Tone in the phonology, lexicon and grammar of Ikaan

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I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

This thesis investigates the forms, functions and behaviour of tone in the phonology, lexicon, morphosyntax and the phonology-grammar interfaces in Ikaan (Benue-Congo, Nigeria). The analysis is based on an annotated audio corpus of recordings from 29 speakers collected during ten months of fieldwork complemented with participant observation and informally collected data.

The study demonstrates that tone operates at a wide range of levels of linguistic analysis in Ikaan. As phonemes, tones distinguish meaning in minimal pairs and are subject to phonological rules. As morphemes, tones and tonal melodies bear meaning in inflection, derivation and reduplication. In the syntax, tones mark phrase boundaries. At the phonology-semantics interface, construction-specific constraints on the tonal representation distinguish between predicating and referential nominal modifiers. Combined with intonation and voicing, tones distinguish between statements and morphosyntactically identical yes/no questions.

The research identifies a range of unusual tonal behaviours in Ikaan. The two tones H and L follow markedly different phonologies. In the association of lexical and grammatical tonal melodies, H must be realised whereas non-associated L are deleted. Formerly associated but de-linked L however are not deleted but remain floating. The OCP is found to apply to L but not to H. H is downstepped after floating L but not after overt L. In addition, three different locations of downstep are attested which correlate with different syntactic and semantic properties of the respective constructions. In two of these downstep locations, a leftward copying process occurs in addition to a generally applicable rightward copying process so that two directions of copying occur.

The thesis concludes by discussing the implications of the Ikaan findings for the wider theoretical discourse with respect to the status of the OCP, the directionality of spreading and the modelling of downstep.

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To the people of Ikakumọ

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Abbreviations and conventions

Abbreviations used in the text and in interlinear glosses

1	agreement class 1
2	agreement class 2
3	agreement class 3
4	agreement class 4
5	agreement class 5
6	agreement class 6
1P	first person plural
1S	first person singular
2P	second person plural
2S	second person singular
3P	third person plural
3S	third person singular
A2	noun class A, agreement class 2
ADJ	adjective
AM	associative morpheme
ANA	anaphoric
ATR	Advanced Tongue Root
BEN	benefactive marker
C	consonant
COND	conditional
CONT	continuous aspect
DEM	demonstrative
DET	determiner
DIST	distal
E5	noun class E, agreement class 5

epV	epenthetic vowel
EMPH	emphatic marker
EXC	excessive suffix
FOC	focus
FUT	Future tense
H	high tone (in Register Tier Theory: high tonal feature)
Ⓗ	floating H
H%	high boundary tone
h	in Register Tier Theory: high register feature
Hi	in Register Tier Theory: high tone
HAB	habitual aspect
I4	noun class I, agreement class 4
IMP	imperative mood
L	low tone (in Register Tier Theory: low tonal feature)
Ⓛ	floating L
L%	low boundary tone
l	in Register Tier Theory: low register feature
Lo	in Register Tier Theory: low tone
LOC	locative marker
M	mid tone
n_{Tones}, n_{TBUs}	number of tones, number of TBUs
NEG	negation
NFUT	non-future tense
NOM	nominal, non-predicative
NR	number
O1	noun class O, agreement class 1
O6	noun class O, agreement class 6
OBJ	object
OCP	Obligatory Contour Principle
P	plural
PERF	perfective
POSS	possessive pronoun
PRED	predicative
PROX	proximal
PS	person

QU	question marker
REL	relative marker
RTT	Register Tier Theory
S	singular
SPEC	specific
T	tone
TAM	tense-aspect-mood
TBU	tone-bearing unit
U3	noun class U, agreement class 3
V	vowel
X	extra low tone
$^{\downarrow}$	downstep
$^{\uparrow}$	register raising
$\emptyset$	unspecified tone
%	boundary tone
μ	mora
$\textcircled{\mu}$	unassociated tone-bearing unit
σ	syllable
+	morpheme boundary
#	morpheme boundary
##	word boundary
$	phrase boundary
*	ungrammatical form
?	in glosses: uncertain about the gloss; in translations: forms which are grammatical but would not be used

Notation conventions in interlinear glosses

The notation of tones follows the tradition in African language studies and marks tones with accents placed above the vowel: high (H) with an acute accent /á/, mid (M) with a macron /ā/, low (L) with a grave accent /à/, extra low (X) with a double grave accent /ȁ/, rising (R) with a haček /ǎ/ and falling (F) with a circumflex /â/. Downstep is marked with a downward arrow before the syllable /ꜜbá/ or the second mora of a long vowel where the downstep takes place /áꜜː́/. An upstep or an upward movement in register is indicated with an upward arrow as in /ꜛa/.

The notation in interlinear glossing follows the Leipzig Glossing rules (Comrie et al., 2004).

Reference to examples

Wherever possible, data from the corpus has been used to illustrate my claims with examples in order to allow the readers to return the data and listen for themselves.

For those examples where recorded and annotated data from the corpus is available, reference to the data is given in the brackets after the free translation. In annotated files, each annotation is uniquely labelled and identified, e.g. as `9ynt.015` and can therefore be traced in the corpus. For references to data where notes or recordings but not unique labels are not available, file names and time stamps such as `ikaan025_na.wav, 1min` or references to sets of field notes such as `IV/30` or `ikaan.167` are given instead. Examples without a reference to the corpus are data that I have collected without recording and annotating, for example data taken from the dictionary database, participant observation, or informal interviews with speakers.

Chapter 1

Introduction

This thesis is a first description and analysis of the tone system of Ikaan, a dialect of the Nigerian Benue-Congo language Ukaan. It aims to describe and explain the forms, functions and behaviour of tone in the phonology, the lexical representations and the grammar of Ikaan.

Yip (2002) shows that cross-linguistically tone is used to signal lexical, morphological, syntactic, semantic and pragmatic information. Which tones are used and the locations in which these tones are realised can partly be attributed to the general word-level tonology of the language, the general phrase-level tonology of the language and the choice of one particular syntactic feature or a combination of features. Ikaan shows tone that is actively involved at all these levels and that is influenced by all these factors. Ikaan is therefore among the languages that uses tone extensively as part of the linguistic system, not just as a phoneme to distinguish lexical items but at all levels of linguistic analysis and at the interfaces between these levels.

Ukaan is a seriously endangered minority language that is almost undescribed and has not been documented. With the exception of Abiọdun (1999) and this research, there is no research available on this language. Cross-linguistically, detailed studies of tonal systems and the functions of tone are comparatively rare. From a descriptive perspective, describing the Ikaan dialect therefore does not only provide information about the language itself but also adds to the understanding of the many roles tone may play in tone languages.

From a historical linguistic perspective, studying Ukaan is of importance because the area south-west of the Niger-Benue confluence where Ukaan is spoken is seen as the cradle and homeland of the Benue-Congo languages (Ohiri-Aniche, 1999:88; Oyetade, 1997:19; Williamson, 1989:272). A wide range of minority languages from many different branches of Benue-Congo are spoken in this area. However, the vast majority of them is not described let alone documented. Because of this lack of data, an agreed-on classification within Benue-Congo and, more specifically, a classification of Ukaan itself within Benue-Congo has not yet been possible. However, there seems to be agreement among researchers on Benue-Congo languages that Ukaan dates back far in time. While it is not the objective of this research to find an appropriate classification, studying the Ikaan dialect will generate descriptive data which other researchers can use to investigate the history and genetic classification of the Benue-Congo languages.

Typologically, investigating tone in Ikaan is of interest because Ikaan shows a range of rare tonal features. Firstly, like only a handful of other languages Ikaan shows downstep of H after floating L but no downstep of H after overt L. In addition, the range of locations of downstep is unusually broad in Ikaan. Then, my analysis of the tone system crucially relies on a violation of the OCP for H tones but compliance with the OCP for L tones. The phonologies of H and L are substantially different in Ikaan even though both tones are underlyingly present and phonologically active. With both Rightward and Leftward copying, the directionality of tone spreading/copying is unusual in Ikaan. In the association of tonal melodies to words, Ikaan employs a tone deletion strategy that to my knowledge is not explicitly described elsewhere.

From a theoretical perspective, the Ikaan data brings up questions that add to existing challenges to established notions and frameworks. My study is a descriptive study of one specific language and is very data-driven rather than idea-driven. I am not setting out to work within a specific framework or to compare or develop existing models. Nonetheless, my approach is analytical as well and generates and tests hypotheses. For selected topics, I will look at the relevant theoretical concepts and models and I will show that existing models for downstep have difficulties accounting for Ikaan downstep. Further, I will show that Leftward copying in Ikaan cannot be explained as High Tone Anticipation.

With this, I hope that this thesis will be of interest for descriptive and theoretical linguists working in phonology, in particular on tone, and for linguists working on West African languages, in particular Benue-Congo languages, to some degree including Bantu. The thesis will also be of interest for general linguists working at the interface of phonology with other areas of linguistics, such as morphology, syntax and semantics.

1.1 Research questions and outline

The questions that this research addresses, simply speaking, are which tones there are in Ikaan, how the tones are represented in underlying forms, how the tones behave and what the tones are used for in Ikaan.

Chapter 2 gives background information on the language and the speakers, describes this research project, outlines existing research on the language and gives a very brief introduction to some basic grammatical features of Ikaan to enable the reader to understand the tonal description that will follow.

Chapter 3 investigates the phonology of tone in Ikaan, asking which tones there are and how these tones behave. I identify Ikaan as a two-tone language with the mora as the tone-bearing unit and show that a downstepped H and an extra low tone occur as allotones of H and L respectively. I further look at tonal melodies and melody association and at other rules and constraints that apply to the tones. Finally, I illustrate when and where tones are downstepped in Ikaan.

Chapter 4 addresses how tone is represented in the underlying lexical entries in Ikaan and distinguishes between four different ways of including tone in these underlying forms. I show in more detail how tonal melodies are associated to tone-bearing units.

Chapter 5 describes what tone is used for in the Ikaan grammar. I show how tone is used at the word-level in derivation and inflection, at the phrase-level in associative constructions and reduplications and at the sentence level for distinguishing between statements and questions.

Chapter 6 looks at downstep at the interface between phonology and grammar to discuss phonological processes that only occur in certain semantic or syntactic contexts. I first account phonologically for the observed downstep locations. I then propose an explanation for this distribution, arguing that construction-specific segmental and tonal phonology is used to mark syntactic and semantic properties of the constructions in which these phonological rules and constraints occur.

Finally, Chapter 7 picks up evidence from all preceding chapters and asks what the Ikaan findings imply for the wider theoretical discourse with respect to the status of the OCP, the directionality of tone spreading and copying and the description, analysis and modelling of downstep.

Chapter 2

Language background and research context

This first chapter gives general background to Ikaan, the language that is the subject of this thesis, to the Akaan, who are the speakers of Ikaan, and to the Akoko hills, the area where the Akaan live and Ikaan is spoken. It further includes an overview of the methodology employed in this research project and a review of the existing literature on Ukaan, Finally, I give a very brief introduction to some basic aspects of the Ikaan grammar.

In section 2.1, I give an introduction to Ukaan, the language to which Ikaan belongs as one of its dialects, and the linguistic context in which Ukaan is spoken. I briefly review the history of the name of the language because there are different names used in the literature and most are not accepted by the speakers. I introduce the different dialects of Ikaan and report on intelligibility between the dialect based on the literature and my own research. I look at the degree of endangerment that Ukaan faces and present preliminary findings on language use in the communities. To round off the linguistic context in which Ukaan is situated, I give some background to the presence and influence of other ethnic groups in the villages and in the wider area.

Section 2.2 is concerned with the Akaan themselves, giving an account of their history, the geography of the area and the infrastructure of the Ikakumọ village, and of the way of life of the Akaan.

In section 2.3 I describe the research project, the contributors to the project, the corpus and the work flow of data collection and preparation.

In section 2.4 I review the existing literature on Ukaan. Most of the available literature focuses on the classification of Ukaan within the Benue-Congo family. Therefore the bulk of the discussion is taken up by this discussion but there are also some descriptive and applied linguistic publications.

Finally, section 2.5 gives Ikaan grammar background in a nutshell to enable the reader to follow the discussion and examples in the following chapters.

2.1 Ukaan and the Ukaan-speaking people

Ikaan is a dialect of Ukaan, a potential language isolate in the Benue-Congo family of the Niger-Congo phylum. Ukaan is spoken in south-western Nigeria in five villages. The villages are Ikakumọ (7°31'43.73"N, 6°1'0.82"E) and Ayanran (7°28'51.13"N, 5°57'53.06"E), which are both located in the Akoko Edo of Edo State, and Ikakumọ (7°34'59.22"N, 6°0'17.98"E), Auga (7°33'16.26"N, 5°54'59.28"E) and Iṣẹ (7°31'11.56"N, 5°55'15.06"E) in the Akoko North Local Government Area, Ondo State.[1]

Figure 2.1 is a linguistic map of Nigeria. The Akoko area where Ukaan is spoken is located south-west of the Niger-Benue confluence. Figure 2.2 gives a more detailed map of the Akoko area itself. Four of the Ukaan-speaking communities are indicated on this map. Ikakumọ (Ondo) is called Kakumo Aworo, Ikakumọ (Edo) is called Kakumo, Iṣẹ is spelled Ishe and Auga is entered in its original form. The Ayanran village is missing from this map, it should located to the south of Ikakumọ (Edo) and east of Iṣẹ.[2]

2.1.1 The name of the language

The Ukaan language and its dialects are referred to in the literature using a number of different terms. Linguists mostly use 'Ukaan' and 'AIKA' or 'Aika' to refer to the language as a whole and use the names of the towns or the actual names of the dialects to refer to the individual varieties.

The speakers themselves do not have a cover term for the whole cluster, they only have names for the individual dialects. The word 'Ukaan' does not exist in any of the dialects as a word referring to the cluster and is rejected as a name for the language as a whole. 'AIKA' was not mentioned as a name for the language by any of the speakers and it was not seen as an appropriate name for the language when I specifically asked about it, though it may be acceptable to some. Overall,

[1]The geographical co-ordinates for Ikakumọ (Ondo) were provided by Mr Kola Atiba, professional land surveyor from Ibadan. I am grateful to him for his assistance. The geographical co-ordinates for the other villages are taken from Google Maps.

[2]There are two villages called Ikakumọ, and both go by various names, some of these contested among the people in the village. From here onwards I will use 'Ikakumọ' to refer to the Ikakumọ village located in Ondo State where I spent most of my fieldwork and 'Ikakumọ (Edo)' to refer to the Ikakumọ village located in Edo State. This is not meant to imply any hierarchy, it's is simply for convenience.

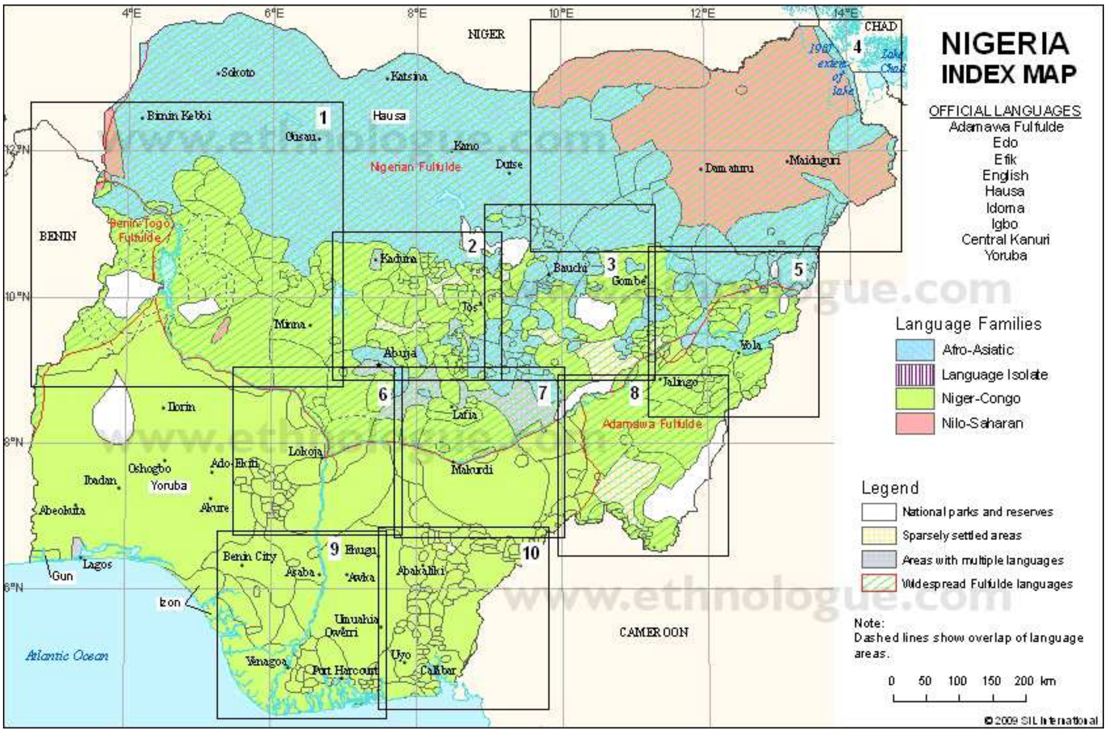


Figure 2.1: Linguistic map of Nigeria (Lewis, 2009)

it does not seem as though the speakers felt the need for a term that covers all the languages.[3]

In the linguistic discussion, the term 'Ukaan' as the name for the group is attributed to Carl Hoffman by Jungraithmayr (1973:40). Jungraithmayr also quotes a letter from Kay Williamson, who writes that 'Ukaan' is an orthographic form of the name John Laver and herself were given at Kakumo-Akoko, as the name of the language. Williamson was later given 'Ikan' as the language name by a speaker from Ikakumọ (Ondo) but noticed that Ịsẹ speakers react negatively to Ukaan as a language name (Jungraithmayr, 1973:52).

Elugbe (2001) suggests 'AIKA' or 'Aika' as the name for the cluster, stating that AIKA is an acronym made up of the initial letters of the villages where Ukaan is spoken, i.e. Ayanran—Ịsẹ—Kakumo—Auga. While this seems a reasonable explanation, there is also another etymology for the acronym AIKA.

[3]Unless otherwise indicated, the information presented in this chapter is based partly on participant observation, but mostly on interviews carried out during the fieldwork and preliminary data from the self-report data from interviews carried out during a sociolinguistic survey in March 2007. The people who kindly agreed to be interviewed by me were Mr Ẹkundayọ Ilesanmi, Mr Samuel Lauran, Mr Ademọla Manuel Immanuel, Mr Tifase Rotimi and Mr Oluerẹmimọ Francis (Ịsẹ, 19 March 2007), Mrs Aminat Arijeniwa and her grandson Jimoh Sherif Ajijọla, who interpreted from Iigau (Auga, 21 March 2007), the Alayanran Ọba Vincent D. Deji (Ayanran, 24 March 2007) and Mr Patrick Olusi and Mr Samuel Oloyo (Ikakumọ, 2 and 26 March 2007)

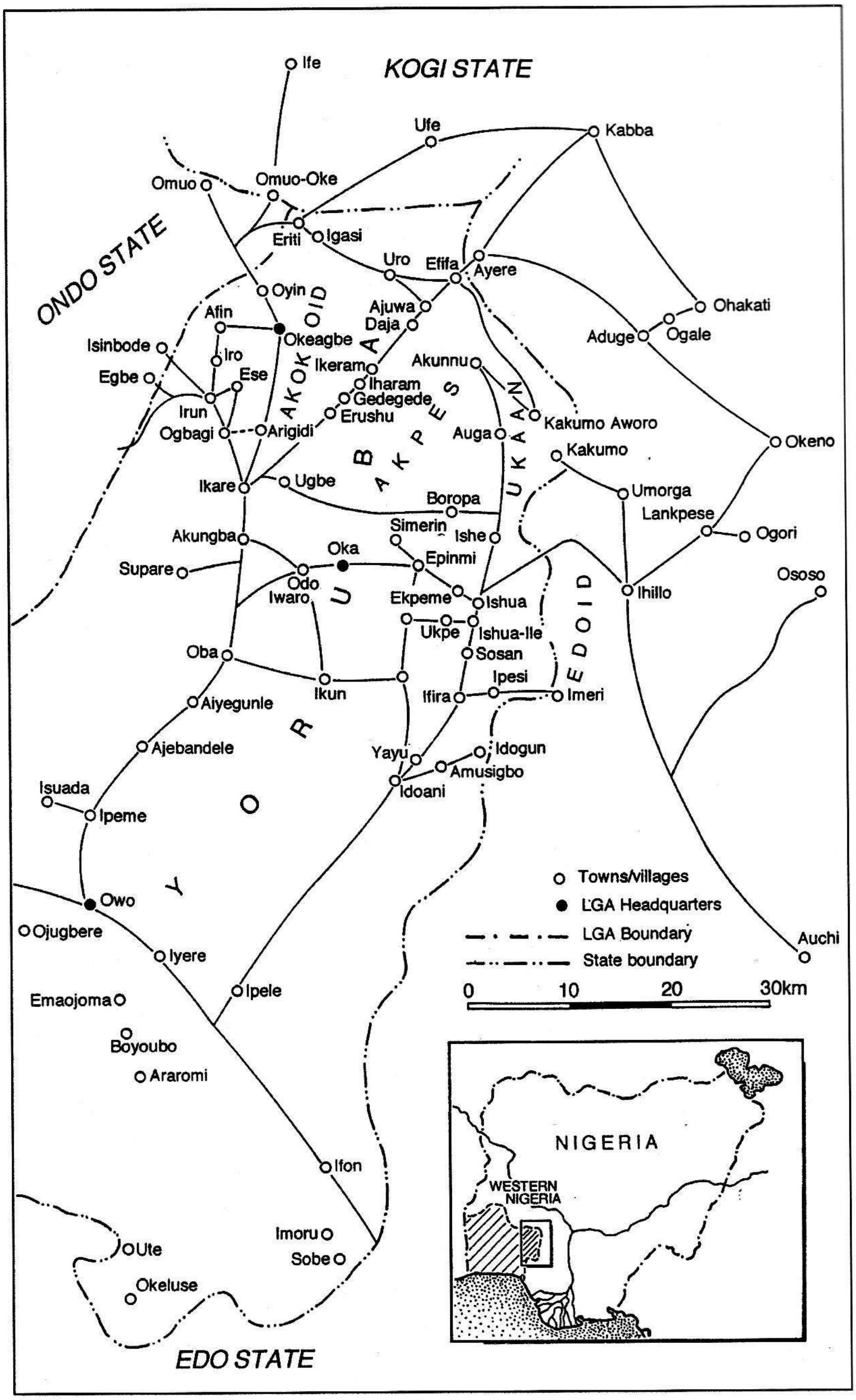


Figure 2.2: Map of the Akoko area (Ohiri-Aniche, 1999)

Aminu (1969), a native of Ikakumọ, includes a range of official documents from communication with the state administration. Among those there is one letter regarding the proposed establishment of a cattle ranch in the area for which the communities intended to give land and requested compensation. The communities involved in this project were the Akpes-speaking village Akunnu, Iṣẹ, Ikakumọ (here called 'Kakumo') and Auga. Ayanran and Ikakumọ (Edo) were not involved in this project, and the project was not related to the Ukaan language or the establishment of a joint ethnic identity as 'AIKA'. To my knowledge, the cattle farm was not established and it is possible that consequently the term 'AIKA' was reinterpreted to refer to the Ukaan-speaking villages. Abiọdun (1999:1) cites one speaker each in Auga and Ikakumọ who state that the term 'AIKA' was coined in the 1950s to 'forge closer ties between the villages that speak Ukaan' to encourage growth and development in the Ukaan-speaking villages. However, when an administrative reform assigned the five villages to two different states the idea was abandoned and the term 'AIKA' does not seem to be in use these days.

It is not possible or in fact necessary for me to solve the problem of the language name here. Since most of the literature available on the cluster calls the language 'Ukaan', since 'Aika' does not seem to be used much among the speakers, and since there is no indigenous alternative I will use 'Ukaan' to refer to the cluster as a whole, even though it is not a term used or accepted by the speakers.

2.1.2 Dialects of Ukaan

The Ukaan language is made up of four different dialects. These dialects are called[4]

- Ikaan [*ìkàːn*] in Ikakumọ and Ikakumọ (Edo)
- Ayegbe [*àjégbè*] in Iṣẹ
- Iigau [*îːgāʊ̄*] or Iigaọ [*îːgāɔ̄*] in Auga
- Iinọ [*íínɔ́*] in Ayanran

Linguists mostly treat the cluster as a language with mutually intelligible dialects.

Jungraithmayr (1973:40) finds considerable dialect variation between the towns, except for the two Ikakumọ towns, which are separated by the Osse River

[4] The tones in the transcriptions are phonetic surface tones, I have not analysed the underlying tones for Ayegbe, Iigau and Iino.

but share the same dialect variety. This is confirmed by my own research. According to Blench (1994:1) however, Iigau, Ikaan and Ayegbe have widely different lexemes for many items of basic vocabulary, which is why he proposes that there at least three distinct languages spoken in the Ukaan towns. Unfortunately, Blench does not give examples to back up this analysis, and the sources he refers to are unpublished and therefore inaccessible. Abiọdun (1999:3) observes that the Ukaan dialects are mutually intelligible but not intelligible with neighbouring languages in the area. This observation correlates with his cognate count of 86-94% between the Ukaan dialects, 20-29% with Akpes and Ekiromi, both dialects of the Akpes cluster, and 5-15% with other languages in the area (Ebira, Owon, Yoruba) (Abiọdun, 1999:4). Recently however, Abiọdun has observed speakers from different villages (here Iṣẹ and Ikakumọ) using Yoruba with each other, claiming that they do not understand each other's languages (Abiọdun p.c., October 2006).

In the interviews I have conducted, the speakers themselves see each village as having its own language, with the exception of Ikakumọ and Ikakumọ (Edo), which according to them share the same language. At the same time, all speakers stress the common ancestry of the Ukaan-speaking communities. Abiọdun (1999:1) reports different information from other speakers, according to the information given to him speakers see Ukaan as a common language and the varieties of the villages as dialects of Ukaan.

To my knowledge, no intelligibility tests between the dialects have been carried out. As the currently available information is not conclusive, it remains to be seen if the dialects are mutually intelligible or not.

In addition to the variation between the dialects there is considerable variation within the dialects, at least for Ikaan, and at least at the surface phonetic level. For example, Ikaan speakers differ considerably in their pronunciation of the voiceless alveolar approximant, giving pronunciations such as [*ɹ̥ s ʃ ɬ s̺*]. They also differ in the degree of merger of high vowels with mid vowels, a process that is currently going on in the language. Some speakers still form glides from [*ɛ*] and [*ɔ*] which are underlyingly or historically [*ɪ*] and [*ʊ*] respectively, whereas other speakers do not do this any more.

2.1.3 Number of speakers

The number of speakers of the Ukaan language is difficult to determine. Taiwo (1988:1) quotes the 1963 Nigerian population census with around 25,000 speakers for Ikakumọ, Auga, Iṣẹ and Ayanran. Lewis (2009) gives SIL data from 1973 with 18,000 speakers. Wald (1994) puts the number of speakers at 27,000. Arohunmolasẹ et al. (2006a:2) quote the 1991 Nigerian population census with

4,600 inhabitants for Auga and Ayanran but point out that Nigerian census figures are not reliable. Another population census was carried out in Nigeria in 2006, but questions on ethnic identity and language were not included there; only the home Local Government Area was collected.

In addition to the problems of finding reliable census data in the first place, the population of the villages does not reflect the number of speakers. There are speakers living outside the village, migrants living in the village and members of the ethnic group who are not speakers of the language.

For the Ukaan villages, a large part of the ethnic population lives outside the village elsewhere in Nigeria or even abroad. According to community members, as much as 80% of the population of Ikakumọ does not reside in the village. As far as the village population in Ikakumọ is concerned, my impression is that it has a population of around 2,000. Around a third of the inhabitants are migrants who have been living in the village for generations but do not all speak Ikaan. The indigenous children and young adults understand the language but do not speak it very well, they lack vocabulary, make grammatical mistakes and generally do not have command of oratory genres. This leaves Ikakumọ with around 600-700 actual speakers of the language, but even among those certain genres have all but disappeared for many if not all speakers.

2.1.4 Language endangerment and attitudes toward language decline

Based on my interviews and observations during the fieldwork, my estimate is that Ukaan is seriously endangered in Ikakumọ and Ayanran and endangered in Ịṣẹ, Ikakumọ (Edo) and Auga.[5]

There are different degrees of language proficiency in the different generations. Parents and elders are still mostly competent in the language and remember genres such as stories, riddles, proverbs, praise songs and some other traditional songs. Genres such as story telling, however, are not regularly practised any more.

The transmission between the parent generation and children is breaking down in some villages and becoming weaker in others. Participant observation in Ikakumọ shows that many parents and guardians use mostly Yoruba and very little Ikaan with the children, claiming that the children do not understand Ikaan. Others purposely do not speak Ikaan to their children and encourage Yoruba and English. An additional problem in transmitting the language is the high mobility of the speakers. Children often come to Ikakumọ to stay with their grandparents or

[5]For the use of terminology and degrees of endangerment see Salminen (1999)

another guardian for a short period of time and then go back to a different village or town where Yoruba or an Akoko-language is spoken. Therefore the children are exposed to many languages in passing, and Yoruba is the only language the children are continuously exposed to and the only language they can use in all the different places.

Elders in the communities have noticed this decline in proficiency and usage of Ukaan among younger speakers. However, the attitudes towards this decline in proficiency vary from village to village. Speakers in villages with a more advanced shift show more concern than speakers in villages with less of a shift to other languages.

In Ikakumọ, where there are barely any Ikaan-speaking children, elders see the language as dying and are worried about this looming language death. The impression given by the elders, however, may be a little too pessimistic. In some families I have observed interactions in Ikaan between parents and children that were initiated in Ikaan by the children. Also, there are teenagers who claim to speak the language and even use it among their peers. As I myself am considered too mature to freely mix with teenagers it was not possible for me to observe this language use in practice but if this is true the outlook for the language may not be as bleak as it is viewed by some.

The situation in Ayanran is similar to Ikakumọ. Children understand Iino but do not speak it well. Elders are concerned about the fact that the language is not as strong as it used to be and that even among the old people there is a lot of mixing with Yoruba, which the elders describe as ‘polluting the language with Yoruba’.

In Auga on the other hand many children are still fairly proficient speakers even though their language skills are decreasing. According to elders, there are also many speakers living outside the village but unlike the expatriates from Ikakumọ, expatriates from Auga are said to pass on their language to their children even when they live away from home. At least for one of the elders in Auga, the attitude is that the language will never die, and that it will be spoken forever simply because they do not have any other dialect for themselves.

2.1.5 Literacy

Arohunmolasẹ et al. (2006f), a linguist and native of Auga, developed orthographies for the Ukaan dialects spoken in Ayanran and Auga. According to speakers in Auga, there are some people who can read and write in their own language but do not use Iigau to write letters. In Ayanran speakers claim that there is no-one who reads and writes in their language. Ayanran elders find this regrettable and have requested outside help to remedy this. Aminu (1992), a native speaker of Ikaan but not a trained linguist, uses his own orthography based on Yoruba to write Ikaan-Yoruba word lists. In addition, some speakers in Ikakumọ use their own spelling conventions, also based on Yoruba, to occasionally write letters to one another although this does not seem to be a wide-spread practice. According to people in Ikakumọ (Edo), there are translations of two books of the Bible into Ikaan and there are written hymns for use in church in Ikaan.

2.1.6 Language use

Currently, no published information is available on the domains in which Ukaan is used, nor is there data on its current social roles or status. Together with students and staff from the Adekunle Ajasin University Akungba and the University of Ado-Ekiti, I carried out a sociolinguistic census and survey gathering self-report data on these questions in March 2007.[6] A full analysis of this data is not yet available but there are a number of linguistic traditions and cultural traditions with links to language use that already stand out and will be included here. Some of these linguistic and cultural traditions are fading out of use, others are still being maintained in at least some of the communities.

oriki praise songs

All communities still know and to some degree practice traditional *oriki* praise songs. In Ikakumọ and Ayanran, these praise songs are partly in Yoruba and partly in the respective dialect of Ukaan because the Ukaan-speaking people trace their history back to a Yoruba origin in Ifẹ. The praise song of the traditional ruler of Auga is written on a stone plate in front of the king's palace, together with a painting of the king.

In Ikakumọ, *oriki* are recited by men and women during weddings, burials, festivals or other happy occasions. Written versions of the *oriki* of the different quarters of Ikakumọ are given in Aminu (1969).

Masquerades

Some community members in the villages still practice at least some of their traditional masquerades. Masquerades come out during festivals or for burial ceremonies of elders or followers of the spirit or god the masquerade represents.

[6] I owe many thanks to Prof Mike Abiọdun, Dr Francis Oyebade, Dr Taiwo Agọyi, the Akungba and Ekiti students, Miss Nikẹ Sofẹla, Mr Fred Adekanye, Prince Festus Oyedele Ọbaudẹ and the many people in Ikakumọ, Ikakumọ (Edo), Auga, Iṣẹ and Ayanran.

Not all masquerades use spoken language, and not all of the masquerades that speak use Ukaan.

In Ikakumọ, some masquerades are mute whereas others speak Ikaan. There are also publications that suggest that there are masquerades that speak a language from Edo State. In Ayanran, the masquerade speaks in its own masquerade language and has an interpreter following it around to translate into Iino. Similarly, the masquerades that come out in Ịṣẹ in February and June have their own language and do not speak Ayegbe.

Talking drums and talking sticks

The traditions regarding talking drums vary in the different communities. The Ayanran community does not have talking drums. Instead they have talking sticks which they call *ògi̖di̖gbó*. For talking sticks, one person beats two different sticks, thus producing different sounds. Talking sticks are played during celebrations in the king's house for the people in the house and outside to hear. They can be accompanied by singing and are used for praising but will not be used for insulting, teasing or abusing people. Not everybody understands the language of the *ògi̖di̖gbó*. Elders do, but young people do not, which is why the drummer may translate what the sticks are saying. The *ògi̖di̖gbó* are not practised very often; the current ruler of Ayanran has only had the sticks played once since he became king. According to the Alayanran, the community in Ikakumọ (Edo) uses the same talking sticks, and people in Ikakumọ (Ondo) also claim to have *ògi̖di̖gbó* talking sticks.

Interviewees in Ịṣẹ and Auga did not mention the use of talking sticks. Instead here talking drums are used. In Auga, talking drums are used during festivals to attract people. At the *ɔ̀gúdὲ* festival a special drum that can be heard from distance is used. In the past, talking drums were also used to communicate and convey messages but this is not done any more. Also, a special type of talking drum called *sákárâ* was used to accompany singing, to talk, or to insult people.

In Ịṣẹ, talking drums are used for masquerades. The talking drum in Ịṣẹ is called *okoli*. Interviewees also said they used the talking drums for communication within the village to convey messages.

Story telling

Story telling used to be practised widely, especially at nights around the full moon. According to elders in Ịṣẹ, story telling, asking each other riddles and the use of proverbs in everyday language is still very much alive in this community. In Ikakumọ and Ayanran however, story telling and asking riddles is not practised any more. Instead, people prefer to stay indoors and watch television and the very popular Nollywood movies.

Giving Ukaan names

There are a number of indigenous Ukaan personal names that were used in the community, alongside Yoruba, Muslim and Christian names. These days, mostly Yoruba, Muslim and Christian names are used. Lists of Ikaan indigenous names and their translation into Yoruba is given in Aminu (1969, 1992).

2.1.7 Other ethnic groups and languages, multilingualism

Ukaan is not the only minority language spoken in the area. The Akoko region where Ukaan is spoken is a highly multilingual area with a number of geographically neighbouring but genetically not necessarily related languages. Many of these languages are still undocumented and undescribed. Some of them (e.g. Ayere or Ibilo) are only spoken in one single village, others are spoken in just a few villages.

Figure 2.3 gives an impression of the linguistic density of the area. The area where the Ukaan dialects are spoken (labelled as area 306) is surrounded by a number of languages from different families.

The Ukaan villages are in direct contact with Edoid languages (Ibilo in the south-east, Okpamheri to the south-west, Aduge in the north-east[7]), Defoid languages (Arigidi (Akokoid) to the west, Ayere to the north) and isolates within Benue-Congo (Akpes to the west, Oko-Eni-Osayen to the east). Not directly adjacent but very close are further Edoid languages (Ososo in the east, Ukue, Ehueun, Uhami and Iyayu to the west), another Defoid language (Ahan in the north-west) and a Nupoid language (Ebira in the north-east). The Ukaan-speaking villages themselves are not quite as mixed as the area as a whole but even there there are quite a few ethnic and linguistic groups living in the villages, with different consequences for the various villages.

Ikakumọ's population is mainly Ukaan-speaking. Other ethnic groups living in the village are Ebira and Yoruba. In the farms around the village there are more Ebira and also nomadic Bororo-Fulani. The Ebira have been living in Ikakumọ for around four generations. The first Ebira came as spouses of Akaan husbands, later the relatives of the Ebira spouses followed. By now around on third of the population of Ikakumọ is Ebira. The older Ebira speak Ikaan native-like, many if

[7]However, Aduge is given as a language of Anambra state in its Ethnology entry and may therefore be misplaced on this map.

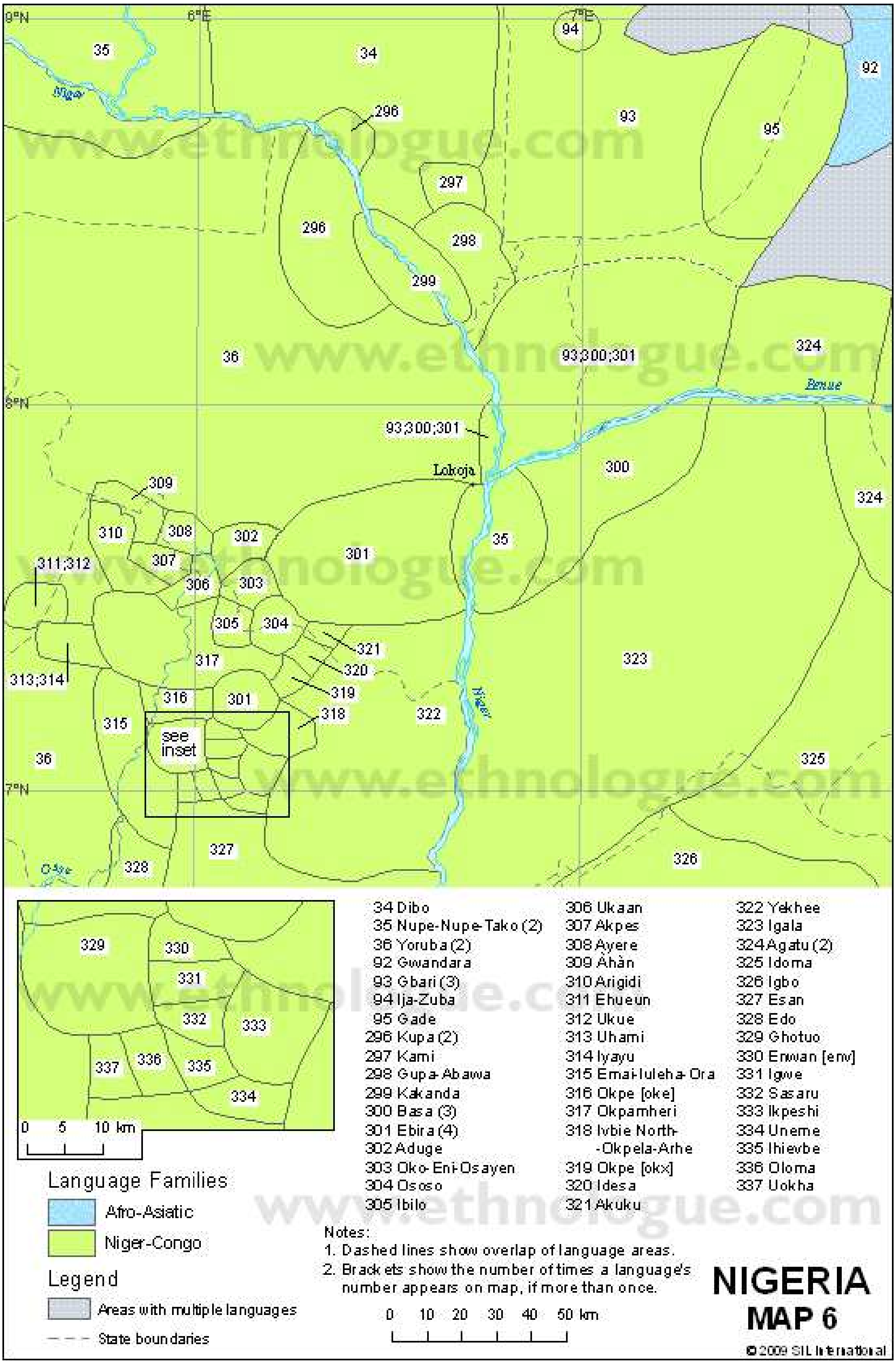


Figure 2.3: Linguistic map of Nigeria south-west of the confluence (Lewis, 2009)

not most of the parent generation and younger however and those living outside the village on their farms do not speak Ikaan. The Yoruba speakers came to the village to work as teachers, reverends or nurses. Most of them do not speak or understand any Ikaan, and some speak and understand a little. The Fulani also do not understand any Ikaan.

Auga also has a substantial Ebira population and additionally a more substantial Yoruba population than Ikakumọ. In contrast to Ikakumọ however both the Ebira and the Yoruba understand the Auga dialect. There are also nomadic Fulani in the bush, but again these do not speak Auga.

Ịṣẹ has established Ebira and Yoruba populations and Igbo people who came there to trade.

Ayanran is the smallest of all the Ukaan-speaking villages but has the most diverse population. In Ayanran there are people speaking Ebira, Uhami, Oka, Ukue, Ibilo and Yoruba. All except the Yoruba speakers have been there for a long time but mostly continued to speak their own languages rather than learn and use Iino.

All Ukaan speakers are at least bilingual in Ukaan and Yoruba. The vast majority is trilingual, speaking Ebira and/or English in addition. Many speakers are fluent in more than three languages and use them frequently, code-mixing and code-switching naturally between the languages. It is not uncommon to overhear even short exchanges such as in (1).

(1) bɛ́ꜜtóː how=now
general.greeting(Ikaan) how.are.you(Nigerian.English)
'Hello, how are you?'

dáādáā kákáfine
fine(Yoruba) thank.you(Ikaan)

'I'm fine, thank you.'

Speakers in all Ukaan-speaking villages have native-like command of Yoruba and use it as a lingua franca. English is used alongside Yoruba as an official language in the schools. Nigerian Pidgin is used in Edo State. Younger speakers in particular in Ikakumọ (Edo) are fluent in Pidgin. Ebira is understood by many speakers in the villages because of the large Ebira migrant minority living in the villages. In addition, there are Ukaan speakers who have lived in other parts of Nigeria and it is not uncommon to find speakers who are fluent in Hausa, Igbo, Pidgin and a wide range of other languages.

2.2 The field site—Ikakumọ

2.2.1 History

I have not investigated the origin and history of the Akaan people. Instead, I asked Prince Oyedele Festus Ọbaudẹ, my host in Ikakumọ, to narrate the history of the Akaan to me. I am aware of the fact that there is a chieftaincy title case currently being heard in court, and that different families in Ikakumọ might tell the history of the village differently. I am neither a historian nor a judge and I do not wish to take sides in this case, I am merely re-telling the account of the history as told to me by Prince Ọbaudẹ.

According to the information provided by Prince Ọbaudẹ, the people of Ikakumọ originate from Ile-Ifẹ. They are the descendants of three brothers and their families who left Ile-Ifẹ because of an ongoing chieftaincy conflict that could not be settled. The eldest of the three brothers was called Aworunke, the second was called Olayele, and the youngest was called Oreju. The three brothers and their families first went to Benin to live there, then to Uromi, then to Ayanran, and finally to what is today Ikakumọ. In Ikakumọ they first lived at a site called Ayon where they farmed and held a market. The second brother, Olayele, later went to hunt at a rock where monkeys were said to be plentiful in supply. Eventually his family joined him there and they founded what is now Ikakumọ in Edo State. Because of those monkeys, Ikakumọ (Edo) is now called Ẹwan [*ɛ̀wã́*] 'monkey' by the Akaan of Ikakumọ. In return, the Akaan of Ikakumọ (Edo) call the Ikakumọ village in Ondo Awun [*ꜜáwṹ*] 'I have found something'. The youngest brother, Oreju, and his family later crossed the Osse river and founded a town called Oreju [*òrédʒù*]. This town however was wiped out during the Ogidi war. Today, the town is inhabited by Ebira people and called 'Arima'.

The language spoken in the Ikakumọ villages is called Ikaan [*ìkàːn*], literally 'ring' by the speakers. This is because when the Akaan were coming from Ifẹ, the senior brother brought three rings and before he died he gave his brothers one ring each. Now the language is called Ikaan [*ìkàːn*], a person from the Ikakumọ village is called Ọkaan [*ɔ̀kàːn*] and the plural form for the people from Ikakumọ is Akaan [*àkàːn*].

2.2.2 Geography and infrastructure

Ikakumọ is situated in the north-eastern corner of Ondo State, at the very end of a tarmacked road leading from Ikarẹ, a major town west of Ikakumọ, to Kwara State. The village stretches along the road, with up to three rows of houses on each side of the road. Ikakumọ is relatively well connected in terms of transport, with local transport running to and from neighbouring towns many times a day. A bus departs to the state's capital Akure once every day, and connecting buses to every other major town in Nigeria are available at least once daily.

Other infrastructure is also relatively well-developed in Ikakumọ. The village is connected to a fairly well-functioning section of the national electricity grid, has a number boreholes for drinking water and mobile network coverage. There are two primary schools (one government, one private) and one secondary school where most children go. There is a hospital building with a ward maid who administers basic health care such as malarial treatment.

The geographical surrounding of the village is made up of remnants of forest, farm land, hills originating from former volcanic activity, many small streams and ponds and the river Osse, which demarcates the border between Ondo and Edo State. The landscape mostly resembles high savannah but was tropical rain forest before it was converted into farm land. The land itself is fertile and thanks to the river and streams access to water is not difficult.

2.2.3 Way of life

Traditionally, the village was ruled by a king called ọhikaṣ *[ɔ̀hìkàʃ]* 'father of the town' in Ikaan. Currently, there is no ruling king in the village because over the last decades there has been a chieftaincy dispute, with families from two quarters claiming rights to the throne. This situation has continued to the current day. Therefore there are regular meetings in the individual quarters and regular meetings of elders of all the quarters to discuss and make decisions that are relevant to the village.

Almost everyone in the village is engaged in farming, either as their main occupation or as an additional occupation. The main crops are yam, cassava, melon and cashew. Other crops include guinea corn, tomato, okra, beans, although those crops and the animals that are kept are mostly for people's own consumption. There is also a lively gaari (ground, fermented and roasted cassava) production going on in the village; gaari and farming produce are sold at the village market, which is held every four days in the mornings.

