



Ting, Connie. 2023. Malagasy N-bonding: A licensing approach. *Glossa: a journal of general linguistics* 8(1). pp. 1–48. DOI: <https://doi.org/10.16995/glossa.6386>



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Malagasy N-bonding: A licensing approach

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This paper provides an account of N-bonding in Malagasy, a predicate-initial Austronesian language of Madagascar. N-bonding refers to a morphological process in which material from nominal arguments is morphologically bound to certain heads (Keenan 2000). I argue that N-bonding can be analyzed as a reflection of head-head adjunction configurations which can be derived in Malagasy through Local Dislocation (Embick & Noyer 2007; Levin 2015; Erlewine 2018), a post-syntactic operation that yields a complex head. Following Levin 2015, I assume that Local Dislocation is implemented in Malagasy due to licensing constraints. More specifically, I show that N-bonding occurs in all constructions in which an argument cannot be licensed by the structural mechanisms available in the language. The resulting head-head configuration then feeds a language-specific morphophonological operation that inserts a bundle of features which surface as the N-bonding element. This approach not only accounts for the distribution of N-bonding and is consistent with the observed phonological patterns, but also offers an alternative view of underlying clausal structure and voice morphology in Malagasy.

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1 Introduction

Malagasy has a process referred to as *N-bonding*, a term coined by Keenan (2000) to describe a morphological process in which material from nominal arguments is morphologically bound to certain heads.¹ In the usual case, a segment *n* is used as a bonding element between the two components. This process is shown in (1) illustrating the N-bonding element (bolded) between a verb and the following external argument, as in (1a), between a possessee and its possessor (1b), and between a preposition and its complement (1c).² Here and throughout, the N-bonding element is glossed as N.

- (1) a. Voa-voha-**n**'-ilay vavy ilay varavarana.
 PV-open-N-DEM girl DEM door
 'That door was opened by that girl.' **Verb + EA**
- b. trano-**n**'-ilay olona
 house-N-DEM person
 'that person's house' **Possessee + Possessor**
- c. ami-**n**'-ilay seza
 PREP-N-DEM chair
 'on that chair' **Preposition + Complement**

As Keenan (2000) notes, both the presence of the N-bonding element and its shape depend on the forms of the two components being bound. Thus, it is not always the case that a bonding element *n* is realized on the surface. For example, the sentences in (2) below are similar to those in (1) in that they include a verb and an adjacent external argument (2a) or a possessee followed by a possessor (2b), both constructions in which N-bonding is expected. However, when the noun or verb ends in a final syllable *ka* or *tra*, that final syllable becomes *ky* or *try*, and no additional *n* segment is observed, as shown in (2). According to Keenan (2000), no N-bonding element is inserted in (2). Instead, the pattern observed in these constructions is derived by a rule that raises the word-final vowel /a/ to /i/ (see Keenan & Polinsky 1998). Note that the vowel /i/ is represented with an orthographic *y* in word-final position.³

- (2) a. Tapaky ny olona ny tady.
 PV.cut DET person DET cord
 'The cord is cut by the person.' **Verb + EA**

¹ See also Tomlin (1986) for discussion on bonding principles more generally.

² Unless otherwise stated, data presented in this paper come from elicitation work in Montreal with speakers of the Merina dialect. Data from other sources were also checked through elicitation.

³ All data are presented following orthographic conventions of the language, which uses apostrophes to indicate certain morpheme boundaries (Keenan & Polinsky 1998).

- a. tongotry ny zaza
 foot DET child
 ‘the child’s feet’

Possessee + Possessor

Although structures like those in (1) and (2) are seen regularly in the literature on Malagasy, the role of N-bonding and whether the process arises due to syntactic or morphophonological reasons, or both, is not well understood. Moreover, the details regarding the distribution of N-bonding and the possible variation in shape of the N-bonding element require further exploration. I assume, following proposals by Paul (1996) and Pearson (2005), that in (2), the *y* is a possible surface form of the N-bonding element and surfaces instead of *n* due to the surrounding phonological context. Therefore, the N-bonding element is present in all of the examples in (1) and (2). We return to the particular cases of phonological variation in Section 5. The main claim is that N-bonding occurs consistently in these constructions and the aim is to understand the properties that are shared among them that give rise to N-bonding.

The primary goal of this paper is to provide a unified syntactic account of N-bonding that explains how N-bonding is derived, accounts for its distribution, and is consistent with the observed phonological patterns. In terms of its derivation, I propose that N-bonding reflects a particular configuration, namely head-head adjunction. Following Levin (2015), I assume that Malagasy employs a licensing strategy called Local Dislocation (Embick & Noyer 2001), a post-syntactic operation that yields a complex head. I argue that this strategy is used when an argument cannot be licensed by the structural licensing mechanisms available in the language. The resulting configuration then feeds a language-specific morphophonological operation within Ornamental Morphology (Embick & Noyer 2007; Embick 2015). Finally, I propose that the final product of these operations is the insertion of a bundle of phonological features that, depending on the phonological environment, surface as the N-bonding element. Under this approach, the distribution of N-bonding is accounted for and the associated phonological patterns follow straightforwardly. Moreover, this analysis provides additional empirical support to existing theoretical accounts on nominal licensing and morphological operations, while offering an alternative view of underlying clausal structure and voice morphology in Malagasy.

The remainder of the paper is organized as follows. Sections 2 and 3 provide background information and an overview of the distribution of N-bonding in Malagasy. Section 4 presents the assumptions of basic Malagasy clause structure and spells out the analysis of N-bonding as a reflection of nominal licensing. Section 5 overviews the post-syntactic processes and phonological variation observed in N-bonding and provides an analysis which characterizes insertion of the N-bonding element as a language-specific morphophonological operation. Section 6 concludes.

2 Malagasy Background: Word Order and Voice Morphology

Malagasy is an Austronesian language belonging to the Western Malayo-Polynesian branch and is spoken on the island of Madagascar. Dialects of Malagasy are divided into three main groups: the eastern, western, and intermediate dialects (Andriamanatsilavo & Ratrema 1981; Kikusawa 2012; Adelaar 2013) which are distinguished by certain phonemic oppositions (see Beaujard 1998; Rasoloson & Rubino 2005). The data presented here are from the Merina dialect, a central eastern dialect spoken in the capital Antananarivo, and central plateau region. For general background on Malagasy, see also Randriamasimanana (1986), Keenan & Polinsky (1998), Paul (2000), Pearson (2001), and the many references cited therein.

Basic word order in Malagasy is predicate-initial. The examples in (3) show that this word order holds across clausal predicates of different syntactic categories. The predicate phrase can be verbal as in (3a), a bare nominal (3b), a prepositional phrase (3c), a weak quantifier (3d), or an adjectival phrase (3e). Note that the language does not mark gender and number on nouns, and phrases are generally head-initial. Thus determiners precede head nouns and prepositions are initial in PPs.

- (3) BASIC PREDICATE-INITIAL WORD ORDER
- | | | |
|----|-------------------------------------|-------------------------|
| a. | M-i-hinana ny akondro <u>Rabe</u> . | |
| | AV-PFX-eat DET banana Rabe | |
| | ‘Rabe is eating the banana.’ | Verbal predicate |
| b. | Dokotera <u>iBakoly</u> . | |
| | doctor DET.Bakoly | |
| | ‘Bakoly is a doctor.’ | Nominal predicate |
| c. | Tany an-tsena <u>izy</u> . | |
| | PST.there at-market 3SG.NOM | |
| | ‘She was at the market.’ | Prepositional predicate |
| d. | Roa ny <u>zana-dRaso</u> . | |
| | two DET child-Raso | |
| | ‘Raso has two children.’ | |
| | (lit. ‘Raso’s children are two.’) | Weak quant. predicate |
| e. | Feno rano <u>ny tavoahangy</u> . | |
| | full water DET bottle | |
| | ‘The bottle is full of water.’ | Adjectival predicate |

Malagasy clauses contain a referentially and/or structurally prominent constituent, underlined throughout this section, a pattern observed across many Western Austronesian languages. In Malagasy, this constituent, which I call the TRIGGER following Schachter (1987) and Pearson (2005), occurs in clause-final position and must be formally definite.⁴ Thus, in each of the

⁴ Other names for the trigger include Focus DP, Pivot, or Topic (see Schachter 1987; Guilfoyle et al. 1992).

sentences in (3), the underlined argument is also identified as the trigger. Like many other Western Austronesian languages, Malagasy exhibits a rich voice system wherein voice morphology appears on the verb reflecting the thematic role of the trigger. Malagasy exhibits three distinct voices: Agent Voice (AV), Patient Voice (PV), and Circumstantial Voice (CV), shown in (4)–(6).

In AV, the agent is the trigger and appears in clause-final position and the verb takes the AV prefix *m-*.⁵ In AV, the verb also takes one of two verbal prefixes, *aN-* and *i-*, which are shown in (4a) on the verb *didy* ‘cut’ and (4b) on the verb *petraka* ‘live’, respectively.⁶

- (4) a. **M-an-didy** ny trondro amin’-ny antsy ny vavy.
 AV-PFX-cut DET fish with-DET knife DET girl
 ‘The girl cuts the fish with the knife.’
- b. **M-i-petraka** any Antsirabe ny vehivavy.
 AV-PFX-live there Antsirabe DET woman
 ‘The woman lives in Antsirabe.’ (Pearson 2005)

In PV, the theme is the trigger and appears in clause-final position, and the verb takes a PV prefix *a-* or suffix *-Vn*, where the vowel *V* is lexically determined. These are shown in (5a) and (5b), respectively.⁷ Though not traditionally reported as a PV morpheme, the prefix *voa-* is also used when the theme is the trigger, as shown in (5c). This prefix has been analyzed as the telic counterpart to the PV *-Vn* suffix (see Keenan & Manorohanta 2001 and Travis 2005 for more discussion on *voa-* in Malagasy).

- (5) a. **A-tao-n’-ilay** vehivavy ny fiomanana.
 PV-make-N-DEM woman DET preparation
 ‘The preparations are being made by that woman.’
- b. **Didi-a(n)-n’-ilay** vavy amin’-ny antsy ny trondro.
 cut-PV-N-DEM girl with-DET knife DET fish
 ‘The fish is cut by that girl with the knife.’
- c. **Voa-voha-n’-ilay** vavy ny varavarana.
 PV-open-N-DEM girl DET door
 ‘The door was opened by that girl.’

⁵ *Agent* is used here as a cover term for the external argument of a transitive clause or single argument of an intransitive clause.

⁶ The verbal prefixes, glossed as PFX, are lexically determined but do correlate to some degree with transitivity (see Pearson 2005 for examples).

⁷ A PV-N sequence results in two adjacent nasals. Geminate consonants are not possible in Malagasy, therefore one of the nasals will be deleted. The nasal deletion is also represented in the orthography. Therefore, I show the nasal in the PV suffix in brackets and the following nasal as the N-bonding element to facilitate the discussion. The same is true for Circumstantial Voice.

Finally, in CV the nominal that expresses a peripheral participant role (such as instrument, location, manner, etc.) is the trigger and appears in clause-final position, as shown in (6). In CV, the verb takes the CV suffix *-an* and also carries a verbal prefix as in AV. A breakdown of the voice morphemes is shown in **Table 1** (adapted from Pearson 2005).

Voice	Template	Root	Surface Form
Agent Voice	<i>m- Pfx- ROOT</i>	<i>didy</i> <i>hira</i>	<i>m-an-didy</i> <i>m-i-hira</i>
Patient Voice	<i>a- ROOT</i> <i>voa- ROOT</i> <i>ROOT -Vn</i>	<i>tao</i> <i>didy</i> <i>didy</i> <i>voha</i>	<i>a-tao</i> <i>voa-didy</i> <i>didi-an</i> <i>voha-in</i>
Circumstantial Voice	<i>Pfx- ROOT -an</i>	<i>didy</i> <i>vidy</i>	<i>an-didi-an</i> <i>i-vidi-an</i>

Table 1: Malagasy verb template and voice morphemes.

- (6) N-a-metrah-**a(n)**-n'-ilay vavy ny boky ny latabatra.
 PST-PFX-put-CV-N-DEM girl DET book DET table
 'The books were put on the table by that girl.'

Although the trigger typically occupies clause-final position, certain kinds of complement clauses and sentence-level adverbials such as *omaly* 'yesterday' and *matetika* 'generally' can follow the trigger, as shown in (7). For more discussion of post-trigger constituents, see Pearson (2001).

- (7) a. Nanoratra taratasy ny mpianatra **omaly**.
 PST.AV.write letter DET student yesterday
 'Yesterday the student wrote a letter.'
- b. Mandamina ny trano Rakoto **matetika**.
 AV.arrange DET house Rakoto generally
 'Generally Rakoto puts the house in order.'

