, like many of the world's languages, has two copulas whose meanings, at least at first approximation, correspond to the distinction between stage-level and individual-level predication (Balusu, 2016):[6]

(35) నేను గురువును.
nēnu guruvu-nu ø
I teacher-1SG be
'I am a teacher.'

(36) నేను గురువుగా ఉన్నాను.
nēnu guruvu-gā un-n-ānu
I teacher-PRED be-NFUT-1SG
'I am acting as a teacher/currently a teacher'

5. See Welch (2012) for another approach to variation in copulas as due to the presence or absence of v; there is also a large thread of work arguing for a support approach to auxiliaries (sometimes including copulas) cross-linguistically (Bach, 1967; Arregi, 2000; Bjorkman, 2011; Arregi and Klecha, 2015; O'Neill, 2019; Pietraszko, 2023, *a.m.o.*).

6. Note that in (36), I have glossed what looks like a regularly-formed past construction as NFUT for 'non-future'. When used with the copula verb *un-*, the past/perfective construction has a slightly different interpretation than normal; it can be used for past tense predication, but also for a general present tense predicational meaning as well. This is why I have glossed it 'non-future' in this case.

As Balusu (2016) points out, besides the alternation between the zero copula in individual-level predication and the copula verb *un-* in stage-level predication, another difference between the constructions is that individual-level predication patterns with nominal agreement, while stage-level predication patterns with the predicative suffix *-gā*: we can see this by comparing the form of the predicate noun in (35) vs. in (36); in the former, the predicate noun inflects for the person and number features of the subject, but in the latter, there is no agreement, and instead there is a suffix *-gā* on the predicate noun. When *avu-* has a local-person subject, it patterns with (35) and not (36), suggesting that it is part of the paradigm of the zero copula and not stage-level predicative *un-* (data: my elicitation):

(37) నేను గురువును అవుతాను.
nēnu guruvu-nu avu-t-ānu
I teacher-1SG be-IMPF-1SG
'I will be/become a teacher'

The example in (37) provides evidence that *avu-* is an overt form of the zero copula: both constructions trigger the same morphological form of the predicate noun.

Wrapping back around, I have shown that *avu-* can be seen as an allomorph of the zero copula which occurs in the context of verbal functional/inflectional material. On the assumption that the corresponding verbal functional structure must be built on top of a v projection, the alternation between the zero copula and *avu-* can be seen as an alternation at the root which is conditioned by (the presence or absence of) v, as follows (repeated from (34) above):

(38) **Adjusted rules of exponence for *be***
a. √BE → ø
b. √BE]v → avu-
c. √BE]v → kā- / _] Asp.DEF

If this is on the right track, I have now shown that the behavior of the individual-level copula is in line with Rule Support: when suppletion of the root is conditioned across the v phase head, there must be a separate rule of exponence for the root which is conditioned by v but not any higher heads.

5.3.3 Suppletion of *vac-* 'come'

I now turn to the other verb in Telugu which exhibits root suppletion with respect to heads past *v*: *vac-*, meaning 'come'. Like *avu-*, it has a suppletive alternant which occurs in the context of default aspect suffix *-a* (data: my elicitation following generalizations from Krishnamurti (1961)):

(39) ***vac-* suppletes in the context of *-a***

Gloss	Form (underlying)	Form (surface)
come-ASP.DEF-IMP.SG	rā-a-u	rā
come-ASP.DEF-OBLIG	rā-a-āli	rāvāli
come-*v*-IMPF-1SG (future construction)	vac-cu-tu-ānu	vastānu
come-*v*-PRF-1SG (past construction)	vac-cu-i-ānu	vaccǣnu

The table in (39) reveals that in the context of default aspect, the root √COME is exponed *rā-*, while in other contexts, it is exponed *vac-*. The alternation between /c/ and /s/ seen between the surface forms of the future/imperfective and past/imperfective is phonologically regular: underlying /c/ and /cc/ always surface as /s/ before the dental stop /t/; this alternation also always patterns with syncope of the stem-final /u/ (see footnote 10 in Chapter 3 for more on this). Also note that while until now I have cited the verb with just its root *vac-*, part of my analysis is that this root is selected by a *v* head which is itself exponed overtly as *-cu*. As evidence that this is the right parse of the stems in (39), this *v* suffix is found all over the lexicon of Telugu – recall, for example, the example verbs used in §5.2 to demonstrate glide suppletion: *ēḍu-cu-* 'cry', *olu-cu-* 'peel', *pilu-cu-* 'call', *vā-cu-* 'swell', and others. Given this, the following is a (partial) ruleset for the root meaning *come*:

(40) **Partial ruleset for *come*:**

a. √COME → vac-

b. √COME]v → rā- / _] Asp.DEF

Of course, the ruleset in (40) cannot be exhaustive if *v* is a phase head and Rule Support is correct: we have one rule which makes reference only to the root, and another which makes reference to the root, *v* and the higher head Asp. Since *v* is a phase head, Rule Support states that there must be some other rule for the exponence of √COME whose structural description includes *v* but no higher head. Unlike what we did for *avu-*, we cannot simply add v to the left side of the arrow in (40a); since *vac-* comes with an overt v suffix *-cu*, it cannot be the case that *vac-* expones both the root and v at once. Thus, in order for (40b) to be licit, we need some other supporting rule of exponence for the root √COME whose structural description includes v but no higher head.

Besides the suppletion pattern in (39) which is triggered by Asp, the root for *come* also participates in an alternation in form between the basic stem and a causative one: there is a verb stem *rappincu-* meaning 'cause to come'. Let's now take a look at all three possible stems for *come*:

(41) **Stems for *come***

Stem	**Distribution**
vac-cu-	Elsewhere
rā-	In the context of Asp.DEF
rap-pincu-	Causative

I argue that the causative stem in (41) is evidence that the supporting rule we are looking for in fact exists; the analysis for the three-way stem alternation is as follows:

(42) **Rules of exponence for the root (final):**

a. √COME → vac-
b. √COME → rap- / _] v.CAUS
c. √COME]v → rā- / _] Asp.DEF

Unlike in the ruleset in (40), in this one, (47c), which conditions exponence of the root across the v phase head, is properly supported by (47b), which conditions exponence of the root with respect to v but no higher head. Recall that following the discussion in §4.4.2, even though the v in (47c) is not the same v as in (47b), the fact that they share the v category is enough for them to be comparable with respect to Rule Support. I argue that v.CAUS is a separate flavor of v which can assign a 'causer' θ-role to its specifier and is exponed by a suffix *-pincu*, resulting in the form *rap-pincu-* for the causative stem, as reported in (41):

(43) **Rule of exponence for *-pincu***
v.CAUS → -pincu / √COME] _

However, as the reader may recall, I have assumed thus far that there is a Caus head in the extended verbal projection which is distinct from v and which is exponed by the causative suffix *-incu*. Thus, it would be very tempting to instead analyze the causative stem for √COME is consisting of three overt exponents, the root *rap-*, causative *-incu*, and a v suffix *-p*.

Corroboratively, there is an entire class of verbs wherein the stem alternates between ending in *-cu/-su* (like the basic stem for √COME, *vac-cu-*) and /pincu/ (data: combination of forms from Krishnamurti (1961) and my own elicitation):

(44) ***-cu/-su* often alternates with /pincu/**

Gloss	Stem w/out causative	W/ causative
cry-v-(CAUS)	ēḍu-cu-	ēḍipincu-
call-v-(CAUS)	pilu-cu-	pilipincu-
shine-v-(CAUS)	meru-su-	meripincu-
meet-v-(CAUS)	kalu-su-	kalipincu-

Note that the vowel alternation between /u/ and /i/ seen in the roots in (44) is an instance of phonologically regular regressive vowel harmony (see Chapter 3 for more). Given the alternation in (44) and the fact that there exists a separate causative suffix *-incu*, a natural analysis of the stem alternation in √COME would be as follows:

(45) **A problematic analysis**:
a. v → -cu / √COME,CRY,CALL,...] _
b. v → -pu / √COME,CRY,CALL,...] _] Caus
c. Caus → -incu

While the analysis in (45) clearly captures the basic alternation seen in (44), it runs into a problem when it comes to explaining the root alternation between *vac-* and *rap-* seen in the paradigm for *come*. Note that on the analysis in (45), there is no morphosyntactic or featural difference between the v heads seen in the causative and the non-causative forms: the difference in exponence at v is due to contextual allomorphy sensitive to the Caus head. This means that the difference between *vac-* and *rap- cannot* be due to conditioning of exponence at the root conditioned solely by v and not by any higher heads. This, of course, would be an undesirable state of affairs given my proposal: it would have to be the case that root suppletion is directly triggered by Caus across v in a way which both violates both Rule Support *and* Head Adjacency.