People in the community are well educated. The vast majority, including some elderly women, are literate to some degree, and have finished at least primary school. Many of the parent generation have also finished secondary school, and among the younger generation virtually everybody finished secondary school and many go on to further education. In the generation of elders, there are a number of people with university and polytechnic degrees. Accordingly, other professions in the village include school masters, electrical engineers, teachers, police men and carpenters, etc..

Ikakumọ has a number of churches of different denominations, two mosques and a traditional shrine for worship.

2.3 This research on Ikaan—methodology

The findings presented in this thesis are based on data I collected during ten months of fieldwork in Nigeria between October 2006 and March 2008. Of these ten months, eight months were spent in Ikakumọ living with the Ikaan speakers. As part of this work in the village I recorded a range of data to build a corpus of spoken Ikaan which I subsequently transcribed, glossed and translated with the help of the native speakers. I took part in village life to some degree, which contributed a substantial amount of participant observation and supplementary contextual data and allowed me to conduct informal interviews and vocabulary elicitation sessions. Living in the village also gave me the chance to learn to speak the language, which helped get a constant stream of informal grammaticality judgements.

2.3.1 Native speaker contributors and languages

For informal interviews, participant observation and language practice I worked with many speakers in the Ayindu quarter of Ikakumọ.

For recordings of Ikaan data, I worked with 29 speakers (15 men and 14 women) aged between 17 and 80 years, with most of them between 35 and 65. There is a bias in genre and gender—elicitations of word lists, phrases and sentences were carried out with men, whereas stories and most of the riddles were told by women. This is because word lists and structured elicitation sessions take a long time and women are very busy during the days whereas men are mostly free in the afternoons. Women, on the other hand, seem to be the traditional story tellers and praise song singers.

For comparative dialect recordings and sociolinguistic interviews, I worked with 26 consultants from Ịṣẹ, Auga, Ikakumọ (Edo) and Ayanran (19 men, 7 women), mostly elders but also two younger people from each village.

To transcribe and translate the recordings, I worked with one speaker, Mr Fred Adekanye, who I trained in orthographic transcription and word-by-word translation. However, most transcription sessions where done in front of someone's house so that often other speakers walked past and stayed for a while to help with and comment on the transcriptions and translations, giving alternative interpretations, or adding to paradigms.

I spoke (broken) Ikaan with those consultants who did not speak English during participant observation, informal interviews, staged communication and language learning. I used (Nigerian) English as a language of research with those people who spoke English during elicitation, participant observation, informal interviews and formal interviews with village elders during the sociolinguistic survey. During the sociolinguistic survey I carried out with local colleagues, Yoruba was used by the surveyors.

2.3.2 The data collection

The data collection which this thesis is based on includes data from a variety of natural, observed and staged contexts combined with controlled, detailed and structured elicited data from standard questionnaires and from questionnaires designed by me to follow up hypotheses developed during the data analysis. As I have just mentioned, the corpus contains data from 55 speakers, both men and women, from different age groups and from all Ukaan-speaking villages.

Even though the research for this project was carried out within the framework of language documentation and description, the available corpus is not a language documentation and description corpus as envisaged by Himmelmann (1998) in his defining article. Instead, the corpus is skewed with respect to naturalness and contains far more controlled elicitation data than natural and spontaneous speech. Additionally, the priority for transcription and translation has been with controlled elicited data. The reason for this is the nature of this thesis as an academic qualification rather than a solely documentary and descriptive project, two objectives which are difficult to reconcile.

Nonetheless, the available data collection includes a variety of primary and supplementary language data and descriptive data. The available data is:

- *Audio recordings*
  - around 170 files of varying length
  - personal, historical, procedural and descriptive narratives and stories
  - staged dialogues
  - songs
  - formal and ritual speech such as praise songs, proverbs, riddles, prayers and public speeches
  - structured elicitation for Ikaan

  - structured elicitation for comparative work on the other Ukaan dialects

- *Video recordings*

  - two short recordings of counting gestures

- *Written language data*

  - SMS, emails, two books and one manuscript in Ikaan and on Ikaan

- *Photographs*

  - photographs used as stimuli for data collection
  - photographs of the contributors
  - phonographs 'documenting the documentation'

- *Annotations*

  - around 60 files of time-aligned electronic annotations in Praat[8], ELAN[9] and Toolbox[10]
  - phonemic transcriptions, free translation, partly with glosses and notes

- *Transcriptions*

  - electronic orthographic transcriptions of all natural texts, in MS Excel and not yet time-aligned
  - word-by-word glosses, free translations and notes

- *Field notes*

  - hard copies and digital photos of all handwritten field notes
  - transcriptions, glosses, translations, paradigms and further grammatical and semantic information, session plans and observations

- *Legacy and current descriptive linguistic work*

  - two BA theses, two MA theses, one PhD thesis and some academic papers on Ikaan

- *Metadata*

[8]http://www.fon.hum.uva.nl/praat/

[9]http://www.lat-mpi.eu/tools/elan/

[10]http://www.sil.org/computing/toolbox/

– extensive cataloguing metadata on recordings, descriptive data, contributors, locations and legacy data

So far the data is only partly electronically accessible and searchable. Further work on turning the data into a fully-fledged electronic corpus is ongoing.

All data has been archived with the Endangered Languages Archive of the Hans Rausing Endangered Languages Project at the School of Oriental and African Studies, University of London and will be openly accessible in due time. Copies of the data and applied linguistic material are with the community. Further distribution and archiving with institutions in Nigeria is also due to take place in the near future.

2.3.3 Technical issues and workflow

The Ikaan data was recorded digitally with an Edirol r-09 solid state recorder and either Sony ECM-MS957 stereo microphones or an Audio Technica AT803B audio lavalier microphone. The data was recorded in 48kHz, 16bit/24 bit wav files in stereo or mono quality depending on the recording situation. The recorded data was copied onto a laptop computer and backed up onto external hard disc and DVD.

For transcription and easy playback, the wav files were converted to mp3 files, uploaded into iTunes, labelled and put onto an iPod. With the help of a consultant, some recordings of narrative texts were transcribed with pen and paper. The handwritten transcriptions were digitally photographed and also backed up.

The remaining narrative texts were transcribed, glossed and translated by the main consultant, Mr Fred Adekanye. He transcribed the data orthographically, glossed the individual words, translated the sentences freely and supplied notes and comments on speakers' style, slips of the tongue, possible grammatical mistakes and cultural background. These annotations were completed in MS Excel and imported into ELAN, although they have not yet been time-aligned.

Controlled elicited recordings and the transcriptions of the narratives were annotated phonetically or phonemically in Praat or ELAN. The ELAN annotations were imported into Toolbox, where the words were broken up into morphemes, glossed and translated. The completed interlinearised annotations were re-imported into ELAN and a Toolbox dictionary database was created based on the Toolbox interlinearisations.

Finally, metadata for all data and contributors was collected and written down in pen and paper and later copied into an Excel file.

2.4 Previous research on the Ukaan language

Existing research on the Ukaan cluster is sparse, what does exist is often very difficult to access. Most of the accessible work is concerned with the linguistic classification of Ukaan within the Benue-Congo family. In addition, there are some word lists and a few papers on descriptive linguistic work on aspects of the languages. Finally, there is a handful of publications by native speakers, both linguists and non-linguists.

2.4.1 Linguistic classification

Ukaan is unanimously classified as a Benue-Congo language. Its classification within Benue-Congo is yet to be determined and very divergent proposals have been brought forward. The analysis is further complicated by the fact that according to Blench (1994:8) Ukaan seems to have borrowed heavily from other languages even in its core vocabulary so that the Ukaan lexicon now shows parallels with Benue-Congo branches such as Yoruboid, Akokoid, and Edoid. Researchers agree however that Ukaan is significantly different from the surrounding Benue-Congo languages, which are Defoid, Edoid, Nupoid and further unclassified Benue-Congo languages.

Using mostly short word lists, previous researchers have employed a number of methods and a range of arguments to classify Ukaan within Benue-Congo. These methods are lexicostatistics and cognate counts, shared lexical innovations, reconstructions, regular sound correspondences, morphological parallels and, finally, mutual intelligibility to establish the Ukaan cluster as a language. The difficulties involved in some of these studies are that not all researchers clearly describe the criteria they use to establish the genetic relationships. Different researchers may apply different criteria to what counts as a cognate, and different sets of words may be chosen to look for cognates.

The three questions researchers are concerned with are:

- Where within the Benue-Congo languages is Ukaan to be located?
- Is Ukaan related to Akpes, a dialect cluster spoken in a number of villages north-west of the Ukaan speaking area?
- Are the Ukaan dialects distinct languages or part of a mutually intelligible dialect cluster?

In the following section, I will go through the existing research on Ukaan's linguistic classification in a chronological order.

Abiọdun (1999:2) cites Hoffman (1976:169–90) and Akinkugbe (1978:265), who both classify Ukaan as belonging to a Northern Akoko Cluster within Benue-Congo. Neither publication is accessible to me.

Voeglin and Voeglin (1977:13) classify Ukaan together with Akpes as a Central Akoko Kwa language on the basis of a manuscript by Williamson (1972). However, they do not explicitly state whether they see Ukaan and Akpes as related or not.[11]

Abiọdun (1999:3) and Taiwo (1988:2) refer to Capo (1987). According to Abiọdun, Capo sees Ukaan as a separate branch within Benue-Congo. According to Taiwo, Capo sees Auga as a dialect of Ukaan, which he classifies as Akokoid under Defoid. Unfortunately, I do not have access to Capo (1987).

Williamson (1989) works with shared lexical innovations to lay out the genetic tree for the whole Benue-Congo family. She notes that most innovations in languages come about through semantic shift and are therefore not fully reliable for classification (Williamson, 1989:249). She therefore restricts herself to borrowings and apparent inventions, which are more reliable, though rarer. The data she works with comes from her own work and that of other researchers and she emphasises that many questions remain open (Williamson, 1989:251).

For the nine words that she examines, she finds one Ukaan word which is a Benue-Congo innovation (*ɔ̀hɔ̃́nɔ̃́* 'firewood'; Ikakumọ dialect), three words that are later innovations (*ɔ̀kyéc* 'firewood', *ɛ́lɔ̂k* 'neck', *ʃú* 'one'; Iṣẹ dialect) and one word which she describes as an old root attested outside Benue-Congo (*ònyòwí̵s* 'husband'; Iṣẹ dialect). For the remaining five words ('lick, count, back, dance, roast') she does not provide any data.

Williamson (1989:267) concludes that Ukaan and Akpes are closely related to each other, though she does not point to concrete evidence for this relationship. She further says that for now, the wider affiliation of Ukaan is not clear and that there is a serious lack of data. Until this can be resolved, she places Ukaan and Akpes together to form their own branch in a flat Benue-Congo tree, co-ordinate with the Oko to its left and the Defoid and other branches to its right, as shown in Figure 2.4.

Blench (1989) aims to summarise recent and mainly unpublished developments in the classification of Benue-Congo and complement the findings in Williamson (1989). The paper is based on informal discussions with linguists and unpublished word lists and manuscripts. For Ukaan this is Jungraithmayr (1973),

[11]At the time Voeglin and Voeglin (1977) classified Ukaan, some of the languages that are now considered to be Benue-Congo languages were considered to be Eastern Kwa languages. The re-grouping into 'New' Benue-Congo came with Bennett and Sterk (1977) (Schadeberg, 1986:73).

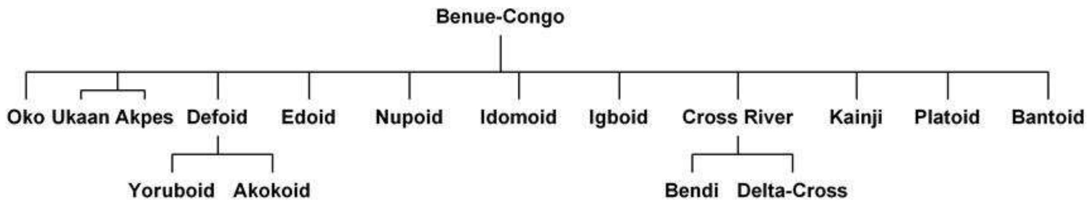


Figure 2.4: Linguistic classification by Williamson (1989)

for Akpes this is an unpublished word list. From this, Blench (1989:130) concludes that Ukaan and Akpes are a joint branch of Western Benue-Congo, as shown in Figure 2.5.

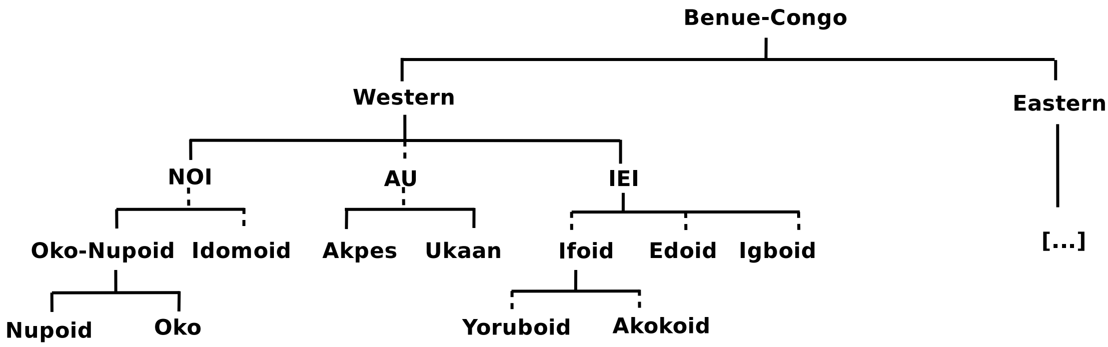


Figure 2.5: Linguistic classification by Blench (1989)

Crozier and Blench (1992:104) classify Ukaan together with Akpes as a branch of Benue-Congo in the index entry and as separate entries in Benue-Congo (presumably indicating separate branches) in their listed classification Crozier and Blench (1992:115).

Blench (1994) investigates the classification on Ukaan based on data from Jungraithmayr (1973), Abiọdun (1989), Ohiri-Aniche (1999) and Ibrahim (n.d.) (Blench, 1994:3). Blench (1994:2) describes Ukaan as a language with a nine-vowel system and a highly structured noun class and concord system. He further presents a list of 180 vocabulary items from the various Ukaan dialects together with possible cognates, 'look-alikes' and loans occurring in other languages. He observes a large number of cognates with an extraordinary variety of languages, and specifically he finds resemblances to Cross River and Ekoid languages (Blench, 1994:9).

Blench concludes firstly that the dialects of Auga, Ikakumọ and Iṣẹ are in fact distinct languages. Secondly, he puts forward the 'tentative hypothesis' that Ukaan is a branch of Bantoid-Cross, co-ordinate with Cross-River and Bantoid (see Figure 2.6), and that the speakers migrated to the current location in Ondo. He admits, however, that other classifications are also possible with the current knowledge of the language and that it is not possible to determine clearly until there is more data (Blench, 1994:10).

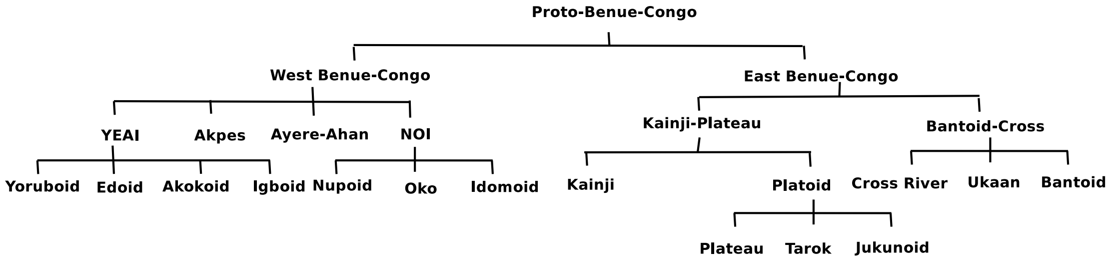


Figure 2.6: Linguistic classification by Blench (1994)

Connell (1998) discusses the place of Cross-River within Benue-Congo. Referring to unpublished work by Ohiri-Aniche and Blench, he observes regular sound correspondences between Ukaan and Cross-River, in particular Delta Cross, and similarities in noun classification (Connell, 1998:23). He therefore puts forward the hypothesis that Ukaan belongs to Cross-River.

Ohiri-Aniche (1999) investigates language diversification in the Akoko area using a multi-disciplinary approach. She correlates linguistic data from lexicostatistics and mass comparison with the oral history of the people and archaeological data on the antiquity of settlements in the area. The linguistic data was collected with the Swadesh 100 word list as modified by the University of Ibadan (Ohiri-Aniche, 1999:83).

With regard to oral traditions, Ohiri-Aniche reports that Ikakumọ speakers themselves insisted they were of Edoid stock (Ohiri-Aniche, 1999:83). Regarding a linguistic cognate count, Ohiri-Aniche does not state how she establishes whether two words are cognates. However, she concedes that lexicostatistics has an inherent weakness in the subjectivity of deciding what to count as cognates (Ohiri-Aniche, 1999:84). In Ohiri-Aniche's data, Ikaan shows a cognate score of 31% with Igbo, 32% with Ibilo and Degema, 34% with Edo and Arigidi, 36% with Oka and Standard Yoruba and 45% with the Akunnu dialect of Akpes (Ohiri-Aniche, 1999:84). Ohiri-Aniche (1999:86) also finds striking similarities between Kainji-Platoid and Ukaan which are not found elsewhere in West Benue-Congo languages.

Ohiri-Aniche (1999:88) concludes that Ukaan and Akpes are each other's closest relatives. They are equally distant from Yoruboid, Akokoid, Edoid and Igboid, and they show similarities with Kainji-Platoid languages which are not shared with West Benue-Congo. Therefore Ukaan and Akpes together form a branch of Benue-Congo that bridges the Eastern and Western Benue-Congo branches, as shown in Figure 2.7.

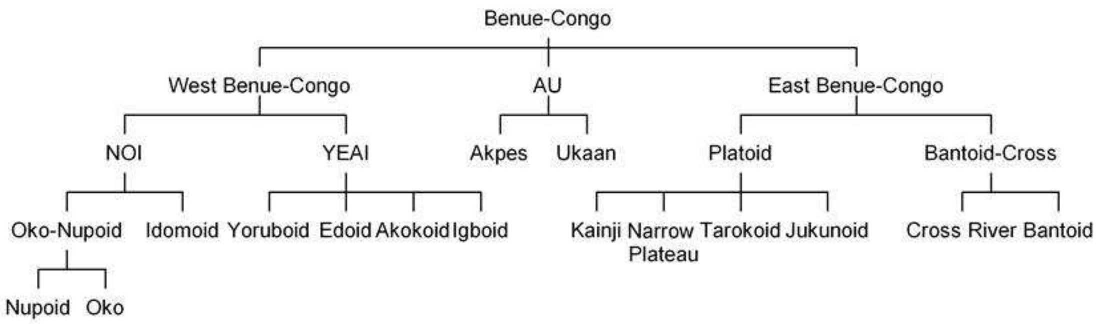


Figure 2.7: Linguistic classification by Ohiri-Aniche (1999)

Abiọdun (1999) is a descriptive study of the proto-phonology and proto-morphology of the Ukaan dialects. His work is based on his own research using the Ibadan 400 word list and some additional words and sentences. Regarding a classification, Abiọdun (1999:5) agrees with Agọyi (1997), published as Agọyi (2001) in that Ukaan is likely to be Edoid.

Williamson and Blench (2000), giving a general introduction to Niger-Congo languages, repeat that there is very little data on Ukaan. Referring to the conflicting classifications in Ohiri-Aniche (1999) and Connell (1998) and without citing any further data, they now classify Ukaan as an independent branch in East Benue Congo 'as a compromise' (Williamson and Blench, 2000:30), as shown in Figure 2.8.

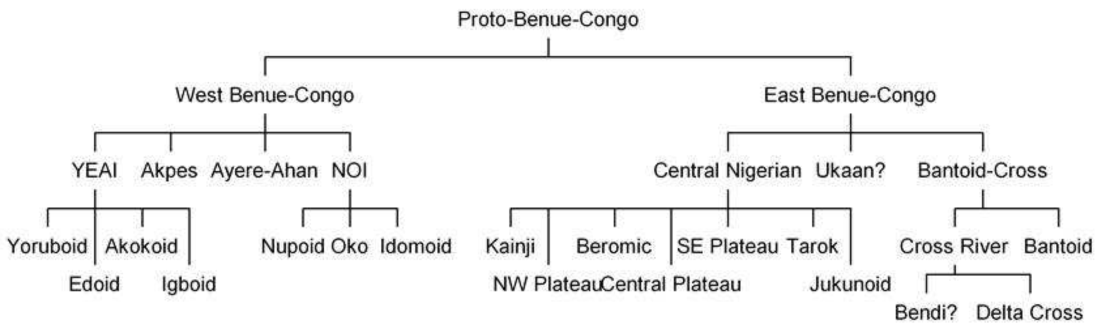


Figure 2.8: Linguistic classification by Williamson and Blench (2000)

Agọyi (2001:72) finds similarities in lexical items between Ukaan spoken in Auga and twelve Edoid languages, including the Ekiromi dialect of Akpes. Additionally, she identifies /*a*-/ and /*i*-/ as plural prefix markers in Ukaan (Auga dialect) and in many Edoid languages. Based on the lexical comparison and parallels in the morphological structure, she concludes that the similarities between Ekiromi, Ukaan and Edoid languages are due to genetic relationship and that both Akpes and Ukaan are therefore Edoid languages (Agọyi, 2001:78).

Elugbe (2001) discusses the genetic classification of Akpes and Ukaan, using data from a word list collected by himself. He discusses previous classifications and points out inconsistencies, contradictions and gaps in the argumentation in Ohiri-Aniche (1999). He offers a different interpretation of the statistical results given there, concluding that the classification given there is not sustainable with the evidence that was provided (Elugbe, 2001:5-12). He also rejects Connell's (1998) classification by presenting evidence that the correspondences between Cross River and Ukaan given by Connell are not unique to those two groups and can be found between Ukaan and Edoid languages too (Elugbe, 2001:12-14). Elugbe tests Agọyi's (1997) hypothesis that Ukaan is an Edoid language. He finds evidence of the claim that Ukaan is Edoid in the following:

- sound correspondences in a certain set of words which he considers as essentially Edoid, even though Ukaan only shows few of those (Elugbe, 2001:14)
- regular sound correspondences with proto-Edoid lenis, non-lenis and implosive consonants (Elugbe, 2001:15-20)
- shared innovations in sound change (Elugbe, 2001:20-22)
- morphology, where he points to the singular/plural prefixes in nouns, which are similar both in form and meaning to Edoid languages such as Oloma and Degema (Elugbe, 2001:22), and the gerund morpheme, which is derived with the prefix *u-/ʊ-* in Ukaan as well as Edoid languages such as Degema, Edo, Yekhee and Emhalhe (Elugbe, 2001:23-26)

Elugbe's preliminary conclusion is that Edoid, Akpes and Ukaan have a common ancestry to the exclusion of other languages spoken in the area. There are however contact phenomena with languages spoken in Akoko, such as the lack of voiced fricatives, which is typical of Yoruba, or borrowed vocabulary from Yoruba. He therefore classifies Ukaan as the oldest branch of Edoid, more closely related to Akpes than to other Edoid languages (Elugbe, 2001:26-28).

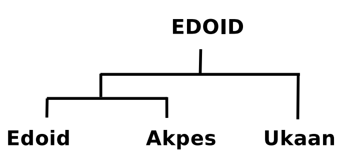


Figure 2.9: Linguistic classification by Elugbe (2001)

Blench (1994/2004) attempts to classify the languages of the Benue-Congo family. The data used for Ukaan comes from word lists by Ibrahim (n.d.), which is not accessible to me, and Jungraithmayr (1973). Based on those words, Blench offers two classifications: as its own branch co-ordinate with Cross River and

Bantoid ('This is admittedly problematic and represents no more than a speculation.', (Blench, 1994/2004:19)) and as a branch of East Benue-Congo between Central Nigerian and Bantoid Cross (Blench, 1994/2004:18). Akpes is placed as an independent branch of West Benue-Congo and not seen as related to Ukaan in either of these classifications.

Finally, Bankalẹ (2008:1) attempts to reclassify West Benue-Congo based on shared innovations. She compares sixty-one cognates from different West Benue-Congo languages, using Ukaan data collected by Elugbe (2001) (Bankale p.c.). Her reasoning is that if the stem-initial consonant changed in the same way in two cognates in two languages then these languages share an innovation, and the more shared innovations two languages have, the more closely related they are. Using this method, Bankale finds both shared innovations among geographically non-contiguous groups and cases of diffusion among the group (Bankalẹ, 2008:1). For Ukaan, Bankalẹ (2008:10) concludes that Ukaan (called AIKA here) is one of the two main co-ordinate branches of West Benue Congo (see Figure 2.10).

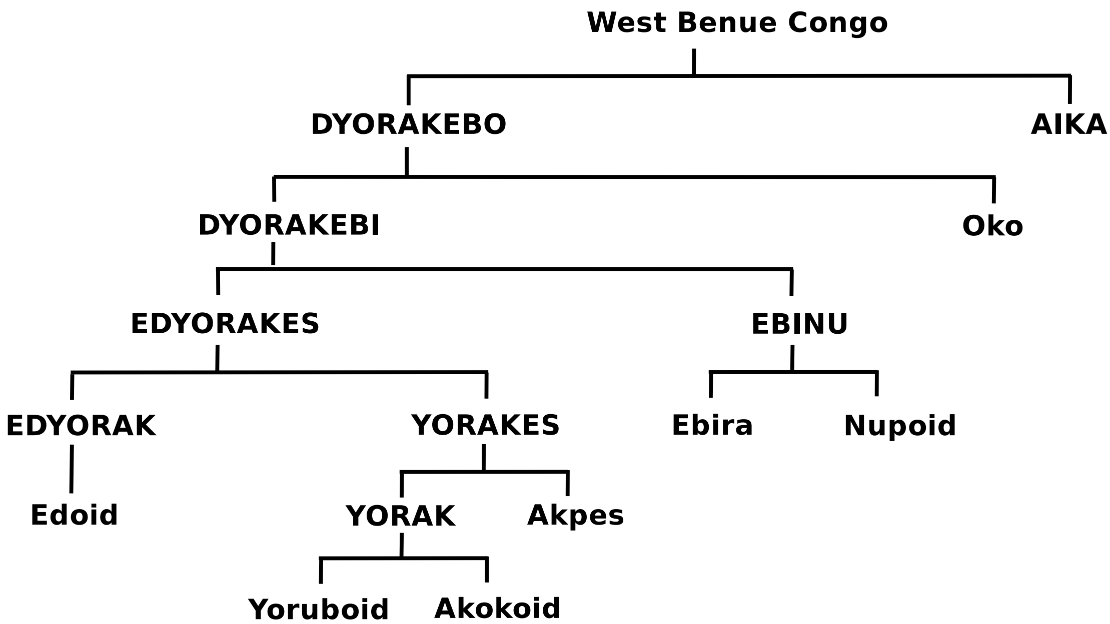


Figure 2.10: Linguistic classification by Bankalẹ (2008)

It is beyond the scope and purpose of this paper and beyond my knowledge of historical linguistics to discuss all the papers in detail. Therefore a few points will have to suffice here. Firstly, a point that all researchers agree on is that there is a serious lack of data. Many of the classifications are based on very short word lists. Secondly, although the authors try to work with 'basic items', compounds or even phrases find their way into the word lists ('snake', 'dead person', 'star'). Spotting these as compounds is not straightforward and requires knowledge of the language that researchers collecting word lists cannot be expected to have. The point remains that this makes some of the data less useful for linguistic comparison. Thirdly, there is a lot of phonetic variety at least within the Ikakumọ speaker community. If data is collected from only one speaker, then depending on the speaker one of a range of possible pronunciations is given. Features that may or may not be crucial may thus be missed. Voiceless approximants and their different allophones as pronounced by different speakers in different context, which is a feature of Edoid languages or possibly an areal feature of the Akoko region. Finally, even when researchers work with the same consultant, their (broad phonetic) transcriptions vary quite substantially and it is not clear to me how much comparative and reconstructive work is actually feasible without looking at the language and its phonemic inventory more systematically.

With reference to the three main research questions mentioned above, the current opinion is that Ukaan might be an Edoid language and that Akpes is also an Edoid language, which makes the two languages related. Since I am neither a historical linguist and nor an expert on Benue-Congo in general I will not attempt to make my own classification and will leave this for other researchers to investigate.

2.4.2 Other previous research and available data

Apart from the attempts at classifying Ukaan, very few linguists have worked descriptively on Ukaan. Most of the work that does exist is unpublished and very difficult to access because it is manuscripts, BA essays or papers from Nigerian universities.

Data and papers that I am aware of, but cannot access are:

- Ayẹni (1987), a BA Long Essay on the Auga verb phrase (mentioned in Abiọdun, 1999:1)

- Olukoju (1985), a BA Long Essay on the Ukaan phonology (mentioned in Abiọdun, 1999:323)

- Oyetade (2004), a sociolinguistic survey of language use in the Akoko Area of Ondo State

- Ibrahim n.d. (mentioned in Blench, 1994:1)

- 6min of Ukaan recordings prepared by missionaries, with transcriptions of the English original but not the Ukaan text (Petrie, 1963a,b)

The following section is an overview of word lists and other descriptive work. The content of the papers will not be summarised here. Instead, where applicable, previous contributions to the study of Ukaan will be discussed in the relevant chapters of this thesis.

Word lists

Williamson (1970) is a word list of fifty-seven vocabulary items from Ọkọ, Akpes, Arigidi, Ayere, Ahan, Yoruboid, Edoid and Ebira and Ukaan. The dialect for Ukaan is Ayegbe (Iṣẹ village). Most words are transcribed without indicating tones.

Jungraithmayr (1973) conducted very brief fieldwork on the Ayegbe dialect of Ukaan (Iṣẹ village) together with A. O. Awobuluyi as part of a survey for a language map of the area. They collected a word list based broadly on the Swadesh 100 word list, some numerals and very brief and incomplete verb paradigms. Jungraithmayr further notes down some grammatical observations from the data he collected.

Descriptive work

Taiwo (1988) describes the sound inventory and some phonological processes for the Iigau dialect of Ukaan (Auga village). The data was collected from three consultants using the Ibadan 400 word list translated from Yoruba into Auga.

Using data from the Ikaan dialect, Abiọdun (n.d.) investigates the development of Ukaan vowels which are neutral with respect to ATR harmony.

Abiọdun (1999) is a PhD thesis on the comparative synchronic and proto-phonology and morphology of the four Ukaan dialects. It is based on recordings with the Ibadan 400 word list and words from the local environment which were collected during over a month of fieldwork with at least seven adult speakers (six men, one woman).

Abiọdun (1989, 1997) discusses the noun class, number and concord systems in Ikaan. Abiọdun describes five noun classes based on their prefixes, and agreement marked on the one hand by concord prefixes between noun and most modifier and between subject and verb, and class matching on the other hand between noun and demonstrative modifiers (Abiọdun, 1997:4).

Oyetade (1996) lists cardinal numerals from the Ikakumọ dialect, transcribed with three tones (H, M, L) and gives a preliminary analysis of the morphological structure of the compound numerals.

Borchardt (in preparation) describes the numeral system of Ikaan dialect of Ukaan based on two months of fieldwork and data from various speakers. Her focus is on the semantics of numeral bases, morphology and syntax of numerals and semantic domains to do with numerals and concepts of measuring.

Kelsey (2007) investigates relative clause formation in Ikaan in order to establish what is relativisable in simplex sentences and how it is relativised. Her work is based on translations of English sentences into Ikaan.

Oyetade (1997) investigates the origin and migration of the groups living in the Akoko area by comparing lexical items from the Ibadan 400 word list and number words (18 towns) and by carrying out interviews on the folk etymologies of names of towns (12 towns). For Ikaan, he collected data from three speakers. He concludes that the Akoko languages have been influenced by Yoruba, Nupe, Hausa/Fulani, Edo-Bini and other Edoid languages, Ebira and Igara. However, he concedes that his data did not provide enough evidence to decide whether the similarities between these and the Akoko language was due to common origin or independent evolution (Oyetade, 1997:34).

2.4.3 Native speakers' publications

For the Iṣẹ community, Rev Bọla Ọmọla has written a book about the history of the community, their way of life and part of their lexicon. For the Ikakumọ community, there are two publications (Adekanye and Salffner, 2007; Aminu, 1969) and one unpublished manuscript (Aminu, 1992).

Aminu (1969) contains information about the village's history, culture and its traditional religion. In addition, it gives items of Ikaan vocabulary in a Yoruba-based orthography for the semantic fields of divination, deities and festivals, counting, traditional days, weekdays, week, months of the year and Ikaan names and their meanings. It contains the *oriki* praise songs of the individual quarters of Ikakumọ and, finally, official communication with administration over disputes in the community.

Aminu (1992) contains vocabulary items and phrases in Ikaan for the semantic fields greetings, household items, animals, insects, birds, food, the house, surroundings, family, parts of the body, names and their literal translation into Yoruba, and names of the months. There are further sections on the meaning of the name of the village, the history of the people and the language and the quarters of the village. Again, the Ikaan orthography is based on Yoruba. Two tones, H and L, are marked, since there are also unmarked vowels I assume that these are to indicate M tones, parallel to the Yoruba notation. In addition to Aminu's work, there are comments by Prince Oyedele Festus Ọbaudẹ, another native speaker who was asked by Aminu to edit the manuscript. Because Aminu passed away before he could complete the manuscript it has not yet been finished.

Adekanye and Salffner (2007) is a joint edited a collection of Ikaan proverbs, riddles and a story told by people in Ikakumọ, with translations into Yoruba and English. The Ikaan writing system used in this publication is a trial orthography based on the one hand on a number of ad-hoc orthographies that are currently used by some native speakers and on the other, on a preliminary phonemic analysis of the language by me.

2.4.4 Applied linguistic material

Arohunmolasẹ et al. (2006a,b,c,d,e,f,g) is a set of primers, word lists, an orthography guideline and a teaching handbook for the Ayanran and Auga dialects of Ukaan.

The Iigau and Iino words in the word lists are given Yoruba and English glosses, with the compounds broken up into stems and given individual glosses. The primers contain short stories illustrated with pictures. The orthography guideline includes the spelling of consonants, oral and nasal vowels and tones. All phonemes are given their grapheme and illustrated with a glossed example. There are also guidelines on word division. Finally, the teaching guidelines give basic instructions on how to speak, read, teach and learn Iigau and Iino.

2.5 Essential grammar background

The aim of this section is to present some basic grammatical structures of Ikaan in order to give the reader enough background to understand the following discussion of the behaviour and roles of tone in Ikaan. This section is not intended to be a sketch grammar, therefore any structures which are not immediately relevant for the remaining chapters have been left out of the discussion here.

In the phonology section, I will present the phoneme and toneme inventory of Ikaan and preliminary findings on syllable structure and some phonological processes which I will return to later for the discussion of tones. In the morphology section, I will present the internal structure of nouns and nominal modifiers and of verbs and briefly touch upon noun classes and agreement. I will further present paradigms for a limited set of tense-aspect-mood categories to lay the basis for the discussion in later chapters and give initial findings on alternate verb forms, which will be relevant for the discussion of underlying tones in verbs in 5.2.1. In the syntax section, I will restrict my presentation to the word order inside the noun phrase, the word order in the main clause and to benefactive and locative phrases.

2.5.1 Phonology

This section includes the consonant, vowel and tone inventories of Ikaan, the syllable structure and minimal word and some phonological processes occurring across morpheme boundaries which will be relevant for the discussion of tones later on. I will only give very little information on allophones, and I cannot give justifications for my analysis here. Detailed work on the segmental phonology and the phonetics of Ikaan is, however, in progress.

Consonants

Ikaan uses pulmonic consonants only. There are no implosives or ejectives. As consonants, Ikaan has plosives, nasals, fricatives, affricates and approximants. The places of articulation are bilabial, labiodental, labiovelar, alveolar, postalveolar, palatal, velar and glottal. Note that there are no voiced fricatives but contrasting voiced and voiceless approximants. A preliminary Ikaan consonant inventory is given in Table 2.1.

/s, l, ŋ/ only occur in loan words in Ikaan, therefore they are given in brackets. */p/* occurs in loan words and in a single indigenous word *òpú* 'ten' when the word is used as an enumerative in counting 'one, two, three' etc. When 'ten' is used as a modifier, the consonant is /f/ instead, as in (2).

(2) | à- | jén | âː- | fù |
|---|---|---|---|
| A2- | woman | 2- | ten |

ten women

Depending on the speaker, */r, r̥/* are realised as approximant, tap or trill. */r, r̥/* have been grouped with the approximants here because they behave like the approximants */w, w̥, j, j̥/* phonologically.

The pronunciation of what is transcribed here as affricates varies from palatal plosive to postalveolar affricate to postalveolar fricative between speakers. Further work is in preparation and may show that classifying the sound as a palatal plosive may be more appropriate.

Within lexical items, some but not all consonants occur as palatalised and labialised consonants. These consonants are given in Tables 2.2 and 2.3.

Note that the voiceless approximants */w̥, j̥/* could also be interpreted as labialised and palatalised */h^w, h^j/* respectively. For some words I have evidence that the consonants are indeed */w̥, j̥/* whereas in other words it is not yet clear which of the two interpretations is appropriate. More in-depth research is in preparation. Meanwhile, I will postpone the decision and instead transcribe the sounds as sequences as in */hw, hj/*.

Manner/Place	Bilabial	Ladiodental	Alveolar	Postalveolar	Palatal	Velar	Labiovelar	Glottal
Plosive	(p) b		t d			k g	k͡p g͡b	
Nasal	m		n			(ŋ)	ŋ͡m	
Fricative		f	(s)	ʃ				h
Affricate				dʒ				
Approximant			r̥ r		j̊ j		w̥ w	

Table 2.1: Ikaan consonants

Manner/Place	Bilabial	Alveolar	Velar	Glottal
Plosive	b^w	t^w d^w	k^w g^w	
Nasal	m^w			
Fricative				h^w
Approximant		r̥^{w} r^w		

Table 2.2: Labialised consonants

Manner/Place	Bilabial	Labiodental	Alveolar	Glottal
Plosive	b^j		t^j d^j	
Nasal			n^j	
Fricative		f^j		h^j

Table 2.3: Palatalised consonants

Vowels

Ikaan vowels are distinguished by height and fronting as well as contrastive ATR value, length and nasality.[12] Nasal vowels have a restricted distribution and do not occur word-initially. The five archiphonemes for Ikaan vowels are given in Table 2.4.

	Front	Back
High	I	U
Mid	E	O
Low	A	

Table 2.4: Ikaan vowel archiphonemes

Almost all vowel archiphonemes are attested with contrasting features oral/nasal, +ATR/−ATR and long/short. The only gaps so far are */ẽː, ʊ̃ː/*. It remains to be seen whether these are systematic or accidental gaps, or gaps because the corpus is not yet big enough or gaps because the transcriptions are inaccurate.

There are instances in Ikaan where a vowel is fully unspecified. In these cases, the vowel surfaces as */i, ɪ/*.

Tones

There are two tones in Ikaan, a high tone (H) and a low tone (L). After floating L, H is downstepped. As all following chapters in this thesis are concerned with

[12] ATR values, especially for short high vowels and for nasalised vowels, are very difficult to hear. While I have tried my best to transcribe them correctly, I cannot guarantee that my transcriptions are always accurate. Similarly, nasality in vowels may not have been transcribed accurately all the time. I therefore recommend not to use the transcriptions given here for further work on ATR harmony or nasality and to go back to the original recordings instead.

tone, no further information will be given here.

Syllable structure and minimal word

Possible syllable structures in Ikaan are V, CV and CVC. In all three types, V can be either long or short. In CVC, only the segments */b, t, d, g, m, n, f, ʃ, dʒ, r r̥/* occur in final position.

(3)

CV	Ikaan	Gloss
V	ɔ̀bá	'he fetched'
Vː	ɔ̌ːbà	'he knew'
CV	ɔ̀fárì	'he washed'
CVː	ɔ̀fâːrì̀	'he fried'
CVC	ɔ̀jén	'wife'
CVːC	ìdʒěːn	'yesterday'

The minimal word in Ikaan is bimoraic. Since most Ikaan words consist of a root prefixed with a vowel they automatically have two moras.

There are however words that lack an agreement prefix and there are words in which the root consists only of a consonant and has no vowel. These words would fail to meet the two-mora requirement for the minimal word, but in these instances the one remaining vowel surfaces as a bimoraic vowel. Diachronically, this may be explained by compensatory lengthening to ensure that the requirement for the minimal word is met. Synchronically this has now probably lexicalised into words with bimoraic vowels. This kind of compensatory lengthening occurs with the two of the demonstratives and with two of the possessive pronouns as shown in (4).

(4)

nɔ̀ː	'DEM.PROX:6', 'this'
ꜜnɔ́ːn	'DEM.DIST:6', 'that'
ɔ̀ː- dʒ	'6- 1S.POSS', 'my'
ɔ̌ː- n	'6- 3S.POSS', 'his, her'

Phonological processes

Ikaan does not allow consonant clusters or vowel clusters. If there are adjacent vowels or adjacent consonants, for example across word boundaries, a number of phonological processes apply to eliminate the prohibited *CC and *VV sequences. Depending on the consonant or vowel in question, and depending on the grammatical construction in which the *CC or *VV sequence occurs, one of the following processes is triggered:

- vowel deletion

- vowel assimilation
- glide formation
- vowel epenthesis
- */g, m/* deletion

Vowel deletion applies in some V ## V contexts with non-high vowels and eliminates the first vowel of the sequence including its mora.

Rule 1 *Vowel deletion*

$V_{[-high]} \rightarrow \emptyset \ / \ \_\_ \ \#\# \ V$

To show more clearly that the vowel and its mora are lost, the same rule is rewritten in autosegmental notation in (5).

(5)
$$\begin{array}{ccc} \mathrm{V} & \#\# & \mathrm{V} \\ | & & | \\ \cancel{\mu} & & \mu \\ \nmid & & | \\ \mathrm{T} & & \mathrm{T} \end{array}$$

Vowel assimilation applies in other V ## V contexts with non-high vowels. It eliminates the features of the vowel and replaces them with the features of the following vowel but it does not delete the mora.

Rule 2 *Vowel assimilation*

$V_{[\alpha]} \rightarrow V_{[\beta]} \ / \ \_\_ \ \#\# \ V_{[\beta]}$

Again, to show how the mora is kept and the vowel features are erased, the same rule is given again in autosegmental notation in (6).

(6)
$$\begin{array}{ccc} \mathrm{V} & \#\# & \mathrm{V} \\ \nmid & & | \\ \mu & & \mu \\ | & & | \\ \mathrm{T} & & \mathrm{T} \end{array}$$

The occurrence of vowel deletion or vowel assimilation depends on the grammatical construction. Verb + object constructions undergo deletion whereas noun + modifier constructions for example, undergo assimilation.

Glide formation applies in V ## V contexts with the high vowels */i, ɪ, u, ʊ/*. Instead of deleting or assimilating, the high vowel becomes a glide and labialises or palatalises the preceding consonant.

Rule 3 *Glide formation*

/i,ɪ/ $\rightarrow {}^{j} \ / \ \_\_ \ \#\# \ V$

/u,ʊ/ $\rightarrow {}^{w} \ / \ \_\_ \ \#\# \ V$

Glide formation also affects some vowels which on the surface are mid vowels /ɛ, ɔ/ but underlyingly are high vowels /ɪ, ʊ/. Which surface mid vowels are underlyingly high vowels differs both between speakers and within individual speakers at different points in time.

(7) a.

ɔ̀ː-	rɛ̀ː	ôː-	ʃì	→ [ɔ̀ːrʲôːʃì]
O6-	path	6-	one	

one path (num.001)

b.

ɔ̀-	jɔ̃́ː	ì-	tòmátò	→ [ɔ̀jʷítòmátò]
3S.NFUT-	grind.NFUT	I4-	tomato	

she ground tomato (foc.083)

Vowel epenthesis applies in C ## C contexts. To break up a prohibited C ## C sequence, a vowel is inserted. This vowel is invariably high but undergoes front/back harmony with the preceding vowel. Following the front vowels */i, e, a/* and their –ATR, long and nasalised counterparts the epenthetic vowel is */i, ɪ/*. Following the back vowels */u, o/* and their counterparts, the epenthetic vowel is */u, ʊ/*. Epenthetic vowels are underlyingly toneless and surface with the same tone as the preceding tone-bearing unit.

Rule 4 *Vowel epenthesis*

$\emptyset \rightarrow V_{[+high]}$ / C ## C

Examples for front and back high vowels as epenthetic vowels are given in (8). The word *ùbít* 'oil' ends in a consonant, the word proximal demonstrative *dɔ̀ː* 'this' begins with a consonant. An epenthetic vowel is inserted, in the case of *ùbít* the front vowel */i/* because the vowel preceding the epenthetic vowel is also a front vowel.

(8)

ùbít í dɔ̀ː	'this oil'
òjén í jɔ̃̀ː	'this woman'
ìkàʃ ì dɛ̀ː	'this town'
òhún ú nɔ̀ː	'this tree'
èkpòd ù nɛ̀ː	'this hare'

However, if C1 in a C1 ## C2 sequence is */g, m/*, the consonant is deleted instead of a vowel being inserted.

Rule 5 */g, m/ deletion*

/g, m/ $\rightarrow \emptyset$ / ___ ## C

Examples for deletion of */g, m/* are given in (9).

(9)

/ɛ̀r̥ágṹm nɛ̀ː/	[ɛ̀r̥ágṹ nɛ̀ː]	'this sheep'
/ʊ̀kɔ́g dɔ̀ː/	[ʊ̀kɔ́ dɔ̀ː]	'this grindstone'

Note also that *m* deletes if it occurs at the right edge of syntactic boundaries and at the end of an utterance. *g* does not delete in these contexts so that in isolation /m/-final words surface without /m/ whereas /g/-final words surface with /g/. /m/ deletion is expressed in Rule 6, examples for underlying and surface forms for words pronounced in isolation are given in (10).

Rule 6 */m/ deletion at syntactic boundaries*

/m/ → ∅ / __ $

(10)	/ɛ̀r̥ágʉ̋́m/	[ɛ̀r̥ágʉ̋́]	'sheep'
	/ʊ̀kɔ́g/	[ʊ̀kɔ́g]	'grindstone'

2.5.2 Morphology

This section discusses the internal structure of nouns and nominal modifiers including inflection for number and noun class and agreement. I will further describe the internal structure of the verb and the forms of some tense-aspect-mood categories.

Nouns and nominal modifiers

Structure of the noun Ikaan nouns are made up of a nominal root prefixed by its respective noun class marker. The noun class prefix itself is made up of two morphemes: a segmental morpheme consisting of a short monomoraic or long bimoraic oral vowel and a tonal morpheme which is either L (nominal use) or H (predicative use). Noun class prefixes encode six different nominal agreement classes. On the noun itself, the prefixes for noun class O1 and noun class O6 are the same, but the corresponding demonstratives, determiners and relative pronouns are different, which is why they are in different noun classes.