Word order in Malagasy additionally reflects certain adjacency requirements of the language. Relevant to the topic at hand, non-trigger agents (i.e. agents in PV and CV) must be strictly adjacent to the verb, as shown in (8) where an adverbial cannot intervene between the verb *nohanina* 'eat' and the non-trigger agent *ny gidro* 'the lemur'.

- (8) a. Nohanin'-ny gidro haingana ny voankazo omaly.
 PST.PV.eat-DET lemur quickly DET fruit yesterday
 'The fruit was eaten by the lemur quickly yesterday.'

b.* Nohanina *haingana* ny gidro ny voankazo omaly.

c.* Nohanina *omaly* ny gidro ny voankazo omaly. (Pearson 2005)

This adjacency requirement, however, does not hold for other arguments such as non-trigger internal arguments and sole arguments of intransitives, as shown in (9). The reader is referred to the Appendix for additional discussion on adjacency patterns in the language. Following Levin (2015), I assume that this adjacency requirement is due to licensing constraints of the language; the non-trigger agents are unable to be structurally licensed in their merged position and consequently have to be adjacent to a preceding head as a means to satisfy licensing requirements. I return to the implications of adjacency and licensing constraints in Section 4.

(9) a. Nijinja *an-tsirambina* ny vary ny mpamboly.

PST.AV.cut carelessly DET rice DET farmer

‘The farmer harvested the rice carelessly.’

b. Maty *angamba* ny vadiny.

PST.AV.die probably DET wife.3SG

‘His wife probably died.’

(Pearson 1998)

With this background on word order and voice morphology in place, I turn to the discussion of N-bonding in Malagasy. In the following sections I present the distribution of N-bonding across the verbal and nominal domains, connecting the empirical observations to a licensing approach.

3 Distribution of N-bonding

The following sections illustrate the distribution of N-bonding in Malagasy across the verbal and nominal domains. The constructions in which N-bonding is found are listed in (10). I start by showing the patterns of N-bonding in the verbal domain in Section 3.1. I will then show in Section 3.2 that the same patterns are reflected in the nominal domain. Crucially, the environments in which N-bonding occur are described as being genitive in the literature. I return to the connection between N-bonding and nominal licensing in Section 4.

(10) N-BONDING ENVIRONMENTS

- a. between non-Agent Voice verbs and non-trigger agents
- b. between possessors and possessives
- c. between certain prepositions and their complement
- d. between certain adjectives and their complement⁸

⁸ I follow Rajemisa-Raolison’s (1971) description of Malagasy for which the highest nominal following a predicative adjective is referred to as a complement. This nominal is also referred to as a *cause* (see e.g. Travis 2005; 2010) since it shares similar structural properties with root passives and following agents.

3.1 N-bonding in the verbal domain

N-bonding occurs in both PV and CV sentences, but not in AV sentences, as shown in (11). (11b) and (11c) show PV sentences and (11d) shows a CV sentence. In both cases, N-bonding is observed between the non-Agent Voice verb and the following agent. In the literature, this post-verbal agent is described as being genitive (see e.g. Paul 1996; Keenan & Manorohanta 2001). In contrast, (11a) illustrates an AV sentence for which N-bonding is not observed.

- (11) a. **Agent Voice**
 M-an-didy ny trondro amin'-ny antsy ilay vavy.
 AV-PFX-cut DET fish with-DET knife DEM girl
 'That girl cuts the fish with the knife.'
- b. **Patient Voice (-Vn)**
 Didi-a(n)-n'-ilay vavy amin'-ny antsy ny trondro.
 cut-PV-N-DEM girl with-DET knife DET fish
 'The fish is cut by that girl with the knife.'
- c. **Patient Voice (voa-)**
 Voa-didi-n'-ilay vavy amin'-ny antsy ny trondro.
 VOA-cut-N-DEM girl with-DET knife DET fish
 'The fish was cut by that girl with the knife.'
- d. **Circumstantial Voice**
 An-didi-a(n)-n'-ilay vavy ny trondro ny antsy.
 PFX-cut-CV-N-DEM girl DET fish DET knife
 'The knife is used by that girl to cut the fish.'

In PV and CV sentences, the verb often takes a suffix voice morpheme. For example, the verb *didy* 'to cut' takes the PV suffix *-an* in (11b) and the CV suffix *-an* in (11d). (Recall that the PV suffix is *-Vn*, where the vowel is lexically determined. For the verb *didy*, the PV suffix is realized as *-an*.) When the N-bonding element comes between the agent and preceding verb, where the verb takes a suffix that ends in *n*, it is not always clear that the N-bonding element is independent from the voice morpheme.⁹ I include (11c) to show the presence of the N-bonding element in the absence of a voice suffix. Rather than taking the PV suffix *-Vn*, the verb in (11c) takes the prefix

⁹ It is worth noting here that since the language does not allow geminates, a question that arises is whether the presence of the N-bonding element is reflected only in the orthography. Examples like (11c) show that the N-bonding element is independent from other morphemes. Furthermore, Ting (2022) presents production data showing that the N-bonding element contributes to the duration of a nasal sequence. That is, when the N-bonding element is present and is adjacent to another nasal, as in (11b) and (11d), the N-bonding element and adjacent nasal /n/ are produced with a longer nasal duration compared to a construction that includes only a single /n/ segment. I take this as supporting evidence that the N-bonding element has an underlying phonological representation and warrants further investigation.

voa-.¹⁰ This example shows that the N-bonding element is distinct from the preceding verb and the following demonstrative.

Note also that the presence or absence of N-bonding in these environments is not optional. That is, the presence of N-bonding in an AV sentence leads to ungrammaticality, as shown in (12a). On the other hand, the absence of N-bonding in PV and CV sentences leads to ungrammaticality, as shown in (12b) and (12c).

(12) a. **Agent Voice**

*M-an-didi-n'-ny trondro amin'-ny antsy ilay vavy.
 AV-PFX-cut-n-DET fish with-DET knife DEM girl
 Intended: 'That girl cuts the fish with the knife.'

b. **Patient Voice** (*voa-*)

*Voa-didy ilay vavy amin'-ny antsy ny trondro.
 VOA-cut DEM girl with-DET knife DET fish
 Intended: 'The fish was cut by that girl with the knife.'

c. **Circumstantial Voice**

*An-didi-ana ilay vavy ny trondro ny antsy.
 PFX-cut-CV DEM girl DET fish DET knife
 Intended: 'The knife is used by that girl to cut the fish.'

In the verbal domain, N-bonding also does not occur between a verb and an adjacent argument if that argument is the trigger. This is shown in (13) where the theme is the sole argument of the clause and is thus the trigger. Similarly, N-bonding does not occur between a verb and an adjacent prepositional phrase, as shown in (14). Therefore, within the verbal domain it is not the case that N-bonding occurs between non-Agent Voice verbs and any adjacent constituent. Rather, N-bonding occurs only between a non-Agent Voice verb and a non-trigger (genitive) agent.

(13) *No N-bonding between verb and trigger*

Voa-didy ny trondro.
 PV-cut DET fish
 'The fish was cut.'

(14) *No N-bonding between verb and prepositional phrase*

Voa-didy amin'-ny antsy ny trondro.
 PV-cut PREP-DET knife DET fish
 'The fish was cut with the knife.'

¹⁰ A verb which takes the *a-* prefix could also illustrate this pattern. However, roots that take the *a-* prefix often result in instruments occupying clause-final position (see e.g. Paul 2000), resulting in a different word-order from the other PV sentences. The *voa-* prefix is used here to keep examples as parallel as possible.

3.2 N-bonding in the nominal domain

In the nominal domain, N-bonding is observed in possessive constructions, as shown in (15a), and between certain prepositions and adjectives and their complements, as shown in (15b) and (15c). These examples additionally show that the shape of the D-material (i.e. definite determiner *ny*, demonstrative *ilay*, etc.) does not affect the form of the N-bonding element, which consistently appears as *n*.¹¹

(15) a. **Possessee + Possessor**

trano-**n**'-ilay olona
house-N-DEM person
'that person's house'

(Keenan & Polinsky 1998)

b. **Prep + Complement**

ami-**n**'-ilay seza
PREP-N-DEM chair
'on that chair'

(Pearson 2005)

c. **Adj + Complement**

mainti-**n**'-ny molaly
black-N-DET soot
'blackened by (the) soot'

(Paul 1996)

The observation that N-bonding occurs with *certain* prepositions and adjectives requires further explanation. In Malagasy, complements of prepositions and adjectives are marked for one of three distinct cases. These are traditionally labeled as 'nominative', 'accusative', and 'genitive'. I adopt these labels for descriptive purposes, but will return to the distribution of case in Malagasy in Section 4. Distinct case morphology occurs most consistently in the pronominal system, which is presented in **Table 2**.

	Nominative	Accusative	Genitive
1st SG	izaho, aho	ahy	-ko/-o
2nd SG	ianao	anao	-nao/-ao
3rd SG	izy	azy	-ny
1st PL Incl	isika	antsika	-ntsika/-tsika
1st PL Excl	izahay	anay	-nay/-ay
2nd PL	ianareo	anareo	-nareo/-areo
3rd PL	izy (ireo)	azy (ireo)	-ny/izy ireo

Table 2: Malagasy pronoun series.

¹¹ It should be noted that some variation has been observed in the distribution and form of N-bonding. However, there exists an overall pattern of N-bonding, which is the focus of this paper. Further discussion on the variability of N-bonding is provided in the Appendix.

I start with prepositions. A given preposition can assign either nominative, accusative, or genitive case to its complement. The sentences in (16)–(18) show that patterns of N-bonding emerge only when the complement is marked for genitive case. In (16), the complement of the preposition *noho* ‘because of’ is marked for nominative case and as a result no N-bonding occurs; no additional N-bonding element is found in the construction. The same pattern is found when the complement of a preposition is marked for accusative case. This is seen in (17) for the preposition *lavitra* ‘far from’. Lastly, the examples in (18) show the presence of N-bonding when the complement of a preposition is marked for genitive case. For example, (18a) shows that the preposition *aloha* ‘in front of’ takes the genitive pronoun *-ny* and (18b) shows that when the complement of the preposition is a nominal DP, the N-bonding element *n* appears between the two. We will return to the connection between N-bonding and the pronominal paradigm in Section 4.3.3.

(16) **Preposition + nominative complement**

- a. *noho izy*
 because.of 3SG.NOM
 ‘because of him/her’
- b. *Vaky ny vilia noho ilay zaza.*
 broken DET plate because.of DEM child
 ‘The plate is broken because of that child.’

(17) **Preposition + accusative complement**

- a. *lavitra azy*
 far.from 3SG.ACC
 ‘far from him/her’
- b. *Mipetraka lavitra ny tsena ny vavy.*
 AV.live far.from DET market DET girl
 ‘The girl lives far from the market.’

(18) **Preposition + genitive complement**

- a. *aloha-ny*
 in.front-3SG.GEN
 ‘in front of him/her’
- b. *aloha-n’-ilay fiara*
 in.front-N-DEM car
 ‘in front of that car’

There is a similar division for adjectival predicates in Malagasy, which occur with a following nominal in one of three forms (see Ralalaoherivony 1995) listed in (19).

(19) THREE FORMS OF ADJ + DP CONSTRUCTIONS

- i. Nominal is marked for accusative case.
- ii. Preposition appears between the adjective and nominal, where the nominal is marked for accusative case.
- iii. Nominal is not marked for accusative case.

Examples of the three different forms are illustrated in (20). Crucially, N-bonding occurs only when the nominal appears *without* accusative case (20c). This provides preliminary support for a licensing account for N-bonding, which I develop in more detail in Section 4.3.

(20) Adjective + DP construction

- a. antra olona
compassionate person.ACC
'compassionate to people'
- b. tsara ho azy
good PREP 3SG.ACC
'good for him'
- c. mainti-n'-ny molaly
black-N-DET soot
'blackened by soot'

(Paul 1996)

Taken together, the data provided in this section show that the patterns of N-bonding in the nominal domain mirror those described in the verbal domain from Section 3.1 above. To summarize the discussion so far, N-bonding occurs across the verbal and nominal domains in Malagasy and is found between a non-Agent Voice verb and following non-trigger agent, a possessee and possessor, and between certain prepositions and adjectives and their complements. Importantly, these are all environments that are descriptively genitive. All of these facts, I argue, can be explained under a licensing approach.