(46) **A problematic analysis: root suppletion**

a. v.TR/ITR → -cu / √COME,CRY,CALL,...] _
b. v.TR/ITR → -pu / √COME,CRY,CALL,...] _] Caus
c. Caus → -incu
d. √COME → vac-
e. √COME → rap- / _] v] Caus

No matter whether or not v is included in (46e), my proposal is too restrictive to allow it, as my version of Head Adjacency does not allow conditioning by an adjacent span (Merchant, 2015). Even if we were to remove v from (46e), something which would be allowed on some views (Moskal, 2015; Božič, 2019), this would be completely non-adjacent conditioning and thus also ruled out on my view. I argue that the alternative analysis presented in (42) and repeated below explains the facts while also enabling us to argue that √COME obeys both Head Adjacency and Rule Support:

(47) **Rules of exponence for the root (final):**

a. √COME → vac-
b. √COME → rap- / _] v.CAUS
c. √COME]v → rā- / _] Asp.DEF

The minimum requirement for a successful analysis is that the v heads involved in the stems *vac-cu-* and *rappincu-* are underlyingly different: then, we can argue that the alternation between *vac-* and *rap-* is conditioned solely by v. This alternation, then, supports the other alternation (involving *rā*) which is conditioned by Aspect.

So, is there evidence that the allomorphy analysis sketched above is not correct, and that we should prefer the analysis in (47), on which there is a v exponent with the form *-pincu*? I argue that there is independent evidence that stems in /pincu/ involve a single suffix *-pincu*. It has been argued (Arad, 2003) that a property of v heads (and other categorizer heads) is that they have the potential to trigger allosemy; that is, an idiomatic interpretation for the categorized element. There is a small class of verbs, all of whose standard stems have the form CVnu-, which also have a stem in *-pincu* whose meaning is not the same as standard causative *-incu*. Assuming that these stems involve allosemy of the root conditioned by v, this is evidence that there is an exponent of v with the form *-pincu*:

(48) **CVnu- verbs**

Root/Meaning	**Causative**
vinu- 'listen'	vini-pincu 'hear'
anu- 'say'	ani-pincu 'feel'
konu- 'buy'	koni-pincu 'buy for (someone)'
**kanu-* 'see'	kani-pincu 'be visible'

The fact that the root *kanu-*, at least in Modern Telugu, cannot appear without *-pincu* can be itself seen as evidence that *-pincu* expones v: perhaps *-pincu* is the only v left which can select the root exponed by *-kanu*. If *-p* in *-pincu* were always an allomorphic variant of *-cu/-su*, it's hard to explain why there is no **kanu-cu-* or **kanu-su-* in the language.

To demonstrate how the allosemy argument bears out, let's semantically compare a regular *-pincu* verb like *pilu-cu-/pili-pincu-* 'call/make call' to the irregular *-pincu* verbs in (48) (data: my elicitation):

(49) ***pilu-* 'call'**

a. రాహుల్ రాజేష్ని పిలిచాడు.
Rahul Rajesh-ni pili-c-(i)-āḍu
Rahul.NOM Rajesh-ACC call-v-PRF-3SG.M
'Rahul called Rajesh.'

b. రాహుపల్ సరితతో రాజేష్ని పిలిపించాడు.
Rahul Sarita-tō Rajesh-ni pili-pinc-(i)-āḍu
Rahul.NOM Sarita-INSTR Rajesh-ACC call-v.CAUS-PRF-3SG.M
'Rahul made Sarita call Rajesh.'

The examples above show that when the causative is added to *call*, an instrumental-marked causee can be introduced; that causee is the agent of the embedded calling event. Transitive verbs in the (44) class whose subject is an agent work this way. On the other hand, even though 'buy' is clearly a transitive verb whose subject is an agent, it does not work this way (data: my elicitation):

(50) ***konu-* 'buy'**

a. రాహుల్ బొమ్మను కొన్నాడు.
Rahul bomma-nu kon-n-ādu
Rahul.NOM toy-ACC buy-PRF-3SG.M
'Rahul bought a toy.'

b. రాహుల్ రాజేష్కు బొమ్మను కొనిపించాడు.
Rahul Rajesh-ku bomma-nu koni-pinc-(i)-āḍu
Rahul.NOM Rajesh-DAT toy-ACC buy-v.CAUS-PRF-3SG.M
'Rahul bought Rajesh a toy.'