(11)	ò-	jén	à-	jén	ʊ̀-	tɛ́	ì-	kúkú	è-	gù	ɔ̀	-tá
	O1-	wife	A2-	wife	U3-	cloth	I4-	chair	E5-	house	O6-	lamp
	wife, wives, cloth, traditional low chair, house, lamp											

In addition to inflection for noun class, nouns, nominal modifiers and verbs are inflected for number to give singular and plural. This can already be seen in (11) in the words *òjén, àjén* 'wife, wives'. Each singular class has a corresponding plural class. A2 is additionally used as a plural-only gender so that there are six genders in total. The mapping of noun classes to genders is illustrated in Figure 2.11.

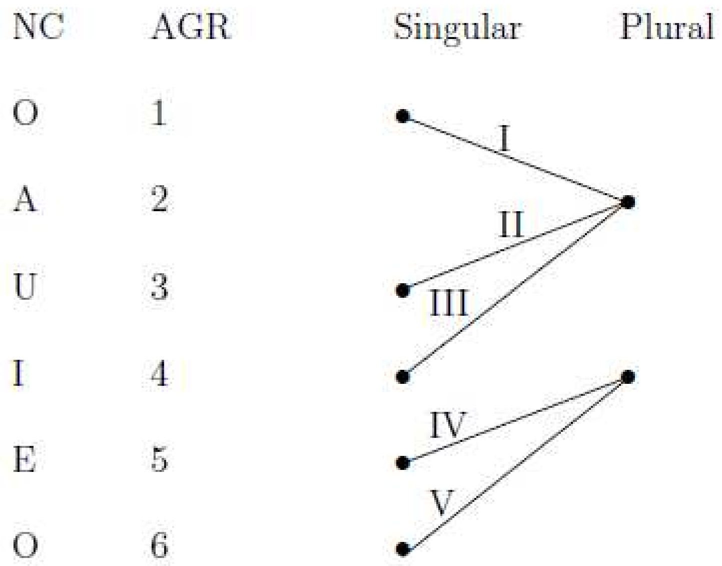


Figure 2.11: The gender system of Ikaan

Modifiers of the noun Ikaan nouns can be modified by possessive pronouns, adjectives, numerals, quantifiers, demonstratives and determiners. Of course, other nouns, relative clauses, etc. may also modify the noun but I will not go into this here. With the exception of the demonstratives, nominal modifiers are made up of agreement prefixes and roots. Like with nouns, the tonal morpheme of the prefix may be H or L and the segmental morpheme may be monomoraic or bimoraic.

Possessive pronouns in Ikaan agree in noun class with their head noun. Possessive pronoun stems, without agreement indicated yet, are given in (12), examples for all possessive pronouns modifying the noun *àr̥ʊ̀g* 'ears' are given in (13).

(12)

	Singular	Plural
1	V̀ːdʒ	V̀bɔ́
2	V̀rɔ̀	V̀mɔ́n
3	V̌ːn	V̀mán

(13)

	Singular		Plural	
1	àr̥ʊ̀g àːdʒ	'my ears'	àr̥ʊ̀g àbɔ́	'our ears'
2	àr̥ʊ̀g àrɔ̀	'your (sg.) ears'	àr̥ʊ̀g àmɔ́n	'your (pl.) ears'
3	àr̥ʊ̀g ǎːn	'his ears'	àr̥ʊ̀g àmán	'their ears'

The determiner in Ikaan is used to mark a noun as [+definite, +specific]. This is the only nominal determiner in Ikaan. The forms for all six noun classes are given in (14).

(14)

Agreement class	Noun + Determiner	Gloss
1	òjén òjón	'the very wife'
2	àjén àdán	'the very wives'
3	ʊ̀r̥ʊ̀g ʊ̀dɔ́n	'the very ear'
4	ìkàʃ ìdɛ́n	'the very town'
5	ègù ɛ̀nɛ́n	'the very house'
6	òdʒó ɔ̀nɔ́n	'the very month'

Demonstratives in Ikaan may be proximal and distal deictic demonstratives or an anaphoric discourse demonstrative. Demonstratives are maximally distinguished into noun classes with six different surface forms for the six different noun classes. Unlike other modifiers of the noun however, demonstratives do not have a prefix indicating their noun class. Nonetheless, they maintain the one-to-one match between noun classes and demonstratives through their different surface forms.

(15)

Agreement class	Noun	Proximal	Distal	Anaphoric
1	òjén 'wife'	jɔ̏ː	ꜜjóːn	jɔ̀m
2	àjén 'wives'	dàː	ꜜdáːn	dàm
3	ʊ̀r̥ʊ̀g 'ear'	dɔ̀ː	ꜜdɔ́ːn	dɔ̀m
4	ìkàʃ 'town'	dɛ̀ː	ꜜdɛ́ːn	dɛ̀m
5	ègù 'house'	nɛ̀ː	ꜜnɛ́ːn	nɛ̀m
6	òdʒó 'month'	nɔ̀ː	ꜜnɔ́ːn	nɔ̀m

Apart from the demonstratives, agreement between head noun and modifier is marked through alliterative agreement on the noun class and agreement prefixes.

In this chapter, I will gloss noun class prefixes, agreement prefixes and agreement classes for all examples. In the following chapters, I will only break up and gloss the morphemes within the words where it is necessary to illustrate a grammatical feature of Ikaan. In all other cases, I will work with glosses that are less detailed so that I do not distract from the point I am actually trying to make.

Verbs and verbal affixes

Structure of the verb Verbs are made up of a verb root and prefix which encodes person, number and noun class agreement with the subject as well as additional tense-aspect-mood information.[13] The verb prefix is so far analysed as

[13]The forms and meanings of the various tense-aspect-mood categories are much more complex than those presented here, with additional inflectional morphemes for adding semantic

a portmanteau morpheme but is likely to have internal structure which is yet to be described and analysed. Verb roots are underlyingly toneless and are inflected for tense-aspect-mood with tonal grammatical melodies.

(16) gives the same proposition in three different tense-aspect-mood categories.[14] In each form, the verbal prefix and the verb root differ, both segmentally and tonally.

(16)

a. àtínàhʊ́ ɔ̀- fɛ́r̥ ì- wé
[Atinahu] 3S.NFUT- write.NFUT I4- book
Atinahu wrote a book.

b. àtínàhʊ́ ɔ́ꜜː́- fɛ́r̥ ì- wé
[Atinahu] 3S.CONT- write.CONT I4- book
Atinahu is writing a book.

c. àtínàhʊ́ á- ì- wé è fɛ́r̥ág
[Atinahu] 3S.FUT- I4- book L write.FUT
Atinahu will write a book.

Depending on which tense-aspect-mood category is used, one or all of these characteristics of the verb change:

- the vowel on the verb prefix: which vowel, vowel length, here in 3S /ɔ-/ for NFUT, /ɔː-/ for CONT or /a-/ for FUT
- the tones on the verb prefix: here L in NFUT, HꜜH in CONT, H in FUT
- the form of the verb: one of two alternate forms, here *fɛr̥* in NFUT and CONT, *fɛr̥ag* in FUT
- the tone on the verb: here H on all forms but other tonal are used for bimoraic and trimoraic verbs
- a tone before the verb: here in FUT the verb *fɛr̥* is preceded by a mora bearing a L tone

distinctions and many more tense-aspect-mood categories. Also, factors such as the inflectional morphemes, word order and focus, negation, occurrence in main or subordinate clauses or occurrence in questions vs. statements affect both the segmental and tonal composition of the prefix and the verb root. Furthermore, the semantic analysis is only preliminary and the labels used here are tentative. Much more research remains to be done on the verb phrase. What I present here and in the remainder of the thesis are only preliminary findings.

[14] The distinction between Non-Future tense and Future tense is a preliminary analysis. Non-Future tense refers to states and events in the present as well as in the past, no further tense distinction is made here. Future tense refers to states and events in the future. Whether this split constitutes a genuine tense distinction or possibly a modality distinction between for example realis/irrealis is a question for further research.

In addition, verbal inflectional morphemes may co-occur with the verb and change both the semantics, adding further tense-aspect-mood distinctions, and the tonal and segmental structure of the verbs. Two examples with the word *bó* ‘just’ are given in (17).

(17) a.

hĩ́ː	dʒɛ̀-	ʃũ̂m
yes	1S.NFUT-	wake.up.NFUT

Yes, I woke up.

b.

hĩ́ː	dʒó-	bó-	ʃũ̂m
yes	1S.NFUT?-	just-	wake.up.NFUT

Yes, I just woke up.

c.

dʒé↓ɪ́ː-	kéné	r̥ã́
1S.CONT?-	do.CONT	finish.CONT

I am finishing.

d.

dʒó-	bó-	↓kéné	r̥ã́
1S.CONT?-	just-	do.CONT	finish.CONT

I am just finishing.

With the inflectional morphemes, the segmental and tonal structure of the verbal prefix as well as the location of the downstep changes. Note also that the ATR value of the subject cross-reference prefix is in harmony with the morpheme if it is present and with the main verb if there is no inflectional morpheme.

These inflectional morphemes are not adverbs. Adverbs in Ikaan have a different morphological structure from the morphemes and may not occur in the positions where the inflectional morphemes occur (and vice versa). Grammatical and ungrammatical examples with the adverb *àʃâːʃà* ‘very well’ are given in (18).

(18) a.

à-	wɛ́jɛ̀	ɪ̀ʃɔ̀r̥	àʃâːʃà
3P.NFUT-	turn.NFUT	pounded.yam	very.well

They turned the pounded yam very well.

b. * à- àʃâːʃà wɛ́jɛ̀ ɪ̀ʃɔ̀r̥

* àwɛ́jɛ̀ àʃâːʃà ɪ̀ʃɔ̀r̥

? àʃâːʃà àwɛ́jɛ̀ ɪ̀ʃɔ̀r̥

Selected TAM paradigms Paradigms for affirmative statements in main clauses without any additional complications such as focus are given below.

The full paradigm for Non-Future tense is given in (19).

(19) Non-Future Tense

	gba 'to be fat'	kʊra 'to sleep'	jõmoji 'to try'
1S	dʒɛ̀- gbá	dʒɛ̀- kʊ́rà	dʒè- jṍmòjì
2S	ɛ̀- gbá	ɛ̀- kʊ́rà	è- jṍmòjì
3S	ɔ̀- gbá	ɔ̀- kʊ́rà	ò- jṍmòjì
1P	bà- gbá	bà- kʊ́rà	bà- jṍmòjì
2P	mánɛ̀- gbá	mánɛ̀- kʊ́rà	mánè- jṍmòjì
3P	à- gbá	à- kʊ́rà	à- jṍmòjì

The full paradigm for Future tense is given in (20).

(20) Future Tense

	gba 'to be fat'	kʊra 'to sleep'	jõmoji 'to try'
1S	dʒâː- gbág	dʒâː- kʊ́rá	dʒâː- jṍmójí
2S	âː- gbág	âː- kʊ́rá	âː- jṍmójí
3S	âː- gbág	âː- kʊ́rá	âː- jṍmójí
1P	bâː- gbág	bâː- kʊ́rá	bâː- jṍmójí
2P	mánâː- gbág	mánâː- kʊ́rá	mánâː- jṍmójí
3P	âː- gbág	âː- kʊ́rá	âː- jṍmójí

The full paradigm for Continuous Aspect is given in (21). The continuous meaning for the property *gba* 'to be fat' in *dʒé↓ː́- gbá* is 'I am becoming fat.'.

(21) Continuous Aspect

	gba 'to be fat'	kʊra 'to sleep'	jõmoji 'to try'
1S	dʒɛ́↓ː́- gbág	dʒɛ́↓ː́- kʊ́rá	dʒé↓ː́- jṍmójí
2S	ɛ́↓ː́- gbág	ɛ́↓ː́- kʊ́rá	é↓ː́- jṍmójí
3S	ɔ́↓ː́- gbág	ɔ́↓ː́- kʊ́rá	ó↓ː́- jṍmójí
1P	bá↓ː́- gbág	bá↓ː́- kʊ́rá	bá↓ː́- jṍmójí
2P	mánɛ́↓ː́- gbág	mánɛ́↓ː́- kʊ́rá	máné↓ː́- jṍmójí
3P	á↓ː́- gbág	á↓ː́- kʊ́rá	á↓ː́- jṍmójí

Finally, examples for Habitual Aspect in context are given in (22).

(22) a. ɛ̀kɛ̀ dʒɔ̀- b- ìkăːkʊ̀mɔ̀ dʒɔ̂ː- fɛ́r̥ ȉwé b- ȉjòhú
when 1S- LOC [Ikakumọ] 1S.HAB- write.HAB book LOC morning
When I was in Ikakumọ, I used to write in the morning.

b. ɛ̀kɛ̀ dʒɔ̀- b- ìkăːkʊ̀mɔ̀ dʒɔ̂ː- kànà ȉwé b- ȉjòhú
when 1S- LOC [Ikakumọ] 1S.HAB- read.HAB book LOC morning
When I was in Ikakumọ, I used to read in the morning.

The full paradigm for Habitual is given in (23).

(23) Habitual Aspect

	fɛr̥ 'to write'	kʊra 'to sleep'	jõmoji 'to try'
1S	dʒɔ̂ː- fɛ́r̥	dʒɔ̂ː- kʊ̀rá	dʒôː- jȍmóji̋
2S	ɔ̂ː- fɛ́r̥	ɔ̂ː- kʊ̀rá	ôː- jȍmóji̋
3S	ɔ̂ː- fɛ́r̥	ɔ̂ː- kʊ̀rá	ôː- jȍmóji̋
1P	bâː- fɛ́r̥	bâː- kʊ̀rá	bâː- jȍmóji̋
2P	mánâː- fɛ́r̥	mánâː- kʊ̀rá	mánâː- jȍmóji̋
3P	âː- fɛ́r̥	âː- kʊ̀rá	âː- jȍmóji̋

Alternate forms of the verb In some tense-aspect-mood categories, an alternate form of the verb is used. This occurs for example in Continuous Aspect if the object is fronted or in Future Tense. An example for Continuous Aspect with and without fronted object and an example for Future Tense are given in (24).

(24) a. dʒɛ́↓ɪ́- bár̥ ɪ̀ːjɔ́
1S.CONT- peel.CONT yam
I am peeling yam.

b. ɪ́ːjɔ́ dʒɔ́- ↓bár̥ág
yam.FOC 1S.CONT- peel.CONT
It is yam I am peeling.

c. dʒá- ɪ̀ːjɔ́ ɔ̀ bár̥ág
1S.FUT- yam FUT peel.FUT
I will peel yam.

The alternate verb form occurs with monosyllabic verbs, bisyllabic and trisyllabic verbs are not affected. The alternate variant is formed either through the suffix /–V*g*/ (reduced to suffix /–V/ in some cases), or reduplication, or lengthening or nasalisation. It is fairly predictable which verb chooses which strategy. Lengthening is a peripheral strategy and can be treated as a contextual variant of suffix /–V*g*/. Nasalisation is peripheral in that it occurs very rarely.

The suffix /–V*g*/ is used for CV verbs, CV: verbs with L tones in imperative and CVC verbs. The vowel in /–V*g*/ depends on the height of the vowel in the verb root. If the vowel in the verb root is [+high], i.e. /*i, ɪ, u, ʊ*/ or any of their nasal counterparts, the suffix is /*–og*/. If the vowel in the verb root is [–high], i.e. /*e, ɛ, o, ɔ, a*/ or any of their nasal counterparts, the suffix is /*–ag*/.

(25)	tif	tifog	'tell'
	di	dʲog	'sing'
	mug	mugog	'cook'
	ju	jʷog	'kill'
	ʃɛg	ʃɛgag	'sift'
	je	jag	'eat'
	kɔr	kɔrag	'break'
	rɔ	rʷag	'be hard'
	bar̥	bar̥ag	'peel'
	fa	fag	'slap'

A contextually determined alternative to the suffix /–V*g*/ is the suffix /–V/ or /–Ṽ/, which is taken by CV verbs ending in a nasal vowel or CVC verbs ending in /*n*/.[15]

(26)	kpĩː	kpʲõː	'hit'
	hwã	hwãː	'scratch'
	kũn	kũno	'tie'
	r̥ãn	r̥ãnã	'prepare (soup)'

Verbs with CV*ː* structure take one of two different strategies. Verbs with H in imperative take reduplicated forms, verbs with L in imperative take the suffix /–V*g*/. I cannot say whether the tones are given dependent on which alternate form is chosen or whether the alternate verb form depends on the tones. All I can say for now is that there is a correlation, with a yet unknown causation.

(27)	kpĩ̀ː	kpʲõː	'hit'
	jɔ̀ː	jʷaːg	'call'
	nɛ́ː	nɛnɛː	'catch, hold'
	jáː	jajaː	'take a photo'

[15]There are a few irregularities in CV verbs which do not follow these patterns. The first involves unexpected lengthening in *ba*/*baː* 'know'. However, this forms a minimal pair with another *ba*/*bag* 'pick', and the two words *ɔ̃ːbà* and *ɔ̀bá* respectively in Non-Future. The second irregularity involves unexpected nasalisation in *r̥ɔ*/*r̥ʷã* 'pound' and *ta*/*tã* 'play (ayo game)'.

Object suffixes Whereas subjects are cross-referenced on the verbs, overt objects of the verb are not cross-referenced. There are however, morphemes that stand for objects, which are likely to be suffixes or clitics.

The object suffixes differ depending on whether the noun they stand in for is a human referent or a non-human referent. Markers for human referents are given in (28), markers for the different noun classes for non-human referents are given in (29).

(28)

Person	Singular	Plural
1	-dʒ	-bɔ́
2	-ɔ̀	-mɔ́n
3	-n	-mán

Object suffixes for human referents show resemblances with possessive pronouns but are not quite the same.

(29)

Noun class	Object suffix
A2	-dán
U3	-dɔ́n
I4	-dɛ́n
E5	-nɛ́n
O6	-nɔ́n

Object suffixes for non-human referents show resemblances with the demonstratives and the determiners but again they are not quite the same.

2.5.3 Syntax

Word order in noun phrases

Noun phrases are head-initial, all other constituents follow. There are two fixed positions in the noun phrase: possessive pronoun and demonstrative. Possessive pronouns immediately follow the noun, nothing can go in between. Demonstratives are the final constituent in the noun phrase, nothing else can follow. Within these restrictions it seems there is no strict order for the remaining modifiers. Although in (30) the word order follows the English word order, 'five', 'little' and 'black' may occur in any order.

(30)

ì-	kɔ̀kɔ̀	ìː-	dʒ	î̤ː-	r̥ùn	ì̤-	té↓tɛ̃́ʲ	ì̤ː-	rĩ̤́rĩ̤́	dɛ̀ː
I4-	chicken	4-	1S.POSS	4-	five	4-	little	4-	black	DEM.PROX:4

these five little black chicken of mine

Determiners may co-occur with the anaphoric demonstrative and immediately precede the demonstrative.[16]

(31) ù- mù ʊ̀- dɔ̂ːn dɔ̀m
U3- river 3- DET:3 DEM:3
that very river [that was mentioned before] (specana.005)

Word order in main clauses

Ikaan has mainly SVO word order. The subject of a sentence is cross-referenced on the verb as part of the verbal prefix. The overt subject, be it a noun as in (32a) or a pronoun as in (32c), may be dropped.

(32) a. ìgè ò- jé à- bàbá àː- dʒ
[Ige] 3S.NFUT- eat.NFUT A2- beans 2- 1S.POSS
Ige ate my beans. (tam3.014)

b. ò- jé à- bàbá àː- dʒ
3S.NFUT- eat.NFUT A2- beans 2- 1S.POSS
He ate my beans. (tam3.010)

c. ìhjèbɔ́ bá àkàːn
1P 1P Akaan.people
We (ourselves) are Akaan people. (`ikaan029_hist.wav`)

d. bá àkàːn
1P Akaan.people
We are Akaan people.

In Future Tense constructions, the word order seems to be reverted to SOV (or SAuxOV, depending on how the morphology of the verbal prefix is analysed).

(33) a. dʒá- ì- wé è káná
1S.FUT- I4- book L read.FUT
I will read a book. (futl.013)

b. dʒá- ù- bít ì jã́ná
1S.FUT- U3- oil L buy.FUT
I will buy oil. (futl.035)

A similar word order also occurs in some clauses with more than one verb, e.g. with *rɔ̃m* 'learn' in (34).

(34) ɔ̀- rɔ̃̀m ì- wé è fɛ́r̥ág
1S.NFUT- learn.NFUT I4- book L write
I learned to write.

[16] I cannot explain the tones on the determiner, nor the fact that there is no epenthetic vowel between the determiner and the demonstrative.

It is possible that the portmanteau prefix *dʒá-* '1S.FUT' is in fact made up of *dʒ*V- and the verb *wa* 'come' because *wa* surfaces both as *wa* and *a*. There is data from a relative clause and a main clause where what is translated as Future Tense surfaces with *dʒɔ́-* followed by *à*.

(35) a.

dʒó-	bó-	à	ʊ̀jág	à	jág	r̥ã́
1S.FUT?-	just-	come?.FUT?	food	L	eat.FUT	finish.FUT

I almost finished eating. (cf. dʒá ʊ̀já à jág r̥ã́ 'I will finish eating.')

b.

à-	nà	dà	dʒɔ́-	à	ná	bɛ̀
A2-	riddle	REL:2	1S.FUT?-	come?.FUT?	say.FUT	now

The riddle that I will say now, ... (`ikaan025_na.wav, 1min`)

If this hypothesis is correct, *dʒá* would actually contain a verb and the Future Tense should be re-analysed as having SVOV word order, similar to (34) above. Further striking resemblances are that both Future Tense and the constructions such as the one in (34) use the alternate form of the verb for the second verb, and that both show a L tone attached to an unspecified vowel preceding the second verb.

BEN and LOC phrases

There are two words in Ikaan that are similar to prepositions but are in fact derived from verbs. These are *rɛ* 'benefactive marker (BEN)' and *b-* 'locative marker (LOC)'.[17]

The locative marker locates entities in space and time, i.e. can be used with both temporal and spacial reference.

(36) a.

dʒɛ̀-	bàr̥	ìː-	jɔ́	b-	ì-	jòhú	dɛ̀ː
1S.NFUT-	peel.NFUT	I4-	yam	LOC	I4-	morning	DEM:4

I peeled yam this morning. (tam.030)

b.

ɔ̌ː-	ŋmànà	ù-	mɔ̃́	b-	ꜜí-	r̥í	=g
3S.NFUT.NEG-	have.NFUT	U3-	water	LOC	I4-	body	=NEG

He's thin. (Lit.: He has not got water in the body, np.062)

c.

mánà-	káká	rɛ́	è-	gù	nɛ̀	ꜜmáná-	dí	rɛ́	-dʒ
2P-	thank.you	BEN	E5-	house	REL:5	2P-	build	BEN	-1P

Thank you for the house that you built for me. (kaka.020)

In my interpretation, *rɛ* 'BEN' and *b-* 'LOC' are both verbs or at least derived from verbs because they undergo vowel deletion when they are followed by another word and their tones vary. In addition, *rɛ* takes an object suffix in (36c) and may

[17]The locative marker is invariably followed by a V-initial word. Therefore vowel deletion occurs at the V##V boundary so that it is impossible to tell which vowel occurs in this word.

in fact be used as the verb ‘give’. Note though that when *rɛ* ‘BEN’ and *b-* ‘LOC’ are used in these adverbial-like constructions they are not prefixed like proper verbs are.

2.6 Chapter summary

In this chapter I have introduced Ikaan, the language that is investigated in this thesis. I have given some background information on the speakers of the language, on the area they live in and on their way of life. I have further given an overview of the set-up of this research project and an overview of existing research on the language. Finally, I have given a very brief introduction to some basic grammatical structures in Ikaan.

The following chapters will go more deeply into the grammatical analysis of the language but will restrict themselves to those parts of the phonology, lexicon and grammar of the language where tone plays a major role.

Chapter 3

Tone in the Ikaan phonology

In the preceding chapter, I provided background on the Ikaan language and its speakers and I introduced the basics of the grammatical structure of Ikaan, but so far very little has been said about tone. In this chapter I will discuss the phonology of tone in Ikaan in detail. My objective is to describe and explain the behaviour of tone in the Ikaan phonology because without this basis any further discussion of the role and relevance of tone at other levels of linguistic analysis is impossible. In the following chapters I will then apply the phonology discussed here to the Ikaan lexicon, grammar and phonology-grammar interface and show how the phonology interacts with these levels.

Tone languages are defined by Hyman (2001:1368) as languages in which an indication of pitch enters into the lexical realization of at least some morphemes. This implies that tone may be part of the lexical information of words themselves but that it can also carry information on other levels of linguistic analysis, including phonology, morphology, syntax, semantics and pragmatics (Yip, 2002:12).

The functions of tone are generally subdivided into lexical and grammatical functions. Lexical tone refers to pitch differences that distinguish lexical items from each other, making tone a crucial part of the lexical representation (Yip, 2002:256). Morphological tone is described as tone that in itself carries a measure of independent meaning (Ratliff, 1992:134). Taking this line of thought further, syntactic tone can be seen as pitch patterns that carry a measure of independent functions when it indicates for example syntactic functions or syntactic boundaries. Pragmatic tone can be seen as tone that might distinguish statements from questions.

The questions that I will attempt to answer in this chapter are

- Is Ikaan a tone language?
- What functions does tone in Ikaan have?

- What is the tone-bearing unit in Ikaan?
- How many tones does Ikaan have and which tones are these?
- Which tonal melodies does Ikaan employ and how are melodies mapped onto tone-bearing units?
- Which well-formedness conditions do tonal representations in Ikaan have to conform to?
- Which phonological rules and processes are active in Ikaan and how are they applied?
- What is the nature and the location of downstep in Ikaan?

In section 3.1 I will give a brief summary of previous work on the tonal phonology of Ukaan. In section 3.2 I will show the lexical and grammatical function of tone in Ikaan and argue for the mora as the tone-bearing unit. In section 3.3 I will discuss the tonemes and allotones of Ikaan. Section 3.4 deals with tonal melodies and the association conventions and well-formedness conditions which govern the association of melodies to words. Section 3.5 introduces additional phonological rules and constraints that are active in Ikaan. Finally, section 3.6 is concerned with downstep in Ikaan.

It is not possible to exhaustively present the arguments for my analysis of the tonal phonology without providing more information on tone in the lexicon and grammar of Ikaan. Therefore I will not straight away give all the evidence for many claims presented in this chapter. Instead I will return to a comprehensive discussion of the motivations for my analysis and potential alternative analyses in later chapters.

Throughout this chapter and the following chapters, I will introduce the relevant theoretical background alongside the Ikaan data and analysis wherever it becomes relevant for the analysis in Ikaan. I will discuss the concepts I am using, their general understanding(s) and use(s) in linguistic theory and, where applicable, the diverging approaches to the concepts and their uses. Based on this review, I describe how the concepts apply Ikaan, where Ikaan behaves the way the theories predict, where problems arise and why these arise. As I said above, the focus of my work is on giving an account of the tone system of Ikaan, it is not an evaluation, comparison and extension of existing frameworks. Therefore, while I will use the Ikaan data to point to gaps that I see in the existing frameworks, I will not go on to suggest changes in these frameworks in this thesis.

3.1 Previous research

My account of the underlying tones, the mechanisms of tonal association and the requirements for tonal specification differ substantially from the only other tonal analysis of Ikaan by Abiọdun (1999). Before I give my own analysis of the phonology of tone in Ikaan, I will present the core of Abiọdun's analysis and argumentation with regards to tone. I will discuss problems I see in his interpretation of the data, briefly state where my analysis differs and later throughout the chapter present my own analysis.

In addition to Abiọdun's work, a few authors either explicitly comment on downstep or use a transcription system that implies a preliminary analysis of downstep in Ikaan. These will also briefly be introduced here.

Abiọdun's (1999) research objective and with it the scope and focus of his description and analysis of Ikaan are very different from mine. Abiọdun (1999) investigates all four dialects in order to present a synchronic account of their phonologies and morphologies and to reconstruct the ancestor language based on this description. Within the phonology, Abiọdun covers tone but focuses mainly on the segmental side of the phonology. His work is based on the Ibadan 400 Word list and a number of additional lexical items (Abiọdun, 1999:18) plus a few sentences and phrases. My interest on the other hand is specifically in tone and its synchronic behaviour and function in one of the Ukaan dialects, Ikaan. My work as it is presented here does not include any data from the other Ikaan dialects. It does however include a wider range of data and speakers for the Ikaan dialect than Abiọdun was working with.

Therefore, part of the differences between the accounts can be put down simply to different data. There is a fair amount of variation between speakers even of the same dialect and in the same village and even within the same quarter so that this is not surprising. Also, I had access to much more data beyond the word level that was not available to Abiọdun so that on the basis of the available data alone I am in the position to observe patterns that would necessarily have escaped Abiọdun. Other differences in the analysis are down to substantially different interpretations of the data and have very different implications for the layout of the tonal system.

3.1.1 Functions of tone in Ikaan

Abiọdun (1999:46) describes both lexical and grammatical functions of tone in Ikaan. He points out that tone has a low functional load in the lexicon, where only very few lexical items are distinguished by tone. The examples he gives, here in (37), apparently involve grammatical functions of tone.[1]

(37)	ùɲɛ̋nì̋	'urine'	úɲɛ̋nì̋	'urinating'
	ùhı́nɔ̋	'question'	úhı́nɔ̋	'asking'
	ùmȁhú	'laughter'	úmȁ́hú	'laughing'

Tone plays a more important in the grammar, where it is used both in derivation (see (37) above) and in the inflection of verbs to indicate tenses (Abiọdun, 1999:127) as in (38).

(38)		'to tie'	'to break'
	Citation form	kùn	fɛ́gɛ́
	Continuous	ꜜkún	ꜜfɛ́gɛ́
	Past	kùn	fɛ́gɛ̀
	Future	kún	fɛ́gɛ́
	Desiderative	kùn	ꜜfɛ́gɛ̀

Regarding dialect variation, Abiọdun (1999:48) finds that the tonal melodies for the verbs follow the same patterns in all Ukaan dialects.

3.1.2 Surface and underlying tones

Abiọdun describes Ukaan as a language with three phonetic surface tones (H, M and L) and two phonologically underlying tones (H and L). H and L occur in citation forms, M is restricted to grammatical constructions and is analysed as a downstepped H (Abiọdun, 1999:45).

3.1.3 Tonal association

In Abiọdun's analysis, not all tones are linked to their hosts from the outset and not all TBUs are linked to tones throughout the derivation. Abiọdun proposes that TBUs receive tones in a variety of ways. Tonal autosegments are linked to TBUs by convention (well-formedness conditions and universal association conventions), by prelinking to TBUs in the lexicon and by a tonal default rule (Abiọdun, 1999:115). Abiọdun thereby differentiates between H which are associated by conventions, H which are prelinked in the lexical entries and L which are invariably inserted by default rule. L are never linked by association conventions or prelinking in Abiọdun's analysis.

Here, I will briefly introduce Abiọdun's use of underspecification and default tone insertion here. I will then show how Abiọdun combines underspecification

[1] Abiọdun's (1999) analysis of the phoneme inventory and some of the phonological processes differs from mine, hence his transcriptions of the segments also differ from mine. I will give Abiọdun's transcriptions when I cite from his work.

with association conventions, with prelinking and with lexical and grammatical melodies. Abiọdun's approach has implications for the OCP, which I will also discuss here.

Underspecification and default tones

In underspecification, the assumption is that underlying phonological representations are minimally specified and exclude predictable feature values. Instead of specifying predictable features, feature specifications are provided either by phonological rules or by universal principles of markedness (Abiọdun, 1999:12–3).

Abiọdun analyses nominal prefixes and verbs as underspecified for tone. Nominal prefixes always receive their surface tones through default tone insertion. Verbs on the other hand receive tones from verbal melodies by way of the association conventions and by default tone insertion for any remaining unassociated TBUs (Abiọdun, 1999:116).

The phonological rule for default tone insertion as stated by Abiọdun (1999:117) is reproduced in (39).

(39) $\mathrm{V} \rightarrow \begin{array}{c} \mathrm{V} \\ | \\ \mathrm{L} \end{array}$

Default tone insertion takes place at the end of the phonology so that L are specified at the phonetic level (Abiọdun, 1999:117). I will return to Abiọdun's argumentation for underspecification and default tone insertion in section 3.1.5 below.

Well-formedness conditions and association conventions

In addition to default tone insertion, Abiọdun (1999:116) finds that tonal specification and tone association in Ukaan is subject to a set of well-formedness conditions. These are

- Link tonal autosegment to tone-bearing units in a one-to-one relation from left to right.
- Association lines do not cross.

Association by convention is used in some nouns, with tense melodies associating with verb roots and with tense markers associating with subject pronouns and concord markers.[2]

[2] Abiọdun (1999:130) analyses *dʒe/dʒɛ*, *o/ɔ*, *ba* etc. with their various tones as subject pronouns and concord prefixes. I analyse them as verbal prefixes which encode subject agreement as

Association of tones to TBUs proceeds left to right but does not start at the left edge of the word. Instead, it starts at the left edge of the morpheme to which the tones belong, for example a noun root. This way, the noun class prefix remains toneless and can later receive a L tone by default tone insertion, which accounts for the fact that nominal prefixes surface with L. Linking tones to TBUs by convention as presented in Abiọdun (1999:119–21) is shown in (40) for *ùmɔ́* 'water' and *ɔ̀kɔ́rɔ̃̀* 'nose'.

```
(40)  a. [u [mɔ]]    →   [u [mɔ]]
                              |
           H                  H
      b. [ɔ  [kɔ rɔ̃]]   →   [ɔ  [kɔ rɔ̃]]
                                   |
            H                      H
```

The remaining TBUs receive default L tones after association of the underlying tones by convention, producing the observed surface forms.

Prelinking

Default tone insertion and association by convention cannot explain all tonal surface patterns. Therefore Abiọdun proposes prelinking as a third strategy for tone linking.

The problem that would result from using only default tones and association by convention is that if tones were to link left-to-right within the root morpheme, then all nouns that include a H tone would inevitably have to be linked to H on the first TBU of the root because H is the only tone that is specified in Abiọdun's analysis. Nouns with L on the first TBU followed by H on the next TBU cannot be derived this way. Nouns with LH melodies on the root are however attested in the language. Abiọdun's solution to this problem is to prelink H to the second TBU of the root for these nouns.

Abiọdun (1999:121) shows how association by convention results in the wrong surface tones for the word *ɔ̀kɛ̃̀gɛ̃́* 'a variety of yam'.

```
(41)  [ɔ  [kɛ̃ gɛ̃]]   →   [ɔ  [kɛ̃ gɛ̃]]   →   * [ɔ  [kɛ̃ gɛ̃]]
                              |                 |    |   |
          H                   H                 L    H   L
```

Prelinking followed by default tone insertion produces the correct forms.

```
(42)  [ɔ  [kɛ̃ gɛ̃]]   →   [ɔ  [kɛ̃ gɛ̃]]
               |           |    |   |
               H           L    L   H
```

well as tense-aspect-mood information. While I am introducing Abiọdun's analysis I will follow his terminology. In the discussion of my own analysis later on I will use my own terminology.

In addition to being used for associating tones in nouns, prelinking is also employed for grammatical morphemes to link H in the future marker (Abiọdun, 1999:134), the desiderative marker (Abiọdun, 1999:138) and the noun class prefix of the verbal noun (Abiọdun, 1999:142).

According to Abiọdun (1999:116), prelinking is a mechanism for associating tones to TBUs that is used only for exceptional cases. In practice however, prelinking is used in so many cases that the notion of 'exception' looks suspicious. What is more, the 'exceptions' are all very similar. Prelinking is used for any H that is either not immediately at the left edge of a morpheme or does not immediately follow another H. In other words, every time a morpheme begins with L and every time a L intervenes between two H prelinking must be used.

In essence, Abiọdun's analysis does not provide a unified explanation for the association of H tones. Instead, it requires two different ways of accounting for their association, depending on their position in the morpheme. Initial H are linked by convention, medial H tone by prelinking.

No Spreading

In Abiọdun's analysis, tone spreading does not exist in Ikaan (Abiọdun, 1999:116). In fact, the prohibition of tone spreading is crucial to his analysis of tonal association based on only one specified tone, underspecified TBUs and default tone insertion.

Abiọdun (1999:123–4) discusses H spreading as an alternative analysis to melodies for the verbal nouns, which surface with all H tones in his data (see (37) above). Even though tone spreading would simplify his analysis, he rejects introducing tone spreading because according to him the verbal nouns are the only construction in which spreading would be required. Therefore he prefers to use a H-toned prefix and a HH derivational melody instead (Abiọdun, 1999:142),

However, ruling out tone spreading comes at a price. In order to explain why bisyllabic roots (both nominal and verbal) surface both with HL and HH melodies, Abiọdun is forced to propose two contrasting underlying melodies H and HH.

Tonal melodies and the OCP

Abiọdun (1999:127, 142) explicitly works with grammatical melodies for inflection (tense categories) and derivation (verbal noun) of verbs. For nouns, he does not explicitly talk about melodies, although by distinguishing between underlying H and HH he does work with melodies here too.[3]

Since Abiọdun prohibits tone spreading in Ikaan, he cannot explain sequences of H surface tones as derived from one underlying H tone. He therefore needs to account for them in a different way. An example here is the difference between the nouns *ɔ̀kɔ̃́rɔ̃̀* 'nose' and *ɛ̀rágṹ* 'sheep'. *ɔ̀kɔ̃́rɔ̃̀* 'nose' is derived unproblematically by convention and the insertion of default L as shown in (40). To derive *ɛ̀rágṹ* 'sheep' however, Abiọdun has to postulate a HH melody which contrasts with a H melody. The HH melody violates the OCP, so that the HH sequence must be merged into a multiply associated H tone after linking it to the TBUs.

(43)	[ɛ [ɾa gũ]]	→	[ɛ [ɾa gũ]]	→	[ɛ [ɾa gũ]]	→	[ɛ [ɾa gũ]]
	H H		H H		H		L H

In grammatical melodies, Abiọdun (1999:128) goes a step further. He contrasts H not just with H–H melodies but further with H–[ ] melodies, where [ ] presumably stands for an unspecified TBU. The tonal melodies and the tenses and verbs they apply to are given in (44).

(44)	Tense	Monosyllabic	Disyllabic
	Continuous & Future	H	H–H
	Past & Desiderative	[ ]	H–[ ]

However, this absence of a tone as indicated by [ ] does not seem to differ from other unspecified TBUs, so it is not clear why the distinction between H and H–[ ] is necessary. In any case, even it is not necessary, the distinction between H and H–H remains.

Having contrasting H and HH melodies is problematic because it may result in a violation of the OCP, depending on how the OCP is interpreted.

Abiọdun's interpretation of the OCP is based on McCarthy (1979) (Abiọdun, 1999:12). In McCarthy's interpretation, the OCP is a linguistic universal which rules out adjacent identical autosegments in underlying representations. This reading makes the distinction between H and HH melodies theoretically impossible. However, as shown above, Abiọdun's tonal melodies are based on OCP violations in the underlying representation. Abiọdun needs contrasting H and HH melodies because he has no other option for deriving them, having opted for underspecification and having ruled out spreading.

Abiọdun himself does not comment on this OCP violation. Instead, he introduces adjacent H in the melodies and adjacent L as default tones and consequently merges them into a single, multiply attached tone so that in the end the OCP is not violated any more.

[3] I will define and discuss the concept of tonal melodies in section 3.4.

A solution to this problem might be in re-defining the level of linguistic analysis where the OCP applies. Whereas a standard assumption made by a lot of tonologists working in autosegmental phonology is that the OCP is respected underlyingly within morphemes, not all interpretations of the OCP apply the OCP to underlying representations in the lexicon. There are approaches that employ the OCP only in the phonology or in the phonetic forms. Therefore having contrasting H and HH melodies becomes less of a problem if the OCP is understood as a language-specific constraint that may affect different languages in different ways and at different levels of linguistic analysis, as suggested by Goldsmith (1979) and Odden (1986a). Goldsmith (1979:132–5) himself discusses data from Etung, which contrasts LH with LLH melodies and HL with HHL melodies and accounts for them by letting the OCP apply late. Abiọdun's analysis can therefore be salvaged simply by taking a different view of the OCP.

Abiọdun's analysis of tonal association relies crucially on underspecification of TBUs and on a prohibition on tone spreading, This approach to tone linking radically differs from my own approach. In my analysis, both H and L are specified in lexical and grammatical tonal melodies but are not prelinked to TBUs. Once linking begins, H and L are linked at the same time, it is not the case that one tone is inserted late and the other tone is linked early. Copying (instead of spreading) is obligatory in the language if TBUs are left unassociated. There is a prohibition on underspecification, default tone insertion is not required. Prelinking is only employed to account for a very restricted set of words. I will outline my analysis of tonal association in detail in section 3.4.2.

3.1.4 Downstep

Downstep is the only tonal issue that is addressed explicitly or implicitly in their transcriptions by researchers other than Abiọdun (1999). Ohiri-Aniche (1999) does not work on the phonology but gives a word list with tones marked. She transcribes downstep between adjacent H tones in the word *ìʃíʃí↓réí* 'star' but does not comment on her transcription or on downstep. Oyetade (1996), who does not explicitly discuss the toneme inventory either, transcribes the numerals with three (phonetic) tone levels but does not say whether downstep is involved. He transcribes the numerals as *ūgbóāʃòǹbùgbɔ̄rɔ̄* 'fifteen' and *ūgbóānāābùgbɔ̄rɔ̄* 'sixteen'.[4] Elugbe (2001:3) explains his transcription conventions and says that he does mark non-automatic downstep but that 'automatic downstep is of course not marked' (Elugbe, 2001:3). From this I assume that he did find automatic

[4]Borchardt and Salffner (forthcoming) analyse these numerals as verb phrases.

downstep in Ikaan but decided not to mark it. This contradicts my analysis since I do not find automatic downstep in Ikaan. For my hypothesis on how these different analyses came about see section 3.3.3.

Abiọdun does not discuss downstep in lexical items or in morphological processes such as compounding. He does however observe downstep in grammatical constructions in inflection for tense. He proposes that the motivation for the occurrence of downstep in these constructions is to distinguish between tenses that would otherwise have homophonous melodies, i.e. Continuous/Future vs. Past/Desiderative (Abiọdun, 1999139).

Abiọdun suggests that downstep is triggered by a 'latent' or unassociated L, although he seems suspicious of his own analysis. He comments that the floating L is only there to explain the downstep but never seems to occur elsewhere, which makes this solution is ad-hoc (Abiọdun, 1999:141).

Abiọdun discusses the tonal association in both Continuous and Desiderative tense, the only two constructions where a downstep occurs.

His example for Continuous is *bá ꜜwág* 'We are coming.', with *wag* 'come' as the verb and *ba* 'we' as the subject pronoun (Abiọdun, 1999:140). Abiọdun argues that Continuous tense is made up of a H tense marker, a latent L tone before the verbal melody, and the H verbal melody itself. The underlying sequence of tones is therefore HLH.

(45) ba wag

H L H

The final H of the underlying sequence is a verbal melody and has to link within its morpheme, i.e. the verb root (cf. tones on nominal roots). It therefore links within its morpheme and the remaining tones link one-by-one, left-to-right.

(46) ba wag

H L H

The L remains afloat because it has not found a host. As a floating L it triggers downstep of the following H and the phrase surfaces as *bá ꜜwág*.

(47) ba wag

H L H

While this works well for Continuous, the tonal association becomes less clear for Desiderative, e.g. *dʒáà ɲēnì ùɲéní* 'I want to urinate.', where the M represents a downstepped H (Abiọdun, 1999:137).

The morphological markers for Desiderative are *áa*, with the first syllable prelinked to H, an unassociated L tone and a H melody for the verb. The derivation as proposed by Abiọdun (1999:138–9) proceeds as follows (*ùɲéní* ‘urine’ is left out for simplicity).

```
(48)  dʒɛ       a    a       [ɲe  ni]
                |
                H         L   H
```

The vowel in *dʒɛ* ‘I’ deletes, and the tones are associated by convention within their domain. The L is not affected, there is no explanation for why it does not link.

```
(49)  dʒa  a      [ɲe  ni]
      |            |
      H       L    H
```

Default tone insertion supplies the remaining TBUs with L tones.

```
(50)  dʒa  a      [ɲe  ni]
      |    :       |    :
      H    L  L    H    L
```

The correct surface form is derived but two questions remain open. Firstly, why did the L tone supplied by the grammar not associate? And secondly, if the OCP is active in the language and merges adjacent identical tones as Abiọdun illustrates in the other examples he gives, why do the two adjacent L tones remain immune to the OCP? If the OCP applies, they should become merged, thereby deleting the trigger for the downstep.

A further problem with the downstep, which may however just be a notational problem, is the register shift and ceiling effect. Unlike a true M tone, a downstepped H sets a new pitch ceiling for all following H. H following a downstepped H cannot be pronounced at a higher pitch than the downstepped H and must be pronounced at the same lower pitch as the downstepped H. Abiọdun’s (1999:46–48, 74) transcriptions however do not show this register shift. Instead, the phonetic transcriptions of tones that Abiọdun provides seem to indicate that H tones, after what Abiọdun transcribes phonetically as M but analyses phonologically as $^{\downarrow}$H, are higher than the M/$^{\downarrow}$H tones.

(51) Present Continuous
bá fīdī èg^{w}ú ‘We are entering a house.’

Desiderative
báà fīdì èg^{w}ú ‘We want to enter a house.’

Having [H] after [M] implies that a new ceiling has *not* been set. If it had been set, the following /H/ tone would be expected to be heard as [M] just like the first downstepped /H/ surfaces as a [M].

Abiọdun (1999:49) does point out that the sounds presented in the examples are given at the phonetic level, not at the phonemic level. Based on this it might be justified to assume that tones are also given phonetically rather than phonologically, which makes the transcription of [H] after [M] stand out. Unfortunately, without access to the audio data itself or to pitch tracks of the utterances, it is impossible to clarify this question.

Finally, there is an important difference between Abiọdun's and my data. Object nouns which follow verbs do not undergo downstep in Abiọdun's data set whereas in my data they do. This leads to substantially different analyses regarding underspecification and default tone insertion, which I will now turn to.

3.1.5 Underspecification and default tone insertion

Abiọdun presents data from the nominal prefixes, epenthetic vowels and vowel deletion in imperatives as evidence for underspecification and default tone insertion in Ikaan. In my analysis, I account for the L tone on nominal prefix by saying that L is a morpheme in itself. For epenthetic vowels and the imperative constructions my data differs from Abiọdun's.

Abiọdun's analysis of nominal prefixes as unspecified and receiving default L tones is based on his data and appropriately accounts for his data as presented in Abiọdun (1999:74–5, 124–6). Underspecification and default tone insertion occurs in verb + noun constructions as in (52), noun + noun constructions as in (53) and noun + modifier constructions as in (54).