4 Structure and licensing in Malagasy

I propose that N-bonding arises as a reflection of a particular syntactic environment, namely one in which a nominal cannot be structurally licensed, and that this occurs in Malagasy due to the absence of a dedicated abstract case for external arguments, in combination with details of the voice system, discussed below. I begin by outlining the basic clausal structure of Malagasy in Section 4.1. In Sections 4.2 and 4.3, I establish the distribution of voice morphemes and present the assumptions regarding structural licensing within the proposed structure. I will then show that the absence of abstract case for external arguments results in the possibility of a nominal remaining unlicensed at spell-out. I review the implications of this limitation in structural licensing in Section 5. Following previous analyses, I provide an overview of an

alternative licensing strategy, namely Local Dislocation, a post-syntactic operation which creates the conditions necessary for N-bonding in Malagasy.

4.1 Malagasy clause structure

I start by outlining the basic clausal structure of Malagasy, with the assumption that there are only two structural licensors in the language: CT^0 and $\nu/Voice^0$. In Section 4.1.1, I propose a joint CT^0 in Malagasy, a high functional head responsible for hosting an \bar{A} -featured DP in its specifier and assigning it nominative case. This follows from previous proposals such as those by Aldridge (2004; 2021), Legate (2014), and Erlewine (2018). In Section 4.1.2, I show that deriving the right outcomes of movement to trigger position relies on a lower functional head, namely $\nu/Voice^0$, the head responsible for merging the external argument and assigning accusative case. I return to the implications of such licensing patterns in Section 4.3.

4.1.1 The Malagasy trigger in Spec,CTP

Recall that each clause in Malagasy contains a trigger, a referentially prominent DP which is tied to the particular voice of the clause and occurs in clause-final position. Examples are given in (21), where the trigger is underlined.

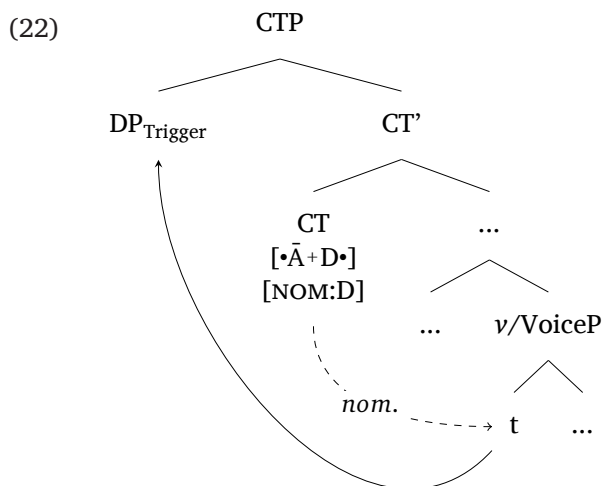
- (21) a. M-an-didy ny trondro ny vavy.
 AV-PFX-cut DET fish DET girl
 ‘The girl cuts the fish.’
- b. Didi-a(n)-n’-ny vavy ny trondro.
 cut-PV-N-DET girl DET fish
 ‘The fish is cut by the girl.’
- c. An-didi-a(n)-n’-ilay vavy ny trondro ny antsy.
 PFX-cut-CV-N-DEM girl DET fish DET knife
 ‘The knife is used by that girl to cut the fish.’

Following the intuition that the trigger picks out what the sentence is about (for discussion see e.g. Pearson 2005; Chen 2017; Hsieh 2020), I assume that the trigger is predetermined by information structural considerations and bears a discourse-motivated \bar{A} -feature. This feature is then probed by a higher functional head, prompting movement to trigger position.¹²

Much discussion in the Austronesian literature has centered around whether the trigger, the agent, or both/neither constitutes the grammatical subject of the sentence. I adopt an analysis similar to that of Guilfoyle, Hung, and Travis (1992) wherein the ‘subject’ function is associated with both the trigger and the agent. Following Guilfoyle et al., I assume that the agent is generated

¹² This is a similar approach to that of Hsieh 2020, which specifies a [PIVOT] feature exclusive to DPs in Tagalog.

in a vP -internal subject position, a position associated with the thematic and binding properties of subjects. The trigger is located in the nominative case position, a position associated with the case- and extraction-related properties of subjects. Following previous work (e.g. Aldridge 2004; Rackowski & Richards 2005; among others), I assume that structural nominative case is assigned in Malagasy by a high functional head to the trigger.



Although it is common across many languages for C^0 (COMPLEMENTIZER) and T^0 (TENSE) to be independent from one another, with C^0 bearing the responsibility of fulfilling information-structural \bar{A} -movement and T^0 being associated with A-movement and properties of subjects (Chomsky 1986; among others), this sharp division between C^0 and T^0 is not as apparent in Austronesian languages exhibiting voice systems that interact with extraction asymmetries. I assume that in Malagasy C^0 and T^0 are bundled into a single head, which I call CT^0 following Martinović (2015; 2017) (see also Legate 2014; Aldridge 2017; and Erlewine 2018 which discuss the application of a joint CT^0 in other Austronesian languages). This CT^0 raises the highest \bar{A} -bearing DP in its c-command domain to its specifier and assigns it nominative case, as illustrated in (22). I will show that the responsibility of ensuring that the trigger DP will be the target for this movement to Spec, CTP lies with a lower functional head, namely v/Voice^0 , which I discuss in Section 4.1.2. Some analyses place the trigger in a specifier position to the right of the head which projects it (see Guilfoyle et al. 1992; Pearson 2005). The current analysis does not depend on whether this Spec position is to the left or right. To obtain the correct surface order for the structures proposed in this paper, I assume a predicate-fronting analysis as proposed by Pearson (1998), Rackowski & Travis (2000), Travis (2005), among others, not represented in the trees for simplicity.

For the current analysis, I assume that movement and Case assignment occur as a result of probe-goal relationships between functional heads and target nominals (Chomsky 2001) (see also Erlewine 2018 for a similar account of probing in Toba Batak). Functional heads are merged with features which constitute probes that search their c-command domain for a goal with matching

features. When a probe finds a goal, it enters into an Agree relationship with it. The CT^0 in Malagasy has a [NOM:D] feature, for nominative case assignment, and a movement-triggering feature (standardly proposed to be an [EPP] feature associated with \bar{A} -features of C^0 or A-features of T^0). I propose that this movement-triggering feature on CT^0 probes for the highest target that simultaneously bears \bar{A} - and D-features (see Coon et al. 2021 and Scott 2021 for a formal implementation of such a probe).¹³ I represent this feature as [$\bar{A} + D$] (notation adapted from Adger 2003; Sternefeld 2006; Heck & Muller 2007; Georgi 2017; Branan & Erlewine to appear). Exactly how the features are organized within the shared CT^0 is not essential to this analysis and will not be discussed in detail (but see Coon & Bale 2014; Deal 2015; van Urk 2015; Erlewine 2018; Scott 2021; Coon et al. 2021 for further discussion regarding probing for combinations of features). What is crucial to the present analysis is that there exists a single high functional head in the structure that can do the work of both C^0 and T^0 , namely moving an argument to its specifier and assigning the argument structural nominative case.

The proposal of a joint head stems from the Feature Inheritance approach (Chomsky 2005; 2008; Richards 2007; Ouali 2008; Legate 2011; Coon et al. 2021; among others) which proposes that all features associated with C^0 and T^0 start on one head and are then spread over a larger amount of structure. Along the same lines, according to Martinović's (2015) theory of *CT head-splitting*, C^0 and T^0 begin the derivation as a single head, CT^0 , which splits under certain circumstances. For example, Martinović (2019) argues that the CT^0 in Wolof can remain unified for V-raising clauses but must split for *wh*-raising clauses to account for differences in available subject positions. Erlewine (2018) claims that a bundled CT^0 head is used in Toba Batak to front nominal *wh*-phrases and focused nominals. Additionally, Aldridge (2021) proposes that the patterns of DP extraction in Tagalog, and Austronesian languages more generally, can be explained under a feature inheritance approach. More specifically, Aldridge argues that a lack of CT-inheritance leads to a competition between subjects and other DPs for a single specifier position of CTP. Following these accounts, I propose that a bundled CT^0 approach can similarly be used in Malagasy.

Support for this single specifier position of CTP comes from *wh*-questions and voice morphology. In Malagasy *wh*-questions, the *wh*-phrase typically surfaces in clause-initial position (Paul 2000; Potsdam 2006). This pattern is shown in (23), where the *wh*-phrase is clause-initial and followed by the focus particle *no* (Pearson 2005). When an agent is questioned, the verb must appear in AV form (23a), when the theme is questioned, the verb appears in PV form (23b), and when a DP other than the agent or theme is questioned, the verb appears in CV form (23c).

- (23) a. *Iza no mamono ny akoho amin'-ny antsy?*
 who FOC AV.kill DET chicken PREP-DET knife
 'Who is killing the chickens with the knife?'

¹³ The \bar{A} -feature is used here as a way to track the trigger DP and capture the effect that the pre-determined trigger DP will always be probed to move to trigger position.

- b. *Inona* no vonoin'-ny mpamboly amin'-ny antsy?
 what FOC PV.kill-DET farmer PREP-DET knife
 'What is the farmer killing with the knife?'
- c. *Inona* no amonoan'-ny mpamboly ny akoho?
 what FOC CV.kill-DET farmer DET chicken
 'What is the farmer killing the chicken with?'

Alternatively, Malagasy *wh*-phrases can stay in-situ. When this occurs, the verb reflects regular AV, PV, and CV morphology with the non-*wh*-argument that has moved to trigger position, as in (24). In Malagasy, every clause must contain either a trigger or a focused DP, but, as (25) shows, the two cannot co-occur (Pearson 2005).

- (24) a. Nividy **inona** Rabe?
 PST.AV.buy what Rabe
 'Rabe bought what?'
- b. Nividy ny vary **taiza** Rabe?
 PST.AV.buy DET rice where Rabe
 'Rabe bought the rice where?' (Sabel 2003)

- (25) * **Inona** no mamono amin'-ny antsy ny mpamboly?
 what FOC AV.kill with-DET knife DET farmer
 Intended: 'What is the farmer killing with the knife?'

Adopting proposals by Paul (2001; 2003), Pearson (1996; 2005), and Potsdam (2006), I assume that Malagasy *wh*-questions are pseudocleft structures that involve movement of a null *wh*-operator.¹⁴ Crucially, these *wh*-operators must be licensed in Spec,CTP. Thus, following Pearson (2005), I assume that the trigger in Malagasy is an \bar{A} -element and is mutually exclusive with *wh*-operator movement within a clause because the trigger and operator compete for the same landing site, namely Spec,CTP. I take this as support for a bundled CT⁰ which raises either the trigger or a *wh*-operator. I also assume, following Pearson (2005), that in order to capture the presence of a trigger (or clause-initial *wh*-DP) in every clause, the specifier position of this bundled CT⁰ *must* be filled in Malagasy.

As mentioned earlier in Section 2, the thematic role of the trigger is reflected in the voice morphology that appears on the verb. Thus we expect the argument that participates in this movement to Spec,CTP (i.e. trigger position) to differ in tandem with the voice of the clause. In the following section, I will illustrate that these different outcomes occur as a result of the properties of a lower v /Voice⁰, the functional head responsible for merging an external argument and assigning accusative case to the theme (see e.g. Legate 2014; Harley 2017).

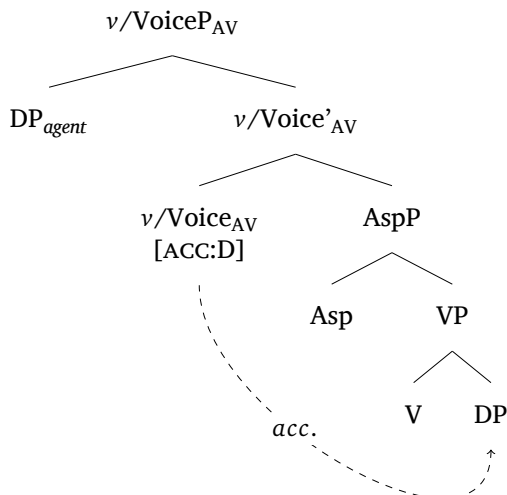
¹⁴ These proposals argue that *wh*-questions are pseudocleft structures in which the *wh*-phrase is a non-verbal predicate and the subject is a headless relative clause involving internal movement of a null operator (Potsdam 2006; Paul 2001; Pearson 1996; 2005).

4.1.2 v /Voice

I assume that Malagasy exhibits different flavours of a bundled v /Voice⁰, following proposals by Pylkkänen (2008) and Harley (2017). That is, rather than a division of labour between separated v^0 and Voice⁰, I assume the bundled v /Voice⁰ bears the responsibility of introducing an external argument, assigning accusative case, and raising an argument to its outer specifier position. I argue that it is the different combinations of these functions of v /Voice⁰ that derive the correct patterns of voice morphology, movement to trigger position, and Case assignment in Malagasy.