As we can see, instead of introducing an introducing an instrumental-marked causee who is the agent of the embedded event, in this case *-pincu* licenses the introduction of a dative-marked 'causee' who is actually the benefactor of the buying event, not its agent. The alternation for 'listen' is even more radically different (data: my elicitation):

(51) ***vinu-* 'listen'**

a. రాహుల్ సంగీతాన్ని విన్నాడు.
Rahul sangīt-ā-n-ni vin-n-āḍu
Rahul.NOM music-n-SG-ACC listen-PRF-3SG.M
'Rahul listened to the music.'

b. రాహుల్కు సంగీతం వినిపించింది.
Rahul-ku sangīt-am vini-pinc-in-di
Rahul-DAT music-n.NOM listen-v.CAUS-PRF-3SG.N
'Rahul heard the music.'

The basic verb takes a nominative experiencer subject and an accusative theme object. However, the addition of *-pincu* suddenly makes it so that the experiencer is dative-marked and the theme is nominative; furthermore, no extra 'causee' or benefactor is licensed as before. The verb 'say' works something like 'listen' (data: my elicitation):

(52) ***anu-* 'say'**

a. రాహుల్ ఏదయినొకటి అన్నాడు.
Rahul ēdayinokaṭi an-n-āḍu
Rahul.NOM something say-PRF-3SG.M
'Rahul said something.'

b. రాహుల్కు ఏదయినొకటి అనిపించింది.
Rahul-ku ēdayinokaṭi ani-pinc-in-di
Rahul-DAT something say-v.CAUS-PRF.3SG.M
'Rahul felt something.'

Regular *anu-* takes an agentive subject, but like *vinu-* 'listen', when *-pincu* is added, the entire verb becomes an experiencer verb wherein the experiencer is marked with the dative case. Since the alternations above are not regular causative alternations, even though they involve a string /incu/, I argue that we have evidence for a *-pincu* exponent of v which is different from causative *-incu*. It is not entirely clear what the core meaning contributed by this v head is, exactly. Causation seems to be quite close – even for *vinu-/vini-pincu-*, one could argue that sounds 'cause' themselves to be heard by an experiencer. 'Feeling' as 'being caused to be said' by the feeler is a little bit more of a stretch, to be fair; the main point, though, is that as predicted for v categorizing suffixes, *-pincu* can trigger idiomatic/allosemic interpretations of the root to which it attaches.

Now that we know that there is a v.CAUS exponed by *-pincu* which is separate from the regular causative suffix *-incu*, we can give derivations delineating that difference for various roots:

(53) **Derivation for *kaḍigincu-* 'cause to wash'**
a. Input to VI: [[[√WASH]v]Caus]
b. √WASH → kaḍugu-
c. v → -ø / √WASH,FALL,LAUGH,...] _
d. Caus → -incu
e. Phonology: kaḍugu-incu → kaḍigincu-

(54) **Derivation for *pili-pincu-* 'cause to call'**
a. Input to VI: [[√CALL]v.CAUS]
b. √CALL → pilu-
c. v.CAUS → -pincu
d. Phonology: pilu-pincu- → pilipincu-

There are still a couple of things to iron out with respect to the analyses above. First, on this analysis, it must be the case that not all verb roots are selected by v.CAUS; for example, there is no such stem

**kaḍigi-pincu-*.[7] Secondly, the fact that there seems to be a correlation between roots occurring with *-pincu* and roots which occur with the v exponents *-cu* and *-su* is, I argue, due to inflectional root class features borne by morphological exponents (Harley and Tubino Blanco, 2013; Gouskova and Bobaljik, 2022). Essentially, I argue that the verb roots occurring with *-cu* and *-su* form an inflectional class, let's call it Class I, and that v.CAUS is exponed as *-pincu* in the context of a root exponent bearing a feature corresponding to Class I membership:

(55) Class I: *ēḍu-* 'cry', *vac-* 'come', *pilu-* 'call'...