(52)	/jé ìbá/	[jíbá]	'eat the cake'
	/fídí àwɔ́g/	[fídáwɔ́g]	'to enter the bush'
(53)	/ɔ̀ní ègʷú/	[ɔ̀négʷú]	'landlord'
	/ìmí ègʷú/	[ìmégʷú]	'room'
(54)	/ègʷú ɛ̀ɲáwá/	[ègʷɛ́ɲáwá]	'a new house'
	/òkpó òtḯn/	[òkpótḯn]	'a small calabash'

L is inserted as a late phonetic default tone for unspecified TBUs only if there is a TBU that has no tone. This explains the tonal patterns on the second word in each phrase. If there is no unassociated TBU, no L is inserted, as Abiọdun (1999:126) shows as given in (55).

(55)	je	ɪ	ba	→	j-	ɪ	ba	→	j-	ɪ	ba
	H		H		H		H		H		H

If L was present earlier in the underlying forms, the expected outcome would either be a contour tone because of multiple linking of tones to one TBU or a downstep if the underlyingly present L was set afloat by the H.

The data that I have collected shows different patterns. In this data, there are both contours and downstep, and my analysis of prefixes with underlying L, not default L, accounts for the patterns I have found. Corresponding data for (52), (53) and (54) are given below, a detailed description and analysis of this data is given in this chapter in section 3.6.2 and in Chapter 6.

(56) /fɛ́gɛ́ ȉkúkú/ [fɛ́gı̋↓kúkú] 'Break the chair!' (obj.143)
/ŋméjı̋ ɔ̀tá/ [ŋméjɔ̋↓tá] 'Extinguish the lamp!' (ikaan167)

(57) /ȉkúkú ɔ̀ní/ [ȉkúkɔ́↓ɔ́ní] 'the person's chair' (`ikaan073_nn.wav, 1524s`)
/ìmí ɔ̀ní/ [ìmʲɔ́↓ɔ́ní] 'the person's belly' (gen.074)

(58) /àjɔ́ àrɔ́ːrɔ́/ [àjâːrɔ́ːrɔ́] 'hot yams' (nadj.022)
/ɛ̀rɛ̀mɔ́ ɛ̀hɔ́hɔ́/ [ɛ̀rɛ̀mɛ̂ːhɔ́hɔ́] 'a dry barrel' (nadj.007)

Abiọdun's second argument for underspecification, no spreading and default L insertion is that in his data he consistently finds L tones on epenthetic vowels before the verbal negative marker */-g/* as reproduced in (59), in noun + noun constructions in (60) and noun + object pronoun constructions in (61) (Abiọdun, 1999:77, 79).

(59) téf téfȉg '(not) to whisper'
kɔ́n kɔ́nȉg '(not) to dig'
kùn kùnȉg '(not) to tie'

(60) a. ȉʃű́m nȉ ɛ̀wí → [ȉʃű́mȉnɛ̀wí]
head of goat
head of a goat

b. ùkɔ́g nȉ ɔ̀kàdʒ → [ùkɔ́gȉnɔ̀kàdʒ]
grinding.stone of guest
grinding stone of a guest

c. èrȉd nȉ ȉɲá → [èrȉdȉnȉɲá]
smoke of fire
smoke of a fire

(61) a. kùn bɔ́ → [kùnȉbɔ́]
tie 1P
to tie us

b. bɔ̀g mɔ́n → [bɔ̀gȉmɔ́n]
choose 2P
to choose you (pl.)

c. háɾ n → [háɾìn]
skin 3S
to skin it/him/her

In Abiọdun's data set, the epenthetic vowel is invariably a front high vowel /i/ or /ɪ/ and invariably L-toned. His analysis fully accounts for his data. Again, my data set differs from Abiọdun's data. Epenthetic vowels are invariably high but agree in front/back values with the preceding vowel. In most cases, epenthetic vowels in my data surface with the same tone as the preceding TBU. There are exceptions to this in my data, such as the invariable L tone in negation and a floating L tone after CVC verbs that does not surface as L but triggers downstep. I analyse these exceptions as lexically specified and will give further explanations on the epenthetic vowels that do not surface with the same tone as the preceding TBU in section 3.5.5 and section 7.1.

3.1.6 Problems and inconsistencies

I have already pointed to some problems and inconsistencies in Abiọdun's analysis and I will briefly summarise them here.

Firstly, a fairly wide range of processes is required to link a fairly small set of tones to TBUs. Furthermore, many cases have to be taken care of by prelinking, which is meant to deal only with the exceptional cases. It remains to be seen if such a range of processes is indeed required to explain how TBUs receive tone in Ikaan, and it remains to be seen if the dual linking status of H needs to be maintained where H at the left edge and after H are linked by conventions and all other H must be prelinked.

Secondly, the dual nature of L seems somewhat problematic to me. In Abiọdun's analysis L occurs either as default tone and or as a floating L to trigger downstep. There is never an underlying L that is phonologically active. Furthermore, unlike H tones, the floating L is not affected by the OCP and apparently cannot be linked by the association conventions either. This behaviour is rather strange and may indicate that either the downstep analysis or the status of L as default only needs to be revised.

Thirdly, subscribing to the OCP while maintaining contrasting H and HH melodies is inconsistent and again requires re-thinking.

Finally, if verbs are indeed inherently toneless as Abiọdun claims, an explanation for the various melodies in what Abiọdun calls the citation form needs to be found.

My own analysis attempts to address and solve the first three issue. Regarding the verbal melodies in citation form, I have not encountered as diverse a range of forms as Abiọdun presents. What I have come across are a range of tonal patterns for verbs in the imperative which I discuss and propose a solution for in section 5.2.1.

This concludes my review of Abiọdun's analysis, I will now move on to describe the patterns I have found and propose my own analysis.

3.2 Basics

Ikaan is a tone language with both lexical and grammatical tone. In (62) and (63), tone functions lexically and distinguishes words from each other. The minimal pairs I have found are almost all in nouns with monosyllabic roots, there are very few in other words.

(62)	ɛ̀wĩ̀r̥	'sunlight; fever'	vs.	ɛ̀wĩ́r̥	'clock'
	ìdʒòː	'mortar'	vs.	ìdʒó	'today'
	èwùr	'hair'	vs.	èwúr	'dew'
	ɛ̀kɔ̀	'fear'	vs.	ɛ̀kɔ́	'hot pap'
	àhwè	'money'	vs.	àhwɛ́	'shoes'
	òjèn	'relative'	vs.	òjén	'wife'
	ìːjɔ́	'yam'	vs.	ìjɔ̃̌ː	'finger nail, toe nail'

(63)	úbʲò	'What? What is it?'
	ùbʲṍ	'morning dew'
	ùbʲõ̂ː	'far; a long time ago'

In (64), tone functions morphologically and is used to distinguish between different tenses and aspects.

(64)	òʃénò	'he played (NFUT)'
	ó↓ː́ʃénó	'he is playing (CONT)'
	ôːʃènó	'he plays (HAB)'

In (65), tone functions syntactically and is used to distinguish words in isolation from words in a predicative construction.

(65)	ègù	'house'
	égù	'It's a house.'
	òhwó	'bone'
	óhwó	'It's a bone.'

The functional load of tone in Ikaan is not distributed evenly over the lexicon and the grammar. There are few lexical minimal pairs whereas tone plays a major role in the grammar in inflection, derivation and at the interface between phonology and grammar.

3.2.1 The TBU in Ikaan

A tone-bearing unit (TBU) is the element in the syllabic structure to which tones associate. This may for example be a syllable, a vowel or a mora (Yip, 2002:xxi; Gussenhoven, 2004:29). The notion of the TBU is used to explain the number of tonal contrasts that are possible on one syllable and to explain how tones distribute themselves over a word (Gussenhoven, 2004:29).

Gussenhoven (2004:29) illustrates the importance of determining the TBU with a hypothetical example from two related dialects. Both dialects have the same underlying tonal melody L H on a hypothetical word. However, in Dialect A the TBU, i.e. the entity that tones associate with, is the syllable whereas in Dialect B the TBU is the mora. Once tones are linked to their respective TBUs one-by-one the result is a different tonal association and different surface melodies for each dialect. Dialect A surfaces with a low-high melody, Dialect B with a rising-high melody.

(66)	taːta$_{LH}$	tàːtá	tǎːtá
	Dialects A, B	Dialect A	Dialect B

The underlying representations in (67) for Dialects A and B show these different associations and explain the different surface melodies.

(67)	Dialects A		Dialect B			
	taː	ta	taː		ta
	σ	σ	μ	μ	μ
	L	H	L	H	

Dialect A with the syllable as the TBU has two elements that tones can link to so that the first tone links to the first syllable and the second tone to the second syllable. Dialect B with the mora as TBU has three potential hosts for tone because there are three moras in the word. The first tone links to the first mora, the second tone to the second mora. That way, both tones are linked to the first syllable and the result is a rising tone. The third mora receives its tone through spreading, i.e. the H tone additionally associates itself with the third mora.

For Ikaan, previous researchers have not explicitly commented on the nature of the TBU, although Abiọdun (1999:117) links tones to the vowel symbol in the phonological rules he proposes. In my own analysis of Ikaan the TBU is the mora. Moras are generally understood as weight units of syllables where light syllables have one mora and heavy syllables have two moras. Heavy syllables are those that end in long vowels and diphthongs, and it is also possible that coda consonants count for weight, i.e. may or may not have a mora. Sonorant coda consonants in particular are often considered to be moraic (Yip, 2002:xx; Gussenhoven, 2004:29). Defining what exactly may count for weight is relevant for Ikaan because the patterns that the data seems to suggest for Ikaan is quite unusual, with only vowels and the segment */m/* playing a role as moras and */n, ŋ͡m/* and other sonorants not being moraic.

Short vowels in Ikaan are monomoraic and therefore carry one tone, long vowels are bimoraic and carry two tones. This is illustrated with the grammatical melody indicating Non-Future in Ikaan in (68) and (69). The Non-Future melody is HL and maps onto TBUs one-by-one left-to-right, as I will outline in 3.4.2.

(68) a. ɔ̀- fárì
3S.NFUT- wash.NFUT
she washed

b. ɔ̀- fâːrì̀
3S.NFUT- fry.NFUT
she fried

The first vowel in *fari* 'wash' is monomoraic and hosts one tone, H. The first vowel in *faːrĩ* 'fry' is bimoraic and hosts two tones, H and L. This indicates that the TBU is the mora. If Ikaan was a language with the syllable as the TBU, ɔ̀ *fâːrì̀* would be ungrammatical because the syllable */faː/* would host more tones than it has TBUs available.

Like oral vowels, nasal vowels may also be short or long. Short nasal vowels are monomoraic and bear one tone, long nasal vowels are bimoraic and bear two tones.

(69) a. ò- jɔ̃́mòjì
3S.NFUT- try.NFUT
he tried

b. ɔ̀- wɔ̃̂ː
3S.NFUT- deliver.NFUT
he delivered

Sonorant consonants that occur in the coda in Ikaan are */m, n, r/*. */n, r/* show non-moraic behaviour whereas */m/* has a different behaviour, indicating that it might indeed serve as a mora.

There are no words with tonal contours if */n, r/* are preceded by a short vowel, the only attested tones are level tones.

(70) a. L before /n, r/ ɔ̀hjàn 'word'
ì̀tùr 'hole'

b. H before /n, r/ ìhín 'chin'
ʊ̀tár 'bed bug'

Furthermore, as I have mentioned in 2.5.1, words ending in */n/* with only one vowel in the word undergo compensatory lengthening of the vowel to give enough weight for a minimal word (see (71)). */r/* in the coda only occurs with words that have a noun class prefix and a vowel in the root and are therefore bimoraic anyway and do not need to undergo compensatory lengthening.

(71) a. ꜜnɔ́ːn
DEM.DIST:6
that

b. ɔ̌ː- n
6- 3S.POSS
his, her

Words with */m/* as the final consonant in CVC syllables are the only words that allow contour tones, i.e. sequences of tones and therefore more than one tone, on short vowels. Note however that there are only falling contours there, never rising contours.

(72) èkpô̂m 'stone'
ɛ̀wàgîm 'crocodile'

Secondly, */m/* differs in its behaviour, both regarding the vowel lengthening and the tonal patterns that */m/*-final words show. Firstly, words with */m/* in the coda are the only ones that do not undergo compensatory lengthening to make a minimal word (see (73)).

(73) a. Compensatory lengthening
ìː- dʒ '4- 1S.POSS'
ǐː- n '4- 3S.POSS'
ꜜdɛ́ːn 'DEM.DIST:4'

b. No compensatory lengthening
dɛ̀m 'DEM.ANA:4'

Why */m/* should be moraic when */n/* is not moraic is not immediately clear and I am not aware of any other languages with this pattern. Further research on this issue is in preparation.

To summarise, my proposal is that the TBU in Ikaan is the mora and that

- short vowels count as one mora
- long vowels count as two moras

- /m/ as final consonant in CVC syllables counts as one mora

Having /m/ as a mora but not having /n/ as a mora is unusual but it does account for the data. In section 4.2 and 5.2.2 I will give further evidence for my analysis that the mora is the TBU and for how this analysis helps to explain the data.

3.3 Tones and allotones

3.3.1 Surface tones and underlying tones

At the surface level, Ikaan has both level and contour tones.

Level tones, also called register tones or punctual tones, are often seen as tones that are realised with an unvarying level pitch on their TBU, with no upward or downward movement (Trask, 1996). In practice however, tones are barely ever pronounced with unvarying pitch. Therefore defining level tones as tones which require the TBU to reach a certain pitch height (Gussenhoven, 2004:26) is more appropriate.

A contour tone, also called a dynamic or melodic tone or modulation, is a unitary, single tone which is realised as a changing pitch pattern on its TBU, e.g. rise, fall, fall-rise or rise-fall. This means that the TBU is pronounced with pitch movement (Trask, 1996).[5]

Tones which surface phonetically in lexical items in Ikaan are the level tones high (H), mid (M), low (L) and extra low (X), the falling contours HM, HL and HX and the rising contour LH. In utterances there are also H/M tones that continuously lower during the utterance.

In monosyllabic words in isolation Ikaan distinguishes between H, M and L[6] tones on numerals and verbs. However, M is very infrequent in verbs, it only occurs in one verb.

(74) Numerals

a. H

ʃíː 'one'

b. M

[5]While I am discussing whether phonetic contours in Ikaan are unitary tones or sequences of level tones, I use 'contour' to refer to unitary tones. In later chapters, 'contour' will refer to sequences of level tones.

[6]Or possibly X instead of L.

wāː 'two'
tāːs 'three'
nā̰ʲː 'four'

c. L

r̥òːn 'five'

(75) Verbs in Imperative

a. H

wʊ̰́ 'Drink!'
ʃḭ́ré 'Cut (into pieces)!'
kpár̥íná 'Carry!'

b. M

ŋmɛ̄ː 'Sit!'

c. L

kɔ̀r̥ 'Pluck!'
fàrḭ̀ 'Wash!'
kàkàrḭ̀ 'Wipe!'

The vast majority of nouns in isolation carry L and H tones. Some nouns also have M tones and a very small set of nouns bears only M tones.

(76) a. L only

ḭ̀tùr 'hole'
ùbùbù 'charcoal'

b. LH

ìwág 'year'
ɛ̀mʷḭ́mʷḭ́ 'small blood-sucking fly'

c. LLH

ɛ̀rɛ̀mɔ́ 'keg, barrel'
ḭ̀wàrú 'arm pit'

d. LHL

òkpódò 'navel'
ùmúsù 'cat'

e. LHM

ɛ̀ːrɛ́ːrɛ̄g 'a small type of cricket'
àgbárā 'strength'

f. M only

ūmū 'river'
ōjṵ̄ 'newborn baby'

Contour tones occur in words in isolation but they are less frequent that level tones. Hosts for contours are either bimoraic oral and nasal vowels or vowels that are followed by an underlying */m/*.

(77) a. HL

ɛ̀wàgîm	'crocodile'
ʊ̀gbɛ̂ːrɛ̀	'cane'

b. HM

àrá̄ːhwō	'night'
ʊ̀wá̄ːhɔ̄	'down, downstairs'

c. LH

ǔːgú	'vulture'
ɛ̀wǎː	'knife'

My proposal is that underlyingly there are only the two level tones /H/ and /L/ in Ikaan. [H] and [M] are allotones in complimentary distribution. [M] is the phonetic interpretation of a H after a floating L tone, i.e. a downstepped /H/. [H] is the allotone that is used in all other contexts. [L] and [X] are also allotones in complimentary distribution. [L] occurs before H in non-final position, [X] occurs in phrase-final position.

I will now argue for the analysis of M as ꜜH, and then for L and X as allophones of each other.

3.3.2 H and M or H and ꜜH?

Ikaan has phonetic mid tones, both in isolation and in grammatical constructions. Whereas in grammatical constructions mid tones are ubiquitous, they are very rare in words in isolation. In words in isolation mid tones only occur in some enumerative numerals, in one verb, in a very small set of monomorphemic nouns that also otherwise show a very unusual tonal pattern, in the distal demonstrative and in the emphatic marker *[ōː]*. (78) lists all monomorphemic words with only mid tones in my Ikaan corpus. Note that the six forms of the demonstrative are allomorphs of the same distal demonstrative.

(78) a. Enumeratives

wāː	'two'
tāːs	'three'
nā̃ʲ	'four'

b. Verb

ŋmɛ̄ː	'sit'

c. Nouns

ōjũ̄ ‘baby, newborn’
ɔ̄kʊ̄ ‘bath’
ɪ̄r̥ɪ̄ ‘body’
īdʒī ‘eye’
ɛ̄mʊ̃̄ ‘hunger’
ījȭm ‘issue, matter’
ūmū ‘river’

d. Distal demonstrative

jȭːn ‘DEM.DIST:1’
dāːn ‘DEM.DIST:2’
dɔ̄ːn ‘DEM.DIST:3’
dɛ̄ːn ‘DEM.DIST:4’
nɛ̄ːn ‘DEM.DIST:5’
nɔ̄ːn ‘DEM.DIST:6’

e. Other

ōː ‘EMPH’

The enumeratives, the verb and the nouns occur in isolation and after pause, whereas the demonstrative and the emphatic marker do not occur on their own.

To my knowledge, none of these words are borrowings from Yoruba, which has three tones and MM words. Akpes, a potential close relative of Ikaan and a geographically neighbouring language, also has three tones but only the word *īmū* ‘hunger’ from the Ikaram dialect could be a possible borrowing from Akpes into Ikaan.[7] For other neighbouring languages it is not possible to tell if any of these M words are borrowings because these languages are mostly undescribed.

I will account for the [M] in the distal demonstrative and in the emphatic marker in section 4.3. I will propose an explanation for the [M] in the nouns and enumerative numerals in 6.5.2. I do not yet have an explanation for the [M] in *ŋmɛ̄ː* ‘sit’.

Depending on their phonological behaviour, phonetic mid tones may be analysed as underlying and phonologically active mid tones, default mid tones or ꜜH tones. I analyse surface mid tones in Ikaan as ꜜH tones rather than true or default mid tones and I will justify my analysis in this section by showing how Ikaan meets the criteria for downstep. This inevitably means pre-empting an analysis of downstep that I will pick up again later in this chapter. What I will do here is to give my arguments for why I think phonetic mid tones are phonologically ꜜH.

[7] Thanks to Taiwo Agọyi for supplying translations for these words into Abesabesi, the Ikaram dialect of Akpes.

In section 3.6 I will return to downstep, provide more theoretical background to downstep and add phonological information that is not relevant for the M vs. $^{\downarrow}$H discussion.

Indicators for $^{\downarrow}$H rather than M are summarised by Yip (2002:148), Hyman (1979:11), Hyman (1986:128) and Gussenhoven (2004:104–5).

1. *Distribution*: $^{\downarrow}$H contrasts with H only after a H or another $^{\downarrow}$H, whereas M contrasts with H after L, M and H.

2. *Ceiling effect*: A H following a downstepped H does not return to the pitch of earlier H but is realised at the pitch of the downstepped H. H following M does return to the original pitch.

3. *Cumulative effect*: A downstep language should theoretically permit an unlimited number of non-low tone levels, i.e. H – $^{\downarrow}$H – $^{\downarrow}$H – $^{\downarrow}$H, whereas M do not trigger this effect.

4. *No initial downstep*: $^{\downarrow}$H is not generally expected to occur utterance-initially, whereas M is expected to do so.

For the first three criteria, the behaviour of surface mid tones in Ikaan indicates that they are underlyingly $^{\downarrow}$H. Regarding the fourth criterion, Ikaan does have utterance-initial downstep and downstep in words in isolation without a preceding H. It therefore has words and utterances which start with downstep, which is not expected. However, I can provide an explanation for this which retains the downstep analysis. I will discuss each criterion in turn.

Distribution

A downstepped H contrasts with H only after a H or another $^{\downarrow}$H. M on the other hand contrasts with H after L, M and H. Therefore, if Ikaan had /H/ and /M/ tonemically, all logically possible sequences of tones should be attested. The possible and actually attested sequences in Ikaan are given in (79).[8]

[8] I am not including phonetic X here so as not to complicate the discussion. I will show in section 3.3.3 that X are allotones of L.

(79)

Potential distribution	Distribution in Ikaan
H H	yes
H M	yes
H L	yes
M H	*no*
M M	yes
M L	yes
L H	yes
L M	*no*
L L	yes

The sequences that do not occur are M H and L M. This can be summarised to say that

- [H] occurs after overt L, [M] does not occur after overt L
- after [M] only [M] and L occur, [H] never occurs after [M]
- [M] does not occur after L, only [H] occurs after L

This shows that [H] does not contrast with [M] after [M] or after [L]. This complementary distribution is typical of downstep and would not be expected if there was an underlying M tone.

Ceiling effect

H following ꜜH does not return to the pitch of earlier H but is realised at the pitch of ꜜH, whereas H after M does return to the original pitch. The stylised pitches in (80) show how H after surface M are pronounced mid.

(80) a. dʒɛ̀- r̥á → [_ ‾]
1S.NFUT- finish.NFUT
I finished.

b. dʒè- jé r̥á → [_ ‾ ‾]
1S.NFUT- eat.NFUT PERF
I finished eating.

c. dʒè- jé ʊ̀jág → [dʒèjʊ́jāg] [_ ‾ ‾]
1S.NFUT- eat.NFUT food
I ate food.

d. dʒè- jé ʊ̀jág r̥á → [dʒèjʊ́jā r̥ā] [_ ‾ ‾ ‾]
1S.NFUT- eat.NFUT food PERF
I finished eating food.

In (80a) *r̥á* 'finish' is pronounced H after L, in (80b) it is pronounced H after H. In (80c), the underlying *jé ʊ̀jág* 'eat food' surfaces as *[j- ʊ́jāg]*, with a mid tone. However, in (80d), the H-toned *r̥á* 'finish; PERF' is pronounced with the same pitch as the surface M in the second syllable in *ʊ́jāg*. This is evidence that what looks like [M] in the object noun is in fact /ꜜH/ which has established a new ceiling for the following H tone.

Cumulative effect—an unlimited number of levels

A downstep language permits an unlimited number of non-low tone levels, i.e. H – ꜜH – ꜜH – ꜜH which would be expected to surface as [¯¯ — — —]. Sequences of M tones however do not show this terracing effect.

In Ikaan, sequences of 'surface M tones' do show this terracing effect.[9]

(81) úꜜdɔ́ nɔ̋- ꜜdʒír- ʊ́ꜜtɛ́ →
this.FOC 3S.CONT.REL- repair.CONT cloth
[¯¯ — — — — —]

This is where she is tucking her skirt back in.

(`ikaan034_yam.wav, 404s`)

An annotated pitch track of the sentence in (81) is given in Figure 3.1.

As can be seen in the annotation in Figure 3.1, each ꜜH sets a new, lowered ceiling that the following H cannot top. As a result, the H tones go further and further down in pitch. Successive lowering which is theoretically unlimited is evidence of the fact that what at the surface at first looks like [M] is in fact ꜜH.

No initial ꜜH

ꜜH is not expected to occur utterance-initially, whereas a true underlying mid tone would be expected to do so. In Ikaan, what sounds like M or ꜜH does occur initially in words in isolation and in whole sentences as illustrated in (82).

(82) a. ꜜídʒí 'eye' → [— —]

b. ꜜdʒɛ́- hár̥̋ ékpód óː → [— — — — —]
1S.NFUT- cut.apart.NFUT hare EMPH
I cut apart the hare o. (ooo.045)

[9] I will not explain the underlying forms or the reasons for the downsteps in this utterance in detail here. Briefly, *úꜜdɔ́* 'It is this that ...' is from underlying *ùdɔ́* or *ùdɔ́n* marked with a H tone for Focus, which is described in section 6.4. The downstep in *ꜜdʒírí* is part of the tense-aspect-mood inflection for Continuous Aspect. The downstep in *ʊ́ꜜtɛ́* is due to phonological processes between the verb and its object, which is described in section 6.1.

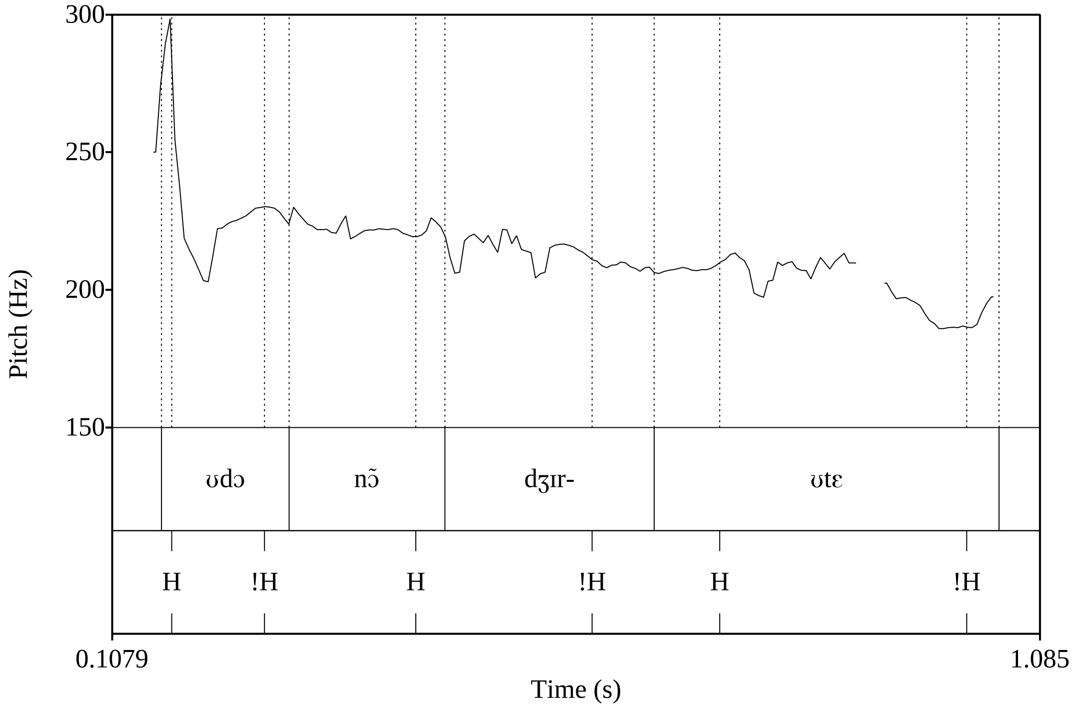


Figure 3.1: Cumulative effect of surface M/downstep H in Ikaan

My proposal is that the nouns, numerals and demonstratives that surface as M are underlyingly linked to H tones and preceded by a floating L. The underlying representation of *ī̄dʒī* 'eye' would therefore be as given in (83).[10]

(83)
```
      i   dʒi
      |    |
 (L)  H    H
```

The sentence in (82b) is derived from an underlying phonological representation that is *dʒɛ̀ hã̀r̥ èkpòd ꜜóː*. Because of tonal constraints and processes that I will describe in detail in section 6.5, this turns into a phrase where all TBUs are linked to H and the L tone remains floating before the sentence (see (84)). As a result, the whole utterance surfaces as ꜜH.

(84)
```
     dʒɛ hã̤r̥     e  kpod     oː
      |   |      |   |      / \
 (L)  H   H      H   H     H   H
```

Therefore even if there seem to be initial M and M in isolation in Ikaan, they are in fact ꜜH tones in my analysis.

[10] In the following, I will give full autosegmental representations for Ikaan with the mora as the tone-bearing unit wherever indicating the mora is necessary. Simplified autosegmental representations with only segments and tones are given when showing tone-bearing units is not immediately relevant for the discussion at hand.

Dschang (Bantoid, Cameroon), a two-tone language with H and L underlyingly present, also has surface M in isolation which is analysed as ꜜH. [M]/ꜜH contrasts with surface H which is H that is not downstepped (Pulleyblank, 1986:39).

(85) ꜜH ꜜmɔ́ [—] 'child'

H sə́ŋ [‾] 'bird'

Pulleyblank (1986:42) gives the underlying representation of *ꜜmɔ́* as reproduced in (86).

(86) ꜜmɔ́
|
L H

I will show later that the causes for initial ꜜH in Ikaan and Dschang are similar. In one set of data, the tonal configuration leading to initial ꜜH is the result of prelinking, which I will discuss for Ikaan demonstratives and the emphatic marker in section 4.3. In a second set of data, the tonal configuration leading to initial ꜜH in Ikaan is the result of phonological constraints and processes, as I will describe in section 6.5.

The phonological behaviour of the surface M tones in Ikaan supports an analysis of [M] as ꜜH and rules out an analysis as /M/. The complementary distribution of [M] and [H] is typical of ꜜH. [M] occurs only after [H] and [M] and never after L, [H] only after [H] and [L] and never after [M]. [M] set a new ceiling for all following H tones and there are sequences of successively lower [M] tones. Finally, even though there are initial surface [M] tones, I will show that these can be analysed as underlying H tones which are preceded by floating L and are therefore also ꜜH.

3.3.3 L and X

The alternation of low and extra low tones in Ikaan has not been noted or described by previous researchers. However, since most previous researchers have worked with words in isolation, and since most words in isolation are fairly short, it is a reasonable analysis to explain a L H X sequence as automatic downstep rather than final lowering. This would explain Elugbe's (2001:3) finding that there is automatic downstep in Ikaan, which I have not found. Note however that a L H X sequence is compatible with both an automatic downstep analysis and a final lowering analysis. It is only when longer sequences like L H L H X are included that the difference emerges. Elugbe (2001) works with a word list of mostly short words where those sequences are unlikely to occur so he would not have had the data to notice the difference. Since I have worked with sentences and texts as well, I have come across both L and X after H and I will analyse L and X here.

Distribution

Ikaan has both L and X tones. L and X are in complementary distribution. L occurs in non-final position in phrases, before H tones. After H tones, however, there are no phrase-final Ls. Instead, X occurs in phrase-final position when no other tone follows within the phrase. The same underlying L tone can therefore surface both as L and X.

In (87a) the L-toned agreement prefix surfaces as X in final position but in (87b) it surfaces as L in non-final position when it is followed by H.

(87) a. è- jímò ɛ̀ː- dʒ → [èjímɛ̏ːdʒ] [— ‾ _]
E5- egg.plant 5- 1S.POSS
my egg plant (pos.020)

b. è- jímò ɛ̀- bɔ́ → [èjímɛ̀ːbɔ́] [— ‾ — ‾]
E5- egg.plant 5- 1P.POSS
our egg plant (pos.023)

Annotated pitch tracks for the utterances in (87a) and (87b) are given in Figure 3.2 and Figure 3.3 respectively. The pitches of the tones are given in (88).

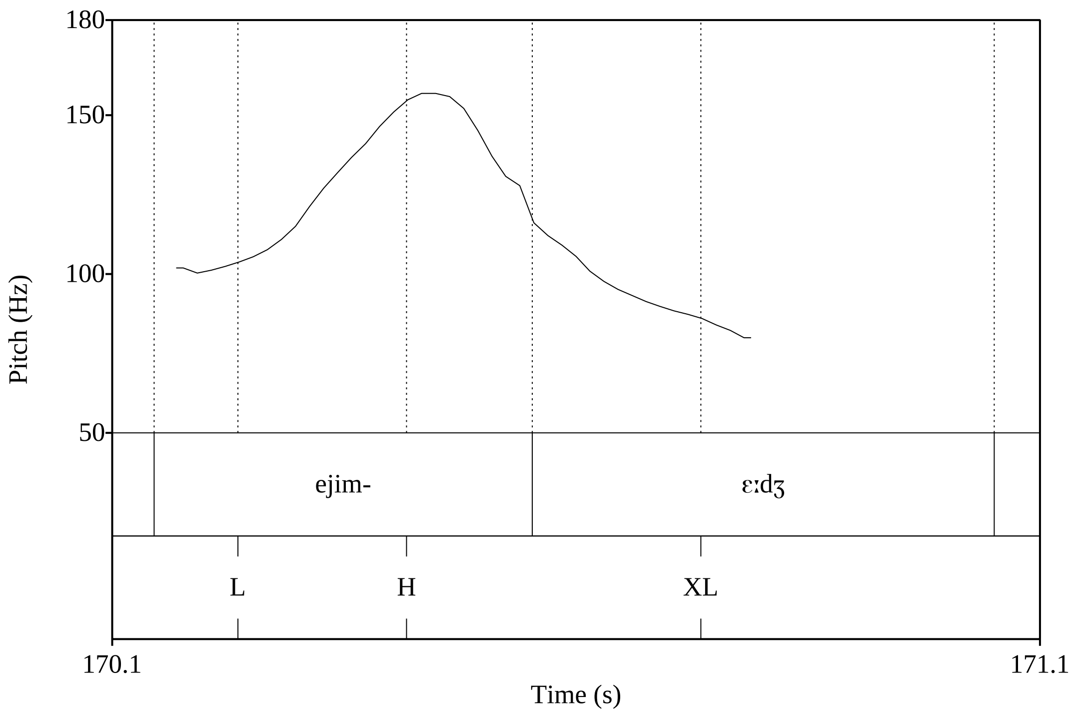


Figure 3.2: Pitch track of *èjímɛ̏ːdʒ* in (87a)

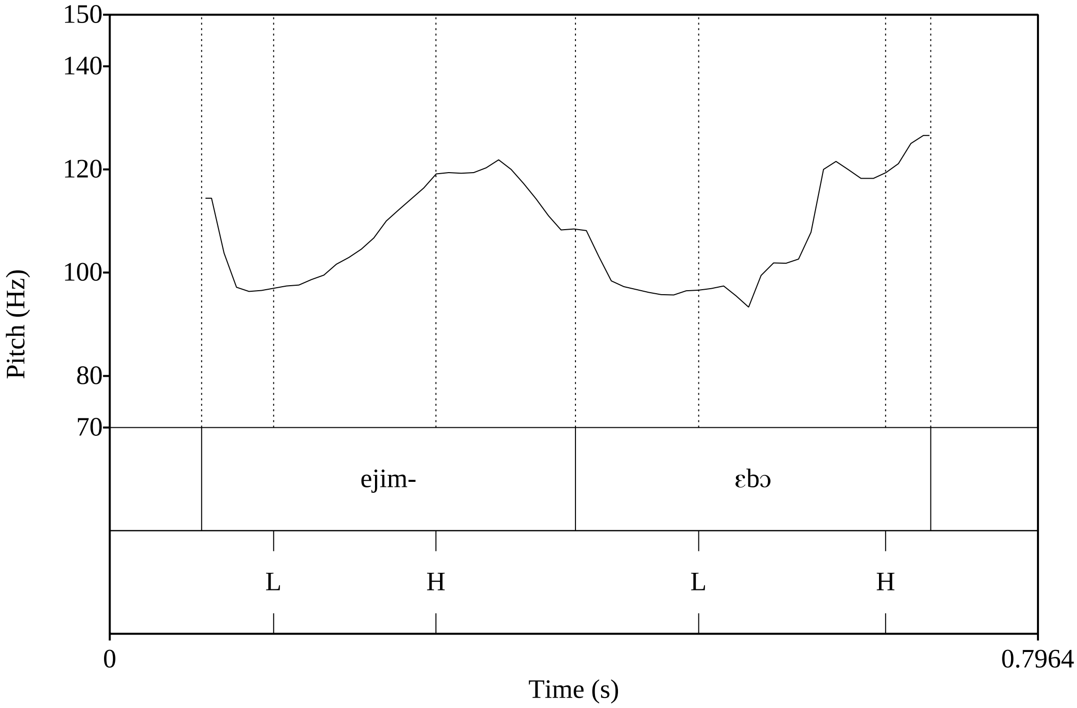


Figure 3.3: Pitch track of *èjímɛ̀ːbɔ́* in (87b)

(88) a.

è	jí	mɛ̏ːdʒ
L	H	X
104Hz	155Hz	86Hz

b.

è	jí	mɛ̀	bɔ́
L	H	L	H
97Hz	119Hz	97Hz	119Hz

The agreement prefix *ɛ̏ː-* in the possessive pronoun *ɛ̏ːdʒ* surfaces at 86Hz in *èjímɛ̏ːdʒ* in final position, almost 20Hz lower than the preceding L tone. In *èjímɛ̀ːbɔ́* however, where the L is followed by H and therefore not in final position, the agreement prefix *ɛ̀-* is not lowered and surfaces at the same pitch as the initial L tone.

Note also that the final H in (87b) is pronounced at the same pitch as the first H in the utterance. This shows that lowering in final position affects only L and not H. Treating different tones differently in the same context has also been described for Ngiti (Kutsch Lojenga, 1994). Like in Ikaan, L and non-L tones behave differently when they occur in final position. Pre-pausally, H and M are realised as level tones in Ngiti. L on the other hand is realised with a falling tone in final position (Kutsch Lojenga, 1994:94).

(89) ōnzí [— ¯¯] 'begging'
ōnzī [— —] 'luck'
ònzì [__ __] 'wealth'

Observing and describing this complementary distribution are the first two steps. The next step is analysing what triggers this distribution. There are two potential explanations[11]. On the one hand, raising L before H could be a case of vertical assimilation, in which case the phonetics causes the distribution of L and X. On the other hand, lowering L (but not H) at the end of a phrase could be a boundary effect, in which case the syntax is the trigger. Although the two approaches both produce the observed distribution, they put the causes for the alternation at different levels of linguistic analysis, have different implications and make different predictions. I will therefore describe and discuss each approach and argue for the syntactic analysis as the more insightful solution.

L raising as a phonetic vertical assimilation effect?

Raising L before a non-low tone is a type of vertical assimilation of tones. Vertical assimilation means that tones come closer together in pitch, for example the pitch difference between LH is made smaller and 'compressed' into MH (Hyman, 2007:3–4). It is common for languages to assimilate tones vertically in step-up intervals like L raising cases or cases where a LH sequence is compressed into a LM interval. It is uncommon and therefore considered unnatural for languages to compress step-down intervals, e.g. HL becoming HM or ML. Step-down sequences are more likely to undergo pitch polarisation, which in Hyman's use of the term means that it makes the pitch difference even bigger than before (Hyman, 2007:4).

Vertical assimilation is a phonetic tendency of tone which is phonologised in some languages, e.g. Fe?Fe?-Bamileke, Mbui-Bamileke (Hyman and Schuh, 1974:86). The degree to which the L tone is raised depends on the individual language (Hyman and Schuh, 1974:85).

L raising is a feasible analysis for the L vs. X alternation in Ikaan. As I have shown above, Ikaan has two tones, L and H, and either one of them has to be the one that is the last tone in the phrase. If L is not the last tone, it is necessarily

[11] A third hypothesis may be that X is in fact a downstepped L. However, with my current analysis there would be a number of problems with this approach. Firstly, if L were to be affected by downstep, I would have to explain why H is not downstepped in this context just like L is, especially when H is downstepped in other contexts. Secondly, it is not clear what the trigger for the downstep is and where it would come from. Finally, if the trigger for downstepping L was a floating L, then the OCP as I will outline it in section 3.5.2 should absorb the floating L into the existing L and therefore delete the trigger for the downstep. Therefore I will not follow this thought further.

followed by H (or ${}^{\downarrow}$H, which is just another H), simply because H is the only other tone that is available. If it is followed by H it is raised. If L is the phrase-final tone, it is not followed by H and therefore not raised, i.e. extra low. This implies that the underlying tone of the two allophones is the X tone and the 'derived' tone is the L tone. For all practical purposes I could also say that L is the underlying tone and it is raised to a mid tone before H.[12]

A generative rule which produces these surface forms could be as the one given in (90).

(90) *L raising*
L → M / __ H
or
X → L / __ H

Final lowering as a syntactic boundary effect

Alternatively to L raising, L or an uninterrupted sequence of L may be lowered to X at the end of a syntactic phrase. This makes the process an example of final lowering. Final lowering in such cases is the grammaticalisation of a phonetic downtrend where the end of an utterance (or in the case of Ikaan, a phrase) receives an extra degree of lowering (cf. Gussenhoven, 2004:110–112).

Final lowering is often attributed to an intonation-phrase-final or an utterance-final L boundary tone (Gussenhoven, 2004:112). A boundary tone is an intonational (i.e. not a lexical) tone that is located at the edge of a prosodic constituent (Gussenhoven, 2004:22). Boundary tones are used to describe intonation in non-tonal languages but have also been employed in the description of tone languages, where there may be interaction between boundary and lexical tones (Gussenhoven, 2004:129–130). Positing an actual tone to account for Ikaan however is problematic. First, it is not clear which tone to employ as a boundary tone. A L boundary tone would be absorbed into an adjacent L and could not affect final L. Also, a following floating L does not affect preceding H in Ikaan in other words such as the possessive pronouns (see section 3.5.5). Even if L was in a position to affect H, for example through metathesis where it changes positions so that L now precedes H, this would produce a downstepped H, which is the wrong result since H is not affected. Positing a special X boundary tone is

[12] This is not to say that the mid level of the raised L is the same as the mid level of the downstepped H. As Hyman and Schuh (1974:87) point out, lowering of H and raising of L may both apply in the same language and result in tones that gradually come closer together without actually ending up at the same pitch level. When using 'mid' here, I therefore mean a tone that is higher than L but not as high as H or ${}^{\downarrow}$H.

difficult to motivate since it would only be required for the final lowering and not elsewhere. Therefore I will not propose an actual tone to account for and model the lowering.

A possible alternative explanation is to return to phonetically motivated tonal processes and combine them with the syntactic context as the trigger. As I briefly mentioned above, it is considered common and natural for languages to increase the pitch difference between two tones in a step-down interval (Hyman, 2007:4). Therefore I suggest that this kind of pitch polarisation is responsible for the final lowering in Ikaan, and that it only applies if the syntactic context (a phrase boundary) is given. Thus an increase in pitch difference in step-down intervals would be a phonological signal or marker for a syntactic boundary in Ikaan.

Pitch polarisation neatly explains why H tones are not affected. If H is the final tone, then the tone preceding it was either another H or a L, and neither interval is a step-down interval. Pitch polarisation does not explain why there is no polarisation if the last tone is $^{\downarrow}$H, after all a H $^{\downarrow}$H sequence is a step-down movement and you might therefore expect the pitch difference to increase. However, in horizontal assimilation, effects such as tone spreading are the more likely the bigger the interval is (Hyman and Schuh, 1974:89). It is conceivable that the same is the case for vertical assimilation. If that holds to be true it is reasonable to suggest that a H $^{\downarrow}$H interval is simply not big enough to cause pitch polarisation.

Phrase-final lowering is formalised in (91).

(91) *Phrase-final tone polarisation/L lowering*
L $\rightarrow$ X / __ \$

Writing the rule like this implies that it is irrelevant if the final L is preceded by H or not. Sentences that are all L would surface as all X. The problem is that if a sentence is all L or X there is no other tone to compare it to, so it may well be that the tones are L or X, it is just not possible to tell. Therefore I do not see this as much of a problem and will leave this description as it stands.

Discussion

L and X are clearly allophones in complementary distribution, but how do I account for their surface forms?

If I take the phonetic approach, I assume that X is the underlying tone and that late in the derivation a phonetically grounded phonological process raises all X before H to L (or L to M, the difference is not crucial here). I can account for the surface forms but I do not make predictions or form hypotheses based on this that would allow further insights into the linguistic structure of Ikaan. As an analysis it works, but it does not offer any further insights.

If I take the syntactic approach, I assume that L is the underlying tone and that at the phonology-grammar interface, i.e. earlier in the derivation, a syntactically grounded process lowers L to X if it is at the right edge of a syntactic boundary. I can account for the surface forms, but I can do more than just that. Once I work with the assumption that X indicates a phrase boundary, I can start forming hypotheses about the syntactic structure of the language straight from the phonology.

An example for how the phonology and phonetic surface tones might reveal something about the syntactic structure of Ikaan is given in (92).

(92) a. ì̀dʒó dɛ̏ː dʒá- à ʃénó →
today DEM.PROX:4 1S.FUT- FUT play.FUT
[— ‾ _ ‾ — ‾ ‾]

Today, I will play. (tam2.019)

b. ì̀wá dɛ̀ ní̋- wág dʒá- à ʃénó →
year REL:4 4- come.? 1S.FUT- FUT play.FUT
[— ‾ — ‾ ‾ ‾ — ‾ ‾]

Next year, I will play. (tam2.020)

Annotated pitch tracks for (92a) and (92b) are given in Figure 3.4 and Figure 3.5 respectively.

Pitch readings for (92a) with the X tone and (92b) without the X tone are given in (93a) and (93b) respectively.

(93) a.

ì̀	dʒó	dɛ̏ː	dʒá	à	ʃé	nó
L	H	X	H	L	H	H
103Hz	151Hz	89Hz	129Hz	102Hz	120Hz	126Hz

b.

ì̀	wá	dɛ̀	ní̋	wág
L	H	L	H	H
119Hz	141Hz	121Hz	141Hz	149Hz

dʒá	à	ʃé	nó
H	L	H	H
139Hz	117Hz	138Hz	140Hz

If phonology tells us something about the syntax (and I assume this to be correct, both here and in other cases) then I can use the phonology to show how the lowered L and not-lowered L point to the fact that the demonstrative in (92a) is at the end of a phrase whereas the relative marker in (92b) is not.