Across the three voices, v /Voice⁰ introduces an external argument. I assume this is the result of a Merge feature [\bullet D \bullet], which I do not include in the structures for simplicity. In an AV clause, the agent DP is the referentially prominent argument and is merged in Spec, v /VoiceP, bearing an \bar{A} -feature. I further assume that v /Voice_{AV} has a Case-licensing feature which assigns accusative case to the structurally closest DP argument. In an AV sentence, the goal for this probe will be the internal argument. The features on v /Voice_{AV} are illustrated in (26). After merging the external argument in its specifier, v /Voice_{AV} assigns accusative case to the internal argument, discharging [ACC:D].¹⁵

(26) v /Voice_{AV} assigns accusative case to internal argument



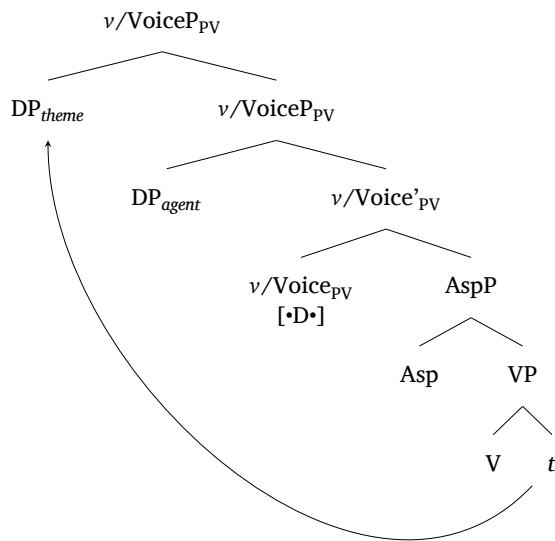
In an AV clause, the agent is the highest DP with both \bar{A} - and D-features. Therefore, following the assumptions described above, once CT⁰ merges, the features on CT⁰ will Agree with the agent DP, assign it nominative case, and raise it to Spec,CTP to become the trigger (as illustrated in (22)).

I turn next to PV. Unlike v /Voice_{AV}, I propose that the v /Voice⁰ in PV (v /Voice_{PV}) *cannot* assign accusative case to the internal argument (see Legate 2014 for a similar analysis of Acehnese Object

¹⁵ Note that the ordering of these features on v /Voice⁰_{AV} does not affect the derivation. That is, the same result is obtained regardless of how the features are ordered in (25). Ordering of certain features will, however, be crucial in obtaining the correct representation for CV, discussed below. I maintain the ordering throughout the examples for consistency.

Voice). Instead, $v/\text{Voice}_{\text{PV}}$ bears two Merge [$\bullet\text{D}\bullet$] features: one merges the external argument and the other triggers movement of the closest DP in its c-command domain to the outer specifier position, above the agent. In PV, the internal argument is the referentially prominent DP and is the highest DP in the c-command domain of $v/\text{Voice}^0_{\text{PV}}$. Thus the internal argument will raise to the outer specifier position of v/VoiceP and will be the highest DP in the clause, as shown in (27).¹⁶

(27) $v/\text{Voice}_{\text{PV}}$ raises internal argument to outer specifier position



Therefore in a PV sentence, once CT^0 merges, the [$\bar{\text{A}} + \text{D}\bullet$] feature on CT^0 will Agree with the theme DP, assign it nominative case, and raise it to Spec,CTP to become the trigger.

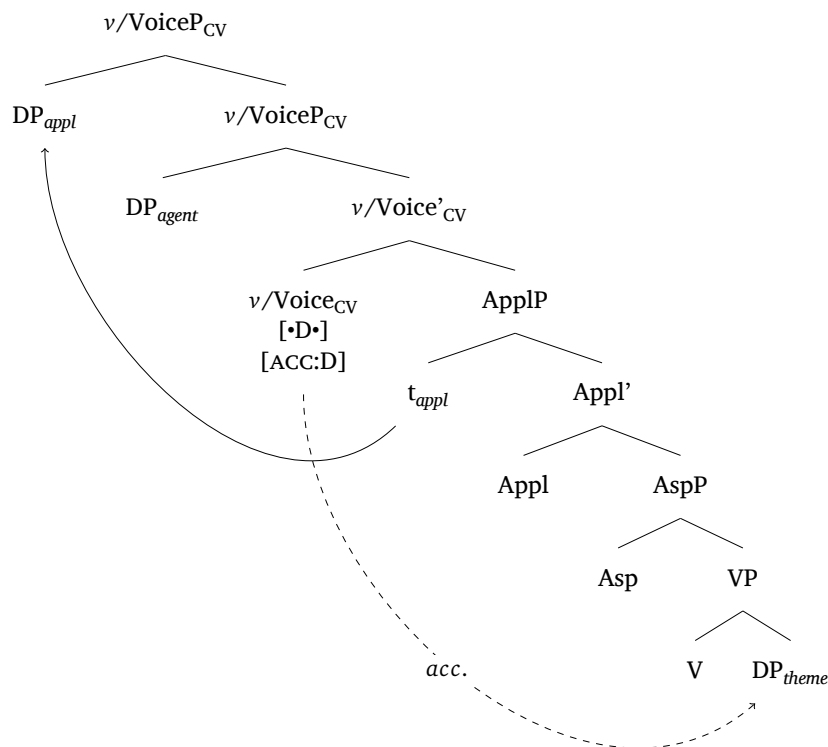
Finally, I turn to CV which displays a combination of AV and PV v/Voice^0 properties. That is, $v/\text{Voice}_{\text{CV}}$ behaves like $v/\text{Voice}_{\text{AV}}$ in that it is able to assign accusative case to the theme, but is like $v/\text{Voice}_{\text{PV}}$ in that it has a movement-triggering feature [$\bullet\text{D}\bullet$]. Since it is the applied argument that must raise to trigger position, the [$\bullet\text{D}\bullet$] feature on $v/\text{Voice}_{\text{CV}}$ must first raise the applied argument to its outer specifier position. Evidence from binding in Malagasy shows that the applied argument c-commands the internal argument but is still lower than the agent (see Travis 1988). I thus assume that the applied argument is in the specifier of an Applicative Phrase (AppIP) that merges directly below v/VoiceP .

¹⁶ The analysis outlined here illustrates a *leapfrogging* derivation (Legate 2014, after Bobaljik 1995), in which the external argument merges first and the internal argument moves to the outer specifier position of v/Voice^0 . See Legate (2014) for detailed discussion of the leapfrogging derivation in Acehnese Object Voice and similar applications by Aldridge (2008) and Cole et al. (2008) for Indonesian Object Voice. However, if the internal argument was to move to the specifier position of v/Voice^0 before the external argument is merged, the intended structure can alternatively be achieved under a tucking-in approach. That is, the external argument would merge, tucking in, below the internal argument. This possibility also applies to CV clauses, wherein the applied argument will still ultimately be in a position above the external argument.

From this position, the applied argument will raise to the outer Spec, v /VoiceP position. Once the applied argument has raised, v /Voice_{CV} will agree with the internal argument and assign it structural accusative case. Finally, upon merge of CT⁰, the [\bar{A} + D \bullet] feature on CT⁰ will Agree with the applied argument, assign it nominative case, and raise it to Spec,CTP to become the trigger, in the same way as agents in AV sentences and themes in PV sentences. The lower structure of a CV sentence is shown in (28).

Note that this ApplP projection appears only in CV constructions to host applied arguments which are otherwise general PP arguments in AV and PV counterparts. Hsieh (2020) makes a similar proposal for Tagalog wherein peripheral arguments are introduced into the derivation as applied objects only if they later become the trigger and are otherwise general PP arguments (see also Rackowski 2002; Nie 2019).

- (28) v /Voice_{CV} raises applied argument to its specifier *then* assigns accusative case to the internal argument

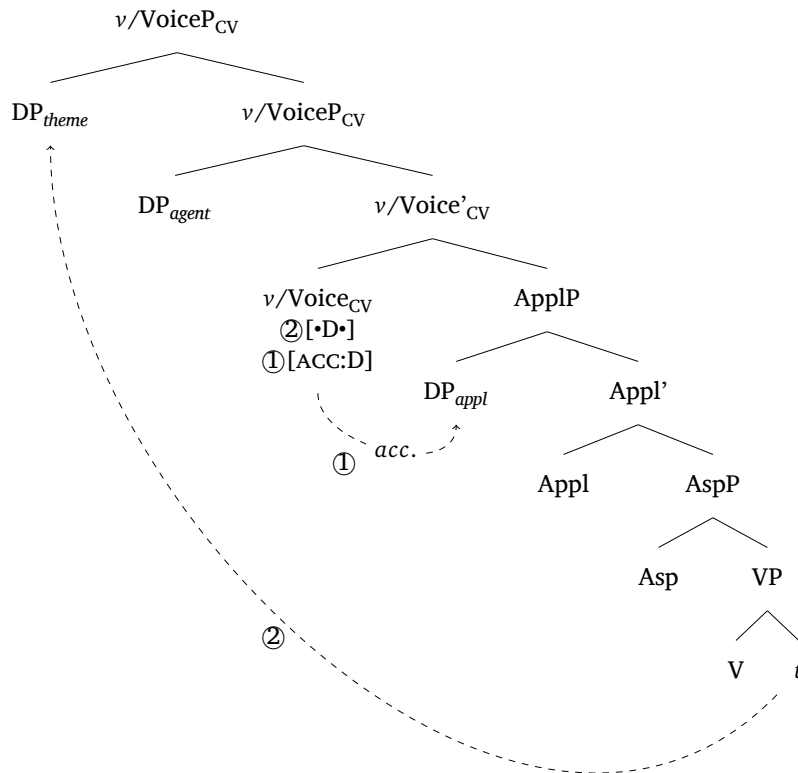


It's important to note that the movement-triggering feature [\bullet D \bullet] and Case-licensing feature [ACC:D] on v /Voice_{CV} must probe in the order specified above to make correct predictions for the language. Under economy conditions, it may seem ideal for v /Voice_{CV} to be able to assign accusative case *and* move an argument to its outer specifier position in one operation (i.e. with a single Agree relation). In other words, it is desirable to minimize the number of operations

that take place, an idea in line with proposals such as the Feature Maximality constraint (Longenbaugh 2019) or Multitasking condition (van Urk & Richards 2015). However, if movement is tied to case assignment, then the applied argument being the highest nominal under $v/Voice_{CV}$ would be the sole goal, robbing the internal argument of the opportunity to receive structural accusative case.

Alternatively, if these operations took place independently from one another but occurred in the wrong order (i.e. if $v/Voice_{CV}$ could assign accusative case *before* moving an argument to its outer specifier position), the applied argument would be the goal for the [ACC:D] feature on $v/Voice_{CV}$. Then, assuming that a nominal can only enter into a single Agree relationship, the internal argument would be the only remaining goal for the movement-triggering [\bullet D \bullet] feature on $v/Voice_{CV}$ and will consequently raise above both the applied argument and the agent. Two problems arise in this situation. First, in a CV clause, the internal argument is not the referentially-prominent DP. Therefore, when CT^0 merges, it will not find a matching goal and the internal argument would not raise to Spec,CTP to receive nominative case and hold trigger status. Second, this would block the applied argument from ever becoming the trigger and incorrectly predicts that circumstantial voice sentences are not possible in the language. A structure with the incorrect ordering of features is schematized in (29).

(29) $v/Voice_{CV}$ incorrectly assigns accusative case to applied argument



Such economy principles must therefore be sensitive to other needs of the derivation. In this case it is the requirement for nominals to be licensed and the requirement for Spec,CTP to be filled which must be satisfied. We can achieve the desired outcome by specifying an order of feature-probing (see also Georgi 2017 for discussion on the effects of relative ordering of Merge and Agree) or by asserting that only the proposed order will result in a converging derivation. A similar proposal has been made by Newman (2020) for theta role assignment.

A summary of the features on the different $v/Voice$ heads is provided in (30). $v/Voice_{AV}$ assigns accusative case to the internal argument and does not raise an argument to its outer specifier position. $v/Voice_{PV}$ cannot assign accusative case but *does* raise an argument to its outer specifier position. $v/Voice_{CV}$ is a combination of both $v/Voice_{AV}$ and $v/Voice_{PV}$ in that it assigns accusative case to the internal argument *and* raises an argument (i.e. the applied argument) to its outer specifier position. The organization of these features determine the spell-out of $v/Voice^0$, described next.