(56) Rule of exponence for *-pincu*:
v.CAUS → -pincu / /root$_{\text{I}}$/, /vinu-/, /anu-/, /konu-/...] _

On my assumption of strictly root-out VI (Halle and Marantz, 1993; Bobaljik, 2000), this kind of *inward*-sensitive suppletion with respect to properties of exponents (as opposed to properties of heads/abstract morphemes) is expected, as by the time VI targets v, the root exponent has already been inserted and is thus available to condition later steps of VI. Assuming, then, that the same *-pincu* discussed above is what is attaching to the root exponent *rap-* of √COME, the analysis on which the alternation between *vac-* and *rap-* is due to an underlying difference in the relevant v heads can be maintained (rules below repeated, slightly modified, from (42):

(57) Rules of exponence for the root:
  a. √COME → vac$_{\text{I}}$-
  b. √COME → rap$_{\text{I}}$- / _] v.CAUS
  c. √COME]v → rā- / _] Asp.DEF

Since the root exponent *vac-* occurs with *-cu*, and *rap-* occurs with *-pincu*, it must be the case that both root exponents belong to Class I, as reflected in (57). Further, since there is root suppletion with respect to v, (57c) is properly supported. To summarize the results of this subsection: As long as it is the case

7. In considering the comparative distributions of v.CAUS and Caus, the question arises of whether the two can co-occur. Speakers do seem to allow forms with 'stacked' *-incu*, as in, for example, *pili-pinc-incu-*, though it's somewhat marginal. Also, some verb roots take a different form of v.CAUS, *-pu*. Speakers are readily able to stack *-incu* onto these: *cū-pu-* 'see-v.CAUS', *cū-p-incu-* 'see-v.CAUS-Caus'. These facts suggest that the predictions made by the analysis of *-pincu* and *-incu* as different suffixes exponing different heads are borne out.

that differently specified categorizing heads (*i.e.,* heads which may have the same category but differ in at least one feature/feature value) are involved in the regular stem *vac-cu-* when compared to the causative stem *rap-pincu-*, the root √COME satisfies Rule Support. I have provided an analysis on which this is the case, drawing on the fact that there is evidence that *-pincu* is a v suffix in Telugu.

5.4 Conclusion

In this chapter, I considered outward-sensitive suppletion within the verbal word in Telugu. I showed that, as was done for nouns in Chapter 4, suppletion in the verb is compatible with my proposal for phase-correlated domains for the locality of conditioning of Vocabulary Insertion. Specifically, in general, verb roots cannot supplete with any head higher than v.

However, this restriction can be lifted in a specific situation – if a root suppletes with respect to v in a way which is not sensitive to any higher head, then that root can separately supplete with respect to a head higher than v; *i.e.,* as long as there is a supporting rule exponing a certain root whose structural description includes v, that root is free to supplete across the domain boundary.

Specifically, I compared suppletion at v with suppletion at the root in verbs, showing that their distribution matched the predictions of my proposal. I observed that v in Telugu can supplete with respect to Asp, as long as the two heads are adjacent; that is, when Caus and Refl are not projected. I also argued that what at first glance (and according to Krishnamurti's (1961) original analysis) looks like outward-sensitive, phonologically-conditioned suppletion is in fact morphosyntactically conditioned by a default Asp(ect) head.

Next, I considered suppletion at the root in Telugu verbs. I began by establishing that in general, roots can supplete with respect to v in Telugu. I continued by taking a deeper look at the two verbs *avu-* 'be' and *vac-* 'come', both of which show root suppletion with respect to Asp across the v head. I showed that in both cases, there is evidence that Rule Support is satisfied, corroborating my proposal further.

CHAPTER 6

CONCLUSION

6.1 Scope and claims

This dissertation provides an analysis of word-internal domain effects in the morphology and phonology of Telugu nouns and verbs. Specifically, through the analysis of vowel harmony, syncope, suppletion, and portmanteaux, it serves to identify domains in the morphology and phonology, understand their properties, and evaluate the state of affairs in Telugu with respect to the predictions of the Cyclic Spell-Out by Phase hypothesis (Uriagereka, 1999; Grohmann, 2000; Chomsky, 2000, 2001, (*et seq.*)).