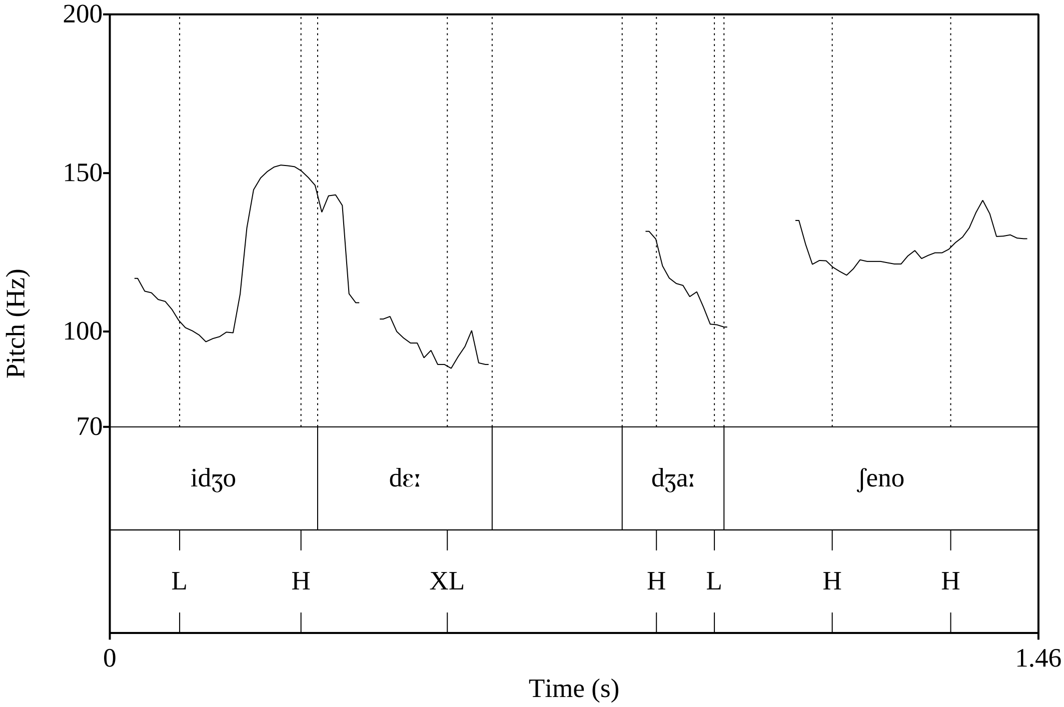


Figure 3.4: Pitch track of *ȉdʒó dɛ̏ː dʒá à ʃénó* in (92a)

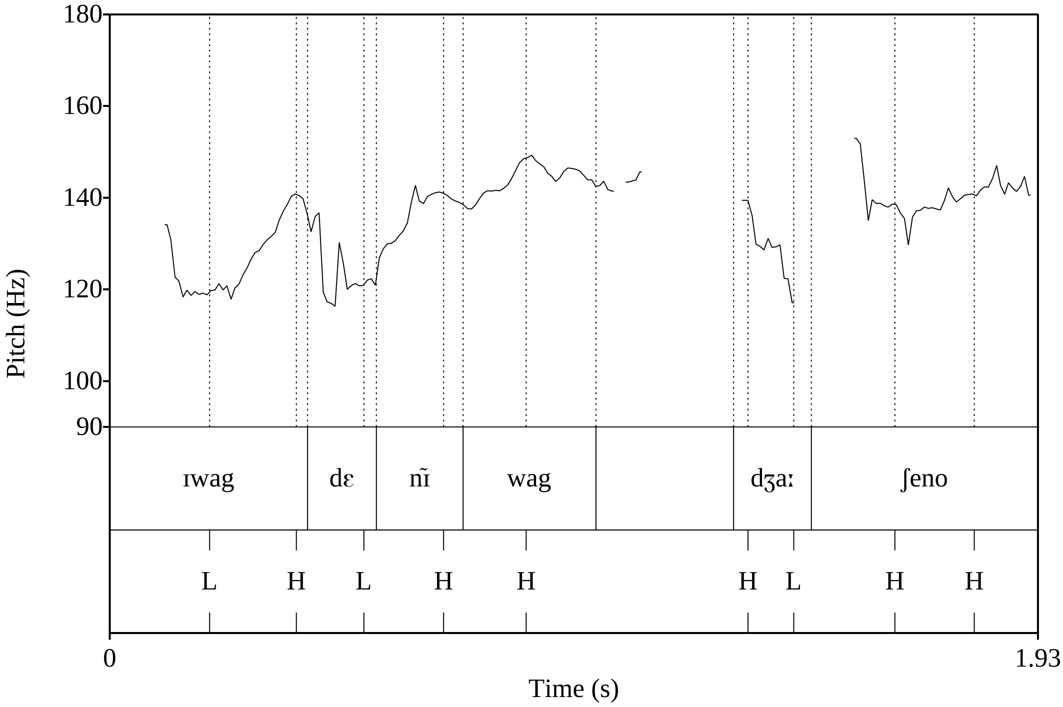


Figure 3.5: Pitch track of *ȉwá dɛ̀ nı̋wág dʒá à ʃénó* in (92b)

A syntactic approach is therefore preferable to a phonetic approach because it generates hypotheses that the phonetic approach is not able to produce. I analyse X as the lowered allotone of an underlying L which is lowered if L is at the right edge of a syntactic boundary. For a similar example and a more formal analysis of the interaction of tone and syntactic phrasing see Kula and Marten (2009).

For the remainder of this thesis, I will however mark all L tones, whether lowered or not, the same way with the non-lowered allotone.

3.3.4 Tonal contours

In section 3.3.1 I have presented Ikaan words that in their phonetic surface form have falling tonal contours (H$^{\downarrow}$H, HL) and/or rising tonal contours (LH). In section 3.2.1 I have discussed the nature of the TBU in Ikaan and shown that the mora is the TBU and stated that each mora can bear only one tone. In this section, I will show that the falling and rising surface contours are sequences of level tones underlyingly, i.e. tonal clusters rather than true contour tones. To show this I will describe where contours occur and demonstrate how contours behave phonologically.

Hosts for contour tones

If it is correct that the TBU in Ikaan is the mora and that each mora can maximally bear one tone, falling and rising tones should only occur on bimoraic syllables if these contours are indeed sequences of level tones. Bimoraic, heavy syllables in Ikaan are syllables with a long vowel or CVC syllables with /*m*/ as the final consonant.

In Ikaan, contours do indeed only occur on these types of syllables, not on light, monomoraic syllables. Examples for falling and rising contours are given in (94).[13]

(94) a. Long oral vowel

[13] Note that syllables that underlyingly end in /*m*/ do not necessarily attract a falling contour. They may also occur with just a H or just a L tone. However, there are no instances where an underlyingly /*m*/-final word ends in a rising contour.

(1)	Tone	Underlying form	Surface form	Gloss
	L	àtɔ̃̀m	àtɔ̃̀	‘lies’
	L	òkpódùm	òkpódù	‘belly button’
	H	ɪ̀kàhṹm	ɪ̀kàhṹ	‘kitchen’
	H	ɛ̀r̥ágʊ̃́m	ɛ̀r̥ágʊ̃́	‘sheep’

òŋmâːdʒègù	'veranda'
àʃâːʃà	'very well'
àrá↓ːíwhó	'night'
dʒé↓ːíʃénó	'I am playing.'
ɛ̌ːnà	'snail'
ɔ̌ːbà	'he knows'

b. Long nasal vowel

ʊ̀dʒɔ̃̂ː	'it spoilt'
ɔ̀kã̂ː	'he collected (fire)'
ɛ̀wĩ̂ːr̥	'skin'
àjɔ̃̌ːr	'body fat'

c. /m/-final word

ɛ̀wàgîm	'crocodile'
ʊ̀fʊ̀r̥âm	'snake'
ɛ̀dʊ̃̂m	'frog'
ɔ̀r̥ʊ̃̂m	'he sent (word)'

If contour tones were not sequences of level tones, they should be able to occur on monomoraic syllables as well. Also, rising-falling tones and falling-rising tones might occur on monomoraic and bimoraic syllables, which they do not. The fact that rising and falling tones only occur on bimoraic syllables is evidence for that the contours are in fact sequences of tones.

In section 4.2 I will give more information on how contours arise on long vowels in Ikaan and why I analyse them as sequences of level tones. In Chapter 6 I will give further evidence that each mora can only bear one tone and that tones have to delink if more than one tone links to a mora because of specific phonological constraints.

Tones on epenthetic vowels

When a falling or rising surface contour is followed by an underlyingly toneless TBU such as an epenthetic vowel, only the second part of the contour is realised on the epenthetic vowel, not the whole contour.

In (95a) and (95b), the H of the rising contour surfaces on the epenthetic vowel.

(95) a. à- jɔ̃̌ːr ú dàː
A2- fat epV DEM.PROX:2
this fat (lr.037)

b. ı̀- dʒɛ̌ːn í dɛ̀ː
I4- yesterday epV DEM.PROX:4

this yesterday (epv1.025)

The annotated pitch track for (95a) is given in Figure 3.6. It shows the epenthetic vowel surfacing with a H tone.

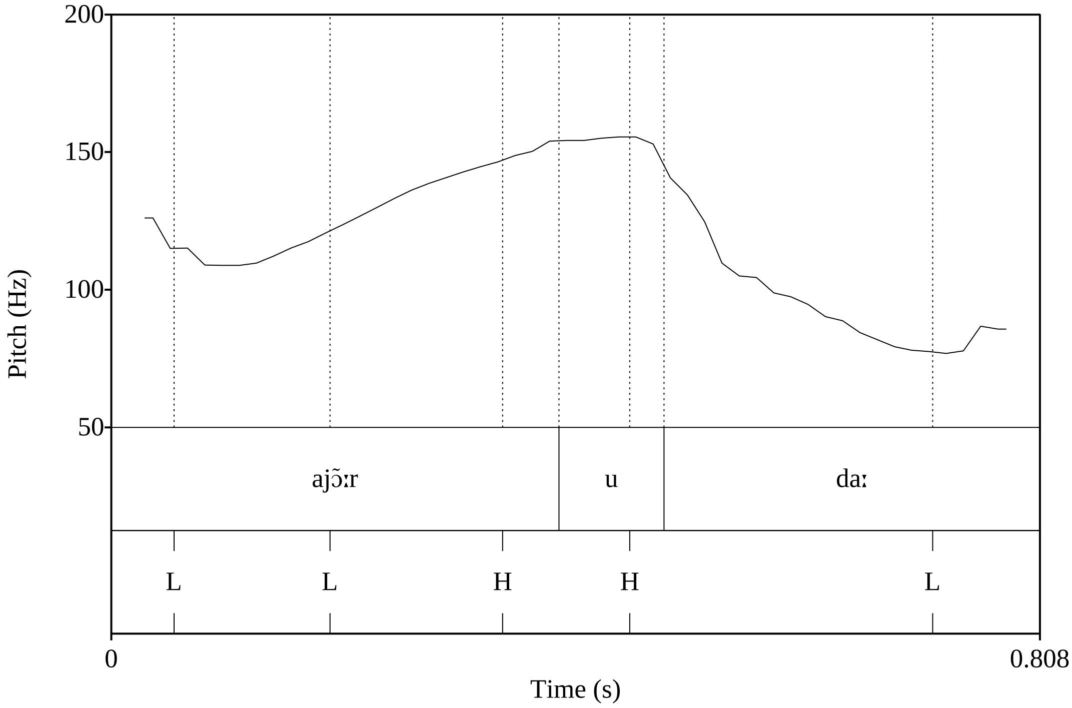


Figure 3.6: Pitch track of *àjɔ̃̌ːr ú dàː* in (95a)

I do not have any recordings of fall-final words ending in consonants to show the same copying there.

No downstep

As objects of verbs and following the benefactive marker *rɛ*, nouns with a low-high surface pattern such as *ɛ̀wã́ʲ* 'monkey' undergo downstep if the preceding word ends in a H. Nouns with a low-rising surface pattern such as *ɛ̀wǎː* 'knife' however do not undergo downstep.

Examples for *ɛ̀wã́ʲ* 'monkey' and *ɛ̀wǎː* 'knife' following the imperative form *jã́ná* 'Buy!' are given in (96).

(96) a. jã́ná ɛ̀wã́ʲ → [jã́nɛ́ꜜwã́ʲ]
buy.IMP monkey
Buy a monkey! (lr.019)

b. jã́ná ɛ̀wǎː → [jã́nɛ́wǎː]
buy.IMP knife
Buy a knife! (lr.002)

Examples for *ɛ̀wã̌ʲ* ‘monkey’ and *ɛ̀wǎː* ‘knife’ following the benefactive *rɛ́* are given in (97).

(97) a. káká rɛ́ ɛ̀wã̌ʲ í nɛ̀ ɔ́- jã̏nà rɛ́ -dʒ →
thank.you BEN monkey epV REL 2S- buy BEN -1S.OBJ

[káká rɛ́ꜜwã̌ʲ í nɔ̌ː jã̏nà rɛ́dʒ]

Thank you for the monkey that you bought for me. (lr.020)

b. káká rɛ́ ɛ̀wǎː nɛ̀ ɔ́- jã̏nà rɛ́ -dʒ →
thank.you BEN knife REL 2S- buy BEN -1S.OBJ

[káká rɛ́wǎː nɔ̌ː jã̏nà rɛ́dʒ]

Thank you for the knife that you bought for me. (lr.003)

In both cases, *ɛ̀wã̌ʲ* ‘monkey’ surfaces as *[ɛ́ꜜwã̌ʲ]* whereas *ɛ̀wǎː* ‘knife’ does not change and surfaces as *[ɛ̀wǎː]*. If low-rising surface forms are seen as underlyingly L+LH forms, this follows naturally. The exact procedure for deriving the tones in downstep and the difference between L+H and L+LH forms will be discussed in Chapter 6 in section 6.1.

Contour tone formation ‘on the fly’

In natural speech, I have observed that speakers may vary freely between dropping and pronouncing intervocalic */n/*.

(98)	mánà	→	máà ∼ mâː	‘with’
	kénè	→	kéè ∼ kêː	‘do’
	ùbúnò	→	úbúò	‘where’

I have not noticed examples where rises would have been created in this manner or examples where the consonant between identical tones has been dropped to create a ‘long’ level tone. Also, I have not come across data where a consonant other than */n/* has been deleted in intervocalic position.

I have shown that Ikaan has two underlying level tones, H and L. H is downstepped after floating L, which leads to successively lower ꜜH tones. L is lowered to X if it occurs at the right edge of syntactic boundaries. Surface tonal contours behave phonologically like sequences of the level tones. In the next section, I show how the underlying tones are associated to TBUs.

3.4 Tonal melodies and the rules and conditions for tonal association

In addition to tones, Ikaan uses tonal melodies, also called 'word melodies' by (Gussenhoven, 2004:30). In this thesis, I will discuss tonal melodies as observed in nouns (see section 4), verbs (see section 5.2) and in the derivational morphology (see section 5.1).

In this section, I first introduce what tonal melodies are and why they are used in linguistic analysis. I then review how phonology explains how tonal melodies get associated to TBUs, which universals have been assumed, which general tendencies emerge cross-linguistically and what alternatives there are to working with tonal melodies and their rule-driven association to TBUs. Following this, I show how tonal association works in Ikaan and compare tonal association in Ikaan with cross-linguistic tendencies. I will turn to tonal melodies in section 4.2 to discuss a problem in the association of melodies to nouns and propose tone deletion as a solution. I will give more evidence for tone deletion in section 5.2.3.

3.4.1 Review of tonal melodies and tonal association

Tonal melodies

In a broad understanding, a melody in autosegmental phonology is the material of any autosegmental tier (Trask, 1996). In that sense, a tonal melody is a sequence of tones on the tonal tier, whatever this sequence may be, e.g. LH, LHH or LHHH. In a narrow understanding, tonal melodies are underlying and initially unassociated sequences of tones that are then mapped onto words.

Gussenhoven (2004:30) illustrates the concept of tonal melodies with an example from a hypothetical language. Assume that there is a language which has two level tones, H and L, and which shows the surface forms in words of different lengths given in (99).

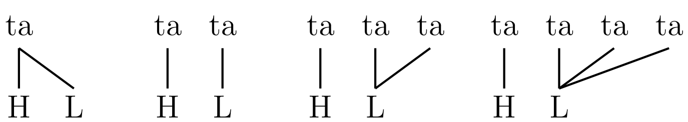
(99) a. tâ tátà tátàtà tátàtàtà

b. tă tàtá tàtátátá tàtátátá

The pattern in (99a) can be explained by assuming a HL tonal melody that associates with the word, the pattern in (99b) with a LH melody.

Autosegmental representations of the words in (99a) are shown in (100).

(100)



In *tâ*, H and L both link to the only available TBU. In *tátà*, H and L link to the two available TBUs. In *tátàtà* and *tátàtàtà* H and L link to the first and second TBU. Then L, the final tone of the melody, spreads and links to the TBUs that are not yet specified for tone so that in the end all TBUs are linked to a tone.

By analysing the surface forms this way, it immediately becomes clear why there is a contour on the word with one TBU but not on words with more than one TBU. Also, there is an explanation for the similarities in the melodies between all four words. Finally, working with the HL tonal melody results in a powerful prediction that can be used to test and possibly falsify the tonal melody analysis. Because of the way linking and spreading proceed, the tonal melodies hypothesis predicts that in a language with an underlying HL melody (in the narrow sense) there will be no surface melody (in the broad sense) that is HHL.

Tonal melodies are therefore an analytic device for explaining distributional patterns of and distributional restrictions on tone. Rather than listing the surface tonal melodies, the analysis abstracts away from the surface patterns that are tied to the number of TBUs in the word and looks only at the underlying tone pattern itself (Gussenhoven, 2004:26). H͡L, HL, HLL and HLLL surface patterns can be reduced to an underlying HL tonal melody, L͡H, LH, LHH and LHHH to an underlying LH melody. The underlying tonal melodies are combined with association conventions, well-formedness conditions and tonological rules (such as tone spreading) and together they produce the correct surface forms.

The advantages of working with tonal melodies are that tonal melodies make the grammar more economical, that they provide explanations rather than descriptions and that they make predictions that can be tested.

In summary, tonal melodies are used to describe and generate all and only the attested surface tonal patterns of a given language by combining the tonal melodies with phonological rules and conditions.

Tonal association and well-formedness conditions

Since melodies are underlyingly present but not yet associated with TBUs there has to be a mechanism for linking tones to their hosts. This process is called tonal association and it is governed by association conventions and well-formedness conditions. Association conventions are the algorithms which are used to map tones onto TBUs. Well-formedness conditions are constraints imposed on autosegmental representations on what may and what may not be considered a well-formed representation.

The original association conventions and well-formedness constraints are described and formalised by Goldsmith (1979:27).

1. All vowels are associated with at least one tone.
2. All tones are associated with at least one vowel.
3. Association lines do not cross.

Goldsmith later refines the association conventions to explicitly say that tonemes are associated to vowels one-by-one starting from the left (Goldsmith, 1979:141). Goldsmith himself points out that the fact that association starts from the left and goes to the right does not follow from the association conventions as given above. However, since there are no counter examples he takes left-to-right as the unmarked direction (Goldsmith, 1979:130). He expresses this directionality in the rule in (101) (Goldsmith, 1979:135).

(101)
```
#  CV
|   :
#   T
```

Goldsmith further points out that the fact that association proceeds one-by-one is also not a necessary consequence of the association conventions. For example, a trisyllabic word with a two-tone melody could theoretically have either of the two autosegmental structures gives in (102) without violating any of the association conventions/well-formedness conditions.

(102)
```
#  bi  so  ne  #
|  |    \  /   |
#  L     H     #

#  bi  so  ne  #
|    \  /   |  |
#     L     H  #
```

He therefore adds that that if there are two possible ways to fulfil the well-formedness condition, an already associated autosegment must not be reassociated (Goldsmith, 1979:136). With these modifications it automatically follows that there must be contouring at the right edge of a word if there are more tones than TBUs and that the final tone of a melody spreads onto the remaining TBUs if the melody has fewer tones than the word has TBUs.

Goldsmith adds these refinements not because he perceives them to be linguistic universals but because he prefers stronger association conventions and well-formedness conditions with fewer language-specific rules to weaker association conventions and well-formedness conditions with more language-specific rules (Goldsmith, 1979:136). All the same, left-to-right association of one tone per TBU with rightmost contouring and spreading is now seen as the default way of tonal association (see Gussenhoven, 2004:32).

There are also languages where the association conventions and well-formedness conditions can be applied successfully most of the time but not all the time. For those exceptions where the conventions would produce the wrong results lexical association is used instead. This means that some words are pre-linked to tones in the lexicon and for the rest the tones are associated through the association conventions (Gussenhoven, 2004:31). I have already shown an example for this in Dschang, where Pulleyblank suggests that the word *ꜜmɔ́* 'child' is lexically prelinked as shown in (103) whereas all other nouns come with underlyingly independent tonal melodies (Pulleyblank, 1986:42).

(103)
```
      mɔ
      |
  L   H
```

The view that these association conventions are default, if not universal, is not shared by everyone. Gussenhoven (2004:32) refers to counter examples, while Pulleyblank (1986) argues against automatic spreading and multiple linking of tones. Pulleyblank sees the association conventions and well-formedness conditions as mainly language-specific conventions. The only universals he upholds are that a sequence of tones is mapped onto a sequence of tone-bearing units one-to-one from left to right and association lines do not cross. By now, even left-to-right association does not seem to fully hold as a universal any more as Harry (2004) describes right-to-left as the appropriate direction for spreading in the lexical domain in Kalaḅarị-Ịjọ.

Pulleyblank (1986) cites Yoruba, Tiv and Margi as examples for languages where spreading is not automatic. Instead, TBUs are left unspecified to receive default tones later on so that spreading is an explicit and language-specific rule. He further demonstrates that in Dschang, Tiv and Margi multiple linking is not automatic. Instead of contours a the right edge 'excess' tones are left afloat.[14]

Given these examples, less broad association rules and more language-specific well-formedness conditions and phonological rules may be more appropriate. As I will show in the next section and in sections 3.5.1, 3.5.2 and 4.2, the default mechanism does not give the correct results for Ikaan either.

[14]For Yoruba, a simple explanation for why the association conventions do not apply may just be that Yoruba simply does not use tonal melodies in the narrow sense. Instead, Yoruba uses prelinking and therefore does not require the mechanism to link tones to TBUs. Therefore it is not surprising that the association conventions do not apply to Yoruba.

3.4.2 Tonal melodies and tonal association in Ikaan

Ikaan uses both lexical and grammatical tonal melodies. Lexical and grammatical melodies are associated with TBUs in the same manner, but they originate from different places and have different status in the grammar.

Grammatical melodies carry independent meaning, for example the verbal TAM melody HL indicates Non-Future tense. Grammatical melodies therefore require their own lexical entries. They are morphemes that consist entirely of tones, they just don't have segmental material. Lexical melodies on the other hand are not morphemes. They do not carry meaning on their own and they are not lexical entries by themselves. Instead they form part of the lexical entry of another morpheme.

What both lexical and grammatical melodies have in common is that both form limited sets and that neither of them are linked to TBUs at the outset. A way of representing that the root of the word *ɛ̀r̥ágʊ̃́m* 'sheep' in Ikaan comes with a H melody would be to write it like *r̥agʊ̃m*$_{\mathrm{H}}$, or to express it in an autosegmental representation like given in (104).

(104) r̥a gʊ̃m

H

Since both lexical and grammatical melodies are not associated to TBUs at the outset, there has to be a mechanism for associating them, and I will explain this in the following sections.

One-by-one left-to-right

Pulleyblank (1986) proposes that the only association conventions that can be maintained as universals are that tones associate to TBUs one-by-one left-to-right and that association lines do not cross. This works for Ikaan.

In (105a), the subject prefix bears a L tone, the verb carries a HL melody. In (105b) the tonal noun class prefix is a L tone and the nominal root comes with a HL melody. None of the tones are prelinked.

(105) a. ɔ- kɔ̃hã
L- -HL
3S.NFUT- cough.NFUT

S/he coughed.

ɔ kɔ̃ hã

L H L

b. a- tama
L- HL
A2 tobacco
tobacco

a ta ma

L H L

As soon as the words are formed, the underlying tones have to be mapped onto TBUs. In Ikaan the available tones are linked to moras one-by-one left-to-right, in line with the association conventions, as shown for (105a) in (106).

(106) ɔ kɔ̃ hã → ɔ kɔ̃ hã

L H L L H L

Since in Ikaan the TBU is the mora, these association conventions can be generalised as given in Rule 7. This association rule applies both in the association of tonal melodies and in the association of tones that are not from underlying melodies.[15]

Rule 7 *Associate the leftmost unassociated tone with the leftmost unassociated mora*

V V
| |
μ μ

T *T*

'TBUs must be linked to tone' and Rightwards Copying

In addition to the association conventions, well-formedness conditions apply in Ikaan. Firstly, each TBU must be associated with a tone, TBUs must not be left unspecified. This is expressed in Constraint 1.

Constraint 1 *μ

This constraint is expressed in Goldsmith's well-formedness conditions. However, after tone mapping has linked the tones of a melody to TBUs, Goldsmith's default mechanism for supplying leftover TBUs with tones is tone spreading. Even though tone spreading is taken as the default assumption within autosegmental

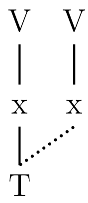
[15]Note that this is the only occasion where L tones that are not linked actually associate with TBUs. In almost all other cases floating L or L that have been set afloat must not link but stay afloat. There is one exception where L tones do dock. This seems to be a phonological rule that is lexically specified for the respective words and is discussed in 3.5.5.

phonology, my proposal for Ikaan is that it is not tone spreading but tone copying that provides tones for unassociated TBUs.

I explicitly distinguish between 'tone spreading' and 'tone copying'. On the surface, both spreading and copying result in sequences of identical tones. As phonological processes however, the two processes proceed differently and result in different autosegmental representations. This again results in different phonological behaviour and different implications for the OCP.

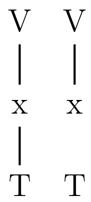
Tone spreading creates multiple associations for a single tone and is perfectly OCP-compliant (cf. Gussenhoven, 2004:34). An autosegmental representation of spreading is given in (107).

(107)



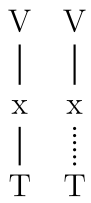
Tone copying in my understanding and use here is when a tone makes a copy of itself and inserts that copy into the tone tier next to itself.

(108)



This creates a representation with an unassociated tone and an unassociated TBU. The association conventions immediately ensure that the tone is linked to the TBU, again in a one-by-one left-to-right manner. Copying therefore results in sequences of adjacent identical tones that are all individually linked to their own TBUs. This of course violates the OCP and additionally goes against spreading as the default assumption in autosegmental phonology.

(109)



As a consequence of their different underlying representations, spreading and copying also differ in their phonological behaviour. Deleting a TBU in (107) breaks one association line of a tone that is multiply associated. It does *not* result in a floating tone because the tone is still associated to another TBU.

(110)
```
V   V   →   V
|   |       |
x   x       x
|           |
T           T
```

Deleting a TBU in (109) *does* result in a floating tone because there is only this one association line that attaches the tone to a TBU. Without this one line the tone is set afloat.

(111)
```
V   V   →   V
|   |       |
x   x       x
|   |       |
T   T       T  T
```

The presence and the absence of a floating tone is crucial because it triggers different phonological processes and, as a consequence, different surface patterns.

With respect to Ikaan, this means that the constraint that TBUs must not be left toneless requires a counterpart mechanism that makes sure that tones for toneless TBUs are supplied. This mechanism, tone copying, is expressed for Ikaan in Rule 8.[16]

Rule 8 *Copy tone (rightwards)*

```
V   V   →   V   V
|   |       |   |
μ   μ       μ   μ
|           |
T           T   T
```

Following tonal copying, the association conventions associate the tone to the TBU. This process therefore does not have to be reduplicated in this rule.

Tonal copying followed by tonal association is illustrated in (112) for the verb *ʃeno* 'to play' which is inflected for Imperative with a H grammatical melody. The verb has two moras, the melody has only one tone. This means that there is no tone available to associate to the second TBU. This violates the constraint that TBUs must be associated and causes tone copying to produce and insert an additional tone. This tone is then linked with the association conventions.

(112) a. Underlying representation

ʃe no

H

[16]There is also a Leftward copying process that takes place in Ikaan. This is not relevant for the association of melodies to words but comes into action at later stages when TBUs are made toneless. Leftward copying is introduced in section 3.5.1.

b. One-by-one left-to-right association

ʃe no
⋮
H

c. *μ is violated, tone copying applies

ʃe no
|
H H

d. Association conventions link tone and TBU

ʃe no
| ⋮
H H

I am aware of the fact that proposing tone copying and working with OCP violations rather than tone spreading and not having OCP violations is quite unusual. While it would be good to show straight away that copying and OCP violations account for the data better than OCP-compliant spreading, I will postpone this discussion until I have laid out the relevant data. Therefore I will work with Copy and a violated OCP throughout the thesis and then return to the OCP violations in section 7.4 to give evidence for my analysis. Furthermore, I will discuss potential alternative analyses, point out where they fail and show examples of other language which also do not employ the OCP. Based on that, I will show in 7.5 how employing Copy rather than Spread makes for a simpler phonology.

'TBUs have maximally one tone' and L Deletion

The second well-formedness condition that applies in Ikaan is that each TBU maximally has one tone so that no TBU can bear more than one tone. This implies that the assumed default mechanism of multiple linking and contour formation at the right edge does not apply in Ikaan. This second well-formedness condition is stated in Constraint 2. The description rules out any representation in which two or more tones are linked to one mora.

Constraint 2 *A TBU maximally bears one tone*

$*\mu$
/ \\
T T

However, there are instances where tonal melodies are longer than the words they map on. An example for this is given in (113) where the HL Non-Future melody maps onto a monomoraic verb root and surfaces as H.

(113)	ɔ-	kɔ	→ [ɔ̀kɔ́]
	L-	-HL	
	3S.NFUT-	plant.NFUT	

s/he planted

If there is a shortage of TBUs because there are more tones in the melody than there are TBUs in the word, the leftover tones are not associated. A tone from a melody that cannot be associated does not 'survive' this non-association. Instead, it is deleted. In (113) tone deletion affects L, and I will later present evidence to show that H are not deleted in Ikaan but must be realised. Therefore the rule for tone deletion given in Rule 9 only refers to L, not to H.

Rule 9 *L deletion*

$L \rightarrow \emptyset$

L deletion does not mean that L is delinked from its TBU but still present on the tone tier. Instead, it means that L is fully erased from the tone tier so that it simply does not exist any more. Tone deletion is only active at the melody association stage in the Ikaan grammar because it affects only leftover melody tones that could not find a host, it does not happen at any other point in the derivation.

I will return to tone deletion in Chapter 4 to discuss tone deletion and alternative analyses for melody association in nouns in detail. In section 5.2.3 I will give evidence that L is deleted in Non-Future tense if the HL melody maps onto a monomoraic CV verb. Finally, in section 7.1 I will show that contrary to expectations, the L of a HL Non-Future melody is not deleted if it maps onto a monomoraic CVC verb.

Taken together, the association conventions, well-formedness conditions and phonological rules that are required to produce tonally well-formed words in Ikaan are:

- Tones are linked to moras one-by-one, left to right.
- Association lines do not cross.
- TBUs must be linked to one but not more than one tone.
- The final tone of a melody copies if it is followed by a toneless TBU.
- Non-associated L delete.

For associating tones to TBUs at the lexical levels, these conventions are for now sufficient. I will introduce additional well-formedness conditions and tonal processes in section 3.5.

Finally, I should add a note on the domain of tonal association. I have not investigated the domain of tone melody mapping thoroughly and especially in verbs a lot of work remains to be done. For now I am working with the assumption that the domain of a tonal melody is the word so that Ikaan is a word tone language. For nouns, melodies map onto the noun class prefix and the root. For verbs, melodies map onto the subject agreement prefix, the TAM auxiliary, the root and any suffixes that follow such as the excessive marker *-ge/-gɛ*. Note that some of the constituents come with their own tones (subject agreement prefix, some auxiliaries) whereas others are toneless (segmental noun class prefix, excessive marker) and yet others are entirely tonal (tonal noun class prefix). Incidentally, vowel harmony in Ikaan operates in the same domain as melody association. I leave it for further work to ascertain whether this phonological definition of the word in Ikaan coincides with morpho-syntactic characteristics.

3.5 Additional rules and constraints

In this section, I will discuss the remaining phonological rules and constraints that in my analysis make up the sets of rules and constraints applicable to Ikaan and illustrate when and how they apply. I hope to show in this chapter and the following one that my analysis is simple, non-redundant and makes for a lean and efficient phonology of the language.

3.5.1 Leftward Copying

In section 3.4.2 I described Rightward tone copying as part of the mechanism that links tonal melodies to words. In addition to Rightward copying, Ikaan also has copying in a leftward direction.[17]

Rightward copying in Ikaan cannot proceed over a floating L. This creates a problems for tonal representations like the one given in (114).

(114)
$$\begin{array}{cccc} \text{V} & & \text{V} & \text{V} \\ | & & & | \\ \text{H} & \text{L} & & \text{H} \end{array}$$

Because the first H has a floating L tone to its right, Rightward copying is blocked. The condition that TBUs must be linked, however, is still in place. What happens in Ikaan if Rightward copying cannot apply is that Leftward copying

[17]Again, copying here differs from the standard approach in autosegmental phonology, which would argue either for leftward spreading to a toneless TBU or leftward spreading and delinking of L (e.g. Hyman (2007:17) or Goldsmith (1979)). I will return to leftward copying in sections 6.3, 6.4 and 6.5 to present more data, and in section 7.5 to argue for why I choose copying rather than spreading.

applies instead. The second H makes a copy of itself, inserts the copied tone to its left and the newly inserted tone is again linked by the association conventions in a one-by-one left-to-right manner. Leftward copying is given in Rule 10.

Rule 10 *Copy tone (leftwards)*

$$\begin{array}{ccccccc}
 & \mathrm{V} & \mathrm{V} & \rightarrow & & \mathrm{V} & \mathrm{V} \\
 & | & | & & & | & | \\
 & \mu & \mu & & & \mu & \mu \\
 & & | & & & & | \\
L & & T & & L & T & T
\end{array}$$

Leftward copying applies no matter how many TBUs there are in between the floating L and the tone that is copied. As the notation in Rule 10 suggests, Leftward copying also applies in contexts where there is no H tone preceding the floating L.

Arguments and examples for Rightward copying will be given throughout the thesis while detailed arguments and examples for Leftward copying will be given in Chapter 6. In section 7.6 I will revisit the issue of directionality to compare Rightward and Leftward copying in Ikaan to rightward and leftward spreading in Kalaḅarị-Ịjọ.

3.5.2 OCP(L)

In section 3.4.2 I have proposed copying, inserting and linking of tones to TBUs. This copying process creates adjacent identical autosegments, which is generally seen as a state that is prohibited by the OCP. In my analysis of Ikaan, the OCP applies to L tones so that adjacent identical L tones are indeed ruled out. The OCP does not apply to H tones as I will show in section 7.4.

Adjacent L in Ikaan arise in three contexts: firstly, from copying of L to provide tones for unassociated moras as outlined in 3.4.2, secondly within words across morphemes (e.g. nouns, verbs) when the prefix tone and the initial tone of the root melody are both L, and thirdly across word boundaries. In all three cases, the OCP applies to L and rules out sequences of adjacent L. This constraint is expressed in Constraint 3.

Constraint 3 *OCP(L)*

$* L\ L$

In order to remove violations of OCP(L), 'L merging' as given in Rule 11 changes representations that clash with OCP(L) into representations that match it.[18]

Rule 11 *L merging*
L L → L

OCP(L) prohibits adjacent L tones only after tones and tonal melodies have been linked to TBUs. In early underlying forms where tones are specified but not yet linked, adjacent L are not prohibited and remain adjacent. From the first tonal association onwards, adjacent L are merged by a L merger process wherever they occur, whether linked or floating, within morphemes or across morpheme boundaries. I will return to the late application of OCP(L) in section 4.2.5 and show why I claim OCP(L) cannot apply before tones are first linked to TBUs.

There is phonological evidence that adjacent L tones are merged and that sequences of surface L tones are best treated as a single, multiply linked L tone. Firstly, H after floating L in Ikaan is realised as ꜜH, L after floating L is not downstepped. This behaviour follows naturally if it is assumed that sequences of adjacent L tones are ruled out and merging of L applies to remove this violation. A sequence of a floating L and a linked L is merged into a single linked L. The trigger for the downstep is removed so that sequences of ⓁL can never arise and L can never be downstepped in Ikaan. Sequences of a floating L and a linked H obviously do not violate OCPL(L) and cannot be merged so that H undergoes downstep. Therefore, rather than just observing and stating that H is downstepped after Ⓛ whereas L is not, OCP(L) gives a phonological analysis and explanation for why this is the case. It also makes the prediction that L can never be downstepped in Ikaan and this prediction holds.

Secondly, merging adjacent L across morpheme and word boundaries explains why phrase-final lowering of L to X affects a single L in exactly the same way as it affects sequences of two, three, four or even more adjacent surface L. In (87a) I showed phrase-final lowering of L with a single L, (115) shows a sequence of underlying L which surfaces as a sequence of X.

(115)	dʒɛ̀-	kpĩ́	ìgbàrà	ìr̥ʷàjɔ̀m	→ [dʒɛ̀kpĩ́gbȁrȉr̥ʷȁjɔ̏m]
	1S.NFUT-	hear.NFUT	gun	god	

I heard thunder. (ooo.050)

The annotated pitch track for (115) is given in Figure 3.7. The pitch readings for the individual surface tones are given in (116).

[18] It may seem unreasonable to propose tone copying, which creates representations that violate the OCP, only to then come back and remove these violations with a L merging process. Instead, I could have chosen to work with tone spreading straight away. I think that copying and OCP(L)/L merging result in a simpler analysis overall though and is therefore preferable. I will discuss my reasons for my analysis in section 7.5.

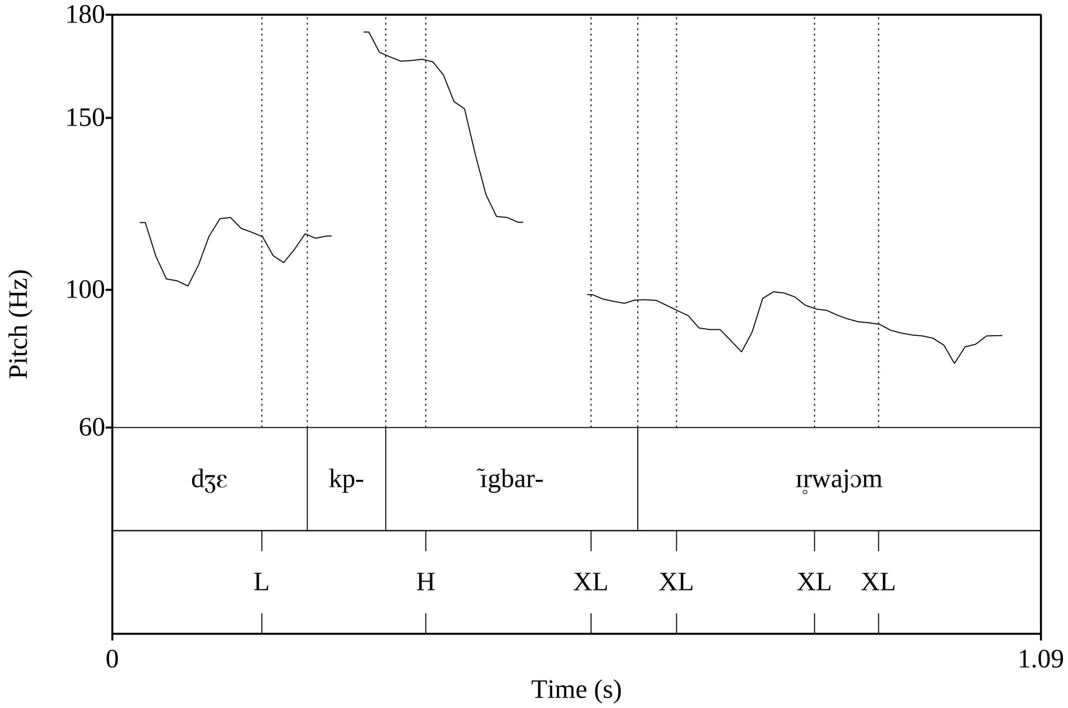


Figure 3.7: Pitch track of *dʒɛ̀kpɪ̃́gbȁrȉr̥ʷȁjȍm* in (115)

(116)	dʒɛ̀	kp- ɪ̃́	gbȁ	r- ȉ	r̥ʷȁ	jȍm
	L	H	X	X	X	X
	115Hz	169Hz	99Hz	94Hz	95Hz	90Hz

All final L are affected and lowered to X. Again, this behaviour follows naturally if the OCP applies to adjacent L tone and tone merging has created a single multiply linked L.

I will return to OCP(L) in section 4.3.1 to give further evidence for OCP(L) with tonal alternations in distal demonstratives and in section 7.3 with a range of data from the phonology-grammar interface which support OCP(L).

3.5.3 No floating H and H docking

In addition to the association conventions and well-formedness conditions described in section 3.4.2, H tones in Ikaan must always be realised in the surface representation. H must not be left floating. The constraint that prohibits floating H is expressed in Constraint 4.

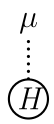
Constraint 4 *H tones must not be left afloat*

*Ⓗ

Theoretically speaking, there are many ways to ensure that a floating H does not occur. H could be deleted, in which case *H would not be violated any more because there would not be any H to violate the constraint. It would also be conceivable that H is changed into a different tone which removes the violation of fh because a tone other than H cannot violate the *H constraint.

In Ikaan, the corresponding process which ensures that *H is not violated is H docking. 'Docking' refers to the association of a floating tone to a tone-bearing unit. In Ikaan, obligatory docking applies only to H tones. Docking does not require the TBU that H associates with to be toneless, it applies no matter what the status of the target TBU is.

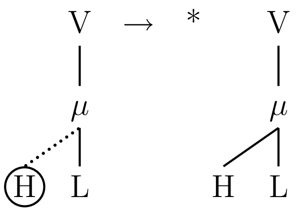
Rule 12 *H docking*



Therefore, once a H has come into existence, no matter if it is part of a lexical tonal melody or has come about through tone copying, it has to be linked. If it is delinked and has been set afloat because its TBU has been deleted, it must relink.

H docking has to apply even if it creates tonal representations that by themselves are in conflict with another well-formedness condition. For example, if a floating H docks onto a TBU that is already linked to a low tone *H is not violated any more but the representation that has been created violates the constraint which prohibits more than one tone per mora.

(117)



If the application of a rule repairs one violation but creates another, further phonological rules apply until all violations have been resolved. In the representation created by H docking above, an L delinking rule, which I will describe in the following section, will apply. This delinks L from the multiply linked mora and thereby removes the newly created violation.

It may be argued that H docking is a redundant rule in the phonology of Ikaan since the association conventions (if expressed as 'Associate tones with TBUs one-by-one left-to-right') already take care of the process expressed in H docking. However, the association conventions are an instruction for linking unassociated tones to unassociated TBUs. By themselves, they do not make it possible for an unassociated tone to link to an already associated TBU. In languages where this does happen (e.g. Mende and Ganda as formalised in Goldsmith (1990)), an additional constraint requiring all tones to be linked and an additional algorithm describing how to link the tones are necessary. Parallel to the argumentation there, an additional rule of H docking is required to enable a floating H to link to a mora that is already linked.

*H and H docking play a role in various parts of the grammar and I will come back to this constraint and rule in later sections. In section 4.2.6 I will demonstrate how *H and H docking offer insights into the different frequencies of tonal melodies in nouns which would otherwise appear random and how *H and H docking fill what seems to be a 'gap' for the occurrence of the HLH on monomoraic roots. In section 5.2.4 I will show how *H and H docking make it possible to derive two different surface melodies for Habitual Aspect from one underlying melody. Finally, in Chapter 6 I will use *H and H docking together with other rules and constraints to explain a range of downstep data.

3.5.4 L delinking

L delinking is a tonal rule that acts to remove violations of well-formedness constraints. In the preceding section, I have mentioned how such a violation comes about when H docking links an unassociated H to a TBU which is already linked to a L tone. This creates a TBU that is associated to more than one tone, which is prohibited (see Constraint 2). L delinking removes the violation by breaking the association line between L and the TBU so that the TBU is only associated with one tone.

L delinking as a phonological process is expressed in Rule 13.

Rule 13 *L delinking*

$$\begin{array}{c} \mu \\ \ddagger \\ L \end{array}$$

L delinking will be used as a phonological process throughout the following chapters. Apart from applying after H docking, L delinking is needed to resolve violations of construction-specific constraints. In Chapter 6 I will show how certain morphosyntactic constructions impose their own tonal constraints and how L delinking removes violations of these constraints.

Note that L delinking does not affect the same tones as L deletion. Tones that could never be associated are deleted and therefore do not 'survive' non-linking. Tones that are associated are not deleted but 'survive' delinking as a floating tone.

3.5.5 L docking

Unlike for H there is no condition which requires unassociated L to associate and surface. Instead, L that have been delinked and set afloat by phonological processes remain floating, L from tonal melodies that could not be associated are deleted. Because of this L deletion after melody association, there generally are no lexical floating L tones in Ikaan.

For some words however, it seems necessary to posit a lexical floating L and an explicit L docking process after all, because in some constructions this floating L seems to associate with a toneless epenthetic vowel and be realised in the surface form. The words that show this behaviour are possessive pronouns and object suffixes for human referents. The constructions in which the lexical floating L surfaces are before demonstratives and before the negation clitic */-g/*. L docking as a process is given in Rule 14.[19]

Rule 14 *L docking*

$$\begin{array}{c}\mu\\ \vdots\\ L\end{array}$$

Here I will show two constructions where L docking applies and one construction where it does not apply.

In 2.5.1 I gave examples for surface tones on epenthetic vowels before proximal demonstratives. These showed that the tone on the epenthetic vowel is identical to the tone of the preceding TBU. If a distal demonstrative is immediately preceded by a possessive pronoun, the epenthetic vowel is not the same as the preceding TBU. Instead, it is invariably L. (118) shows this for consonant-final possessive pronouns.[20]

(118) a. èkpɔ̀d ɛ̀ːdʒ ì nɛ̀ː
hare 1S.POSS epV DEM.PROX
this hare of mine (epv1.170)

b. èkpɔ̀d ɛ̌ːn ì nɛ̀ː
hare 3S.POSS epV DEM.PROX
this hare of his (epv1.171)

---

[19] As a process that affects only a very limited set of lexical items in a very limited set of constructions, L docking should not actually be discussed in a chapter on phonological processes that apply across the board. However, as these L and the L docking rule do not seem to affect other aspects of the lexicon and grammar of Ikaan, I will describe L docking here and not return to it for any further discussion later. Further work on this issue however is planned.

[20] V*rɔ̀* '2S.POSS' and V*bá* '1P.POSS' are vowel-final and therefore do not insert epenthetic vowels.

c. èkpòd ɛ̀mɔ́n ù nɛ̀ː
hare 2P.POSS epV DEM.PROX
this hare of yours (pl.) (epv1.172)

d. èkpòd ɛ̀mán ȉ nɛ̀ː
hare 3P.POSS epV DEM.PROX
this hare of theirs (epv1.173)

As the L before demonstratives only surfaces with possessive pronouns, I assume that the L is part of the pronoun and that in this construction it associates with the epenthetic vowel.

The same pattern occurs with consonant-final object suffixes in negated statements. Negated statements end in the clitic *-g*. Epenthetic vowels are inserted if the preceding word is consonant-final. For object suffixes, the tone on the epenthetic vowel is invariably L, no matter if the preceding tone was H or L.