(30) **Distribution of Movement-triggering and Case-licensing probes on $v/Voice$**

Voice	[•D•]	[CASE]
$v/Voice_{AV}$	✗	✓
$v/Voice_{PV}$	✓	✗
$v/Voice_{CV}$	✓	✓

4.2 Spelling out voice morphology

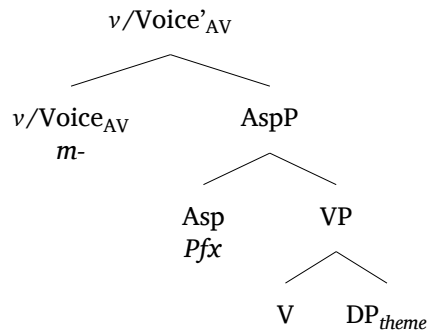
With the clausal structure outlined above, we can connect the properties of $v/Voice^0$ with the different voice morphemes in Malagasy. Recall the voice morpheme distribution repeated in **Table 3**. In AV the verb takes the AV prefix *m-* and a verbal prefix (e.g. *aN-*). I propose that the AV prefix *m-* is realized on $v/Voice_{AV}$, reflecting the absence of the movement-triggering [•D•] feature. In contrast, when there is such a feature on $v/Voice^0$ (i.e. in PV and CV), $v/Voice^0$ is null.

Voice	Template	Root	Surface Form
Agent Voice	<i>m-</i> Pfx- ROOT	<i>didy</i> <i>hira</i>	<i>m-an-didy</i> <i>m-i-hira</i>
Patient Voice	<i>a-</i> ROOT <i>voa-</i> ROOT ROOT - <i>Vn</i>	<i>tao</i> <i>didy</i> <i>didy</i> <i>voha</i>	<i>a-tao</i> <i>voa-didy</i> <i>didi-an</i> <i>voha-in</i>
Circumstantial Voice	Pfx- ROOT - <i>an</i>	<i>didy</i> <i>vidy</i>	<i>an-didi-an</i> <i>i-vidi-an</i>

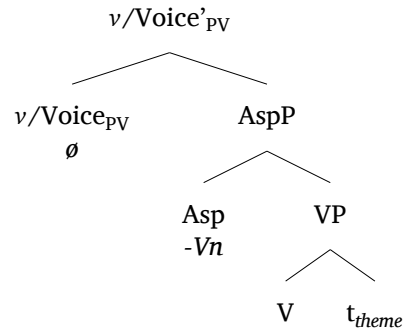
Table 3: Malagasy verb template and voice morphemes.

Following Pearson (2005), I assume that the verbal prefixes are realized on the same head as the PV affixes: Asp.¹⁷ When the theme moves out of the complement of Asp⁰, Asp⁰ is spelled out as a PV affix. Otherwise, Asp⁰ is spelled out as a verbal prefix.¹⁸ Following Pearson (2005), I assume the CV suffix *-an* is the spell-out of the Appl⁰. As traditionally assumed, all affixes combine with the verb root as it raises via successive head movement. Following Travis (1994; 2006) I assume that verb movement in Malagasy is contained within the heads that are event related and therefore the verb moves only as far as E⁰, an event related functional head situated between CTP and *v*P which defines the edge of an event (see Travis 1994 for more discussion on E⁰).¹⁹ AV and PV structures with the corresponding voice morphemes are shown in (31).

(31) a. Agent Voice



b. Patient Voice



The observation that Appl⁰ is spelled out as *-an* only when the applied argument raises out of the specifier position of ApplP, can be explained under a generalized version of the DOUBLY-FILLED COMP FILTER, as in (32) (following Sportiche 1992; Koopman & Szabolcsi 2000; Pearson 2005).

(32) DOUBLY-FILLED COMP FILTER

If H is a category containing some feature F, * $[_{HP} XP [_H H^0 \dots]]$ when XP and H⁰ both overtly encode F.

¹⁷ Situating the verbal prefixes in the same Asp head as the PV affixes captures the fact that they are in complementary distribution. While alternatives have been argued for (see e.g. Travis 2005), the exact location of the verbal prefixes is not directly relevant to the current analysis of N-bonding.

¹⁸ This pattern can be achieved either through selection or by positing that the theme moves through Spec, AspP. Both possibilities are compatible with the current analysis.

¹⁹ I tentatively locate the morphemes *n(o)-* and *h(o)-* in this Event head. These morphemes are often considered tense morphemes and therefore in T⁰, though it has also been proposed that these are better described as indicating a realis/irrealis distinction (e.g. Travis 2005). If these morphemes are in E⁰, then they will combine with the verb when the verb raises to E⁰. More work is needed to determine the status of these tense/(ir)realis morphemes which I leave as an avenue for future work.

The spell-out of v/Voice^0 , Asp^0 , and Appl^0 for each of the three voices is summarized in **Table 4**. In AV, there is no movement-triggering feature on v/Voice^0 , resulting in the spell out of v/Voice^0 as the AV prefix *m-*. In contrast, the movement-triggering feature is present on v/Voice^0 in both PV and CV, resulting in the spell-out of a null v/Voice^0 . Verbal prefixes are spelled out on Asp^0 in AV and CV when the theme remains within the complement of Asp^0 . In PV, on the other hand, when the theme is raised due to the [$\bullet\text{D}\bullet$] feature on $v/\text{Voice}_{\text{PV}}$, Asp^0 is spelled out as a PV affix. Lastly, the CV suffix *-an* is the spell out of Appl^0 (projected only in CV), when the applied argument raises.

Voice	v/Voice^0	Asp^0	Appl^0
Agent Voice	<i>m-</i>	<i>Pfx</i>	
Patient Voice	\emptyset -	<i>a-/-Vn</i>	
Circumstantial Voice	\emptyset -	<i>Pfx</i>	<i>-an</i>

Table 4: Spell-out of Malagasy voice morphemes.

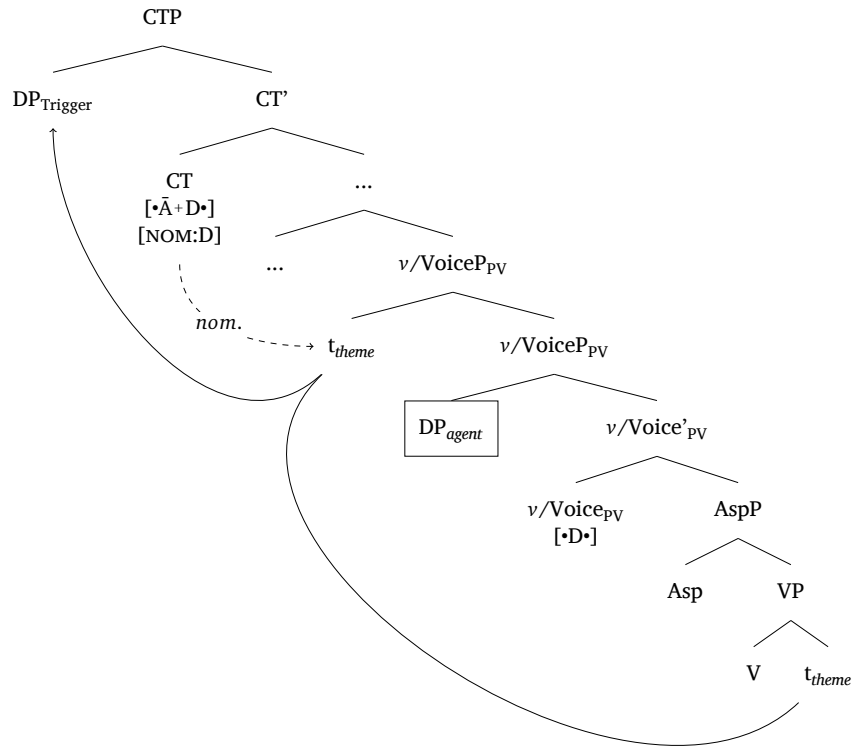
In the next section I explain how these assumptions regarding the structural organization and licensing constraints in the language lead to N-bonding.

4.3 Case and licensing in Malagasy

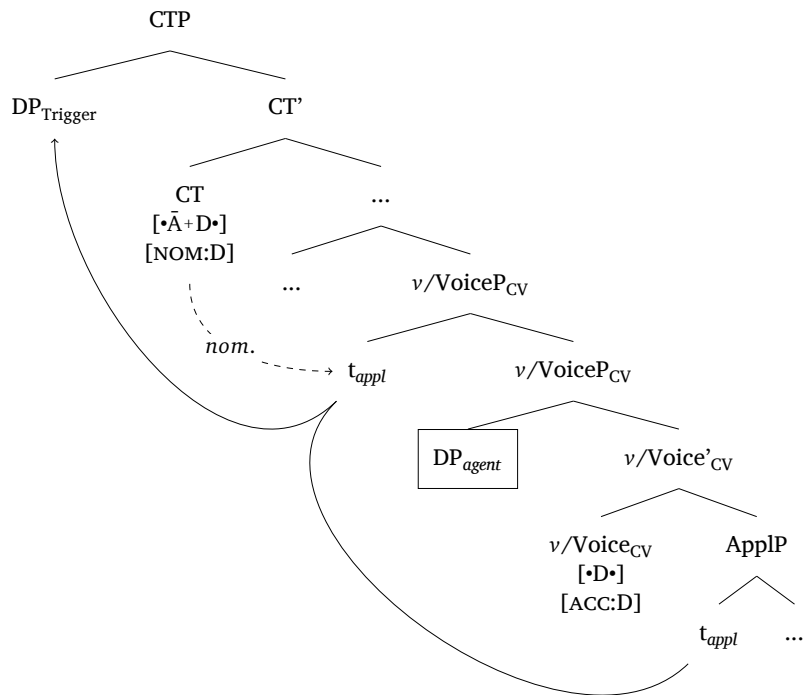
4.3.1 Licensing in the verbal domain

I assume that Malagasy complies with the Case Filter (see Vergnaud 1977/2008; Chomsky 1980; 1981), a requirement that all nominals receive Case. When we consider the availability of structural nominative and accusative case from CT^0 and v/Voice^0 , respectively, the main properties that underlie the process of N-bonding emerge. With nominative case being available only to the trigger DP and accusative case being available to the internal argument, any DP argument that is not in one of those two positions is left unlicensed. Crucially, I propose that v/Voice^0 in Malagasy is unable to license an argument in its specifier. In other words, there is no inherent ergative case assignment available in Malagasy like there is in some other languages (see e.g. Massam 2006 on Niuean; Aldridge 2008 on Tagalog; Legate 2014 on Acehnese; and Legate 2008 on inherent ergative more generally). Therefore, in-situ agents that are merged in $\text{Spec},v/\text{VoiceP}$ and *do not* raise to trigger position cannot be licensed by any of the structural mechanisms available in the language. This occurs in sentences when a DP other than the agent raises to trigger position (i.e. PV and CV sentences), which are the same types of sentences in which we observe N-bonding. The structure of a PV sentence is illustrated in (33) highlighting the in-situ agent that cannot be licensed in its structural position. The structure in (34) shows the same restriction in a CV sentence.

(33) Non-trigger agent in PV clause cannot be structurally licensed



(34) Non-trigger agent in CV clause cannot be structurally licensed



When we consider the patterns of N-bonding in the verbal domain within the current proposal of structural licensing in Malagasy, we see that the arguments that do not receive structural case are exactly the arguments that undergo N-bonding. In the following section I extend this analysis to the nominal domain.

4.3.2 Licensing in the nominal domain

As just described for the verbal domain, under the current analysis the only types of structural case assignment that are available in Malagasy are nominative and accusative, with the result being that N-bonding occurs when a nominal cannot receive either one. In Section 3.2 we saw the presence of N-bonding in the nominal domain in constructions described as being ‘genitive’. In these constructions, N-bonding appears between a possessor and possessee, and in some cases between a preposition or adjective and its complement. The data is repeated in (35).

- (35) a. **Possessee + Possessor**
 trano-**n**-ilay olona
 house-N-DEM person
 ‘that person’s house’ (Keenan & Polinsky 1998)
- b. **Prep + Complement**
 ami-**n**-ilay seza
 PREP-N-DEM chair
 ‘on that chair’ (Pearson 2005)
- c. **Adj + Complement**
 mainti-**n**-ny molaly
 black-N-DET soot
 ‘blackened by (the) soot’ (Paul 1996)

If we extend the same licensing proposal of N-bonding from the verbal domain to the nominal domain, we predict that the bonded elements in (35) do not reflect genitive case assignment but rather a lack thereof. I take the case of prepositions as an example. If we assume that the language possesses only abstract nominative and accusative case, we can reframe the distribution of nominal complements to prepositions as follows: some prepositions assign nominative case, as in (36) for the preposition *noho* ‘because of’. Other prepositions assign accusative case, as shown in (37) for the preposition *lavatra* ‘far from’. Yet other prepositions do not assign case at all, as seen in (38) for the preposition *aloha* ‘in front of’. I propose that N-bonding occurs only when the preposition does not assign case.