The main claim is that in Telugu, in both morphology and phonology, there are domain effects which are correlated with phase boundaries, but which are crucially not directly symptomatic of cyclic Spell-Out: instead of being domains which are epiphenomenal of cyclicity and seriality, they are domains mediated by global constraints on the representations which form the inputs to the relevant stages of the grammatical derivation. In the process of developing this claim, many new empirical generalizations and analyses of the same were developed; there were also many re-analyses of already-described generalizations in the language (Krishnamurti, 1961; Chekuri, 1976; Krishnamurti and Gwynn, 1985; Sastry, 1987; Kolachina, 2016). I outline the main takeaway points of the dissertation below.

6.2 Vowel harmony: category-specificity and domains

There is a long history of work on Telugu vowel harmony (see both Sastry (1987) and Kolachina (2016), as well as references therein, along with Kiparsky (2024)) in both Telugu linguistics and in general linguistics. However, most of the work tends to treat vowel harmony in the language as a single phenomenon with a single analysis applying across lexical categories (nouns and verbs). This leads to a lot of confusing descriptions and incomplete analyses, as scholars tie themselves into knots trying to make what look like two contradictory patterns into a single system. I argue in this dissertation through the analyses in Chapters 2 and 3 that in fact treating nominal and verbal harmony separately, while *a priori* seeming like a path to loss of generalization, in fact allows us to carefully tease apart what aspects of vowel harmony are actually category-general and which are not.

My results, thus, are that the identities of trigger and target vowels in regressive harmony are different between nouns and verbs; different sets of markedness and faithfulness constraints are relevant in the two cases. However, across categories, regressive harmony is sensitive to stress in a similar (but not identical) way; that is, stressed vowels are more faithful in quality to their input than unstressed vowels, such that unstressed vowels are more likely to harmonize than stressed ones. Further, the role of the PStem seems to be similar across categories in that PStem-external vowels are the only possible harmony triggers, and PStem-internal vowels are the only possible harmony targets. Finally, progressive harmony seems to be somewhat more parallel cross-categorically: in both nouns and verbs, it targets PStem-external /u/ and fronts it to /i/ in the context of a preceding /i/.

I give an analysis leaning on the notion that category- (or under DM assumptions, morpheme-) specific phonological grammars are possible, such that nouns and verbs are subject to different constraint rankings when it comes to regressive vowel harmony. On the other hand, as mentioned in Chapter 1, the algorithm determining the size and location of the PStem and its boundaries is category-general, and only makes reference to word-internal phase heads.

6.3 Phonology: cyclicity by phase, cyclicity by insertion, and opacity

As discussed in Chapter 1, much work within the Minimalist framework, given the cyclic Spell-Out to PF by (syntactic) phase hypothesis, has attempted to find evidence for cyclicity by phase in phonology in general, as well as word-internally (when Distributed Morphology assumptions are added into the mix).

On the other hand, interactionist (Scheer, 2011) views of cyclicity in morpho-phonology (Kiparsky, 1982; Mohanan, 1986; Inkelas, 1989; Kiparsky, 2020) treat the core intuition as being that serial affixation/morphological insertion itself is what drives cyclicity in word-internal phonology. In this dissertation, I espouse what is in some ways a hybrid view: while cyclicity in the phonology is in fact interactionist/driven by serial morphological insertion, there are still phase-correlated domain effects in word-internal phonology. I show in Chapters 2 and 3 that these domain effects cannot be direct reflexes of cyclicity, either cyclicity by phase or by insertion. Thus, I argue, they must be representational, prosodic domains which are constructed during the derivation in a way which is sensitive to phasal domains in the syntactic structure.

An additional argument that cyclicity by insertion is a stronger analysis comes from a clear ordering effect found in Chapter 2: plural-triggered syncope must occur before plural-triggered regressive harmony. On the assumption that cycles of phonological computation do not in and of themselves consist of ordered/serial applications of rules (instead, they involve a single step of global, constraint-based computation along the lines of Optimality Theory (Prince and Smolensky, 1993)), and that ordering in phonology must then diagnose cycles of phonological computation, the only way to understand the ordering effect we see in Chapter 2 is that phonology triggered by the plural suffix must take place in two cycles. Cyclicity by phase is unhelpful here, as Num (the locus of the insertion of the plural suffix) is not a phase head, but cyclicity by insertion can help us understand this, as there is a morphological slot after the plural wherein case and agreement suffixes are inserted.