(119) a. ǒː- ʃèmè -dʒ ȉ =g
3S.NFUT.NEG- curse.NFUT.NEG -1S epV =NEG
He didn't curse me (pl.). (epv4.063)

b. ǒː- ʃèmè -mɔ́n ʊ̀ =g
3S.NFUT.NEG- curse.NFUT.NEG -2P epV =NEG
He didn't curse you (pl.). (epv4.067)

c. ǒː- ʃèmè -mán ì =g
3S.NFUT.NEG- curse.NFUT.NEG -3P epV =NEG
He didn't curse them. (epv4.068)

Again these forms can be explained with a lexical floating L which is part of the marker and associates with the epenthetic vowel in this construction.

However the same object suffixes behave differently in another construction. As I will discuss in detail in section 5.4, yes/no questions have to be V-final in Ikaan. If there is no vowel at the end of an utterance, an epenthetic vowel has to be inserted. Unlike in the negated statements however, the epenthetic vowel shows normal epenthetic vowel behaviour and is realised with the same tone as the preceding TBU.

(120) a. ò- ʃèmè -dʒ ì
3S.NFUT- curse.NFUT -1S epV
Did he curse you (pl.)? (epv4.062)

b. ò- ʃèmè -mɔ́n ʊ́
3S.NFUT- curse.NFUT -2P epV
Did he curse you (pl.)? (epv4.062)

c. ò- ʃèmè -mán í
3S.NFUT- curse.NFUT -3P epV

Did he curse them? (epv4.061)

The lexical floating L that I propose for object suffixes and that docks to epenthetic vowels in negated statements does not dock onto the epenthetic vowel in the yes/no question.

As a solution, I suggest that consonant-final possessive pronouns and object suffixes are followed by a lexical floating L. This floating L docks to an epenthetic vowel in some constructions but not in others. L docking is therefore a process in Ikaan that is tied to a specific part of speech (possessive pronouns, human object suffixes) in specific constructions and cannot apply across the board. Which constructions use L docking and which constructions do not remains to be investigated.

As for where the lexical floating L might come from, it is possible that L is left over from a previous CV syllable structure. The V is no longer realised but it is either still present in some way or it is not present any more but left its tone behind. In section 7.1 however I have data for CVC verbs where I argue that these are underlyingly CVCV. The final V is not realised segmentally but it does have an affect on tonal association. The explanation for object suffixes may be parallel to this.

3.5.6 Terminology

Throughout this chapter, I have discussed conditions, constraints and rules rather descriptively without defining my use of these terms. Also, I have given rules without including structural descriptions for the contexts in which rules apply, and I have talked about violations of constraints and about how rules remove violations. Before moving on, I will clarify what I mean by the terms that I use here, how I see the rules and constraints work, and which framework I am working in. Note that with the explanations given here I refer to the tonal phonology only, not to the segmental phonology or to the grammar.

First, I work within autosegmental phonology and I use autosegmental representations for my description and analysis of tone in Ikaan. This is because there is clear evidence that in Ikaan tones behave independently of their host TBUs and are therefore best analysed as being autosegmental and located on their own tier.

Apart from autosegmental theory, my analysis of Ikaan has primarily grown out of the data itself rather than being driven by the application of phonological ideas and frameworks. My approach is data-driven and inductive and my aim is to describe and explain the surface and underlying forms of the language and to describe and explain the ways of arriving at the surface forms from the underlying forms in the simplest and most insightful way possible. This is not to say that my approach opposes the use of phonological theory, quite the contrary. The understanding of rules and constraints that has grown out of my data-driven approach partly coincides with the notions of phonotactically motivated rules by Sommerstein (1974) and harmonic rule application by Goldsmith (1990) and has been informed by these notions.

In the following section, I will briefly review how rules, conditions and constraints are understood and used in input-triggered and output-triggered approaches. I will then move on to my own understanding and use of rules and constraints and to implications of this understanding of rules and constraints for my analysis of Ikaan.

Input-triggered and output-triggered approaches

Many though not all phonological frameworks work with rules, conditions and constraints.

Conditions and constraints are similar notions in that they describe states that are either required or ruled out. Constraints are generally negative in their nature, ruling out ill-formed configurations that would otherwise be allowed or even generated by the grammar. An example for a constraint is the OCP expressing that adjacent identical autosegments are ruled out. Conditions are generally positively expressed, describing well-formed configurations that have to be adhered to. By implication of course, this also expresses negative constraints—everything that does not conform to the positively expressed condition is ruled out. An example for a condition is that all TBUs must be linked to a tone, which rules out configurations where a TBU is unassociated or linked to more than one tone.

Conditions and constraints are static in the sense that they do not themselves act on representations or alter phonological structures. Instead, they only prescribe or rule out representations. What conditions and constraints may do is that they may serve as triggers for rules, which then apply to the representations to satisfy the conditions and constraints.

In contrast to the static conditions and constraints, rules are dynamic. Rules act upon representations, changing them or creating new ones. How the application of a rule is triggered differs depending on the framework. The distinction here is between rules that are triggered by their input and rules that are conditioned by their output. Input-conditioned rules apply when a potential input matches the structural description of a rule. Output-conditioned rules apply when the result of the application meets a condition that was violated before the application of a rule.

Discussing the differences between these two approaches, Goldsmith (1990) distinguishes between the understanding of generative phonological rules on the one hand and the notion of well-formedness conditions and conditional rules as repair mechanisms on the other hand.

Rules in generative phonology relate adjacent stages in a derivation, or, in a more dynamic interpretation, change one representation into another. Rules include a structural description and apply if this description is met. The structural description of a rule may include phonological as well as morphosyntactic information. If a representation fits the input description on the left-hand side of the rule, then at the next stage of the derivation, the representation will look like the right-hand-side description or the output of the rule. Rules apply whenever their structural description is met and they are not seen as applying or not applying depending on whether their output matches a particular structure (Goldsmith, 1990:320-1).

This understanding and mode of application contrasts with Leben's (1973) idea of how surface forms come about. According to Goldsmith (1990:320-1), in Leben's (1973) and Goldsmith's (1979) understanding there are phonotactic well-formedness conditions, rules and an algorithm which determines how the rules are applied.

Well-formedness conditions are seen as a phonotactic description of a state of affairs that may or may not be met in a given representation. Rules are seen as instructions on what to do. The algorithm is seen as the component that explains how to apply a rule in a minimal fashion to maximally satisfy the well-formedness conditions. This way, the well-formedness conditions can be seen as the 'why', the rules as the 'what' and the algorithm as the 'how'. Violations of well-formedness conditions determine the 'when'.

The main idea here is that rules apply when they encounter a violation of a well-formedness condition which will be removed by applying the rule, almost as a repair strategy. Therefore a rule applies if and only if its input violates a specific well-formedness condition and its output conforms to this condition. In all other cases, the rule fails to apply (Goldsmith, 1990:319).

Therefore, in both the generative approach and the approach with well-formedness conditions, rules have a left-hand-side that is the input and a right-hand-side that is the output. However, in a generative rule there is no equivalent to the condition in Leben's and Goldsmith's approach, though the structural description of the phonological rule corresponds to one possible way in which a condition may be violated.

Leben's and Goldsmith's approach to how phonology operates is fundamentally the same as Sommerstein's (1974) understanding of phonotactically motivated phonological rules. Sommerstein's thesis is that the grammar of a given natural language contains an exhaustive set of conditions or constraints on the output of the phonological rules and an exhaustive set of language-specific phonological rules linked to these conditions Sommerstein (1974:71).

In Sommerstein's approach, rule application is motivated by conditions. A rule linked to a phonotactic constraint C does not apply unless its application removes or alleviates a violation or violations of this constraint C. Applying a rule motivated by constraint C may however create a fresh violation of a different constraint D. This new violation is then removed or alleviated by a rule or rules linked to constraint D. Rules must apply and re-apply until all violations are removed, which implies that ill-formed representation are acceptable as long as the final representation is well-formed (Sommerstein, 1974:75).

A single rule may be conditioned by a number of constraints, and a constraint may be linked to a number of rules. The grammar therefore distinguishes between a set of 'targets' and a set of the means of getting to the targets (Sommerstein, 1974:87). By 'unpacking' traditional generative rules into target states and processes of reaching the targets, the grammar becomes less redundant. Furthermore, it makes new insights possible because rather than grouping rules by their input context, this approach explicitly groups rules according to their output and to the condition towards which the rule works. Therefore Sommerstein's approach captures similarities and generalisations in new ways and in ways that would not have been expressed at all or would not have been expressed explicitly in generative rules.

In a way, the input-based rule application of generative phonology and the output-based application of conditioned rules do not differ all that much. The notion of conditions that are violated could be seen as an equivalent of the context in which a generative rule applies. Still, the two concepts are not quite the same. For structural descriptions of rules, there is only one way in which the context for an application is met. For conditions, there are many ways in which a condition may not conform to what is required or prohibited. Also, in the generative approach, with the input as the trigger, there is less of an explanation for why the rule has to apply, and more of a statement that and how it has to apply. With the conditioned rules, there is the notion of what is well-formed in the language and the idea that rules apply to create well-formedness. Conditioned rules therefore explain the 'why' as well as the 'how' and 'when'.

Rules and constraints

I follow Leben (1973), Goldsmith (1990) and Sommerstein (1974) and distinguish between obligatory and prohibited states (static conditions and constraints) and the means of reaching these states (dynamic phonological rules). I hope that by breaking the rules down into their component steps I can avoid redundancy.

In my analysis, the phonology of Ikaan is made up of a limited and exhaustive set of constraints and a limited and exhaustive set of rules. The rules are available to the phonology to alter phonological representations in case these violate a constraint. The phonology then selects and applies these rules until the representations are well-formed. Phonological rules start applying from the moment lexical and grammatical tonal melodies are first associated. Phonological rules do not apply before that inside the lexicon. From tone association onward, the tonal rules are available to the phonology all the time and apply across the board, not just in certain morphosyntactic constructions. The constraints, on the other hand, come in two types. One subset applies from tone association onwards across the board and all the time. The other subset is tied to specific morphosyntactic contexts or is lexically selected by some specific lexical items and only applies in the given morphosyntactic construction or to the given lexical item.

I further follow Goldsmith (1990) and Sommerstein (1974) regarding the mechanism that triggers the application of rules. Rules apply when constraints are violated, i.e. when a description that is ruled out by a constraint *is* actually given in a representation.

For example, the verb *ʃeno* takes a H melody in Imperative. After the H has been linked by the association conventions the first TBU is linked to a tone but the second remains toneless because there are not enough tones in the melody to link all tones to a TBU.

(121) Association of verbal melody to TBUs

ʃe no
⋮
H

The second mora, which remains toneless, violates the constraint *μ which prohibits toneless TBUs. It therefore triggers a rule to apply to remove this violation. The only rule in the inventory of tonal rules of Ikaan that can remove this violation is Rightward copying followed by tonal linking through the association conventions.

(122) a. Violation of *μ, Copy rightwards

ʃe no
|
H H

b. Tone association

ʃe no
| ⋮
H H

Unlike Sommerstein (1974), Ikaan does not require rules to be linked to constraints. There are very few rules and constraints for Ikaan tones. If a constraint is violated there is only ever one rule available to remove this violation. Therefore, while one rule may remove violations of more than one constraint the reverse is not the case. Therefore it is not necessary to explicitly link rules to constraints.

In Sommerstein's segmental example this may have been different because there are far more segments, segmental constraints and segmental rules to choose from. In that case, it may have been possible that the 'wrong' rule applies so that ill-formed constructions are generated. It may be that Sommerstein's model can be simplified for working with tone by removing the obligatory link between rules and conditions. This however is not an issue I will follow up theoretically here. I will just 'try out' this simplification by applying it to Ikaan.

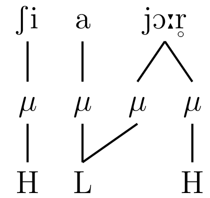
Ill-formed representations

Regarding whether constraints are violable, I follow Sommerstein (1974) rather than Goldsmith (1990). In the final representation, all violations must be removed, constraints are not violable in the final surface forms. However, during the derivation it is possible that constraints are violated, and it is this violation that triggers the application or reapplication of phonological rules.

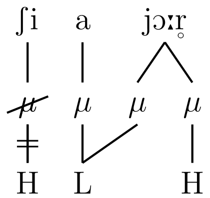
At the beginning of the derivation when tonal melodies are first associated with words, ill-formed representations arise when tonal melodies are shorter than the words they associate with, as I have shown in (121) and (122). This is inevitable but not problematic and is taken care of by the phonological rules that are triggered by the violations of the well-formedness conditions.

Ill-formed representations may also arise during the derivation. Segmental processes such as vowel deletion may create tonal configurations that are ill-formed. For example, if a TBU carrying a H is deleted, the tone, being autosegmental, stays behind and becomes a floating H. This is the case in the verb *ʃí* 'Cut!' in the phrase *ʃí àjɔ̆ːr̥* 'Cut the fat!', which surfaces as *[ʃájɔ̆ːr̥]* (lr.014).

(123) a. Underlying representation

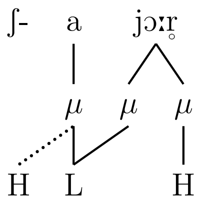


b. Vowel deletion delinks H and sets it afloat



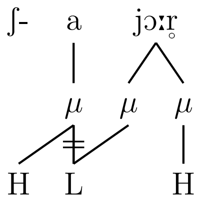
The H that is set afloat violates the constraint that H in Ikaan must not be left floating. Therefore, the H docking rule applies to link the floating H to a TBU.

(124) Violation of *Ⓗ, H docking



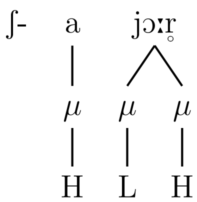
H docking, while removing a violation of the constraint *Ⓗ, results in an ill-formed representation itself. This is exactly the situation that Sommerstein (1974:75) describes when saying that constraint A may condition the creation of a representation that conforms to constraint A but then violates constraint B. If H docking associates a floating H to a mora that already bears a L, the constraint *Ⓗ is not violated any more but the condition that a mora may only bear one tone is now violated. Therefore another rule is triggered to remove the fresh violation. In Ikaan, L delinking delinks L from the mora, thus satisfying the constraint that moras cannot have more than one tone.

(125) Violation of ‘One tone per mora only’, L delinking



This finally results in a tonal representation that is well-formed, as given in (126).

(126)



Along the way towards the final representation, ill-formed tonal configurations may therefore exist and will in fact be created by phonological rules. However, this triggers the application of further rules until all violations are removed. At the end of the derivation, all representation are well-formed, no constraint is violated.

Further assumptions

By working with underlying forms and applying rules to them to arrive at surface forms I work with a derivational model.

My way of looking at the phonology requires strata at least to some degree. Some rules and constraints apply from a certain point onwards but not before this point. For example, in section 3.5.2 I state that OCP(L) and L merging do not affect tones until tonal melodies have been associated. In section 4.2.5 I will show how applying OCP(L) too early produces the wrong results. Working with strata has implications for the modelling of the way the phonology works, for example Lexical Phonology (Pulleyblank, 1986) would be able to include such strata. I will not follow up this topic here however.

Finally, I make a distinction between non-associated tones and associated tones. Non-associated L, i.e. 'leftover' tones from tonal melodies that cannot be associated with TBUs because there are not enough TBUs in the word, cannot survive as floating tones and are deleted instead. L that were associated but have been delinked do survive as floating tones and remain. Whether deletion or delinking applies to a L that is not associated therefore depends on the history of the L. Reference to the history is a rare process, but it is attested for segmental processes in Kinyamwezi (Kula, 2008). In this language, surface /ʃ/ may either be lexical /ʃ/ or derived /ʃ/ which originate from /s/ which has undergone a palatalisation process. Derived /ʃ/ are subject to an OCP constraint in a different process and revert back to their original /s/ whereas lexical /ʃ/ are unaffected by the same OCP constraint and remain /ʃ/ (Kula, 2008:1329–1330).

3.6 Downstep

I have already discussed downstep in Ikaan in section 3.3.2 where I have shown that phonetic mid tones are underlyingly downstepped H tones. Here I am returning to downstep to introduce the relevant literature on downstep and add to the phonological description of downstep in Ikaan.

3.6.1 Definitions and terminology

Downtrends are common processes in African languages but the terminology around them is used differently by different researchers. Therefore I will briefly describe some downtrends and clarify my terminology. The discussion here follows Yip (2002), Gussenhoven (2004) and Connell (2001).

The term 'declination' is used to refer to an overall fall in pitch as an utterance proceeds. It is sometimes also referred to as 'downdrift'. Declination is seen as a mainly phonetic effect and has been attributed to drop in subglottal pressure. The degree of the declination varies not only across languages but also across different tones within the same language or even within the same language across speakers.

Connell (2001:2) illustrates declination in tone languages with an utterance from Hausa. All tones in this utterance are H and still the tones gradually lower in pitch. The sentence and the schematic pitch track are given in (127).

(127) Múudíi yáa zóo gídáa → [— — — — — —]
'Muudii came home.'

I will not discuss declination any further in this thesis.

'Downdrift' is used by many researchers to refer to the pitch lowering of H after an overt L tone. It is more phonological in nature than declination. Downdrift is also called 'downstep', 'automatic downstep', 'key lowering' or 'register shift'. I will use 'automatic downstep' here.

Connell (2001:3) illustrates automatic downstep with an utterance from Ibibio. The utterance begins with a sequence of H tones followed by a L and then another sequence of H tones. The second sequence of H tones is at a lower pitch than the first sequences of H. The phrase and the schematic pitch drawing are given in (128).

(128) ékíkéré yè úkárá ídém → [— — — — _ — — — —]
'thought and self-rule'

If a H tone is lowered in pitch in the absence of an overt L tone this is called 'downstep' or 'non-automatic downstep'. I will use 'non-automatic downstep' here. The presence of non-automatic downstep is usually explained by an unassociated, floating L tone.

Connell (2001:3) illustrates non-automatic downstep again with an utterance from Ibibio. The utterance is made up entirely of H tones but there are floating L tones in between some of the H tones which cause the H that follows the floating L to lower in pitch. The Ibibio phrase and the schematic pitch drawing are given in (129).

(129) úbɔ́k í́ꜜwá úꜜbɔ́ːŋ ɔ́ꜜbɔ́ːŋ → [— — — — — — — —]
'hand of cassava of king's kingship'

Non-automatic downstep can be seen as the grammaticalisation of declination because the downstep is a pitch drop in a specific phonological or morphological context that contrasts with the absence of the pitch drop. What exactly triggers the non-automatic downstep and when and where it is triggered varies greatly between languages.

Going back to Welmers (1959), a distinction is made between languages that have downstep and languages that do not have downstep. Languages with downstep are called terraced-level languages or downstepping languages, while languages that do not have downstep are referred to as discrete-level or simply non-downstepping languages. Typical terracing languages are Igbo, Ibibio, or Akan. A typical discrete-level language is Ega (Gibbon, 2004). For further discussion on the usefulness and validity of this distinction see Connell (2001).

3.6.2 Downstep in Ikaan

Ikaan is characterised by the presence of non-automatic downstep without automatic downstep and by the contrast between H and ꜜH after pause. Examples for words in isolation which show ꜜH after pause have been given in (78). More examples of this will be given in section 6.5. A more detailed description of ꜜH after pause remains a task for further research. In this section, I will focus only on the absence of automatic downstep and the presence of non-automatic downstep.

Automatic and non-automatic downstep

In Ikaan, in sequences of H and L there is no automatic downstep, i.e. there is no downstep after overt L tones. In (130) there are H and L tones alternating. All H and L are linked to TBUs, no tone is floating.

(130) a.

dʒɛ̀-	r̥ã́n	ɔ̀wɔ́g	àrákpà
1S.NFUT-	prepare.NFUT	soup	bean

I made bean soup. (ooo.063)

b.

dʒɛ	r̥ãn	ɔ	wɔg	a	ra	kpa
|	|	|	|	|	|	|
L	H	L	H	L	H	L

As shown in the annotated pitch track in Figure 3.8, there is no lowering of the H tones after the L tones. All three H tones are between 147Hz and 149Hz.

After floating L tones however H are partially lowered. Floating L tones may be lexically present, as in (131a), or they may have been set afloat after their TBU deleted as in (131b).

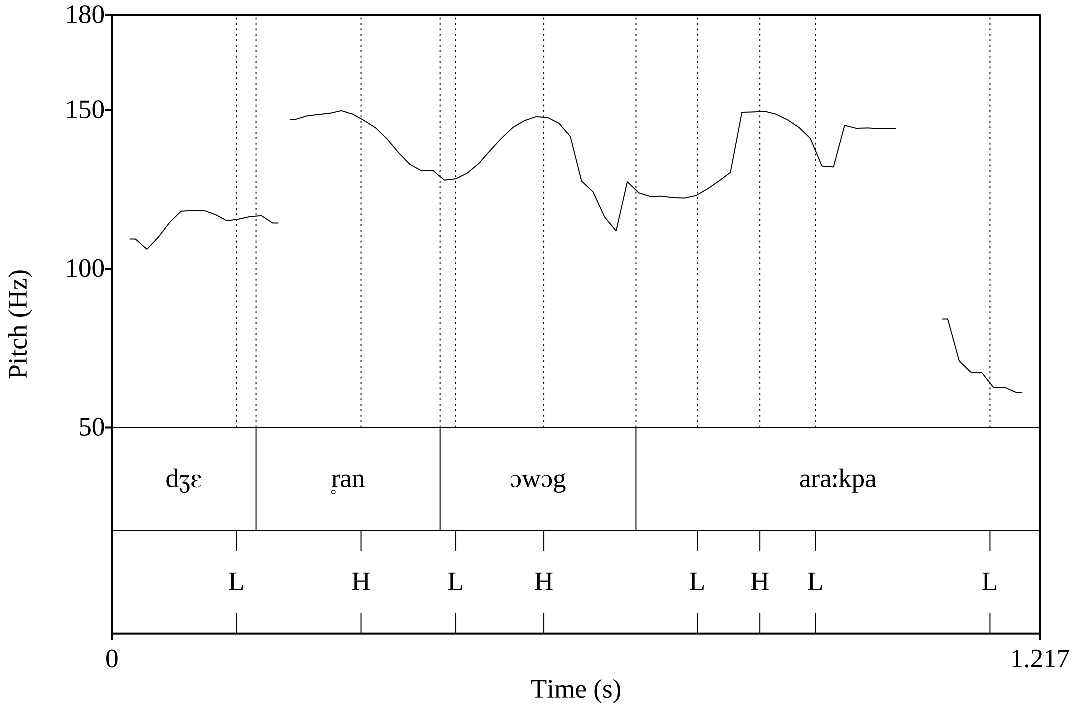


Figure 3.8: Pitch track of *dʒὲr̥ấn ɔ̀wóg àrákpà* in (130)

(131) a. àfá ꜜdáːn
leaves DEM.DIST
those leaves (dem.071)

a fa daːn
L H L H H

b. dʒè- jé ὲnɔ̃́m ὲkɔ̀kɔ̀ → [dʒèjέꜜnɔ̃́m ὲkɔ̀kɔ̀]
1S.NFUT- eat.NFUT meat chicken
I eat chicken meat. (ooo.071)

dʒe je ɛ nɔ̃m ɛ kɔ kɔ
L → H L H L

dʒe j- ɛ nɔ̃m ɛ kɔ kɔ
L H L H L

Annotated pitch tracks of (131a) and (131b) are given in Figure 3.9 and 3.10.

In both cases, there is a pitch difference between the first and second H tone in the utterance, and in both cases the pitch difference is less than the difference between the initial LH interval. Therefore Ikaan shows partial downstep of H, not total downstep.

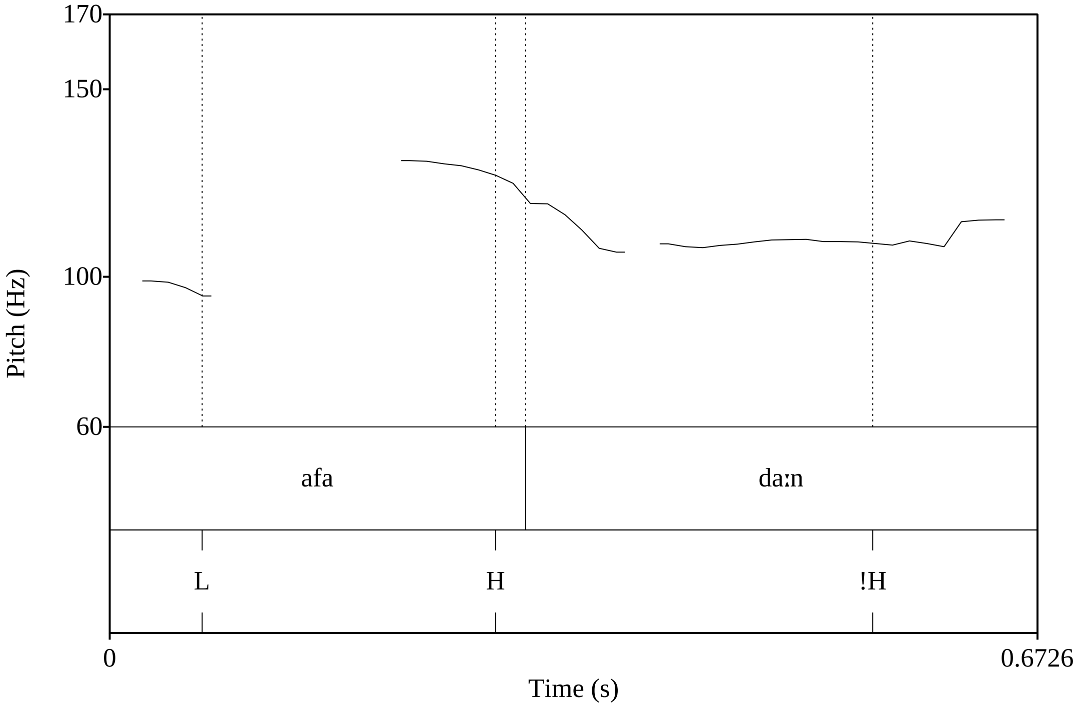


Figure 3.9: Pitch track of *àfá ꜜdáːn* in (131a)

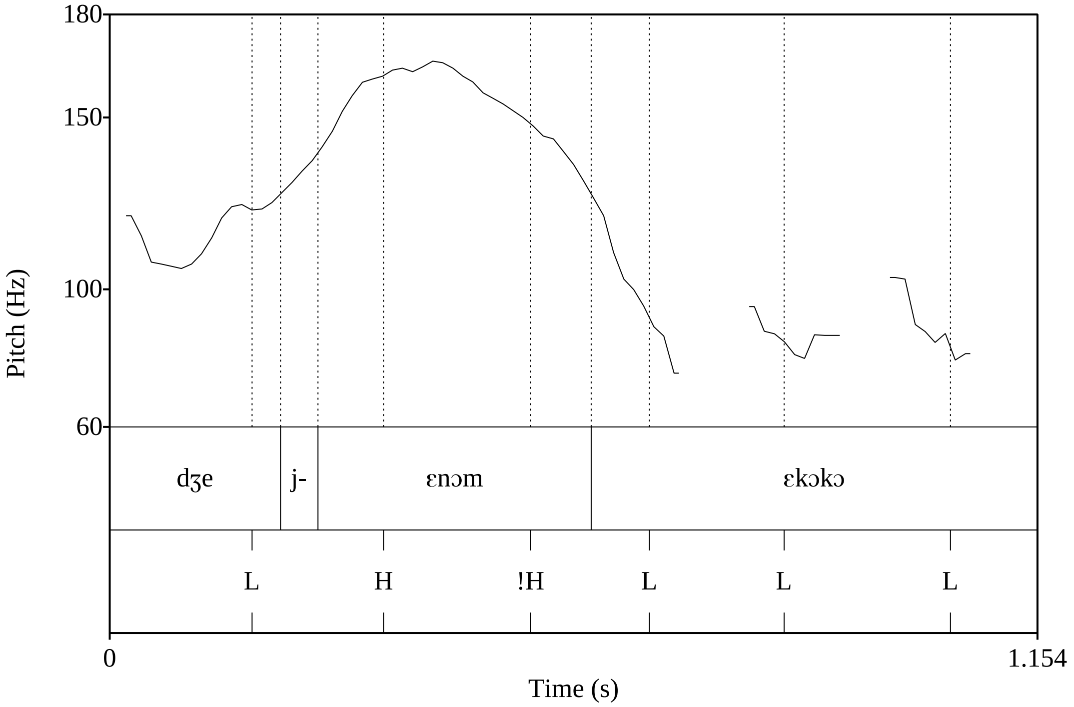


Figure 3.10: Pitch track of *dʒèjɛ́ꜜnɔ̋m ɛ̀kɔ̀kɔ̀* in (131b)

L tones are not downstepped.[21] This is simply because L does not occur after floating L because OCP(L) in Ikaan merges adjacent identical L tones so that Ⓛ L contexts never arise. (132) shows an example with L tones on each side of a morpheme boundary. The TBU on the left side of the morpheme boundary is deleted but the tone that follows it does not surface at a lower pitch.

(132) ɔ̀- fɛ́g- ɔ̀kɔ̃́rɔ̀m ɔ̀ːdʒ → [— ¯¯ — ¯¯ __ __]
3S.NFUT- break.NFUT nose 1S.POSS
He broke my nose. (ooo.065)

The annotated pitch track in Figure 3.11 shows the pitch levels for the first two L tones. They are at 114Hz and 118Hz respectively, and therefore not downstepped.

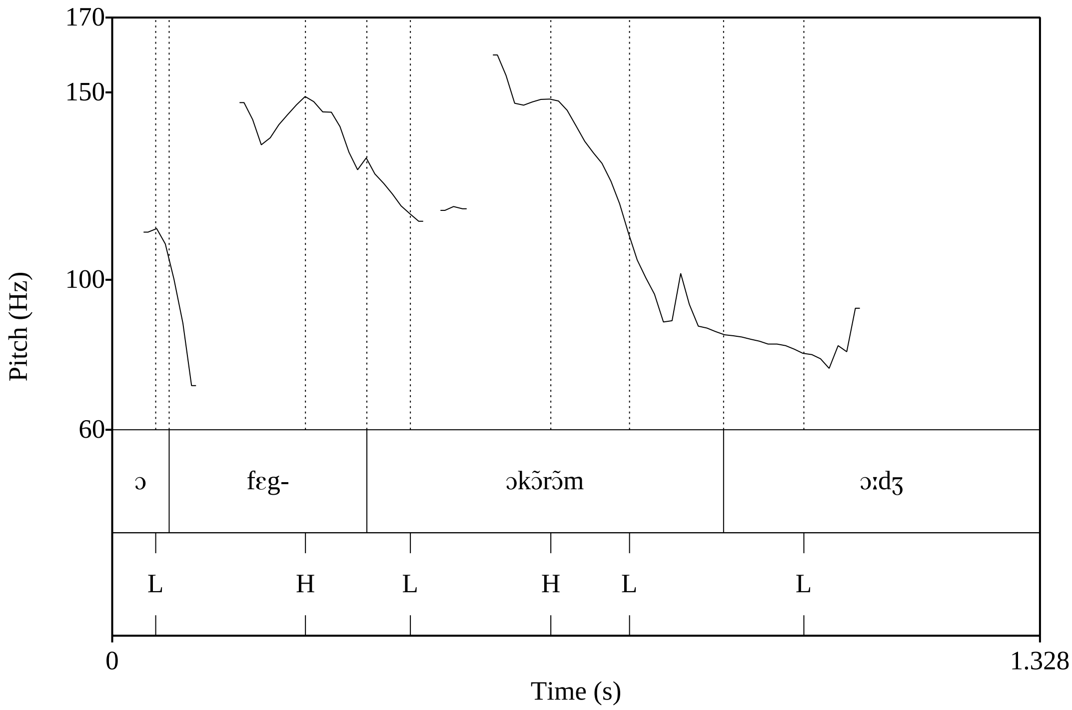


Figure 3.11: Pitch track of *ɔ̀fɛ́gɔ̀kɔ̃́rɔ̀m ɔ̀ːdʒ* in (132)

Downstep therefore only affect H tones after floating L tones. The process can be expressed as given in 133.

(133) Downstep after Ⓛ
H → ꜜH / Ⓛ__

[21]Remember that L is lowered at syntactic phrase boundaries because of final lowering. This is not a downstep process and has been discussed in section 3.3.3.

This makes Ikaan a language with highly unusual downstep patterns, but having non-automatic downstep without having automatic downstep is not unattested but has been described for Dschang-Bamileke (Hyman, 1979), Kikuyu (Clements and Ford, 1980a), Kanuri (Clements and Ford, 1980b) and Northern Mao (Ahland and Pearce, in prep.:3).

Location of the downstep—when are H downstepped?

The location of the downstep, i.e. the mora where the register is lowered, varies considerably in Ikaan. Of course, H is downstepped immediately after Ⓛ. However, the difficulties lie in finding the location of this floating L and in deciding whether a linked L will be set afloat or not.

There are three locations for downstep in Ikaan. I will briefly illustrate each location here with an example and pitch tracks. I will discuss how the different locations of the downstep come about in Chapter 6.

The first location is the 'classic downstep' where the register is lowered exactly where it would be expected to lower, i.e. on the H that immediately follows the L that was set afloat.

(134) dʒɛ̀- hɔ́ ȉrú → [dʒɛ̀hʷí↓rú]
1S.NFUT- hack.NFUT palm.fruit
I hacked palm fruit. (ooo.095)

The annotated pitch track of (134) showing the downstepped H tone on *í↓rú* is given in Figure 3.12.

In other constructions, the register is lowered one mora to the left of where it lowers in the 'classic' downstep, i.e. right on the formerly L-toned mora.

(135) ȉrèmí ȉdɛ́n → [ȉrèmí↓ːdɛ́n]
orange DET
the very orange (spec.005)

The annotated pitch track of (135) is given in Figure 3.13. It shows the modulation and lowering on the long vowel */iː/* and before the H tone on *dɛ́n*.

Finally, in certain constructions the register is lowered a number of moras before where it would be lowered in 'classic' downstep. This is the case in constructions with the 3S.POSS pronoun. The underlying form *ɔ̀kɔ̋rɔ̏m ɔ̌ːn* 'his nose' surfaces as *[ɔ̀kɔ̋↓rɔ̋m ɔ́ːn]*. The downstep is located before the final L of the noun *ɔ̀kɔ̋rɔ̏m* 'nose'. This leftward shift is because the L tones delink and the H tone copies leftward.

(136) dʒá- ɔ̀kɔ̋rɔ̏m ɔ̌ːn ù fɛ́gɛ́ →
1S.FUT- nose 3S.POSS epV.FUT.L break.FUT

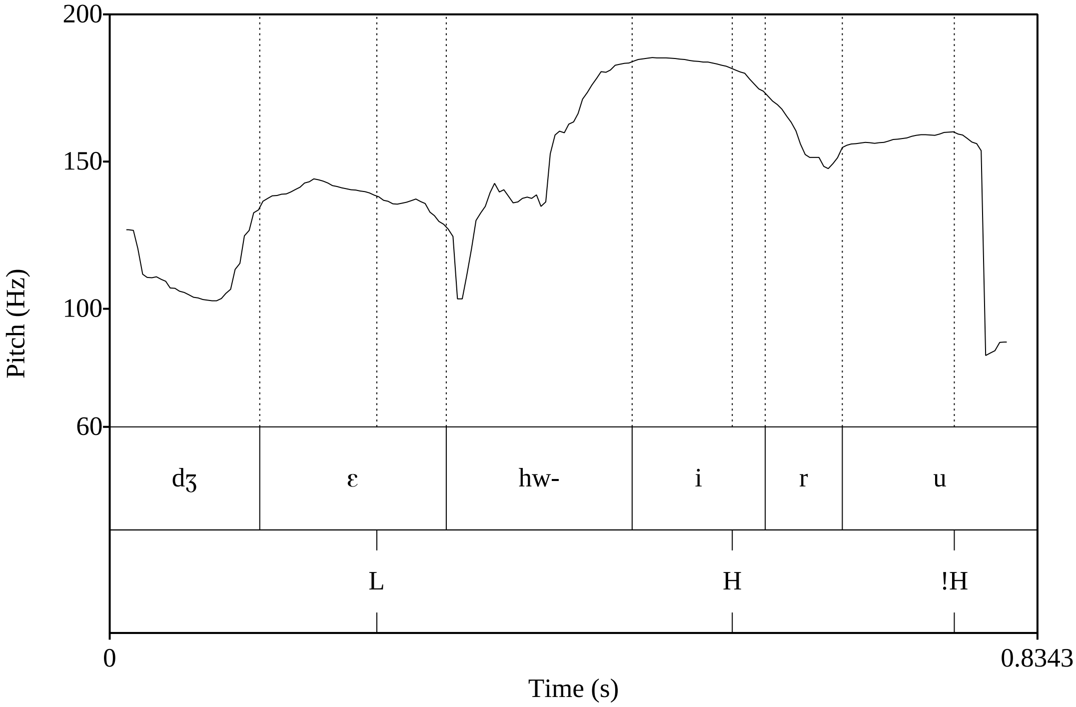


Figure 3.12: Pitch track of *dʒɛ̀hʷí↓rú* in (134)

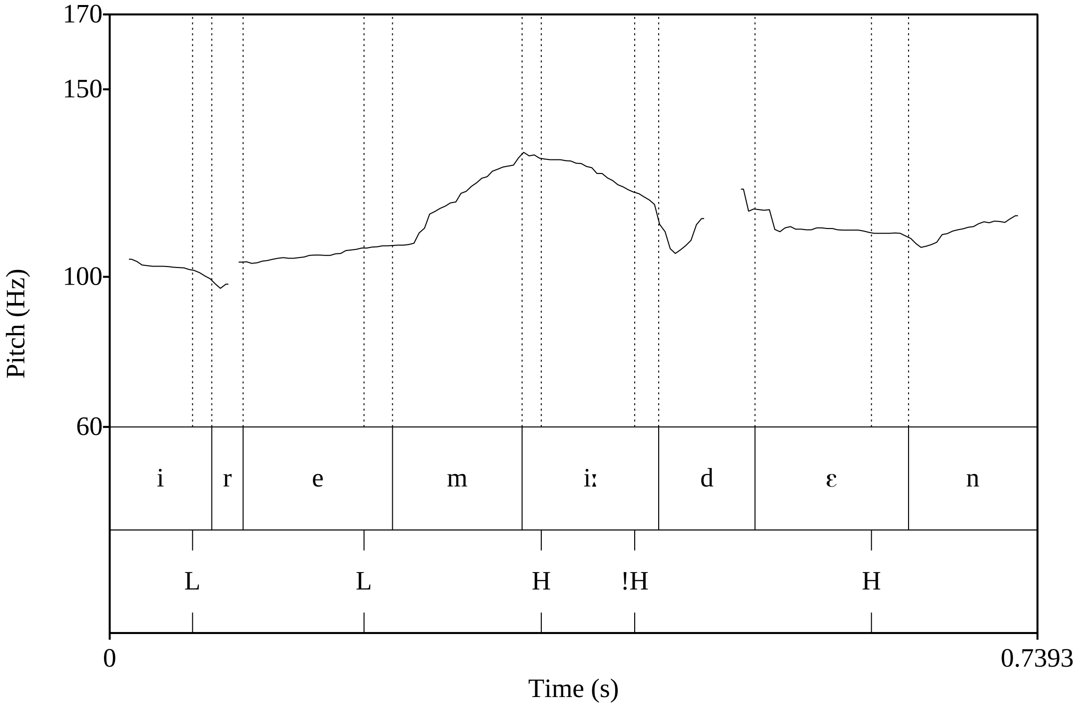


Figure 3.13: Pitch track of *ìrèmí↓ː́dɛ́n* in (135)

[dʒá ɔ̀kɔ̃́ꜜrɔ̃́m ɔ́ːn ù fɛ́gɛ́]

I will break his nose. (futl.044)

As evidence, the pitch track for the surface form *[ɔ̀kɔ̃́ꜜrɔ̃́m ɔ́ːn]* is given in Figure 3.14. The L tone is at 109Hz, the H at 130Hz and the downstepped H tones at 122Hz and 117Hz.

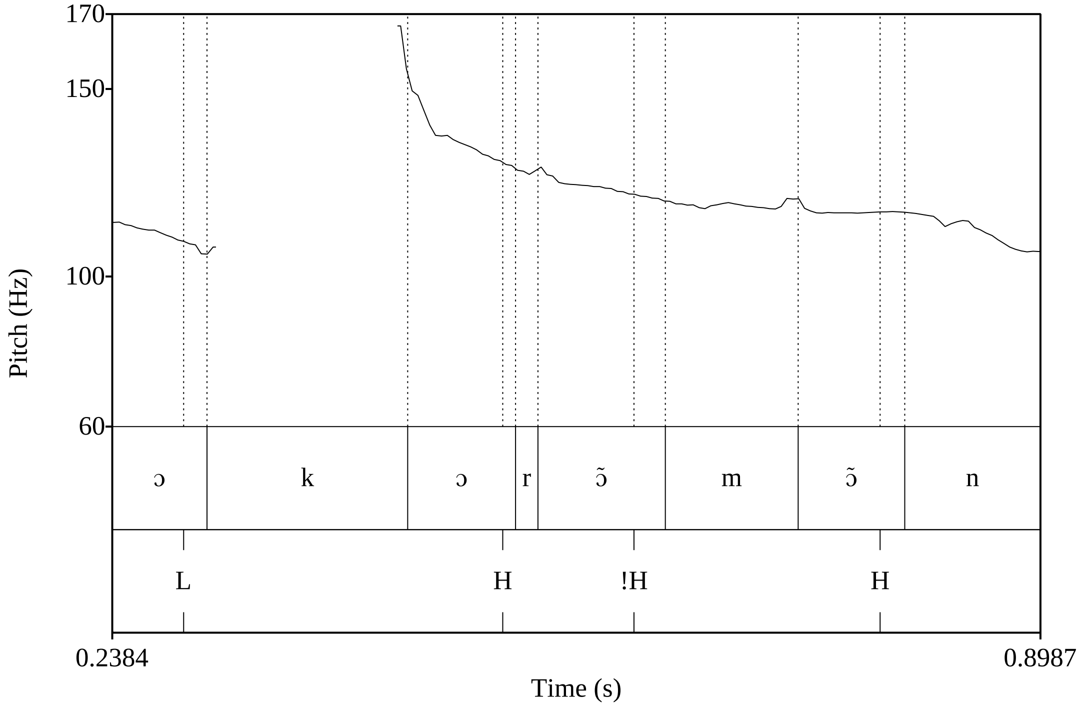


Figure 3.14: Pitch track of *ɔ̀kɔ̃́ꜜrɔ̃́m ɔ́ːn* in (136)

The leftward shift of the downstep may even affect a whole sentence. (137a) shows a sentence in which all words are L-toned. If this sentence is followed by the emphatic marker *ꜜóː* (see 137b), the whole utterances surfaces with ꜜH throughout.

(137) a. dʒɛ̀- jã̀nà ìhjɛ̀hjɛ̀g
1S.NFUT- buy.NFUT sponges

I bought sponges. (ooo.048)

b. dʒɛ̀- jã̀nà ìhjɛ̀hjɛ̀g ꜜóː →
1S.NFUT- buy.NFUT sponges EMPH

[ꜜdʒɛ́jã́níhjɛ́hjɛ́g óː]

I bought sponges-o. (ooo.048)

In Figure 3.15 the pitch track for (137a) is given. All tones in this utterance range between 115Hz and 123Hz. Figure 3.16 shows the pitch track for (137b).

In this utterance, all tones are higher and range between 137Hz and 144Hz. This absolute pitch in itself may not be all that telling since what is important is relative pitch, not absolute pitch. However, together with the data presented later in section 6.5, I can make a convincing case for an all-$^{\downarrow}$H sentence here.

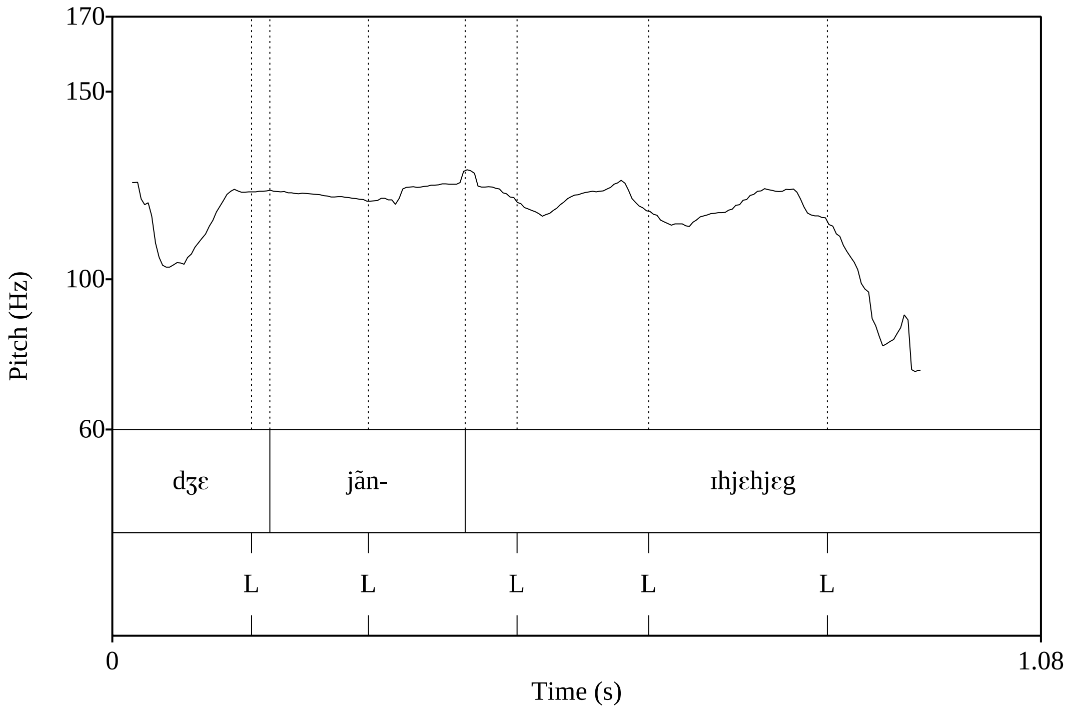


Figure 3.15: Pitch track of *dʒɛ̀jã̀nìhjɛ̀hjɛ̀g* in (137a)

As these examples show, the exact location of where the downstep surfaces varies. The location is specific to certain morphosyntactic constructions, these will be discussed in detail in Chapter 6.