- (36) **Preposition + nominative marked nominal**
 a. *noho* izy
 because.of 3SG.NOM
 ‘because of him/her’

- b. Vaky ny vilia noho ilay zaza.
 broken DET plate because.of DEM child
 'The plate is broken because of that child.'

(37) **Preposition + accusative marked nominal**

- a. lavitra azy
 far.from 3SG.ACC
 'far from him/her'
- b. Mipetraka lavitra ny tsena ny vavy.
 AV.live far.from DET market DET girl
 'The girl lives far from the market.'

(38) **Preposition + unmarked nominal**

- aloha-n'-ny fiara
 in.front-N-DET car
 'in front of the car'

We can take the same approach for adjectives which show variation between nominals that are marked for accusative case and nominals that are unmarked for case. Examples are repeated in (39) and (40). As illustrated, N-bonding occurs only when the nominal appears *without* accusative case (40).

(39) **Adjective + accusative marked nominal**

- a. antra olona
 compassionate person.ACC
 'compassionate to people'
- b. tsara ho azy
 good PREP 3SG.ACC
 'good for him'

(40) **Adjective + unmarked nominal**

- mainti-n'-ny molaly
 black-N-DET soot
 'blackened by soot'

(Paul 1996)

Moreover, this analysis is easily applied to the possessive construction, which is described as being expressed in Malagasy using the 'genitive construction' (Paul 1996). An example is repeated in (41) illustrating the presence of N-bonding in the possessive construction. If abstract genitive case is not available in the language, then the observation that possessive constructions also show N-bonding is explained.

(41) **Possessee + Possessor**

trano-**n**'-ilay olona
 house-N-DEM person
 'that person's house'

(Keenan & Polinsky 1998)

In sum, N-bonding reflects a construction in which a nominal cannot receive nominative or accusative case. Moreover, these patterns reflect a more general property of the language, namely that it lacks abstract genitive case. Further support for this analysis is found in the distribution of pronouns in Malagasy, which I turn to next.

4.3.3 Reassessing Malagasy pronouns

Thus far, we have seen that N-bonding occurs consistently with nominals. In this section, I will show that the same analysis can be extended to pronouns. Moreover, reviewing the distribution of pronouns under an N-bonding lens allows us to simplify the pronominal paradigm in Malagasy. Specifically, I will argue that 'nominative' and 'genitive' forms can be collapsed into a single pronoun series that is unmarked for case. I will further show that N-bonding easily accounts for the variation observed within the 'genitive' series.

Traditional descriptions of Malagasy pronouns generally assume that the language shows three distinct cases: nominative, accusative, and genitive (Keenan 1976; Voskuil 1993; among others), as displayed in **Table 5**. The nominative forms are usually used when the pronoun functions as the trigger, as in (42), while the accusative forms are used when the pronoun is a predicate-internal theme, as in (43). Lastly, the genitive forms are used more widely, encoding both non-trigger agents (44a) and pronominal possessors (44b) (Pearson 2005). The genitive pronouns are also used in the complement position of certain adjectives and prepositions, as described above.

	Nominative	Accusative	Genitive
1st SG	izaho, aho	ahy	-ko/-o
2nd SG	ianao	anao	-nao/-ao
3rd SG	izy	azy	-ny/-y
1st PL Incl	isika	antsika	-ntsika/-tsika
1st PL Excl	izahay	anay	-nay/-ay
2nd PL	ianareo	anareo	-nareo/-areo
3rd PL	izy (ireo)	azy (ireo)	-ny/izy ireo

Table 5: Malagasy pronoun series.

(42) **Nominative Pronoun**

- a. Namangy ny ankizy **izy**.
 PST.AV.visit DET children 3NOM
 ‘He/she/they visited the children.’
- b. Novangian’ ny ankizy **izy**.
 PST.PV.visit.N DET children 3NOM
 ‘He/she/they were visited by the children.’

(43) **Accusative Pronoun**

- a. Namangy **azy** ny ankizy.
 PST.AV.visit 3ACC DET children
 ‘The children visited him/her/them.’
- b. Mieritreritra **anao** aho.
 PRS.AV.think 2ACC 1NOM
 ‘I am thinking of you.’

(44) **Genitive Pronoun**

- a. Novangia-**ny** ny ankizy.
 PST.PV.visit-3GEN DET children
 ‘The children were visited by him/her/them.’
- b. ny trano-**ny**
 DET house-3GEN
 ‘his/her/their house’

However, it has been observed that the nominative forms have a wider distribution than previously described. While the distribution of the pronoun forms remains to be explained, I will show that N-bonding occurs consistently in the expected environments (e.g. between a verb and a following non-trigger agent), regardless of the form of the pronoun. Following Pearson (2005), I take this variability as potential evidence that the nominative and genitive pronominal forms do not spell out abstract case features.

Examples outlining some of the variability that has been observed in previous literature regarding the use of nominative and genitive pronominal forms are provided in (45)–(47) (Zribi-Hertz & Mbolatianavalona 1999; Pearson 2005). With post-verbal agents, a position in which we expect to find the genitive form, as illustrated in (45), the nominative form can be found when the pronoun is coordinated with another DP (46a), followed by the restrictive modifier *irery* ‘only/alone’ (46b), or when the pronoun is modified (e.g. by the verb *mivady* ‘be married’) (46c).²⁰

²⁰ Note that the third person pronouns are ambiguous between singular and plural interpretations. In order to disambiguate these, one option is to use *ireo* to force a plural reading. A reviewer points out that in example (46c), the plurality is represented instead by the modification itself. Therefore, one way of interpreting the pronoun *izy* in such an example is as the third person plural genitive pronoun.

(45) **Post-verbal agent with genitive pronoun**

Nojere-ny tany antokotany i Koto.
 PST.PV.watch-3GEN there garden DET Koto
 ‘He/she/they watched Koto in the garden.’

(46) **Post-verbal agent with nominative pronoun**

- a. Hita-n’-izaho sy ny zaza tany antokotany i Koto.
 PST.PV.see-N-1NOM and DET child there garden DET Koto
 ‘I and the child watched Koto in the garden.’
- b. Jere-n’-ianao irery ilay alika.
 PRS.PV-N-2NOM alone DEM dog
 ‘This dog is being watched by you alone.’
- c. Nojere-n’-izy mivady tany antokotany i Koto.
 PST.PV.watch-N-3NOM AV.married there garden DET Koto
 ‘They, the married couple, watched Koto in the garden.’

Note that the nominative pronouns in (46) cannot be replaced with their corresponding genitive forms, as shown in (47a) and (47b). In direct contrast, (47c) and (47d) illustrate a case in which the genitive form is instead required. Thus the nominative and genitive pronominal forms do not follow a strict complementary distribution. One possibility is to instead think of this alternation between ‘nominative’ (or free) and ‘genitive’ (or bound) forms as being determined by certain discourse- and other related factors.²¹

(47) **Coordination and modification with genitive pronoun**

- a. *Nojere-ko sy ny zaza tany antokotany i Koto.
 PST.PV.watch-1GEN and DET child there garden DET Koto
 Intended: ‘I and the child watched Koto in the garden.’
- b. *Nojere-ny sy ny zaza tany antokotany i Koto.
 PST.PV.watch-3GEN and DET child there garden DET Koto
 ‘He/she and the child watched Koto in the garden.’
- c. *Nojeren’ianareo sy ny zaza tany antokotany i Koto.
 PST.PV.watch-N-2PL.NOM and DET child there garden DET Koto
 Intended: ‘You all and the child watched Koto in the garden.’
- d. Nojere-nareo sy ny zaza tany antokotany i Koto.
 PST.PV.watch-2PL.GEN and DET child there garden DET Koto
 ‘You all and the child watched Koto in the garden.’

²¹ Many Philippine-type Austronesian languages have pronominal clitics, also referred to as “second-position clitics”, which are restricted to trigger arguments and/or non-trigger agents (see Erlewine & Levin 2021). Note, however, that while many of these languages have clitics for both triggers and non-trigger agents (e.g. Sqliq Atayal), Malagasy has bound pronominal forms only for non-trigger agents (Paul 1996; Zribi-Hertz & Mbolatianavalona 1999).

Crucially, in environments where we expect N-bonding to occur, the N-bonding process behaves systematically regardless of the form of the following pronoun. This supports the idea that the post-verbal agent, regardless of its morphological form, has not been assigned abstract case. Given these assumptions, we can reduce the pronominal paradigm in Malagasy to two series: the first is marked for accusative case and is used for predicate-internal themes, as in the traditional analysis, and the second is unmarked for case and has the free/bound alternation as described above. A revised representation of the pronominal paradigm is produced in **Table 6**.

	Accusative	Unmarked	
		Free	Bound
1st SG	ahy	izaho, aho	-ko/-o
2nd SG	anao	ianao	-nao/-ao
3rd SG	azy	izy	-ny/-y
1st PL Incl	antsika	isika	-ntsika/-tsika
1st PL Excl	anay	izahay	-nay/-ay
2nd PL	anareo	ianareo	-nareo/-areo
3rd PL	azy (ireo)	izy (ireo)	-ny/izy ireo

Table 6: Malagasy pronoun series: interim revision.

When we consider the surface forms of the pronouns with N-bonding in mind, we can simplify the pronominal paradigm in Malagasy even further. The clitic pronoun series is traditionally described as showing contextually-determined allomorphy (as shown in **Table 6**). With the exception of the first person pronoun, the two forms of clitic pronouns can be derived from one another; each pronoun either includes or lacks an initial *n* segment.²² This allomorphy is described as being dependent on preceding phonological context such that the initial *n* is absent when the preceding segment is a non-continuant consonant, and is otherwise present. If we reanalyze this initial *n* segment as being the N-bonding element, the presence of the *n* segment is independently motivated and the variation among the clitic pronouns is easily explained. In Malagasy, there exists only one series of clitic pronouns (the forms without the initial *n*) and these pronouns are always in a position to undergo N-bonding. A final representation of the pronominal paradigm is produced in **Table 7**.

²² The first person pronoun form *-ko* is found in almost every Malayo-Polynesian language and is suppletive (Paul 1996).

	Accusative	Unmarked Free/Bound
1st SG	ahy	izaho, aho/-ko
2nd SG	anao	ianaο/-ao
3rd SG	azy	izy/-y
1st PL Incl	antsika	isika/-tsika
1st PL Excl	anay	izahay/-ay
2nd PL	anareo	ianareo/-areo
3rd PL	azy (ireo)	izy (ireo)/-y

Table 7: Malagasy pronoun series revised.

The variation between the presence and absence of the N-bonding element on the surface reflects syllable structure constraints in the language more generally, which I return to in Section 5. Under the current approach we largely obviate the need for contextually-determined allomorphy of the clitic pronouns and are able to achieve a systematic pronominal paradigm within the language.

4.4 Interim summary

In Section 3, I presented the distribution of N-bonding across the verbal and nominal domains in Malagasy. I then outlined the proposed clausal structure for the language in Section 4, tying the N-bonding observations to licensing constraints. Specifically, I proposed that Malagasy has only two structural licensors: CT^0 and $v/Voice^0$, which are responsible for assigning nominative and accusative case, respectively. The constructions in which we find N-bonding all contain a nominal that cannot be structurally licensed due to the absence of abstract genitive case in Malagasy. This analysis was further supported by the distribution of the pronominal forms in the language (Pearson 2005). Having established the syntactic conditions that underlie N-bonding, I turn next to an account of the post-syntactic operations that are involved in its derivation.

5 Deriving N-bonding post-syntactically

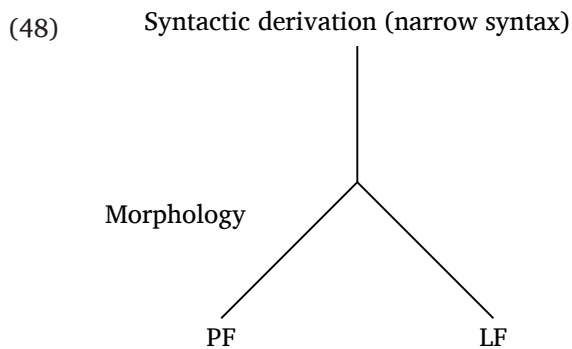
In this section I present N-bonding as the result of two independent morpho-phonological operations that produce (i) the ‘bonding’ configuration and (ii) the insertion of /n/ as the bonding element. In Section 5.1, I present an analysis of ‘bonding’ as a result of Local Dislocation, a post-syntactic operation required to satisfy the Case Filter in Malagasy. Section 5.2 provides further evidence from Malagasy compounds to support this analysis. I will then argue in Section 5.3 that the result of Local Dislocation feeds an independent language-specific operation which inserts

the N-bonding element. Section 5.4 provides an analysis of the N-bonding element as a bundle of features to account for the observed phonological variation.