6.4 Morphology: Head adjacency and Vocabulary Insertion

A question which has sparked much debate in the Distributed Morphology literature is that of adjacency requirements in suppletive allomorphy. While it seems that there are adjacency effects in allomorphy found across the world's languages, DM introduces the question of what the ontology of those effects may be: is it structural adjacency which is relevant, linear adjacency, both, or neither?

I argue in Chapters 4 and 5 that Telugu shows evidence for the structural adjacency view, though linear adjacency plays a role as well in my analysis. Specifically, I argue that there is a strict adjacency requirement such that outward-sensitive suppletion can only be triggered by an adjacent head in the morphosyntactic structure being realized. In Chapter 5, we see that the presence or absence of the intervening Refl head conditions whether or not v can supplete with respect to Asp. When data appears to diagnose long-distance triggering, it always involves insertion at Spans (Svenonius, 2012; Ostrove, 2018), such that in fact the adjacency constraint is met. In Chapter 4, we see that n can supplete with respect to K even across a (null/unexponed) singular Num head. My system of insertion at Spans without conditioning by Spans automatically precludes long-distance conditioning across overtly-exponed intervening heads, such that adjacency-blocking effects automatically fall out. In Chapter 4, we see that the same n heads which can supplete with respect to K in the singular fail to do so in the plural, where there is an overt intervening exponent realizing (plural) Num.

6.5 Root-out Vocabulary Insertion

The assumption that Vocabulary Insertion begins at the root and targets successively higher (in the sense of hierarchical syntactic structure) heads/abstract morphemes makes strong predictions about the conditioning of suppletive allomorphy (Bobaljik, 2000; Paster, 2006; Embick, 2010). Specifically, it predicts that outward-sensitive suppletion (suppletion with respect to a higher head) cannot be phonologically-conditioned, as higher heads, on the assumption of root-out VI, have not yet been targeted for exponence and thus have no phonological information for suppletion to be conditioned by.

Recent work, though, has cast this generalization into doubt (Deal and Wolf, 2017; Rolle and Bickmore, 2022; Brodkin, 2025). In Chapter 5 of this dissertation, I show that what looks at first like a violation of the predictions of root-out VI with respect to conditioning of suppletion is actually not one. Taking the verbal morphological system more generally, one can show that what looks like outward-sensitive conditioning by /a/ in a variety of morphological contexts is actually conditioning by a default Aspect head which is always exponed as *-a*. While one example in favor is not an argument that the generalization is true across the board, it may be the case that further consideration of the individual posited counter-examples will reveal that they may in fact not be so – even if they turn out to be true exceptions, we will have understood the systems of those languages much more deeply.

6.6 Phase-correlated constraints on root suppletion

Root suppletion has long been noted to be more constrained than other kinds of suppletion across the world's languages. Some generative explanations build from the intuition that roots are in some sense the 'base' from which words are constructed; thus, the way in which mapping between abstract root morphemes, exponents with phonological representations, and syntactic structure is achieved is special. For some working in a DM framework, thus, (Embick, 2010), roots are morphemes that automatically come with phonological form (unlike non-roots, which are mapped to exponents through Vocabulary Insertion). In LPM/MM/Stratal OT terms (Kiparsky, 2021) roots are not selected by anything and thus form the beginning of a morphological derivation (this approach has no notion of 'abstract morphemes' at all). Of course, this type of analysis rests on the intuition that not only is root suppletion more constrained, it is in fact impossible, following claims that it is empirically unattested (Marantz, 1997b; Harley and Noyer, 1998). Much recent work has cast that claim into doubt (Harley and Tubino Blanco, 2013; Haugen and Siddiqi, 2013; Moskal, 2015; Bobaljik and Harley, 2017). Other generative analyses, thus, ruling in root suppletion but attempting to explain why it is constrained the way it is, build on the related assumptions that (i) roots are category-less (Marantz, Marantz, 1997a; Arad, 2003) and that (ii) there are special categorizing heads which categorize roots and also double as phase heads (Arad, 2003). Then, the unusualness of roots becomes derivable as a result of roots being the complement of the first phase head in a word-internal derivation.