Triggers for downstep

My proposal is that in Ikaan all instances of downstep are triggered by floating L tones. The floating L can

- be part of the lexical representation of a word (distal demonstrative pronouns as shown in (131a))
- have been set afloat by deletion of its host TBU (verb + object construction as shown in (131b))
- have been set afloat by suprasegmental tonal processes (constructions in (135), (136) and (137b))

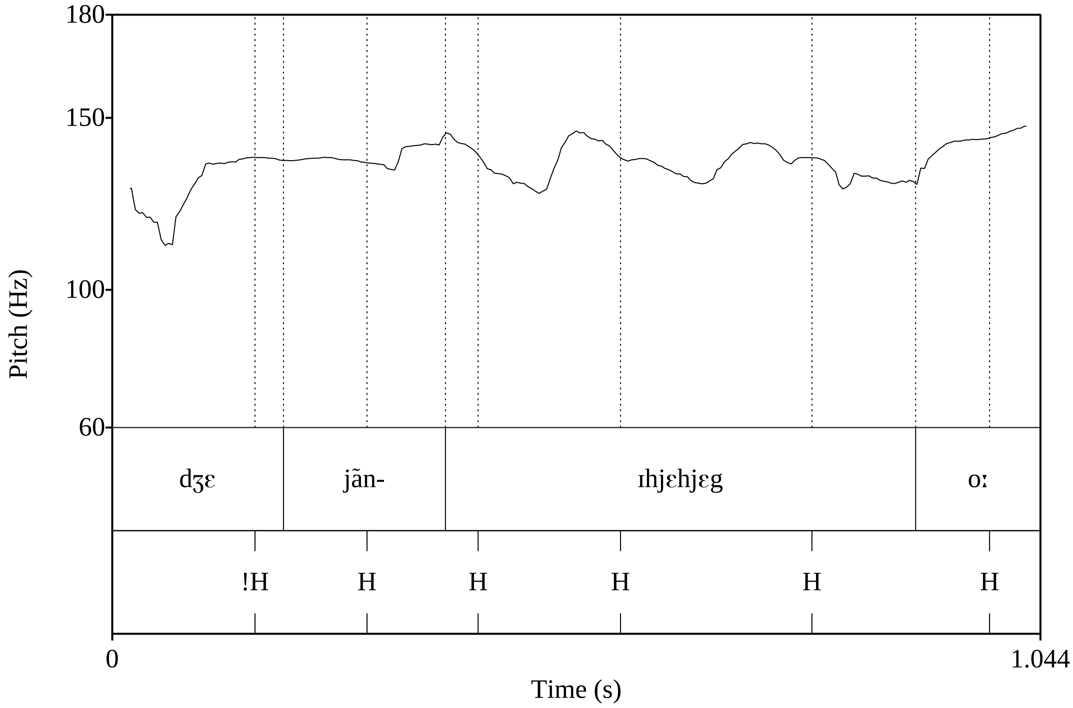


Figure 3.16: Pitch track of *ꜜdʒɛ́jã́nɪ́hjɛ́hjɛ́g óː* in (137b)

3.7 Chapter summary

In this chapter I have discussed the tone-bearing unit in Ikaan, analysed the tones and their allotones and have described tonal melodies and their association. I have introduced a set of tonological rules and the phonological aspects of downstep in Ikaan.

I have also explained my understanding and use of the terms ‘condition’, ‘constraint’ and ‘rule’. In the following chapters I will put these concepts into use and illustrate how the rules and constraints can be applied to account for the data in a simple and insightful way.

What has started becoming apparent in this chapter is that L and H are not symmetrical in their behaviour but follow different phonologies. Even though there are rules and constraints that apply to both tones, there are many rules and constraints that apply only to L or only to H. I will give further examples of this in the following chapters.

In the following chapters I will show how the phonology as it is described here is implemented in the lexicon and grammar and at the interface between phonology and grammar of Ikaan. I will demonstrate how patterns at these levels of linguistic analysis can be used as evidence to back up the claims I have made in this section. I will further show which additional morphosyntactic information has to be added to the purely phonological rules to describe and explain the surface forms that can be observed in Ikaan and argue for these as well.

Chapter 4

Tone in the Ikaan lexicon

The previous chapter introduced the phonology of tone in Ikaan. In this chapter I will look at the representation and behaviour of tone at the lexical level. In particular, I will discuss how tones and segments are represented in lexical items in Ikaan.

What we find is that in Ikaan there are four types of configurations of tones and/or segments in lexical entries.

- Morphemes which are underlyingly toneless
- Morphemes which are solely tonal
- Morphemes with both tonal and segmental information and the tones represented as an underlyingly unlinked melody
- Morphemes with both tonal and segmental information and the tones prelinked to TBUs

For each of these types, I will discuss one example.

Morphemes without tones and morphemes which are solely tonal are counterparts of each other in Ikaan. In Ikaan, pairings of toneless and tonal morphemes are the noun class prefix vowel and the noun class prefix tone or the verb and the inflection tonal melody. I will preview data for verbs and verbal melodies in section 4.1 in order to motivate my claim that verbs are toneless and inflected with tonal melodies. Since inflection is a grammatical topic rather than a lexical issue, I will postpone further discussion of inflection until section 5.2.

Morphemes with segmental information and an underlyingly unlinked tonal melody are represented by nouns in Ikaan. I have already sketched the basics of tonal association in Ikaan in section 3.4.2 but have not given a detailed account of why I argue for these association conventions. In the initial discussion, I have also glossed over an empirical problem in the application of tonal association, namely what happens when there are more tones in a melody than there are tone-bearing units in a word. I will discuss this problem in detail in section 4.2. Tonal association in nouns also offers evidence for two claims I have made in the previous chapter. In section 4.2.5 I will therefore substantiate my proposal that OCP(L) starts to apply only after tones have first been associated with tone-bearing units. I argue for the application of *Ⓗ and H docking after tonal association in section 4.2.6.

Prelinking tones to tone-bearing units occurs as a strategy that is used with two morphemes in Ikaan in my current database, the distal demonstrative and the emphatic marker. Even though prelinking seems to be a strategy for dealing with exceptions, discussing it is worthwhile because again prelinking can be used as evidence for tonal processes in Ikaan. In section 4.3.1, I will show how tonal alternations in the distal demonstrative can be explained with prelinked tones and applying OCP(L) and L merging. I will leave the discussion of tonal processes triggered by the emphatic marker for Chapter 6.

4.1 Toneless morphemes and morphemes made up of tone only

Tones on verbs show an astonishing variability in Ikaan. With almost every tense-aspect-mood category, the tones on the verb root as well as the verbal prefix change. The various tonal patterns are illustrated in (138) with the verb *kʊra* ‘sleep’.

(138) a. ɔ̀- kʊ́rà
ɔ- L- kʊra -HL
3S- NFUT- sleep -NFUT
She slept./She is asleep.

b. ɔ̂ː- kʊ̀rá
ɔː- HL- kʊra -LH
3S- HAB- sleep -HAB
She used to sleep.

c. ɔ̌ː- kʊ́rà
ɔː- LH- kʊra -HL
3S- COND- sleep -NFUT
if she sleeps/if she is asleep

d. ɔ́ꜜː́- kʊ́rá
ɔː- HꜜH- kʊra -H
3S- CONT- sleep -CONT
She is sleeping.

e. ɔ̌ː ꜜkʊ́rá
ɔː LH- ꜜ- kʊra -H
3S- COND- CONT- sleep -CONT

if she is asleep

f. kʊ̀rà
kʊra -L
sleep IMP

Sleep!

g. âː- kʊ́rá
a- H- V- L- kʊra -H
3S FUT FUT FUT sleep -FUT

She will sleep.

For the majority of verbs, the tones can be predicted entirely from their TAM category. Assuming an underlying lexical melody for verbs would not only be unnecessary, it would also complicate the analysis of verbal tones. With underlying lexical tones present (either H or L or any combination of the two tones), it would be highly difficult to explain why the same verb surfaces with five different tonal melodies (L, H, ꜜH, LH, HL). Therefore there would either have to be an explanation for why the lexical melody does not seem to have an effect on the surface melody, or there would have to be a mechanism for removing the lexical melody so that the inflectional melody can surface without being disturbed. Underlyingly toneless verbs and tonal-only inflectional melodies do not raise this problem and derive the observed surface tones without any difficulties.

That being said, there is a range of surface tonal melodies in Imperative which are less straightforward to explain. I will give my proposal for deriving the tones for this TAM category in section 5.2.1.

4.2 Morphemes with underlyingly independent tonal melodies

In section 3.4 I have made the claim that nouns have underlyingly unlinked lexical tonal melodies. I have not yet presented evidence that they really do have these lexical melodies, and I have not looked at data that might be pointing into a different direction. Also, while I have sketched the basics of tonal association, I have not explained how exactly tonal association works and whether there are alternative analyses that would also explain the Ikaan data. Therefore in this section I will show that nouns have underlying lexical melodies and that the association, while it does work, proceeds differently from other well-documented cases of tonal association.

I will first give the attested surface melodies, both on prefixes and on roots. I then reduce the surface prefixes to a set of underlying melodies that map one-by-one left-to-right onto moras. I then briefly go back to an informal and a more formal definition of tonal melodies, which results in three logically possible combinations of lengths of tonal melodies and number of tone-bearing units, two of which are attested and one for which it seems difficult to find evidence. For the attested ones, I will give more examples and then discuss two predictions and two explanations which come about from associating melodies this way. Then I will return to the third, seemingly unattested scenario, explain why it poses a problem and motivate a tone deletion analysis to solve the problem.

4.2.1 Surface melodies and underlying melodies

Surface melodies on nouns can be explained by making a distinction between the melodies which occur on nominal prefixes and the melodies which occur on nominal roots.

On nouns pronounced in isolation in their lexical citation form, there are three different tonal patterns that the prefix can take. On monomoraic prefixes there is L, on bimoraic prefixes either both moras are L-toned or there is a LH sequence, as shown in (139).

(139) a. Monomoraic prefix
    èwùr ‘hair’
    òhwó ‘bone’
  b. Bimoraic prefix
    ɔ̀ːrɛ̀ː ‘path’
    ǐːgáráwá ‘20l measuring unit’

If the noun occurs in a predicative construction, the prefix is not L-toned by H-toned instead.

(140) óhwó ‘It’s a bone.’

On the noun roots, the surface melody may consist of one or more L, one or more H, LH, HL and HLL, LHL or HLH, as shown in (141).

(141) a. One or more L
    ìŋmà ‘breast’
    èkèrè ‘pot’
  b. One or more H

ùkúː 'spider'

ɛ̀rʊ́gʊ́ 'gourd'

ǎːkúr̥ájɛ́ 'peanuts'

c. LH

ɪ̀jòhú 'morning'

ɪ̀dʒě:n 'yesterday'

d. HL or HLL

ɪ̀dámà 'sole'

ʊ̀kâ̂m 'flour'

ùkpêːkùr̥ 'raffia masquerade'

e. LHL

ɪ̀gbàgbénà 'jaw'

ɛ̀wàgîm 'crocodile'

f. HLH

ɪ̀ʃákɔ̀rɔ́ 'white hibiscus'

ɔ̀kâːkú 'glutton'

Going from surface melodies to underlying melodies, my suggestion is that for the prefix the tone is a single L or a single H. For the noun roots, my proposal is to analyse the surface melodies in (141) as the underlying tonal melodies L, H, LH, HL, LHL and HLH respectively. This implies that there are tones from two sources that need to be associated: the prefix tone and the tonal melody of the noun.

In my analysis, the prefix itself is made up of two morphemes—a toneless segmental morpheme which indicates the noun class and a separate tonal morpheme which indicates if the noun is used nominally (L tone) or a predicatively (H tone). This is illustrated in (142).

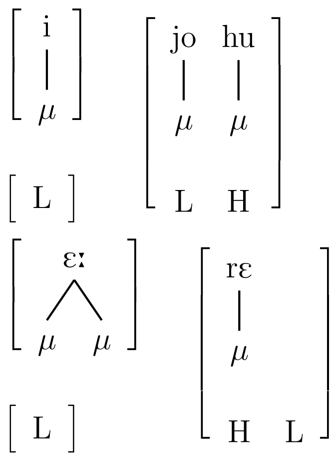
(142) a. ɔ̀- tá
ɔ- L- tá
O6- NOM- lamp
lamp

b. ɔ́- tá
ɔ- H- tá
O6- PRED- lamp
It's a lamp.

For the noun roots, tones and segments do not come from separate morphemes like with the prefixes. Instead, the tones are an integral part of the lexical entry. At the same time, tones are independent of the TBUs in the sense that inside the lexical entry they are not linked to any TBUs yet. For prefix morphemes and the root morpheme put together, the resulting underlying morphological structures for *ȉjòhú* 'morning' and *ɛ̌ːrɛ̀* 'tortoise' are given in (143).

(143) a.

b.



The tones are only associated once the word has been formed. The segmental and tonal prefix and the noun root come together to form a noun. The morpheme boundaries are wiped out and tones and segments line up into a sequence on their respective tier. The sequence of tones then associates to the sequence of moras left-to-right, one-by-one.

Describing tone association this way will result in a problem. To explain how this problem arises I will briefly return to the definition of tonal melodies which I have given in section 3.4.1. Tonal melodies are a limited set of underlyingly independent sequences of tones that are mapped onto the word. Crucially, 'independent' implies that it does not matter how many tones there are in a melody and how many TBUs there are in the word. In a more formal definition, a set of underlyingly independent tonal melodies can be postulated if for a given stem X any tonal melody Y belonging to some set Z of tonal melodies can be selected *without* making reference to phonological properties of X (Pulleyblank, 1986:234).

If the tonal melodies are 'blind' to the segmental and even skeletal structure of the root or the word they will associated with, any tonal melody should be able to occur with any root, independent of their respective lengths. This means there are three logical combinations for lengths of roots and lengths of melodies:

1. There are as many TBUs as there are tones.

2. There are less tones than TBUs.

3. There are more tones than TBUs.

In Ikaan, the first two combinations of tones and TBUs are easily explained. For the third combination however there seems to be little evidence that it does actually occur. If indeed it does not occur, this would pose a major problem for the tonal melody analysis. I will therefore briefly outline the first two and discuss the advantages of this analysis, and then return to the third scenario.

4.2.2 $\mathbf{n}_{Tones} \leq \mathbf{n}_{TBUs}$

Association

The formation of nouns from prefixes and roots is illustrated in (144) and (145). In the noun *ìjòhú* 'morning' in (144), there is one mora in the prefix and one nominal prefix tone, L. There are two moras in the noun root and two tones in the nominal melody, L and H. Therefore are three tones in total, which have to map onto three TBUs. The tones map one-by-one, left-to-right. Afterwards OCP(L) causes L merging to apply.

(144) ìjòhú 'morning'

a. Underlying independent tones

```
i   jo  hu
|   |   |
μ   μ   μ

L   L   H
```

b. One-by-one right-to-left association

```
i   jo  hu
|   |   |
μ   μ   μ
:   :   :
L   L   H
```

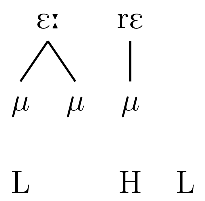
c. Violation of OCP(L) causes L merging

```
i   jo  hu
|   |   |
μ   μ   μ
|  /    |
L       H
```

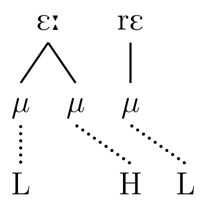
In the noun *ɛ̌ːrɛ̀* 'tortoise' in (145), there are two moras in the prefix and one prefix tone. In the nominal root, there is only one mora but two tones in the melody. Taken together, there are again three TBUs and three tones to be mapped onto the TBUs. Therefore all tones can associate, even though the first tone of the nominal melody in (145) associates already with the prefix and not with the root.

(145) ɛ̌ːrɛ̀ 'tortoise'

a. Underlying independent tones



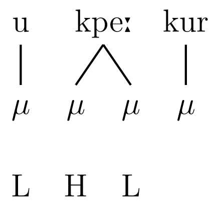
b. One-by-one right-to-left association



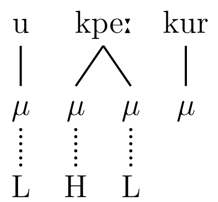
If there are less tones in the melody than there are moras in the word, the last tone of the melody copies, inserts and links to the next mora until all moras are supplied with tones.[1] If the last tone was L and there are now multiple adjacent L tones, OCP(L) applies and merges the L tones.

(146) ùkpêːkùr 'raffia masquerade'

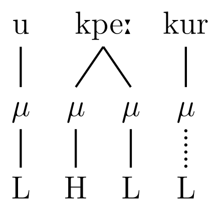
a. Underlying independent tones



b. One-by-one right-to-left association

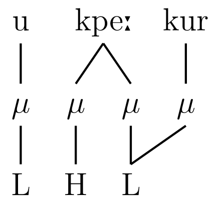


c. Violation of *(μ), copy and link tones



d. Violation of OCP(L), L merging

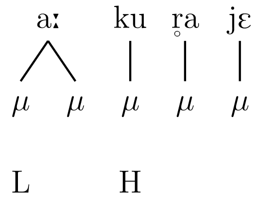
[1] As mentioned before, I am aware of the fact that tone copying rather than tone spreading creates OCP violations and goes against the standard assumption in autosegmental phonology that tones would spread onto available leftover TBUs, not copy, insert and link. I have made the distinction between copy and spread in section 3.4.2 and will return to a justification for why I choose copying rather than spreading in section 7.5 and to a discussion of the OCP violations in section 7.4.



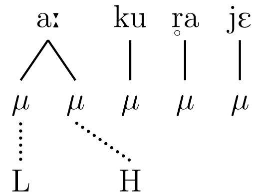
In *ǎːkúr̥ájɛ́* ‘peanuts’ in (147), the tonal melody of the noun again associates with the second mora of the noun class prefix, like in (145) above.

(147) ǎːkúr̥ájɛ́ ‘peanuts’

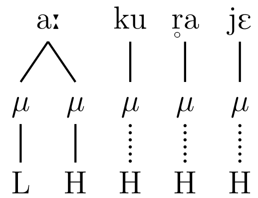
a. Underlying independent tones



b. One-by-one right-to-left association



c. Violation of *μ, copy and link tones



Before turning to the discussion of cases with less moras than tones, I will summarise the predictions which grow out of this approach and present two pieces of data which provide further evidence for the analysis proposed here.

Implications and explanations

The analysis given so far states that there are six tonal melodies (L, H, LH, HL, LHL, HLH), which map onto TBUs one-by-one left-to-right. If there are less tones than TBUs, the last tone copies, inserts and links to the remaining TBUs. This algorithm makes two predictions and provides an explanation for two tonal configurations which occur in some Ikaan words.

Firstly, the suggested mapping of tonal melodies rules out contours on monomoraic vowels in non-final position.[2] This prediction holds for the data.

[2] I am aware of the fact that linking more than one tone to a mora in any position is already ruled out by Constraint 2, which rules out more than one tone per mora. Still, working with

Word-medial contours only occur on on long, bimoraic vowels and can be analysed as sequences of level tones.

Secondly, the tonal mapping predicts that sequences of the same tone followed by a different tone such as *L($_{PREF}$)–LLH or *L($_{PREF}$)–HHL are ruled out because they cannot be derived with the association conventions. Again, this prediction holds. Tonal patterns like this are not attested in monomorphemic words in Ikaan.[3]

In addition to the two predictions that bear out for Ikaan, mapping of tonal melodies accounts for what seems to be a free variation in a tonal configuration. The word 'horse' may be pronounced either as *ùgbátà* or as *ùgbâːtà*. Speakers switch freely between the two pronunciations, neither is considered ungrammatical. If *ùgbátà* or *ùgbâːtà* 'horse' has an underlying HL melody, the pronunciation with the short vowel /a/ would be mapped as in example (148a), the pronunciation with the long vowel /aː/ would be mapped as in example (148b).

(148) a. ùgbátà 'horse'

```
u   gba  ta
|   |    |
μ   μ    μ
|   |    |
L   H    L
```

b. ùgbâːtà 'horse'

```
u    gbaː     ta
|    /  \     |
μ   μ    μ    μ
|   |    |  /
L   H    L
```

This reduction of a HL sequence on a bimoraic vowel to a H level tone on a monomoraic vowel followed by another L also occurs in in other nouns, e.g. *àrâːkpà* 'bean soup' and its free variant *àrákpà*. It further occurs in other parts of speech, for example with the adverb *àʃâːʃà* 'very well' and its free variant *àʃáʃà* or the verb *ʊ̀ʃɛ̂ːʃɪ̀* 'it is more than' and its variant form *ʊ̀ʃɛ́ʃɪ̀*.

Finally, combining the prefix tone with the tonal melodies and mapping the resulting string of tones onto the word explains why monomoraic prefixes are invariably L-toned but bimoraic prefixes are either L-toned or bear a LH sequence. If the noun root is preceded by a bimoraic prefix and the nominal melody is L-

tonal melodies prohibits the same representation for a different reason, which implies that the same prohibition of a tonal representation can be motivated independently from two different perspectives.

[3] Nouns such as *ògìdìmòr̥ó* 'pawpaw' or *ʊ̀kɛ̀jɛ̀kɛ́jɛ̀* '(a type of) maggot' where such sequences do occur are morphologically not simple but compounds or reduplications.

initial, both moras of the prefix will be linked to L tones, as in *ɔ̀ːrɛ̀ː* 'path' or *ìːjɔ́* 'yam'. If the nominal melody is H-initial, the H will link to the second TBU of the prefix, resulting in a LH sequence on the prefix as shown in (147).

Working with tonal melodies and tonal mapping as suggested above explains existing surface patterns and the observed tonal alternation, and there is no counter evidence to falsify the predictions that are made.

Let me now return to the third scenario for combining tonal melodies and roots to show how things are not quite that straightforward there.

4.2.3 $\mathbf{n}_{Tones} > \mathbf{n}_{TBUs}$

With cases of $\mathrm{n}_{Tones} \leq \mathrm{n}_{TBUs}$ accounted for, let us now turn to $\mathrm{n}_{Tones} > \mathrm{n}_{TBUs}$ scenarios, i.e. nouns with melodies whose number of tones exceeds the number of available TBUs in the root. After all, if tone is indeed autosegmental in Ikaan, and if Ikaan uses tonal melodies for nouns, one would expect any type of root in Ikaan to occur with any type of tonal melody attested in Ikaan without making reference to the number of TBUs of the root. Therefore examples with 'long' melodies on 'short' roots are predicted to exist. The problem is that they are difficult to find in Ikaan.

One data set where $\mathrm{n}_{Tones} > \mathrm{n}_{TBUs}$ can be argued to occur is with nouns with long noun class prefixes. The distribution of monomoraic and bimoraic prefixes is entirely lexical, there is no phonological or other motivation for why some noun class prefixes are short and other noun class prefixes are long.

Examples for nouns with bimoraic prefixes and monomoraic roots which take L, H, LH and HL melodies are given in (150).

(149)	Lexical melody	Prefix and root	Gloss
	L	ɔ̀ː- rɛ̀ː	'path'
	H	ʊ̌ː- r̥ʊ̃́	'honey'
	LH	ìː- jɔ́	'yam'
	HL	ǎː- fɔ̀	'the following year'

The nominal roots in (149) are clearly monomoraic. The melodies that come with the roots consist either of one tone, as in the roots *-rɛː*$_L$ 'path' and *-r̥ʊ̃*$_H$ 'honey', or they consist of two tones, as in the roots *-jɔ*$_{LH}$ 'yam' and *-fɔ*$_{HL}$ 'next year'. The latter roots are therefore evidence that roots can be specified for melodies that have more tones than there are TBUs. The problem is that the only time when we can see evidence for $\mathrm{n}_{Tones} > \mathrm{n}_{TBUs}$ is when the prefix is bimoraic. In all other cases, it looks as though the melodies that associate with roots are always either shorter than the roots or just as long as the roots, but never longer than the roots.

Note also that even with V:CV nouns there never seems to be any evidence for tonal melodies that have three tones, though for V:CVCV nouns again there is evidence that the bimoraic root can take a melody that consists of three tones and let all tones surface, but again only if the prefix is bimoraic, as in (150).

(150)

Lexical melody	Prefix and root	Gloss
HLH	ǔː- rùr̥á	‘walnut’
	ǔː- kàr̥á	‘grass hopper’
	ɔ̌ː- rùkú	‘locust bean’

For the $n_{Tones} > n_{TBUs}$ combination there is therefore an unexplained gap and an unexplained restricted distribution, which both need clearing up. The gap is that there never seems to be any evidence for monomoraic roots taking tonal melodies with three tones. The distributional problem is that evidence for $n_{Tones} > n_{TBUs}$ occurs only with nouns with bimoraic prefixes, never with nouns with monomoraic prefixes. Therefore I suggest keeping these examples in mind as an indication that ‘long’ melodies on ‘short’ roots are to some degree possible. Since they are restricted though we must find an alternative explanation to explain the mysterious gap.

Apart from the examples with the long noun class prefixes, what would $n_{Tones} > n_{TBUs}$ look like in Ikaan and when could this scenario come about?

For example, the root *-tá* in the word *ɔ̀tá* ‘lamp’ cannot have the underlying melodies L, LH or LHL because this could not explain the H on the second syllable. It could, however, potentially be H, HL or HLH underlyingly. For the same reasons, the root *-gù* in the word *ègù* ‘house’ cannot be H, HL or HLH underlyingly but could potentially be L, LH or LHL.

The potential underlying patterns for *ègù* ‘house’ and *ɔ̀tá* ‘lamp’ are given in (151).

(151) a.

L	e	+	gu
	L		L
LH	e	+	gu
	L		LH?
LHL	e	+	gu
	L		LH?L?

b.	H	ɔ	+	ta	
		L		H	
	HL	ɔ	+	ta	
		L		HL?	
	HLH	ɔ	+	ta	
		L		HL?H?	

The questions now are where those ‘missing’ L and H are, and, if evidence for their presence cannot be found, why they are not there. To answer this, I will look at what other West African languages do with the left-over tones and describe if the same applies to Ikaan, and if not, what else could apply.

Contours tones and multiple linking

Contour tones are a well-known feature of nouns in Mende and have been described and analysed in detail in Leben (1973). Mende has melodies with one, two or three tones (H, L, HL, LH, LHL) and roots with one, two or three TBUs. All lengths of melodies occur with all lengths of roots. Tones link to TBUs one-by-one, left-to-right. All tones must be associated with TBUs and all TBUs must be associated with tones. TBUs that are unspecified for tone and unlinked tones are not allowed. If there are less tones than TBUs, the last tone spreads onto the remaining TBUs, as shown in (152).

(152) H kɔ́ ‘war’, pɛ́lɛ́ ‘house’
L kpà ‘debt’, bɛ̀lɛ̀ ‘trousers’

If there are more tones than TBUs, the remaining tones all link to the last TBU, creating contours at the right edge of the word (Leben, 1973:64).

(153) HL kényà ‘uncle’, mbû ‘owl’
LH nìká ‘cow’, mbă ‘rice’
LHL nìkílì ‘groundnut’, nhàhâ ‘woman’, mbă̂ ‘companion’

Mende therefore links multiple TBUs to one tone and multiple tones to one TBU.

In Ikaan, contours of three tones like **ègŭ̂* ‘house’ or **ɔ̀tă̂* ‘lamp’, which would be comparable to *mbă̂* ‘companion’ in Mende, are not attested.

There are word-final LH sequences on bimoraic vowels, as shown in (154). However, given that each mora can bear one tone, this is not an instance of multiple linking and therefore not the same as in Mende. Notice that HL contours never occur in these contexts.

(154) ı̏dʒě:n 'yesterday'
ɛ̀wǎ: 'knife'
ı̀jɔ̌̌: 'finger nail, toe nail'
ʊ̀hwı̌̌: 'salt'
àjɔ̌̌:r̥ 'animal body fat'

Word-final HL sequences occur on nouns that underlyingly end in */m/*. */m/* surfaces if the word is followed by a vowel-initial word in the same phrase. Before consonant-initial words and phrase-finally */m/* does not surface. Therefore in some contexts it may sound as though there was a contour on a short final vowel, just like in Mende. Since */m/* is underlyingly there however, and since */m/* is moraic, Ikaan differs again from Mende and does not show multiple linking at the right edge. Note that there are no LH contours on words that underlyingly end in */m/*.

(155) /ɛ̀wàgîm/ [ɛ̀wàgî] 'crocodile'
/ɛ̀dʊ̂̂m/ [ɛ̀dʊ̂̂] 'stone'
/èkpô̂m/ [èkpô̂] 'stone'
/ʊ̀kâ̂m/ [ʊ̀kâ̂] 'flour'

Final 'contours' in Ikaan only occur when there are enough moras to host each tone. In that sense there are no final contours in Ikaan, even though some surface forms may make it sound like there are. As a consequence, a case for multiple linking at the right edge like in Mende cannot be made for Ikaan and another explanation for the missing tones has to be found.

Floating tones

Dschang is a language which solves the problem of leftover tones by letting a tone float at the end of the word.

In Dschang, nouns consist of a L-toned prefix and a root with one TBU. The available tonal melodies consist of one or two tones: L, LH, H, HL. Both lengths of melodies occur on the roots. Unlike Mende, Dschang does not require all underlying tones to be associated to TBUs at the surface level. Instead, leftover tones remain floating at the right edge of the word (Pulleyblank, 1986:39-42). Even though the leftover tones do not surface, there is evidence for their existence because the floating tones show their effect in phonological rules in the language. The evidence for the presence of floating H stems from the non-application of a downglide process, the evidence for floating L comes from the application of a tonal metathesis process which results in downstep.

Final L tones in Dschang undergo downglide. This can be seen in the noun *ǹdzwı̏* 'leopard', which surfaces with the final downglide (Pulleyblank, 1986:39).

```
(156)   L+L   /ǹdzwì/   n  dzwi   [__ __]
                        |   |
                        L   L
```

The noun *ǹdzà* 'axe' does not surface with a downglide but with a level L instead. The explanation for the absence of the downglide is that underlyingly the noun comes with a LH melody so that the final tone is actually H, not L. Since L only downglides in final position and L is not in final position here it must remain level. This in turn is evidence for the presence of a floating H (Pulleyblank, 1986:39).

```
(157)   L+LH   /ǹdzà/   n  dza     [ __ __ ]
                        |   |
                        L   L   H
```

A floating L at the right edge shows its presence by undergoing tonal metathesis and causing downstep. Nouns without floating L do not have downstepped H.

The noun *ǹtsɔ́ŋ* 'thief' in (158) comes with a H melody on the noun root. The one tone of the melody is linked to the one TBU in the root, no tones are left afloat and the word surfaces with a L H melody (Pulleyblank, 1986:39).

```
(158)   L+H   ǹtsɔ́ŋ   n  tsɔŋ   [ __ ‾‾ ]
                      |   |
                      L   H
```

The noun *m̀ꜜbhʉ́* 'dog' comes with a HL melody. Since the root can only associate one tone, the L is left floating at the right edge. Floating L at the right edge undergo tonal metathesis and move before the preceding floating H, changing a L H (L) sequence into a L (L) H sequence. (L) before H then results in downstep of H (Pulleyblank, 1986:41).

```
(159)   L+HL   m̀bhꜜʉ́   m  bhʉ →      m    bhʉ  [ __ ‾‾ ]
                        |   |         |     |
                        L   H  (L)    L (L) H
```

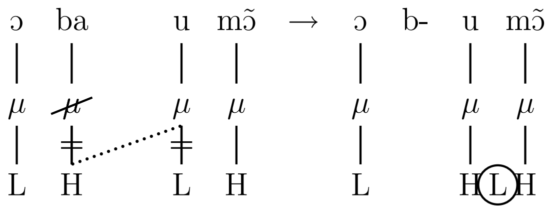
If Ikaan allowed floating tones, it could have (L), (H), (L)(H) and (H)(L) sequences at the right edge of the word. But how could a floating tone be spotted in Ikaan?

I have not come across floating H in Ikaan. Floating H seem to be ruled out and have to dock, which is why I have proposed a constraint against floating H and a corresponding rule which forces (H) to associate with a TBU. I will give more explanations for H docking in nouns later in this chapter in section 4.2.6.

There are instances of floating L in Ikaan, which show their presence in two different ways. L that have been set afloat cause downstep in the following H tone. Rare cases of lexically floating L may dock onto epenthetic vowels (see section 3.5.5 above).

Ⓛ downsteps an immediately following H. In (160), the final vowel of *ɔ̀bá* 'she fetched' is lost, H is delinked and relinks with the following TBU. As a result, L delinks from this TBU, remains afloat and causes the following H to be realised as ꜜH.

(160) ɔ̀- bá ùmɔ̃́ → [ɔ̀búꜜmɔ̃́]
3S.NFUT- fetch.NFUT water
'She fetched water.'



While floated tones from verbs show their presence by triggering downstep in the following noun, it is not possible to find floating L at the right edge of nouns with the downstep test. This is because words that may follow nouns all begin with an agreement marker, which in the nominal use invariably is L. If a putative floating L were to encounter an initial L in the following word it would violate OCP(L) and immediately fall victim to L merging. Therefore, even if there were nouns with Ⓛ at their right edge, it would be impossible to spot this floating L with the downstep test.

A second way of detecting a potential Ⓛ is to see if this floating L links to an epenthetic vowel. This L docking occurs with possessive pronouns and object suffixes.

Epenthetic vowels usually take the same tone as the preceding TBU, though in section 3.5.5 I have shown that possessive pronouns and human object suffixes seem to have a lexical floating L at the right edge which docks onto epenthetic vowels in certain constructions. Examples (118b) and (118c) from this section are repeated as (161) here.

(161) a. èkpòd ɛ̌ːn ì̀ nɛ̀ː
hare 3S.POSS epV DEM.PROX
this hare of his/hers

b. èkpòd ɛ̀mɔ́n ù nɛ̀ː
hare 2P.POSS epV DEM.PROX
this hare of yours (pl.)

For Ikaan nouns, I have elicited nouns with CVC roots followed by the same proximal demonstrative, which would give the same segmental context and could therefore be expected to result in L docking as well. Unlike with possessive pronouns and object suffixes, I found that the tone of the epenthetic vowel that has to be inserted after nouns invariably is a copy of the preceding TBU. Therefore there is no evidence from L docking for floating L in nouns.

As there is no evidence of any floating tones at the end of the word, I can also rule out the hypothesis that Ikaan behaves similarly to Dschang.

Deletion of non-associated tones

Deletion of non-associated tones is a strategy that to my knowledge has not been explicitly described for languages with tonal melodies. Nonetheless it is implicitly used, for example for Kera (Pearce, 2006).

Deleting non-associated tones keeps the idea that all lengths of roots may select all lengths of tonal melodies underlyingly and that tonal association proceeds one-by-one left-to-right. Tones which remain and cannot be associated do not survive their non-association and subsequently delete. The consequence of this approach for Ikaan is that monomoraic roots with H, HL, HLH (and L, LH, LHL) become empirically indistinguishable, which makes this hypothesis not testable and therefore not verifiable or falsifiable. Empirically speaking, this is highly undesirable. However, it would produce results which are descriptively adequate.

Returning to Kera, the TBU is the foot (Pearce, 2006:262). The domain of tonal melodies is the word, monomorphemic words are made up of one or two feet. Words with only one foot can be monosyllabic or bisyllabic. Kera has three tones (H, M, L) and seven attested tonal melodies (Pearce, 2006:273). Examples for the seven melodies on bisyllabic words with one or two feet are given in (162).

(162)	H	mə́ján	'river'
	M	māanɨ̄	'co-wife'
	L	nàalà	'long grass'
	HL	mánhɔ̀r	'ten'
	HM	máalāŋ	'bird of prey'
	MH	māahúr	'flute'
	LH	hùɗúm	'hole'

In monosyllabic words with one foot, not all seven melodies are attested. The only melodies which occur on these 'short' words are H, M and L, as given in (163). The 'long' melodies HL, HM, MH and LH are not attested on these 'short' words.

(163)	H	ké	'to throw (once)'
	M	kān	'water'
	L	gè	'to throw (repeatedly)'

Just like with Ikaan, the combination of words with tonal melodies is not free in the sense that any melody occurs with any length of words. For monosyllabic words (with one foot) only L, M and H are attested. For bisyllabic words with one foot and words with two feet all seven melodies are attested.

Pearce (2006) describes and analyses the surfaces tones as follows: As the TBU in Kera is the foot, tones are associated with TBUs left-to-right foot-by-foot. If there are more TBUs than tones, the remaining TBUs receive their tonal specification through tone spreading. If there are less TBUs than tones, two things may happen. If the word is bisyllabic, there will be a tonal contour on the foot. The first tone of the melody is realised on the first syllable, the second tone of the melody is realised on the second syllable. If however the word is monosyllabic, only one tone surfaces.

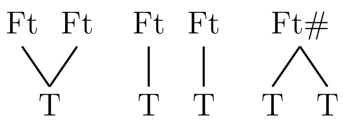
The fact that only one tone is ever realised on monosyllabic words can be explained in two ways. Either the tone is simply not there, which means that there would have to be an explanation for why 'short' roots cannot take 'long' melodies, or the second tone was there but could not be linked and was instead deleted.

Unfortunately, finding evidence for the deletion of an underlying tone before it surfaces is as hard in Kera as it is in Ikaan. However, there is a tone deletion process in a different Kera construction in which the second tone of a melody is deleted without a trace. In fast natural speech, bisyllabic words with a LH melody may be reduced to monosyllabic words. If this happens, the second tone of the melody deletes. Pearce (2006:274) gives the examples in (164) for this process.

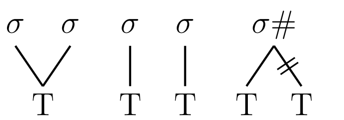
(164)	bègɛ́ɛ	bɛ̀g	'animal'
	hàgɛ́ɛ	hàg	'cry'
	gùníi	gùn	'wake'

Pearce (2006:282) summarises the possible tonal associations in Kera as reproduced in (165).

(165) a. Foot level associations



b. Syllable level associations



As the data and the explanations show, Kera has the same mysterious 'gap' in the distribution of tonal melodies over words as Ikaan has—instances of $n_{Tones} > n_{TBU}$ are not as easily attested as you would expect for tonal melodies. For

Kera and Ikaan, deletion would be a neat solution, and it would be similar to a deletion process that is actually attested in Kera.

Other analyses

Apart from the strategies attested in languages such as Mende, Dschang and Kera, there are other potential analyses.

Tone languages of course do not necessarily use underlying tonal melodies and phonological mapping rules to specify tones for TBUs, there are alternative strategies. I will consider potential alternatives for an analysis of Ikaan here to show how they also fall short of accounting for the Ikaan data. Of the alternatives I discuss here, one retains the notion of underlying tonal melodies whereas two other alternatives give up on this notion.

First, we could keep the idea that there is a limited set of underlying tonal melodies which map onto words, but add the constraint that the number of tones in a melody must not exceed the number of TBUs in the word that the melody associates with. Put simply, there would be a constraint against 'long' melodies for 'short' roots.

The advantage of this analysis is that it would explain the mysterious gap for the combination of tones with three melodies on roots with one mora, and it would explain the restricted distribution of longer melodies that only surface if the noun has a bimoraic prefix.

The disadvantage is that imposing such a constraint means that we would have to give up on the idea that tones are 'autosegmental', i.e. independent of the segmental structure of the word they associate with. In order to comply with this constraint, the tone tier would have to 'see' the moraic tier in the lexical entry of the root. Additionally, the melody would have to 'look ahead' to the fully formed word to check whether the combined number of moras of the prefix and the root is sufficient for the number of tones in the melody. Consulting the skeletal tier should not be possible if tone is fully autosegmental, and 'looking ahead' to stages of word formation that should not have occurred yet should not be possible either. Imposing such a constraint therefore has consequences for the overall autosegmental analysis proposed here that are too serious to still maintain the analysis so that this constraint is rejected as a possible alternative analysis.

Of the two alternative analyses which work without underlyingly independent tonal melodies, one uses prelinking of certain tones combined with the insertion of default tones, and the other specifies all tones in the lexicon, thus gives up on a generative solution altogether.

Prelinking and underspecification of TBUs has been put forward as an analysis for Yoruba. Pulleyblank (1986:192) proposes that in the Yoruba lexicon there are TBUs which are prelinked to tones and TBUs that are underspecified and whose tonal specification is filled in by default tones at a later stage. Without tonal melodies, there is of course no need for a tonal mapping mechanism like the association conventions or multiple linking of tones at the right edge. Also, there is no rule of tone spreading, instead default tone insertion supplies unspecified TBUs with tones.

With its three possible tonal specifications (H, L, ∅) Yoruba words show 3^n (n = number of TBUs) possibilities of tonal patterns. This means that words with one TBU have $3^1 = 3$ different surface melodies, words with two TBUs have $3^2 = 9$ different surface melodies and words with three TBUs have $3^3 = 27$ different surface melodies. As all possible combinations of tones occur at the surface level, underlying tonal melodies do not simplify the analysis of Yoruba. Also, there are additional language-internal phonological reasons to argue for underspecification, lack of spreading and default tones. As a consequence, Pulleyblank concludes that tonal melodies in Yoruba do not have a status that is independent of the segmental composition of stems and proposes the prelinking analysis.

As I have briefly reviewed in section 3.1.3, Abiọdun (1999) also proposes prelinking, underspecification and absence of tone spreading for at least some Ikaan nouns. This approach does account for his data, though there are some problems in the analysis, which I have mentioned above.

With my own larger database, prelinking does not give a satisfying account of the tonal patterns. In Ikaan, prelinking would correctly explain and predict the tonal patterns observed on nouns with monomoraic noun class prefixes and mono- and bimoraic roots. In both cases, the number of observed melodies is 2^n, '2' because Ikaan has two tones and 'n' for the number of TBUs in the word. For monomoraic roots there are $2^1 = 2$ surface melodies, for bimoraic roots there are $2^2 = 4$ surface melodies. For trimoraic roots however prelinking fails to explain why there are only six attested surface melodies when there should be $2^3 = 8$, and why it would be LLH and HHL of all melodies that are not attested. Furthermore, prelinking does not explain why bimoraic noun class prefixes are sometimes all-L and sometimes LH. Both the fact that there are no LLH/HHL melodies and the fact that there are L and LH patterns on bimoraic prefixes follow naturally if underlyingly unassociated tonal melodies are assumed. Therefore prelinking is also rejected as an analysis for Ikaan.

The second approach without underlying tonal melodies would be to simply make the full melody part of the lexical entry. This means taking a fully lexical approach and working without phonological rules for tone mapping. The advantage of this approach would again be that there would be no need to explain the $n_{Tones} > n_{TBUs}$ gap. The disadvantages would first be a lack of economy. In the tonal melody approach six underlying melodies and three phonological rules can explain the tones on all nouns. This contrasts with having to specify the full tones for each noun in the lexicon in the lexical approach. Secondly, the observation that there are no word-medial contours and that there should not be LLH and HHL surface melodies on roots would be mere coincidences in the lexical analysis, whereas they are immediate consequences of the underlying melody analysis. Thirdly, the lexical approach has no explanation for the *ùgbátà* vs. *ùgbâːtà* 'horse' alternation and the L vs. LH alternation on bimoraic noun class prefixes. Again, these patterns are easily accounted for with the underlying melody approach. Therefore even though the lexical approach may be descriptively adequate, it is rejected here because it is not explanatory.

A case for deletion of non-associated tones in Ikaan

To explain what happens in Ikaan when 'long' tonal melodies occur on 'short' roots or words, I have looked for evidence for two well-described strategies for dealing with this problem. I have found no evidence for multiple linking of tones at the right edge, as it is the case in Mende. I have also found no evidence for the presence of floating tones at the right edge, as is the case in Dschang. I have further argued against a constraint that would prohibit 'long' melodies on 'short' words because the very idea is in conflict with the autosegmental nature of tone. Moving away from an analysis based on underlying melodies, I decided against prelinking and full lexical specification of tones because they offer only descriptions and no explanations.

This leaves the deletion of non-associated tones as the only remaining solution to the $n_{Tones} > n_{TBUs}$ problem. The empirical difficulty with this approach is that it proposes tones that exist underlyingly but are deleted before they ever reach the stage where they could reveal their presence, if not directly by surfacing then at least indirectly by triggering or blocking phonological processes. Basically, I am putting forward a hypothesis that is not testable and therefore not falsifiable and therefore empirically vacuous.

Nonetheless, I consider tone deletion the best alternative for solving the $n_{Tones} > n_{TBUs}$ problem, assuming that I want to reach beyond description and move towards an explanation. The full mechanism for the association of tonal melodies in my analysis is:

- A sequence of tones associates to a sequence of moras one-by-one left-to-right.

- If unspecified moras remain the last tone of the melody copies, inserts and links to the mora.

- If non-associated tones remain they are deleted.

I will summarise the evidence and counter evidence and point out what is gained and lost by this analysis to make my case for this association mechanism.

The only evidence against proposing a set of underlying independent tonal melodies is that it does not seem to be the case that for a given root X Ikaan can select any tonal melody Y belonging to some set Z of tonal melodies without making reference to phonological properties of X. There is a gap for melodies with three tones on roots with one mora, and a restricted distribution of the remaining instances of $n_{Tones} > n_{TBUs}$ in that they are only attested on nouns with bimoraic prefixes.

Evidence for the presence of underlying melodies is that it is not the case that tones on nouns occur in any possible combination, i.e. for Ikaan with two underlying tones this would imply 2^n (n = number of TBUs) possibilities of tonal patterns. Further evidence is that there are no contours attested on word-medial TBUs and that it is the specifically the LLH and HHL melodies that are missing from the set of surface melodies. In addition, there are tonal alternations which support the melody analysis, in that both L and LH melodies are attested on bimoraic noun class prefixes and in that there are two different realisations for 'horse' as *ùgbátà* and *ùgbâːtà* and similar words.

What is therefore gained with a melody analysis is explanatory power and the ability to generate hypotheses. Furthermore, the approach is descriptively adequate and economical. What is missing is the last piece of the puzzle—empirical evidence for the deletion of non-associated tones. While I cannot provide this evidence for lexical tonal melodies in nouns, there is evidence for the absence of a tone from a melody and arguments for why this tone should have been present in grammatical melodies for verbs. I will return to this in sections 5.2.3 and 5.2.5.

Even though it is empirically impossible to prove the deletion hypothesis, a lot is gained by including it in the mechanism for associating tonal melodies with words. By using a limited set of underlying independent tonal melodies, association conventions, tone copying and tone deletion, the underlying representations of lexical items in Ikaan include only non-redundant information and the tonal surface representations are arrived at by phonological rules that are also used elsewhere. Predictions are made and bear out for the data, tonal alternations are easily accounted for.

4.2.4 VCV or VCVCV noun roots as an alternative explanation?

In the preceding section, one supporting argument for working with tonal melodies was that bimoraic noun class prefixes surface either with only L tones or with a LH melody. There may however be an alternative explanation for the fact that noun class prefixes may be monomoraic or bimoraic and may bear one of two different surface melodies.

Nominal roots as I have used them so far have always been consonant-initial. As an alternative to such CV (or CVCV, ...) roots it could be argued that some roots are vowel-initial, i.e. would have a VCV or a VCVCV etc. structure. The first advantage of this analysis would be that there would be an explanation for why some nouns begin with a monomoraic vowel whereas other nouns seem to begin with a bimoraic vowel. The length of the vowel would not be arbitrary any more, as it is now, but would be a result of the concatenation of the prefix and the root. The second advantage would be that there would be no need to explain why tones that originate in the nominal root are associated with the noun prefix.

While I see the appeal in taking the arbitrariness or lexical determination out of the length of the prefix, I do not think tonal association needs a revision. The association as I have laid it out above is both descriptively adequate and theoretically sound. Explaining the linking with VCV roots would therefore simply be different, it would not necessarily be better.