5.1 N-bonding as a result of Local Dislocation

Recall from Section 4 that the deficiency of structural licensing in Malagasy leaves nominals in certain constructions unlicensed. If Malagasy complies with the Case Filter, defined as requiring all nominals to receive Case within the syntactic derivation, then the analysis thus far suggests that the Case Filter is violated in Malagasy. Following Levin (2015), I assume that languages can make use of post-syntactic licensing strategies and that we can maintain a version of the Case Filter by appealing to the proposal that the Case Filter is satisfied not at the end of the syntactic derivation, but later along the PF branch.

Before turning to the operations that are required to derive the account, I first spell out my assumptions about the overall structure of the grammar. I assume a conventional Y-model as illustrated in (48):



Once completed, the syntactic derivation is sent to Phonological Form and Logical Form. Following the Distributed Morphology framework (Halle 1990; Halle & Marantz 1993; and much subsequent work) I assume that Morphology represents a set of processes along the PF branch which interpret the output of the syntactic derivation (Embick & Noyer 2001). See Embick and Noyer (2001) for a detailed breakdown of proposed operations that take place along the PF branch. The operation relevant for the discussion of N-bonding in Malagasy is Local Dislocation, which I turn to next.

Embick & Noyer (2001) developed Local Dislocation as a variety of Merger, or Morphological Merger, as first proposed by Marantz (1988) (see Embick & Noyer 2001 for detailed discussion on the development of this operation).²³ Local Dislocation is an operation that combines two linearly adjacent terminal nodes to create a complex atomic head (Embick & Noyer 2001;

²³ Morphological Merger has also been referred to as Merger Under Adjacency (see Harley 2010).

2007).²⁴ This adjunction operation is schematized in (49), where $X \cdot Y$ denotes a requirement that X must linearly precede and be adjacent to Y .²⁵

(49) **Local Dislocation schema**

$$X \cdot Y \rightarrow X + Y$$

I assume following Levin (2015) that nominal licensing can be achieved via linear (i.e. post-syntactic) adjacency. As such, the licensing needs of Malagasy can motivate the implementation of Local Dislocation in the language. More specifically, Levin proposes that adjunction by Local Dislocation allows the nominal to count as part of the verbal extended projection, which obviates the need for the nominal to be Case-licensed. See Levin (2015) for further discussion on licensing by adjacency and proposals on modifying the Case Filter. For the purposes of this analysis, we can think of Local Dislocation as a last-resort licensing mechanism along the PF branch (see Erlewine 2018 for a similar proposal for Toba Batak). This post-linearization operation is also consistent with the empirical data from Malagasy. In a non-AV sentence for example, Local Dislocation can apply to a non-Agent Voice verb and in-situ agent, which will always be linearly adjacent. An example is schematized in (50), for a non-Agent Voice verb *voavoaha* ‘opened’ followed by a non-trigger agent *ny vavy* ‘the girl’.

(50) **Local Dislocation in the verbal domain**

- a. $[_T V^0] \cdot [_{DP} D^0 \dots] \rightarrow [_T V^0 + D^0] [_{DP} \dots]$
- b. $[_T \text{Voavoaha}] \cdot [_{DP} \text{ny vavy} \dots] \rightarrow [_T \text{Voavoaha} + \text{ny}] [_{DP} \text{vavy} \dots]$

We can apply the same machinery to the nominal domain, as schematized in (51) for the preposition *aloha* ‘in front of’ and its complement *ny fiara* ‘the car’. Since the preposition and following nominal are linearly adjacent after spell-out, Local Dislocation can apply, rendering the nominal part of the extended projection of the preposition and thus licensed via adjacency.

(51) **Local Dislocation in the nominal domain**

- a. $[_T P^0] \cdot [_{DP} D^0 \dots] \rightarrow [_T P^0 + D^0] [_{DP} \dots]$
- b. $[_T \text{aloha}] \cdot [_{DP} \text{ny fiara} \dots] \rightarrow [_T \text{aloha} + \text{ny}] [_{DP} \text{fiara} \dots]$

According to Levin (2015), Local Dislocation will not only result in the observed adjacency requirements (e.g. between non-Agent Voice verbs and following agents), but should also ensure that the adjacent components form a tight phonological unit at PF. Evidence from the presence of domain-internal phonological processes are compatible with this approach. For example, evidence

²⁴ Most descriptions of Local Dislocation describe this operation as being one that occurs *after* Vocabulary Insertion (see e.g. Embick & Noyer 2001). However, it has also been noted that it is possible for Local Dislocation to occur *before* Vocabulary Insertion occurs (Embick 2007). As the operation required here is not sensitive to phonological or morphological properties, this analysis is compatible with either option as long as some form of linearization has taken place prior to Local Dislocation.

²⁵ Note that the ordering of the two elements in (49) may or may not be affected ($X+Y$ or $Y+X$) (Embick & Noyer 2007). I assume that ordering cannot be affected in Malagasy.

of adjunction is found when the in-situ agent is a proper name, as in (52). In (52a), the non-Agent Voice verb *novidin* ‘bought’ and proper name *Rabe* are written as a single word, where the N-bonding element ‘n’ and following ‘r’ fuse to form the prenasalized affricate [ndr], a phonological process that otherwise only applies word-internally in Malagasy (Pearson 2005).²⁶ Assuming that local dislocation is also at play in the nominal domain (52b), the parallel outcomes and phonological effects of ‘bonding’ (i.e. fusion) are simply a reflection of adjunction and are thus unsurprising.

- (52) a. *novidi-n-dRabe*
 PST.PV-buy-N-Rabe
 ‘bought by Rabe’
- b. *ami-n-dRabe*
 PREP-N-Rabe
 ‘with Rabe’

Together, the empirical data is consistent with the proposal that N-bonding in Malagasy is linked to the licensing constraints of the language; N-bonding is observed in constructions where a nominal, as a result of not being structurally licensed, is post-syntactically licensed via adjunction. The licensing analysis described up to this point effectively accounts for the distribution of N-bonding and the phonological consequences are in line with the syntactic account.

5.2 Evidence from Malagasy compounds

So far, we have seen that the N-bonding element reflects the adjunction configuration created by Local Dislocation and carries no specific meaning or function other than to reflect that the adjunction operation has taken place. This provides a similar effect to that of linking elements which occur between two constituents of a compound. The -s- in Mainland Scandinavian and the -o- in Modern Greek are two examples of morphemes that are used in compounds as linking elements but are semantically empty (Josefsson 1997; Ralli 2013; among others). If the N-bonding element surfaces as a reflection of adjunction configurations more generally, then we predict the element to also occur in other head-head constructions in Malagasy, such as compounds. This prediction is borne out.

In Malagasy, a class of compounds called “linking compounds” is formed with a “linking morpheme” (Ntelitheos 2012). The structure of these compounds is also described as being parallel to the structure of possessive constructions in Malagasy (Ntelitheos 2012). The examples in (53) show that in these compound forms, the N-bonding element appears between the two nouns which are concatenated and is subject to word-level morphophonological processes of the language such as consonant mutation and prenasalization (Keenan & Razafimamonjy 1996;

²⁶ The phonological process occurs with nasal+consonant sequences more generally, and is not specific to the N-bonding element.

Paul 1996; Keenan & Polinsky 1998). For example, in (53a) the initial consonant of *vava* ‘mouth’ undergoes mutation from ‘v’ to ‘b’ which forms a prenasalized stop with the preceding N-bonding nasal.

- (53) a. **ambi-m-bava**
 excess-N-mouth
 ‘a surplus of food’
- b. **lamba-m-baravarana**
 cloth-N-window/door
 ‘curtain’
- c. **feo-n-kira**
 sound-N-song
 ‘melody’
- d. **trano-n-kala**
 house-N-spider
 ‘spider-web’

This data from compounding provides further support for the use of Local Dislocation within the language and extends the distribution of N-bonding to head-head configurations more generally.²⁷ As a result, we can reformulate our generalization of N-bonding to a language-wide condition as stated in (54).

- (54) N-BONDING CONDITION
 N-bonding occurs in head-head adjunction configurations.

5.3 The N-bonding element is a morpho-phonological ornament

Since Local Dislocation is a post-syntactic operation and is sensitive only to linear order rather than hierarchical structure, I assume that the insertion of the N-bonding element must also be post-syntactic (i.e. inserted at PF). Elements of this type are described as *ornamental* (Embick & Noyer 2007), such that they introduce syntactico-semantically unmotivated structure (i.e. nodes) and features which *ornament* the syntactic representation. In other words, any such ornamentations introduce material into the PF expression but crucially do not add or eliminate information necessary for semantic interpretation. There are two types of elements that can be added in the PF component: features and terminal nodes, as defined in (55) and (56) (Embick & Noyer 2007). These definitions do not explicitly state whether or not the dissociated feature or node is strictly syntactic. I return to this point below.

²⁷ Not all types of compounds in the language are formed with the so-called “linking morpheme”. Further investigation of the different kinds of compounds and processes similar to N-bonding in Malagasy with reference to N-bonding is required. See Appendix A for additional discussion.

(55) Dissociated Feature

A feature is dissociated iff it is added to a node under specified conditions at PF.

(56) Dissociated Node

A node is dissociated iff it is added to a structure under specified conditions at PF.

These inserted elements are deemed *dissociated*, emphasizing that this material signals the presence of certain syntactic morphemes, features, or configurations, but does not itself represent the actual spell-out of these. I assume, following Embick and Noyer (2007), that the implementation of dissociated features/nodes is governed by language-specific rules. Post-syntactic insertion operations involving dissociated elements have been discussed in recent literature for compounds (see Tat 2013 on Turkish and Dolatian 2021 on Armenian), in which linking vowels/compound markers are semantically empty and are proposed to be added during phonological spell-out in PF (see also Aronoff 1994; Ultra-Massuet 1999; Ralli 2008), as discussed above for Mainland Scandinavian and Modern Greek. Post-syntactic insertion has also been discussed for Korean subject honorification, for which honorific agreement suffixes are implemented by so-called node-insertion (Choi & Harley 2019). More recently, this form of introducing a dissociated or ornamental element has been re-dubbed *node-sprouting* by Choi and Harley (2019), a term that more explicitly conveys that the insertion (or ‘sprouting’) of such post-syntactic material can only occur when certain conditions are met.

I propose that a similar approach can be adopted for N-bonding in Malagasy. The N-bonding element is a dissociated element and the condition necessary for its insertion is head-head adjunction, which we’ve seen can come about as a result of Local Dislocation or compounding. Extending previous interpretations of dissociated elements, I further assume that the types of dissociated elements that can be inserted, as well as the conditions in which they can sprout, are not restricted to syntactic features/conditions, but can also include phonological features/conditions. More specifically, I propose that the insertion of the N-bonding element involves the insertion of a bundle of phonological features which can sprout as different surface realizations depending on surrounding phonological context. This will correctly derive the surface representation of N-bonding and its phonological variation, which I turn to next.

5.4 Accounting for phonological variation

In order to provide a complete representation of the N-bonding element, we must first examine the variation that exists in its surface realization. This section aims to provide a brief sketch of the variation of the N-bonding element. Specifically, I will show that the N-bonding element has two possible surface representations: /n/ and /i/, and that the preceding phonological context is what determines which representation surfaces. When the N-bonding element is preceded by a non-nasal consonant, it surfaces as /i/. In all other cases, the N-bonding element surfaces as /n/.

Recall the data from (1) and (2), repeated in (57) and (58) below. The examples are similar in that they include (a) a non-Agent Voice verb and an adjacent external argument or (b) a possessee followed by a possessor—both constructions in which we expect to find N-bonding. However, the N-bonding element *n* is seemingly not present in (58). This is puzzling given the described distribution of N-bonding in the language. If N-bonding is indeed present in (58), then at least two questions arise: (i) is the N-bonding element realized in the surface representation of constructions like those in (58)? and (ii) how do we account for the variation in the form of the N-bonding element? In this section I will argue that the N-bonding element is indeed realized in the surface representation of constructions like those in (58) and that the N-bonding element has an underlying representation /n/ which surfaces as /i/ when it is preceded by a non-nasal consonant and as /n/ elsewhere.

- (57) a. Voa-voha-**n**'-ilay vavy ilay varavarana.
 PV-open-N-DEM girl DEM door
 'That door was opened by that girl.' **Non-AV + EA**
- b. trano-**n**'-ilay olona
 house-N-DEM person
 'that person's house' **Possessee + Possessor**
- (58) a. Tapaky ny olona ny tady.
 PV.cut DET person DET cord
 'The cord was cut by the person.' **Non-AV + EA**
- b. tongotry ny zaza.
 foot DET child
 'the child's feet' **Possessee + Possessor**

As a starting point to answering these questions, we can examine the phonological patterns that are involved in these constructions. Stress patterns and the presence of epenthetic vowels will be used as the primary cues to signal the presence or absence of the N-bonding element. The predominant stress pattern in Malagasy is to stress the penult, as seen on the verb *dídy* 'to cut' in (59). In the following examples, primary stress is marked with an acute accent <á> on the words under discussion.