The natural way to implement this last class of analysis, of course, is to draw on the fact that cyclic Spell-Out by phase predicts that the root, as the complement of the categorizer, is Spelled Out earlier in the derivation/on its own, without any other heads – this is the tack that the phase-based analyses generally take (Arad, 2003; Bobaljik and Wurmbrand, 2013; Marantz, 2013; Moskal, 2015). Here is where I come in: I agree with this last set of views in that (i) root suppletion is possible but that (ii) it is constrained more than other kinds of suppletion because roots are within the complements of phasal categorizer heads. However, I disagree that the role of phases in mediating this restriction is simply epiphenomenal of cyclic Spell-Out: instead, I argue through the analyses in Chapters 4 and 5 that the role of phase heads is, as in the phonology, to mediate a global/representational constraint on Vocabulary Insertion, this time in the form of Rule Support.

6.7 Future directions, open questions

A clear future direction, given the results of this dissertation project, is to attempt to extend the analysis of domain effects in morphology and phonology back to (non-purely morphological) syntactic phenomena like word order, movement, locality in agreement/case assignment, binding, and reconstruction. The primary cross-linguistic empirical evidence for phases comes from syntactic effects like successive cyclicity, and work that extends phasal logic to the morphology and phonology tends to take the existence of phases as a given. Here I am no exception; for a language like English, where a plethora of work has diagnosed phases syntactically, focusing on morphology and phonology and taking phases' existence and distribution as granted is possible. However, there is little to no work on Telugu syntax in the generative tradition in general, let alone work on Telugu syntax which interprets data specifically through the lense of the phase hypothesis. A project for future work, then, would be: I have found that there are phase-correlated effects in the morphology and phonology of Telugu on the assumption that v and n are word-internal phase heads in the language. To what extent can we justify this assumption by using phasehood diagnostics to see whether the Telugu nP and vP qualify as phases?

Perhaps relatedly is the question of how to define the 'word' when it comes to Telugu. In this dissertation I generally assume a very standard DM/morphosyntactic view of word formation wherein complex words are the realization of complex heads formed by head movement (Travis, 1984; Halle and Marantz, 1993; Baker, 1996, ; see also Snigaroff (2024) for relevant discussion). However, this is far from the only way in which the relevant literature has analyzed wordhood cross-linguistically – for example, some have argued that (perhaps in a language-dependent fashion) words may also be constructed in the phonology through properties of prosodic structure and constituency (Julien, 2002; Compton and Pittman, 2010; Barrie and Mathieu, 2016; Ershova, 2020; Zyman and Kalivoda, 2020; Wechsler, Wechsler). If the latter is correct for Telugu verbs and nouns, some of the properties I have taken for granted, especially when it comes to suppletion and Vocabulary Insertion, may need to be re-thought: for example, why is it that, if words are constructed in the phonology, and suppletion is pre-phonological (at the VI stage of the derivation) why does suppletion not appear to occur 'word-externally' in Telugu? That is, things like allomorphy of a verb with respect to its object (which does have precedent; see Bobaljik & Harley (2017)), or allomorphy of a noun with respect to a possessor? Or is it the case that further investigations will reveal that there is in fact word-external allomorphy in Telugu? Interesting in this connection may be the verbal constructions I briefly consider in Chapter 3 (§3.2.1) before leaving them out of the analysis; while they look like auxiliary constructions, which in English involve multiple words, is this the case for Telugu? In Telugu, there are clearly two separate verb roots involved, but can the whole auxiliary-verb complex be analyzed as a single word on any level of analysis? These constructions are often orthographically written without spaces between the verb and the auxiliary, so at the very least, some speakers intuit them to be a single unit on some level.

Overall, in this dissertation I have engaged in deep analysis of suppletion, portmanteaux, vowel harmony, and syncope within Telugu nouns and verbs, considering the results through the lense of the predictions of the cyclic Spell-Out by phase hypothesis (Uriagereka, 1999; Chomsky, 2000). I make two conclusions. First, that there are phase-correlated domain effects in both morphological exponence and word-internal phonology, but that they are best analyzed as representational, not as falling out from the predictions of cyclic Spell-Out by phase. Second, that there is evidence for cyclicity in both morphological exponence and word-internal phonology, but not necessarily cyclicity by phase; instead, only the cyclicity inherent in the assumption of a serial process of Vocabulary Insertion is relevant for exponence and phonology.

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