- (59) **No final *a* epenthesis**
 M-an-dídy ny trondro aho.
 AV-PFX-cut DET fish 1NOM
 'I cut the fish.'

Regarding epenthetic vowels, according to Erwin (1996), when a morpheme is consonant final, one resolution is to insert an epenthetic vowel *a* in order to conform to Malagasy CV syllable structure. This occurs, for example, with the voice morphemes introduced above in Section 2.

When a voice morpheme occurs word-finally, a final vowel *a* is realized on the verb, as shown in (60) where the verb *didy* ‘to cut’ takes the PV suffix *-an*.

- (60) **Word final *a* epenthesis**
 Didí-ana ny trondro.
 cut-PV DET fish
 ‘The fish is cut.’

If we compare the PV form in (60) to its AV counterpart in (59), we see that the PV suffix *-an* causes stress to shift rightward by one syllable. In (59), the stress falls on the first syllable of the root *didy*, while in (60) the stress falls on the second syllable of the root (*didí*). However, the final vowel *a* does not impact stress location. As a result, primary stress falls on the antepenultimate syllable of *didíana*. These stress patterns are consistent with the analysis that the final vowel *a* is epenthetic (Erwin 1996).²⁸

We can apply the same diagnostics to the forms in (57) and (58), repeated in (61) and (62) below. Starting with the examples in (61), the root of the verb ‘to open’ is *voha* and the root of the noun ‘house’ is *trano*. Both are vowel-final and we do not find an epenthetic vowel, as expected.

- (61) a. Voa-voha-**n**’-ilay vavy ilay varavarana.
 PV-open-N-DEM girl DEM door
 ‘That door was opened by that girl.’
 b. trano-**n**’-ilay olona
 house-N-DEM person
 ‘that person’s house’

Turning to the examples in (62), the root of the verb ‘to cut’ is *tapak* and the root of the noun ‘foot’ is *tongotr*. Both are consonant-final thus we expect to find an epenthetic vowel in word-final position. However, the final vowel that appears is *y* and not the traditionally described epenthetic vowel *a*.

- (62) a. Tapaky ny olona ny tady.
 PV.cut DET person DET cord
 ‘The cord is cut by the person.’
 b. tongotry ny zaza.
 foot DET child
 ‘the child’s feet’

This could suggest that Malagasy has more than one option for word-final epenthetic vowels and that the N-bonding element is simply absent in these examples. However, if we compare the

²⁸ The assumption here is that epenthetic vowels do not project a mora and therefore do not contribute to stress assignment in Malagasy (see Erwin 1996).

PV form of *tapak* ‘to cut’ when the following nominal is a trigger versus an agent, an interesting pattern emerges. When the non-Agent Voice verb is followed by the trigger, the final vowel on the verb is the standard epenthetic vowel *a*, as shown in (63a). However, when the non-Agent Voice verb is followed by the agent, as in (63b), the final vowel on the verb is *y*. Crucially, the final vowel *y* occurs in a construction where N-bonding is predicted, namely between a non-Agent Voice verb and a following agent. I assume following Paul (1996) and Pearson (2005) that the final *y* is an alternate form of the N-bonding element.

(63) a. **Patient Voice verb followed by trigger**

Tápaka ny tady.
 PV.cut DET cord
 ‘The cord was cut.’

b. **Patient Voice verb followed by agent**

Tápaky ny olona ny tady.
 PV.cut DET person DET cord
 ‘The cord was cut by the person.’

Following Paul (2000) and Pearson (2005), I assume that the inserted N-bonding element is always present in the expected N-bonding constructions and varies in surface form depending on surrounding phonological context. However, while Pearson (2005) analyzes the N-bonding element as a morpheme *-ny*, I propose that the underlying representation of the N-bonding element is the nasal /n/, which consists of the phonological features [nas] and [cor] such that the feature(s) that can be realized is restricted by surrounding phonological context. When the preceding segment is a vowel, the N-bonding element can be fully realized with both features [nas] and [cor], as illustrated in (64)–(65).

(64) N-bonding element with preceding Vowel

/V/ + {COR, NAS} ... → /Vn/

(65) Voa-voha-n’-ilay vavy ilay varavarana.

PV-open-N-DEM girl DEM door
 ‘That door was opened by that girl.’

Non-AV + EA

On the other hand, when the preceding segment is a consonant, the N-bonding element must surface as a vowel. Assuming that front vowels are coronal (i.e. have a [cor] feature; see e.g. Clements & Hume 1995), I propose that the [cor] feature of the N-bonding element is preserved and the N-bonding element is thus realized as the coronal vowel /i/ (corresponding to orthographic *y*). This is schematized in (66), with an example illustrated in (67) for the verb root *tapak* ‘to cut’.

(66) N-bonding element with preceding Consonant

/C/ + {COR, NAS} ... → /Ci/

- (67) Tapaky ny olona ny tady.
 PV.cut-N DET person DET cord
 ‘The cord is cut by the person.’

Non-AV + EA

The phonological analysis proposed here offers a preliminary account of the general properties of N-bonding. However, deeper investigation into the phonological organization of the language is needed. For example, I remain agnostic regarding the framework governing features within segments, but this will need to be examined more carefully in order to fully understand how the variation observed for N-bonding is derived.²⁹

In summary, N-bonding can be analyzed as a reflection of a particular configuration: head-head adjunction, which, in Malagasy, can be derived through Local Dislocation, an operation that is implemented in the language due to structural licensing constraints. Non-trigger agents, for example, are unable to be licensed in their merged position (Spec,*v*/VoiceP) and therefore must undergo Local Dislocation resulting in a head-head adjunction configuration. This creates the right conditions for [n]-feature sprouting which results in the insertion of the N-bonding element between the verb and non-trigger agent. The same process occurs between possessees and possessors, and between certain prepositions and adjectives and their complements. N-bonding is also found in other head-head constructions such as compounds, lending further support to an adjunction approach. Finally, the variation that is observed in the N-bonding element’s surface forms can be accounted for under the proposal that the underlying form is the nasal /n/, consisting of the features [cor] and [nas] which sprout as either the nasal /n/ or vowel /i/ depending on the surrounding phonological context.

6 Discussion and Conclusions

The primary goal of this paper was to provide a unified syntactic account of N-bonding to explain how N-bonding is derived in Malagasy. A close examination of the distribution of the N-bonding element pointed to a complex interaction between N-bonding and licensing constraints. To this end, I argued that N-bonding in Malagasy signals the presence of a particular construction, namely one in which a nominal cannot be structurally licensed. Starting with the verbal domain, I proposed that the only licensors available in Malagasy are CT⁰ and *v*/Voice⁰, which assign nominative and accusative case, respectively. This analysis was then extended to account for N-bonding in the nominal domain, in which N-bonding is observed in possessive, prepositional, and adjectival constructions. Maintaining a licensing perspective, I argued that the patterns in

²⁹ A reviewer points out that the proposed analysis predicts the coronal vowel /i/ after PV and CV suffixes, but this is not observed. One possibility is that the same string /ni/ in adjacent morphemes is dispreferred. Another option, proposed by Paul (1996), is that the repeated syllable is reduced in speech and reflected in these representations. Alternatively, there may be more complex and interacting morphophonological processes which lead to this surface representation. I leave this as an avenue for future research.

the nominal domain mirror those in the verbal domain; all the environments in which N-bonding occurs, which are traditionally labelled as ‘genitive’ constructions, in fact reflect constructions in which the bonded nominal cannot be structurally licensed.

In order to reconcile the licensing restrictions in Malagasy with the assumption that all nominals must be licensed, I turned to post-syntactic operations as possible alternative licensing strategies. Following Levin (2015), I assume that the observations of N-bonding in Malagasy support the proposal that while nominals need licensing, languages are not restricted to satisfying this requirement in the syntactic derivation. I assume then that for languages like Malagasy, which come up one licensor short in certain constructions, an alternative (post-syntactic) licensing strategy can be employed. Local Dislocation is one such strategy, developed by Embick & Noyer (2001) under the framework of Distributed Morphology. In addition to taking care of the licensing needs of the language, I argued that Local Dislocation offers insight into the conditions required for N-bonding in Malagasy. Evidence from compounding (Ntelitheos 2012) revealed that N-bonding occurs not only as a reflection of licensing constraints but of head-head configurations more generally. In other words, we can generalize N-bonding as a process in Malagasy that is sensitive to all head-head adjunction configurations.

Having established the source of the ‘bonding’ aspect of N-bonding, I then provided an account for the variation and behaviour of the N-bonding element. Since the result of Local Dislocation is one path that leads to N-bonding and Local Dislocation itself is post-syntactic, I proposed that the insertion of the N-bonding element is necessarily also post-syntactic. Following a range of work concerned with the insertion of post-syntactic material, I argued that N-bonding functions as a language-specific morpho-phonological operation within Ornamental Morphology (Embick & Noyer 2007; Embick 2015). More specifically, I proposed that the underlying form of the N-bonding element is *n*, consisting of the features [cor] and [nas] which sprout as either the nasal /n/ or vowel /i/ depending on surrounding phonological context. The generalization of N-bonding is re-stated in (68).

(68) **Malagasy N-bonding**

N-bonding reflects a post-syntactic operation that inserts ornamental phonological features ({COR, NAS}) in head-head adjunction configurations.

This analysis of Malagasy N-bonding is in line with several existing theoretical accounts with a focus on nominal licensing (e.g. Aldridge 2017; Erlewine 2018; among others) and morphological operations (e.g. Noyer & Embick 2001; Levin 2015). Moreover, if on the right track, this account of N-bonding offers an alternative view of underlying clausal structure and voice morphology in Malagasy.

There are several questions that warrant deeper consideration. In particular, the current analysis assumes that the N-bonding element is inserted between two constituents that make

up a prosodic domain, as discussed in Section 5.1. However, it is not immediately clear how the internal (prosodic) structure of this domain should be represented and how the N-bonding element is expected to behave depending on where it is situated relative to prosodic edges. Thus, future work is needed to more fully understand the phonological processes that play a role in the make-up and variation of N-bonding. In addition to this, more work is needed to provide independent evidence for the implementation of a morpho-phonological operation that is specified to insert phonological features (rather than syntactic ones). Previous analyses that have made use of ornamental feature-sprouting have involved exclusively *syntactic* feature-sprouting (e.g. Choi & Harley 2019; Dolatian 2021). Further investigations into other Austronesian and non-Austronesian languages that show similar bonding effects may provide insight into the application of *phonological* feature-sprouting.

Finally, the assumption adopted here in terms of nominal licensing is that all nominals require licensing. There are, however, proposals that call into question whether this is true for all languages or varies across languages (see e.g. Kalin 2018). A similar question can be asked regarding the number of licensors available in a language. If the story laid out here is correct for Malagasy, then it is possible for a language to be deficient in the number of structural licensors, ultimately needing to resort to post-syntactic licensing strategies. One avenue for future work in this line of research is to investigate the distribution of licensors cross-linguistically and examine whether there are shared patterns across languages. The current analysis of N-bonding in Malagasy contributes to this investigation, presenting a connection between nominal licensing, voice morphology, and clausal structure which may potentially be extended to other Austronesian languages.

Abbreviations

1 = first person, 2 = second person, 3 = third person, NOM = nominative, ACC = accusative, GEN = genitive, DET = definite determiner, DEM = demonstrative, SG = singular, N = N-bonding element, AV = agent voice, PV = patient voice, CV = circumstantial voice, PFX = verbal prefix, PREP = preposition, PST = past, FOC = focus

Supplementary files

Supplementary file 1: Appendix. Accompanying discussion on other types of constructions that show similar morphophonological reflexes of N-bonding as well as variation observed in N-bonding. DOI: <https://doi.org/10.16995/glossa.6386.s1>

Acknowledgements

This work would not have been possible without the generosity of the consultants who contributed to it. I am extremely grateful to Vololona Razafimbelo and Sylvie Andriantsara for sharing their language with me and for their unwavering patience throughout. Special thanks to Jessica Coon, Heather Goad, and Lisa Travis for their feedback and guidance throughout this project. Thanks also to Dan Brodtkin, Henrison Hsieh, Will Johnston, Tyler Lemon, Martina Martinović, Jonathan Palucci, Ileana Paul, Justin Royer, Tamisha Tan, three anonymous reviewers, and audiences at McGill and AFLA28 for helpful comments and discussion. All errors are my own.

Competing interests

The author has no competing interests to declare.

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