From a segmental perspective however the CV and the VCV analysis are not equal. The VCV analysis causes problems with vowel deletion and vowel assimilation, whereas the CV analysis does not encounter such problems.

For V1 ## V2 contexts I suggested that in vowel deletion and vowel assimilation processes it is V1 that is either deleted or assimilated to V2, V2 always survives. The noun class prefix and the initial vowel of the proposed VCV stem arguably are in a V1 # V2 configuration, which are both similar to the V1 ## V2 context. The prefix vowel would be in V1 position and would therefore be expected to delete or assimilate. Its specifications would be wiped out and it would not surface any more. The initial root vowel would be in V2 position and would therefore survive. Applying the VCV hypothesis to a word such as *ɛ̌ːnà* '(a type of) snail', this would imply that the underlying structure is V1 # V2CV. The prefix would be a monomoraic vowel, the root would be *ɛna*$_{HL}$. It would not be possible to tell the quality of the vowel of the noun class prefix because it would have been assimilated to V2.

While this would still work out for nouns in singular, problems arise for nouns in plural. When a noun is inflected for number it receives a plural prefix that differs from the singular prefix. In the case of *ɛ̌ːnà* the plural is *ɪ̌ːnà*. If the root was indeed VCV, this form would be very surprising. If there was an initial root vowel, which would be in V2 position, we would expect this root vowel to remain constant and to cause the preceding vowel to delete or to assimilate, just like it did in singular. In essence, none of the supposedly VCV nouns should show any changes in the initial vowel when they are inflected for plural, the second vowel should always remain. The fact that this does not happen and that the prefix vowel is able to change shows that there probably is no root-initial vowel.

To solve the problem of the changing prefix and maintain the VCV analysis, it could be argued that the initial vowel of the VCV root is an underspecified vowel. Underspecified vowel slots do exist in Ikaan, they surface as */i, ɪ/* if they cannot be specified in any other way. For example, the noun class prefix for plural nouns shown in (166) surfaces as */i, ɪ/* but is arguably best analysed as underlyingly unspecified.

(166) a. ɔ̀- tá ɔ̀- rɔ̀ → [ɔ̀tɔ̂ːrɔ]
ɔ̀- tá ɔ̀- rɔ̀
O6- lamp 6- 2S.POSS
your lamp

b. ò- hún ɔ̀- rɔ̀ → [òhún ɔ̀ːrɔ̀]
ò- hún ɔ̀- rɔ̀
O6- tree 6- 2S.POSS
your tree

c. ɪ̀- tá ɪ̀- rɔ̀ → [ɪ̀tâːrɔ]
∅̀- tá ∅̀- rɔ̀
?- lamp ?- 2S.POSS
your lamps

d. ì- hún ɪ̀- rɔ̀ → [ìhún ɪ̀ːrɔ̀]
∅̀- hún ∅̀- rɔ̀
?- tree ?- 2S.POSS
your trees

In (166a), there is a V1 ## V2 context where V1 is deleted and V2 survives. This is the standard case. In (166c) however V1 survives in the V1 ## V2 context, V2 does not surface. This behaviour could find an explanation if the vowel specifications of V2 were not lexically present. The unspecified vowel in would only surface as */i, ɪ/* if there is no other way of finding vowel specifications, like in (166d).

Assuming that the initial vowel in the potential VCV root was also unspecified, we can maintain an analysis in which */ɛ/* in */ɛːna/* is a fully specified vowel serving as the noun class prefix and */ɪː/* in the plural */ɪːna/* is the realisation of an underspecified vowel. /ɛ # V*na*/ would result in /ɛː*na*/, whereas /V # V*na*/ would result in /Vː*na*/, which would be realised as /ɪː*na*/.

Yet another analysis would be to propose that bimoraic prefixes stem from underlying CVCV roots in which the first C has been lost. V # CVCV with a lost initial consonant would again result in a noun with a V:CV structure. Again, this analysis would explain the length of what seems to be the bimoraic prefix as well as the location of the first tone of the nominal melody on the second mora of what looks like the bimoraic prefix. Abiọdun (1999), using comparative data from the four Ukaan dialects, takes this approach in his historical reconstruction. In his 400-word comparative word list, there is one word, 'bird', with a bimoraic prefix. For this word he gives the forms in (167) for the four dialects.

(167)	ɛ̀ɛ́kàn	Ikaan (Ikakumọ)
	ɛ̀kájá	Iino (Ayanran)
	ɛ̀ɛ́kà	Iigau (Auga)
	ɛ̀kájá	Ayegbe (Iṣẹ)

Abiọdun reconstructs *ɛ̀Cɛ́kàjàn*Ṽ as the proto-form of the word. More comparative work is needed to test this hypothesis further.

Despite the alternatives presented here, I remain with the analysis that some prefixes are lexically bimoraic whereas others are lexically monomoraic. In section 5.2.2 we will encounter some verbs which, like some nouns, have bimoraic agreement prefixes and which surface with a LH melody. Like with nominal roots, VCV verb roots may seem an obvious solution to this pattern. I will however again argue that roots are consonant-initial and some prefixes are simply lexically bimoraic. I will provide further arguments that go beyond the arguments presented here and that show that at least for verbs there are no V-initial roots.

4.2.5 Evidence for late application of OCP(L)

Having explained the association of lexical tonal melodies in detail, we can now return to the claim I made in section 3.5.2 that OCP(L) does not apply all the time and at any stage, but only from the point onwards that tonal melodies have been associated. The problem to be resolved is why am I arguing that OCP(L) only applies from after melody association onwards and whether there are any viable alternatives to my proposal.

I have argued above that nouns are made up of a segmental prefix, a tonal prefix and a nominal root consisting of segments and one of six underlying lexical tonal melodies. For the noun *àbàbá* 'beans' these morphemes are the segmental noun class prefix *a*-, the tonal nominal noun class prefix L-, and the root $baba_{\mathrm{LH}}$.

Each morpheme is given in square brackets in (168).

(168) [a | μ] [ba ba | μ μ | L H]

[L]

To form a noun, the individual morphemes come together and morpheme boundaries are wiped out. On the segmental tier, the prefix *a-* and the root *baba* come together. On the tonal tier, the prefix L and the melody LH meet.

(169) a ba ba
μ μ μ
L L H

Segments and tones line up and tones are associated to moras one-by-one, left to right.

(170) a ba ba
μ μ μ
L L H

OCP(L) starts applying after melody association. OCP(L) is violated by the representation in (170) so that L merger applies and merges the two adjacent L into one L. The derived surface form is *[àbàbá]*.

(171) a ba ba
μ μ μ
L H

If OCP(L) was active all the time, even in underlying forms before melody association, the derivation would look different. Like in (169), prefixes and root would come together and line up.

(172) a ba ba
μ μ μ
L L H

Immediately, OCP(L) would be violated, conditioning the (so far unassociated) L tones to merge. Instead of the LLH tonal sequence in (169), there now is only a LH tonal sequence.

(173)
```
a   ba  ba
|   |   |
μ   μ   μ


L   H
```

The remaining tonal sequence is mapped onto TBUs one-by-one left-to-right.

(174)
```
a   ba  ba
|   |   |
μ   μ   μ
:   :
L   H
```

The last TBU has no tone yet, which violates the *μ constraint and conditions Copy to copy and insert a tone, which is then associated.

(175)
```
a   ba  ba
|   |   |
μ   μ   μ
|   |   :
L   H   H
```

The outcome is *[*àbábá*] with a LHH surface melody, which is wrong. Applying OCP(L) at all stages would mean that there should never be any initial LL surface sequences followed by H in nouns, they would all fall victim to OCP(L) at a very early stage. LL-initial surface sequences are attested in the language though, so applying OCP(L) straight away without changing anything else in the analysis produces the wrong results.

An alternative analysis would be to let tonal melodies link within their morphological domain first and not to let OCP(L) apply across domain boundaries.[4] Linking within morphological domains first would explain why and how the morphological origin of a tone determines how the tone is affected by the OCP. With the prefix and the root tones in different domains, tonal association would proceed within the domain, then the domain boundaries would be deleted and only then OCP(L) would be violated. This approach is illustrated below. The long square brackets in (176) indicate that the prefix vowel and prefix tone form one domain and the root with its tones and TBUs forms the other domain. OCP(L) is not violated because within the domains there are no adjacent L.

[4]As OCP(L) does apply across domain and word boundaries after tonal association, this idea has the disadvantage that instead of specifying when OCP(L) does and does not apply it now has to be specified when OCP(L) does and does not apply across domain boundaries. Therefore this does not actually solve the problem, it just presents the same problem in a different way. Nonetheless, I will follow this alternative through to show how it fails with another data set in any case.

(176)
$$\left[\begin{array}{c} \text{a} \\ | \\ \mu \\ \\ \text{L} \end{array}\right] \left[\begin{array}{cc} \text{ba} & \text{ba} \\ | & | \\ \mu & \mu \\ & \\ \text{L} & \text{H} \end{array}\right]$$

The tones are associated one-by-one, left-to-right within their domain. OCP(L) is still not violated because within the domains there still are no adjacent L.

(177)
$$\left[\begin{array}{c} \text{a} \\ | \\ \mu \\ \vdots \\ \text{L} \end{array}\right] \left[\begin{array}{cc} \text{ba} & \text{ba} \\ | & | \\ \mu & \mu \\ \vdots & \vdots \\ \text{L} & \text{H} \end{array}\right]$$

After the tones have been associated, the morpheme boundaries are deleted.

(178)
$$\begin{array}{ccc} \text{a} & \text{ba} & \text{ba} \\ | & | & | \\ \mu & \mu & \mu \\ | & | & | \\ \text{L} & \text{L} & \text{H} \end{array}$$

OCP(L) is violated, triggering L merger. The result is *àbàbá*, exactly as attested in the language.

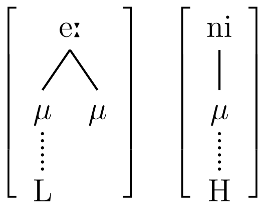
(179)
$$\begin{array}{ccc} \text{a} & \text{ba} & \text{ba} \\ | & | & | \\ \mu & \mu & \mu \\ | & \diagup & | \\ \text{L} & & \text{H} \end{array}$$

While this works for nouns with monomoraic noun class markers, it fails to account for those nouns that have bimoraic noun class markers and a H-initial tonal melody. The noun *ě:ní* 'elephant' is made up of a bimoraic segmental noun class prefix *e:-*, a tonal nominal noun class prefix L and the root ni_{H}.

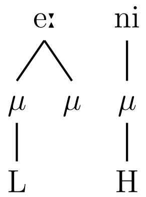
With the different morphemes in their various domains, the starting point would be as given in (180). The segmental prefix *e:-* with its two moras and the tonal prefix L would be in one domain, the root *ni* with its melody H in another domain.

(180)
$$\left[\begin{array}{c} \text{e:} \\ \diagup\ \diagdown \\ \mu\quad\mu \\ \\ \text{L} \end{array}\right] \left[\begin{array}{c} \text{ni} \\ | \\ \mu \\ \\ \text{H} \end{array}\right]$$

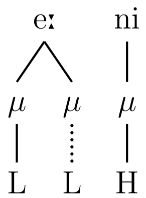
The tones are associated within their domain.

(181) 

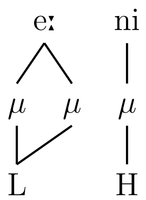
After melody association, the domain boundaries are deleted.

(182) 

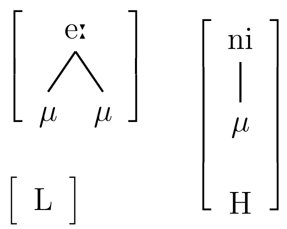
There is one mora that remains without a tone, violating *(μ). This triggers Copy to apply, a L tone is inserted and linked to the mora.

(183) 

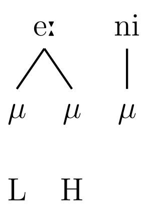
This in turn violates OCP(L), which is fixed by applying the L merger rule and merging the L tones into one.

(184) 

The word is realised as **è:ní*. This however, is not the attested surface form. What we find in this and in other words is a rising tone on some bimoraic prefixes, and an approach with linking within morphological domains cannot produce that. Working the way I outlined above, without domain boundaries and with OCP(L) only applying after melody association does produce the right result.

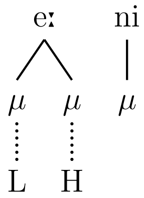
(185) 

Then segments and tones come together and line up.

(186) 

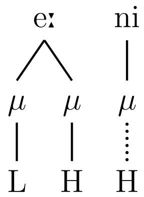
Tones and moras are associated one-by-one, left-to-right.

(187)



The last mora is still unassociated, therefore Copy copies and inserts a tone which is then linked. The correct surface form is produced.

(188)



To summarise, letting OCP(L) apply all the time, even before melody association, produces the wrong results and predicts that there cannot be LL-initial surface sequences on nouns because the tonal prefix L- and the initial L of a lexical melody would instantly be merged. LL-initial surface sequences however are attested in Ikaan, which rules out this early application of OCP(L).

Working with tone association within morphological domains first would allow OCP(L) to apply within domains all the time and produce the attested forms for nouns with monomoraic noun class prefixes and nouns with bimoraic noun class prefixes that bear only L. However, it fails to account for LH-toned noun class prefixes and in fact predicts that they cannot exist, which of course they do. Therefore linking within morphological domains first also does not work.

Letting OCP(L) apply only after tonal melody association, but letting it apply wherever it can from then onwards does work, so I will choose this approach. Incidentally, this late 'timing' of OCP(L) and its failure to apply all the time, even before melody association, coincides with the 'timing' of other constraints. Inside lexical entries, unassociated moras are fine, unassociated H are fine—the idea of lexical melodies in fact crucially builds on that. Like OCP(L), these constraints only start triggering the application of rules once lexical and grammatical melodies have begun associating.

4.2.6 Indications for 'No floating H' and H docking in nouns

Melody association also sheds light on a second issue. In section 3.5.3 I described a constraint which stated that H must not be left floating and a H docking rule which ensured that floating H are linked to a TBU. In the preceding sections of this chapter I have proposed that a tone that has not found a host after one-by-one left-to-right tonal association is deleted. I gave an L deletion rule for this deletion process in Chapter 3 but I did not give a corresponding H deletion rule. My claim is that H tones have to be realised and cannot be deleted. There simply is no H deletion rule in the inventory of Ikaan tonal rules that would carry out the H deletion. Instead, there is a H docking rule which forces H to link and be realised.

In this section I will apply *Ⓗ and H docking to tonal melody association in nouns and show that deletion of non-associated tones only affects L and does not affect H. Using the association conventions, H docking, L deletion for non-associated L and L delinking for L that have been associated, I will firstly account for the fact that tonal surface melodies are not evenly distributed in Ikaan. Secondly, I will account for a so far unexplained downstep in the middle of what seems to be a monomorphemic word. Thirdly, I will give examples and an analysis for monomoraic noun roots with tonal melodies consisting for three tones, which I have identified as a gap in Ikaan in section 4.2.3.

The analysis given here is based on a database of around 400 nouns, though not all of these noun roots are monomorphemic. Of the monomorphemic roots, there are twice as many nouns with CV(C) roots than there are nouns with CVCV or longer roots (just over 200 CV(C) roots vs. just over 100 CVCV or longer roots). Within the set of CV(C) roots that occur with monomoraic prefixes, there are substantially more nouns with H on the root in their surface forms than there are nouns with L on the root in their surface forms (108 and 64 nouns respectively). Within CVCV roots occurring with monomoraic prefixes, the differences are less noticeable. There are 26 nouns with LH surfaces melodies on the roots compared to 20 all-H melodies, 20 HL surface melodies and 16 all-L melodies on the roots. *Ⓗ and H docking offer an explanation for the distribution of surface melodies in monomoraic noun roots and are in line with the distribution of melodies on bimoraic noun roots.

As before, the assumption remains that tonal melodies are autosegmental, i.e. that any noun root, no matter how long, is able to pick any of the six attested tonal melodies, no matter how long. In addition, there is the assumption that no H must be left floating and that floating H will dock onto TBUs.

Monomoraic nominal roots can offer one TBU. (189) shows a monomoraic root with each of the six melodies and the tone that would be linked after *Ⓗ and H docking have applied.[5]

[5](189f) is problematic because the second H of the melody cannot be associated. Also I am not including any information here on how this linking is derived. I will return to both issues

(189)
a. CV
   L
b. CV
   H
c. CV
   L H
d. CV
   H L
e. CV
   L H L
f. CV
   H L H

Even though underlyingly every melody is theoretically equally likely, not all melodies are equally likely to surface. With H-initial melodies, H links to the mora and the mora surfaces as H. With the melody consisting only of L, L links to the mora and the root is realised with a L tone. With the other L-initial melodies, L would associate in accordance with the association conventions, but then H would be left floating, which violates *H. Therefore H docking applies, linking the floating H to the only available TBU. This in turn creates a mora linked to two tones, which violates the constraint that TBUs must not have more than one tone. Therefore L delinks and the mora of the root surfaces with H even though the melody was L-initial. A monomoraic nominal root can therefore only surface with L as the root tone if it has picked the L melody

This predicts that there are considerably more nouns with H on the root than nouns with L on the root. In fact, if the nominal melodies are exactly equally frequent and no other constraint and rule apart from *H and H docking have intervened, there should be five times as many nouns with H on the root than nouns with L on the root.

This prediction does not bear out quite that strongly for the Ikaan data. However, with 108 H-toned nouns compared to 64 L-toned nouns there are considerably more H-toned than L-toned monomoraic nouns in the database.

To a lesser degree, a similar bias for H-toned surface melodies should exist for bimoraic roots. Examples for a bimoraic root with each tonal melody and the tones that would be linked after the application of *H and H docking are given

below.

in (190).[6]

```
(190)  a.  CV CV
           |
           L
       b.  CV CV
           |
           H
       c.  CV CV
           |  |
           L  H
       d.  CV CV
           |  |
           H  L
       e.  CV CV
           |  |
           L  H  L
       f.  CV CV
           |  \
           H  L  H
```

For nouns with bimoraic roots, there is only one possible origin for nominal roots with LL, HH and HL surface melodies, which are the L, H and HL melodies respectively. Nouns with LH on the roots can underlyingly originate from LH and LHL melodies.

The prediction following from this is that there should be more nouns with LH surface melodies on the roots than nouns with LL, HH and HL surface melodies. For the monomorphemic CVCV roots with bimoraic prefixes in the database, there are 26 nouns with LH surface melodies compared to 16 LL, 20 HH and 20 nouns HL surface melodies. The data therefore does not contradict the prediction, and there are indeed slightly LH surface melodies as predicted. Whether this is significant however remains to be seen.

Even though the database is still rather small, the data is in accordance with the predictions I make and there is no data that provides counter evidence. None of the distributional tendencies are direct evidence that *H is part of the inventory of phonological rules and constraints. Nonetheless, there are distributional differences and *H and H docking can offer an explanation.

The question that remains is what happens to the tones that could not be linked or were delinked by H docking.

HL, LH and LHL are straightforward to explain. In LH and LHL melodies, L at the left edge of the root are adjacent to the low-toned noun class prefix and are absorbed into this L by L merging if they are set afloat because of H docking

[6] Again, the derivation of (190f) is slightly more complex and I am not yet giving any information on how this linking is derived. Both problem will be discussed below.

and L delinking. In HL and LHL melodies, L left floating at the right edge of the noun never get associated and are deleted by L deletion. I illustrate this with the noun *ɔ̀tá* 'lamp' and assume for the purpose of demonstration that the root *-ta* comes with a LHL melody. The prefix is still made up of ɔ- and the L- nominal tone.

(191) a. Underlying representation of the potential root -ta$_{LHL}$

ɔ ta

L L H L

b. One-by-one left-to-right association

ɔ ta

L L H L

c. Violation of *H, H docking

ɔ ta

L L H L

d. Violation of 'One tone per mora', L delinking

ɔ ta

L L H L

e. Violation of OCP(L), L merging; L deletion of non-associated final L

ɔ ta

L L H L

f. Final representation

ɔ ta

L H

The resulting surface form is *[ɔ̀tá]* with one H tone as the surface melody on the root even though the underlying melody was LHL.

Accounting for HLH melodies is more complex. To show what happens in the association of HLH melodies, I will apply rules and constraints from the inventory of Ikaan rules and constraints as I have given them so far, see what predictions come out of this and test the predictions on the Ikaan data.

In (192) I give the derivation of a hypothetical CVCV root that comes with a HLH melody. Again, there is a V prefix and a L- prefix tone.

(192) a. Underlying representation

V CV CV

L H L H

b. One-by-one left-to-right association

V CV CV

L H L H

c. Violation of *Ⓗ, H docking

V CV CV

L H L H

d. Violation of 'One tone per mora', L delinking

V CV CV

L H L H

e. Final representation

V CV CV

L H Ⓛ H

The predicted outcome is therefore a noun with a H↓H melody on the root. Monomorphemic nouns with H↓H surface melodies on the roots do in fact exist in Ikaan, as shown in (193).[7]

(193)

òjő́↓dí́	'darkness'
ùdú↓gó	'axe'
ùtű́↓rű́	'a type of edible snail'
òké↓ʃí́	'Hausa language'
àká↓kű́	'cactus-like thorny plant'

Following the same derivation, the underlying tones of the noun *ǔː↓kpé* 'a type of glowing insect' can be seen as a L prefix tone and a HLH melody.

(194) a. Underlying representation

uː kpe

μ μ μ

L H L H

b. One-by-one left-to-right association

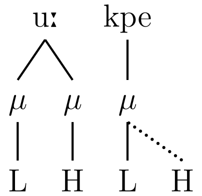
uː kpe

μ μ μ

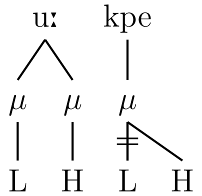
L H L H

[7] The words in (193) contrast with words like à*rá↓ːɦwó* 'night' where the register lowering takes place on the second mora of the long vowel and which in my analysis are not monomorphemic.

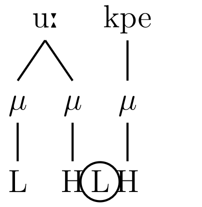
c. Violation of *Ⓗ, H docking



d. Violation of ‘One tone per mora’, L delinking



e. Final representation



Nouns like *ǔː↓kpé* ‘a type of insect’, *ǔː↓bʲɛ́* ‘a type of lizard’ and *ěː↓rén* ‘tomorrow’ therefore can be seen as nouns with monomoraic roots that show evidence for taking a tonal melody with three tones. In section 4.2.3 I identified this combination as a gap in the distribution of tonal melodies over roots and as a potential argument against working with tonal melodies. With this data and *Ⓗ and H docking this gap is filled and the absence of LHL melodies on monomoraic roots like *-ta* ‘lamp’ is also explained, as shown in (191).

This still leaves the problem of associating HLH melodies to monomoraic noun roots which take monomoraic prefixes. Come what may, in those nouns only one H can be associated, the other H cannot find a host. As there is no evidence for any floating H at the right edge of a noun, it may well be that in this case the H has to be deleted after all.

Still, it could be that if there is no tonal solution, *Ⓗsimply has to be obeyed and there is no H deletion rule available, the violation of *Ⓗmay set off changes at the segmental level in order to create TBUs that can then host the H. One possible way of creating TBUs would be to reduplicate part of the root. There are words in the language that could have come about through such a process, *àjɔ̃́↓jɔ̃́* ‘a type of edible maggot’.

If a potential monomoraic root *-jɔ̃́* ‘a type of edible maggot’ came with a HLH melody, it would not be able to link the second H to any mora. Reduplicating the root however would result in an extra mora. A potential derivation is given in (195).

(195) a. Underlying representation with jɔ̃$_{HLH}$

a jɔ̃

L H L H

b. One-by-one left-to-right association

a jɔ̃

L H L H

c. Violation of *H, lack of TBUs results in reduplication of the root

a jɔ̃ jɔ̃

L H L H

d. One-by-one left-to-right association

a jɔ̃ jɔ̃

L H L H

e. Violation of *H, H docking

a jɔ̃ jɔ̃

L H L H

f. Violation of 'One tone per mora', L delinking

a jɔ̃ jɔ̃

L H L H

g. Final representation

a jɔ̃ jɔ̃

L H L H

Reduplication as a response to pressure from *H and H docking would explain the observed surface forms. However, even if it does explain this data, it cannot be the only explanation for reduplication of noun roots or the presence of downstep in reduplication. There are reduplicated forms that do cannot have been caused by pressure from *H, e.g. *ɛ̀kɔ̀kɔ̀* 'chicken', *àbàbá* 'beans' or *ȉkúkú* 'little chair'. Also, downstep occurs in other types of reduplication for other reasons as I will show in section 5.3.2. Therefore the reduplication approach is speculative, even though it would account for the data.

The data indicates that *H and H docking are active in Ikaan after tones have been initially associated. By using this rule and constraint, I can explain why there are more H surface melodies than L surface melodies with monomoraic noun roots. Without *H and H docking this would merely have been a coincidence. I can further explain why there is a downstep in a set of monomorphemic nouns that should not have a downstep if just the association conventions had applied. Finally, by applying *H and H docking I have found evidence for monomoraic noun roots which take HLH tonal melodies and have found an explanation for why there is no evidence for LHL melodies for monomoraic roots. I therefore assume that *H and H docking apply to noun roots immediately after the first tone association through the association conventions.

4.3 Morphemes with prelinked tones

I have shown morphemes with no tones and morphemes with no segments and I have discussed morphemes with both tones and segments where the tones are not linked in the lexical entry but are linked by association conventions. Now we get to morphemes with both tones and segments where the tones are already linked right inside the lexical entry. This prelinking is needed to take care of exceptional tone linking that cannot be derived with the regular association conventions.

There are two morphemes in Ikaan which I analyse as lexically prelinked to tones. These are the distal demonstratives with its allomorphs *ꜜjóːn*, *ꜜdáːn*, *ꜜdɔ́ːn*, *ꜜdɛ́ːn*, *ꜜnɔ́ːn* and *ꜜnɛ́ːn* and emphatic marker *ꜜóː*. The underlying lexical representation which I propose for *ꜜjóːn* and *ꜜóː* are given in (196).

(196) a.
```
      joːn
      /  \
     μ    μ
     |    |
  L  H    H
```
b.
```
      oː
      /  \
     μ    μ
     |    |
  L  H    H
```

I will return to the emphatic marker in section 6.5. In this section I will explain why I propose the prelinked underlying representation for the demonstrative given in (196) and give further evidence for this representation and the application of OCP and tone merging to adjacent L tones.

As shown in (197), modifiers of the noun occur with an agreement prefix that consists of a vowel bearing a low tone.

(197) a. ɔ̀- tá ɔ̀- rɔ̀
O6- lamp 6- 2S.POSS
your lamp

b. ɔ̀- tá ɔ̀- nɔ́n
O6- lamp 6- DET
the very lamp

c. ɔ̀- tá ɔ̀- hã́
O6- lamp 6- special.type.of
a special type of lamp

d. ì- tá ì̀- hòkpátá
I4- lamp 4- all
all the lamps

Demonstratives and the relative marker however do not occur with an agreement prefix that would immediately be obvious. Instead of marking agreement through a vowel prefix, agreement is encoded by having a separate, segmentally distinct allomorph for each agreement class.[8]

(198) a. ɔ̀- tá nɔ̀ː
O6- lamp DEM.PROX:6
this lamp

b. ɔ̀- tá ꜜnɔ́ːn
O6- lamp DEM.DIST:6
that lamp

c. ɔ̀- tá nɔ̀m
O6- lamp DEM.ANA:6
that lamp mentioned before

My proposal is that like nouns, modifiers of the noun are made up of an agreement prefix and a root. Again like nouns, the agreement prefix consists of a toneless vowel morpheme indicating the agreement class and a tonal morpheme. The root of the modifier has the same structure as the root of a noun and consists of segments with underlyingly unlinked tones. Once the word is formed the segmental material and the tonal material line up on their respective tiers and associate one-by-one left-to-right, with copying supplying the tones of any remaining TBUs. The underlying structures of the various morphemes is given for *ɛ̀nɛ́n* 'DET:5, the very' and *ì̀hòkpátá* 'all' in (199).

(199) a.

$$\begin{array}{ll} \begin{bmatrix} \varepsilon \\ | \\ \mu \end{bmatrix} & \begin{bmatrix} \text{n}\varepsilon\text{n} \\ | \\ \mu \\ \\ \text{H} \end{bmatrix} \\ \left[\,\text{L}\,\right] & \end{array}$$

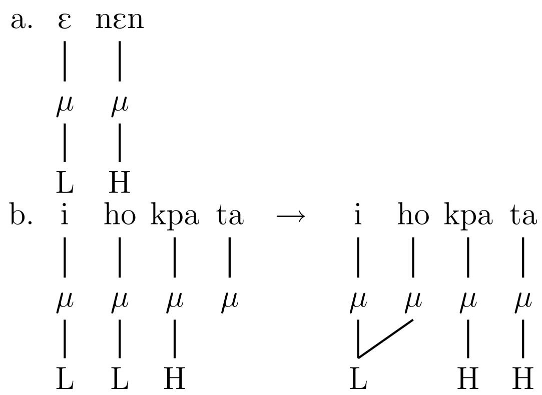
b.

$$\begin{array}{ll} \begin{bmatrix} \text{i} \\ | \\ \mu \end{bmatrix} & \begin{bmatrix} \text{ho} & \text{kpa} & \text{ta} \\ | & | & | \\ \mu & \mu & \mu \\ & & \\ \text{L} & \text{H} & \end{bmatrix} \\ \left[\,\text{L}\,\right] & \end{array}$$

[8]For an overview of the allomorphs of the demonstratives, see (15) in section 2.5.2.

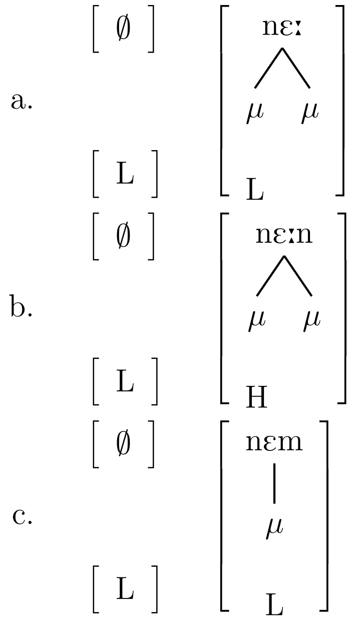
The resulting representations after tonal association are given in (200).

(200)



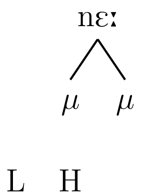
My proposal is that with demonstratives, there is only a tonal prefix. The vowel prefix must have been lost. The underlying representation split up into the morphemes that form the modifier would then be as given in (201).[9]

(201)



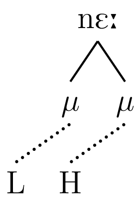
For the proximal demonstrative *nɛ̀ː* and the anaphoric demonstrative *nɛ̀m* one-by-one left-to-right association would result in the observed surface patterns. For the distal demonstrative however one-by-one left-to-right association as shown in (202) produces a LH pattern, which is not what is observed.

(202) a. Underlying representation

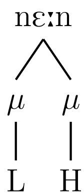


[9]The notation [∅] is not meant to indicate a 'zero morpheme'. Instead, it is meant to symbolise the absence of the segmental prefix, the vowel that indicates agreement class, that occurs with all other modifiers of the noun except the demonstratives.

b. One-by-one left-to-right association

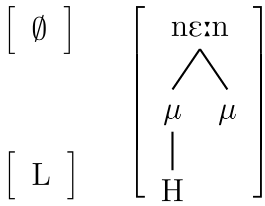


c. Resulting association *nɛ̌ːn



The observed surface tones ꜜ*nɛ́ːn* can be represented if it is assumed that the H tone is prelinked to the root. That way, the L tone cannot link to any TBU and remains floating. For the underlying lexical representation, this implies that instead of the representation of the morphemes given in (201b), the representation given in (203) is more appropriate.

(203)



Prelinking a tone to a TBU in the distal demonstrative and the emphatic marker therefore makes it possible to derive a surface form that would have resulted in an ungrammatical form if the association conventions had applied like they do elsewhere in the language.

One problem remains with this analysis. The L which precedes the prelinked H cannot associate with a TBU. Contrary to non-associated L that are left over from tonal melodies if there are not enough TBUs in a word, this non-associated L does not fall victim to L deletion but remains floating. There are two possible explanations for this behaviour.

One explanation may be that the floating L is a counter example to the L deletion rule which indicates that L deletion needs revising. So far L deletion applies to non-associated tones and therefore makes reference to the history of the L. It may be that in addition to this, L deletion has to distinguish between floating L at the right edge, which are affected, and floating L at the left edge, which are not affected.

A different explanation may be that the derivation in (202) that I have marked as ungrammatical is grammatical after all but is only an intermediate step. Assuming that the tones are linked as given in (202), a *LH constraint that I will propose in section 6.5 may apply, which would result in L delinking and Leftward copying of H. L deletion would therefore not apply because L would first be linked by the association conventions and then be delinked to remove a violation of *LH. Therefore L would not be a non-associated tone but a delinked unassociated tone which of course can remain floating.

4.3.1 Further evidence for OCP(L) and L merging

In section 3.5.2 I stated that the OCP prohibits adjacent L in Ikaan and triggers a merging process which combines adjacent L into a single, multiply linked L. This L merging was said to apply to linked and floating L, within words and across word boundaries. Tonal alternations with the distal demonstratives provide further evidence for OCP(L) and L merging.

To briefly review the starting point of this analysis, the distal demonstrative is lexically prelinked to H and preceded by a floating L, as given for the distal demonstrative for agreement class 5 in (204).

(204)
```
      nɛːn
      /  \
 L   H    H
```

If the distal demonstrative follows a H-final noun, it surfaces as ↓H.

(205) ɛ̀ná ↓nɛ́ːn [_ ‾ ‾] ‘that cow’ (dem.053)

If the distal demonstrative follows a ↓H-final noun, it is downstepped again itself.

(206) ɛ̀wɪ̃́↓wɪ̃́ ↓nɛ́ːn [_ ‾ ‾ –] ‘that mosquito’ (dem.044)

If the distal demonstrative follows a L-final noun however, it surfaces at the same pitch as a previous H, i.e. not as ↓H but as H.

(207) èjɪ̃́mò nɛ́ːn [_ ‾ _ ‾] ‘that egg plant’ (dem.050)

The fact that the distal demonstrative is realised ↓H after H and H after L can be explained with OCP(L) and L merging. If a L-final noun such as *èjɪ̃́mò* ‘egg plant’ is followed by the distal demonstrative, the floating L before the demonstrative is adjacent to the final L in the noun.

(208)
```
 e   ji  mo       nɛːn
 |   |   |        /  \
 L   H   L   L   H    H
```

OCP(L) rules out adjacent L and triggers L merging, which absorbs the floating L into the linked L. As a result, there is no more floating L which could trigger a downstep in the following H so that the distal demonstrative surfaces as H instead.

(209) e ji mo nɛːn

L H L H H

In H-final nouns, the floating L is not adjacent to any L which could absorb it. Therefore it remains floating and triggers downstep in the following H tone—the distal demonstrative surfaces as ꜜH.

The tonal alternation between ꜜH and H as surface forms for the distal demonstrative is therefore further evidence for the claim that the distal demonstrative is in fact preceded by a floating L and for OCP(L) and L merging.

4.4 Chapter summary

In this chapter, I have distinguished four ways of representing tone in lexical entries in Ikaan and have discussed one example for each type of representation.

I have introduced verbs as toneless morphemes with verbal inflectional melodies as their counterpart tonal morphemes. I will take up further issues in inflectional morphology through tones in the next chapter.

I have discussed at length how noun roots are underlyingly specified for one of six tonal melodies and I have discussed in more detail than before how these melodies are mapped onto TBUs. I have shown how instances of ‘long’ tonal melodies on ‘short’ nominal roots seem to be missing from the set of surface tonal melodies that would be expected if underlying tonal melodies are employed, and I have argued for the deletion of unassociated tones as the reason for this gap. I will revisit tone deletion in the next chapter, showing how a case for tone deletion can be made more strongly with verbs and verbal melodies.

I have also discussed an alternative analysis of noun roots and prefixes that works without short and long prefixes and uses vowel-initial roots instead. This would explain the presence of short and long prefixes and the fact that the nominal melody seems to link to the second mora of the prefix rather than the root itself. I have shown how the vowel-initial root analysis may lead to predictions that are not necessarily met in the data. I will return to vowel-initial roots as an alternative explanation for similar patterns in the verb in section 5.2.2 and present further evidence against this hypothesis there.

Using lexical tonal melodies, I have substantiated two of the claims I have made in the previous chapter. I have shown that OCP(L) does not apply early on in the phonology but only after tones are first associated. With the late application of OCP(L), I am implicitly assuming a stratificational model of phonology where not all rules are active all the time.

I have also shown that the comparatively high frequency of nouns with H on their root can be seen as an indication that *Ⓗ and H docking are active in the phonology. Applying this constraint and rule, I have further been able to provide an explanation for why there is no evidence of LHL melodies occurring with monomoraic noun roots and to give examples for HLH melodies occurring with monomoraic noun roots. I have thereby accounted for what seemed to be a gap in the distribution of tonal melodies over noun roots.

Finally, I have argued for prelinking of tones to TBUs to account for unusual surface tones of the distal demonstrative. In my analysis, these unusual surface tones are the result of irregular association of tones to TBUs with these words, which cannot be arrived at with the regular association conventions.

In the following chapters, the representation of tone in the lexical entries will play less of a role. I will however make reference to some of the issues discussed here to show parallels between lexical and grammatical association of tones and to return to tonal patterns on nouns that I have not looked at here, such as nouns with only ꜜH in their surface tonal melodies.

Chapter 5

Tone in the Ikaan grammar

In the preceding chapters, I have described and analysed the way tones behave in the phonology in Ikaan and the way tones are represented in lexical entries. This chapter now deals with tone as a grammatical entity, that is with tone as a a meaningful and meaning-bearing element in the language.

I will not exhaustively discuss here all the forms, functions and behaviour of tone in the grammar of Ikaan. The place to do that would be a reference grammar, after much more in-depth research on the language has been carried out. I will instead show examples of tone as a morpheme in the Ikaan grammar at the word, phrase and sentence level, and discuss its forms, functions and behaviour in a limited set of morphosyntactic constructions.

At the word level, Ikaan employs tone for derivational and in inflectional processes. In section 5.1 I will discuss the derivation of nouns and adjectives from verbs and show both regularities and irregularities in the derivation. In section 5.2 I will take up the discussion of tense-aspect-mood inflection again and discuss phonological rules and constraints I proposed earlier from the perspective of verbs. I will also return to my claim that verbs are underlyingly toneless and show how tonal melodies in Imperative, while varied, are too regular to be treated as unpredictable and lexically specified. At the phrase level, I will look at the associative construction and one type of reduplication in section 5.3 and discuss whether or not a case for an associative morpheme can be made. Finally, in section 5.4 I will show how tones and intonation are employed to mark the distinction between plain statements and yes/no questions.

In my discussion in this chapter, I will concentrate on morphemes that are either made up entirely of tone or include tones as well as segments. I will not discuss here morphosyntactic constructions that are encoded with a phonological constraint that applies specifically to them. Applying a construction-specific phonological constraint to express a morphosyntactic construction is a process that takes place at the interface between the phonology and the grammar. Therefore these constructions will be discussed in Chapter 6 rather than here.

5.1 Word-level tonal grammar—derivation

In this section I discuss derivational processes in Ikaan whereby nouns and adjectives are derived from verbs. I concentrate on the tonal and segmental aspects, leaving out a discussion of syntactic issues and a closer investigation of the actual usage of de-verbal nouns and adjectives. My objective is to show that there is evidence for tonal derivation with regular patterns in Ikaan, but that there is a substantial number of cases where this derivation cannot apply or where it proceeds differently. Therefore tonal derivation, while it does exist, cannot be said to be very productive.

I will first present Abiọdun's (1999) findings on derivation in Ikaan and then present data that I have collected to show both the 'regular' and 'exceptional' behaviour in the derivation. Based on that, I will briefly compare Abiọdun's (1999) and my own analysis.

5.1.1 De-verbal nouns

With the term 'de-verbal nouns', I refer to parts of speech which are derived from verbs and share characteristics with nouns. The derivation, meaning, function and use of de-verbal nouns in Ikaan has not yet been fully investigated. Therefore I will not make specific claims as to the exact semantics and morphosyntax of de-verbal nouns in Ikaan, whether they are gerunds, verbal nouns or 'ordinary' nouns. Instead, I will restrict myself to a limited range of the phonological patterns and show correlations between phonology, morphology and some semantic properties of verbs and their corresponding de-verbal nouns.

My preliminary analysis of de-verbal nominalisation is that nominalisations from verbs denoting activities and from verbs denoting states are to some degree productive, and that their formation can be generalised into a grammatical process.

I will first present Abiọdun's (1999) analysis of nominalisations. I will then show regular phonological patterns which occur in the data I have collected and relate these to semantic properties of the verbs that the de-verbal nouns are derived from. Finally, I will compare Abiọdun's analysis to my own analysis.

Abiọdun (1999:141–146, 249–255) discusses the derivation of verbal nouns, abstract nouns and concrete nouns from verbs. Abiọdun (1999:46) contrasts genuine nouns with cognate verbal nouns as given in (210), repeated from (37) above.

(210)

ùɲẽ́nĩ́	‘urine’	úɲẽ́nĩ́	‘urinating’
ùhĩ́nṍ	‘question’	úhĩ́nṍ	‘asking’
ùmã̀hú	‘laughter’	úmã́hú	‘laughing’

Abiọdun analyses the words beginning with the low tone as regular nouns and the words beginning with the high tone as verbal nouns. He further sees the high-toned prefix *ú-* as the morpheme marking a verbal noun. In addition to the prefix *ú-* verbal nouns are derived by imposing a H melody (Abiọdun, 1999:250).

(211)

Verb	Gloss	Verbal noun	Gloss
kɔ́n	‘dig’	úkɔ́n	‘digging’
jú	‘kill’	újú	‘killing’
wà	‘hoe’	úwá	‘hoeing’
ɲànà	‘buy’	úɲáná	‘buying’

Elugbe (2001:13) quotes Abiọdun’s data in support of his own claim that the gerund or verbal noun prefix in Proto-Edoid is H-toned.

Abstract nouns in Abiọdun’s description also derive from verbs. However, there are far less regularities in the derivation. Whereas the tone on the noun class prefix is invariably L, the vowel that functions as noun class prefix is not predictable. Unlike the tones on verbal nouns, the tones on the noun root are not determined by a grammatical melody. Instead, they are identical with what Abiọdun gives as the underlying tone of the verb.

(212)

Verb	Gloss	Abstract noun	Gloss
hĩ́nó	‘ask’	ùhĩ́nó	‘question’
nɔ̀	‘know’	ànɔ̀	‘knowledge’
kɔ́n	‘fight’	ɔ̀kɔ́n	‘fight’
ɣʷó	‘die’	èɣʷó	‘death’

Finally, concrete nouns are made up of the prefix *ù-*, a verb with a H melody and the word *úmà* ‘thing’ (Abiọdun, 1999:253–5).

(213)

Verb	Gloss	Concrete noun	Gloss
ʃɛ́g	‘sieve’	ùʃɛ́gúmà	‘filter’
wã̀	‘drink’	ùwṹmà	‘drinking material’
méɲĩ́	‘clear’	ùméɲúmà	‘clearing material’
kɔ̀wĩ̀	‘climb’	ùkɔ́wúmà	‘climbing material’

The de-verbal nouns in my database can be grouped phonologically into three sets. The first set consists of words with the prefix *ù-, ʊ̀-* and a root with a H melody. The second set is made up of words with the prefix *ò-*, *ɔ̀-* and a H or occasionally a HL melody. In the third set of what may be de-verbal nouns, neither the vowel in the prefix nor the tonal melody of the root is predictable. Instead various vowels and surface melodies occur.

Examples for de-verbal nouns with the prefix *ù-*, *ʊ̀-* and a H root melody are given in (214).

(214)	ba	‘fetch’	ʊ̀bág	‘fetching’
	fɛr̥	‘write’	ʊ̀fɛ́r̥ág	‘writing’
	kana	‘read’	ʊ̀káná	‘reading’
	kunu	‘tie’	ùkúnú	‘tieing’
	rʷe	‘carry’	ùrʷérʷé	‘carrying’
	r̥ãna	‘cook (soup)’	ʊ̀r̥ã́ná	‘cooking (soup)’
	fa	‘break open’	ʊ̀fág	‘open wound’
	je	‘eat’	ʊ̀jág	‘food’
	kene	‘do’	ùkéné	‘celebration; madness’
	nʲeni	‘urinate’	ùnʲéní	‘urine’

Data for de-verbal nouns with the prefix *ò-*, *ɔ̀-* and a H or HL root melody is given in (215).

(215)	gba	‘to be big’	ɔ̀gbág	‘size’
	hɔ	‘to be dry’	ɔ̀hʷág/ɔ̀hɔ́ːm	‘dryness’
	rɔ	‘to be strong’	ɔ̀rʷág	‘strength’
	rĩ	‘to be black’	òrĩ́ːm	‘blackness’
	bʊ	‘to be wide’	ɔ̀bʊ̂ː	‘width’
	ʃa	‘to be beautiful’	ɔ̀ʃã̂ː	‘beauty’

Words from the third set with different prefixes and various tonal melodies on the root are given in (216).

(216)	wir̥	‘ask’	èwìr̥ìnó	‘question’
	rĩnã	‘think’	ɛ̀rĩ́nã̀	‘decision, opinion, discussion’
	kɔ̃n	‘quarrel’	ìkɔ̃́n	‘argument’
	kpa	‘cultivate’	ìkpàː	‘cultivating’
	rʷe	‘carry’	ìrʷé	‘load’
	kʊ	‘bathe’	ꜜɔ́kʊ́	‘bath’
	jɔna	‘greet’	ɔ̀jɔ̀ná	‘greeting’
	hãr̥ĩnã	‘dream’	àhã̀r̥ĩ̀nã́	‘dream’

In the words in this last third set, the verbs and nouns have the same roots, which shows that there is some kind of relation between the verbs and nouns. Still, because the prefixes and melodies in the nouns are so diverse, I do not consider the nouns to be derived from the verbs. For now I will therefore consider these verbs and nouns to be related through their meaning but will not attempt to find a grammatical derivation process.

Things are different for the examples in (214) and (215). Here, there are both phonological and morphological regularities and semantic properties which correlate with the phonological and morphological patterns.

In my analysis, the de-verbal nouns in (214) consist of the segmental prefix *u-*, *ʊ-*, which I see as a noun class prefix, and the nominal tonal prefix L. The root of these de-verbal nouns is toneless and consists only of the more complex form of the two alternate forms of the verb (for information on the alternate forms of the verb refer back to section 2.5.2). The toneless root is linked to a derivational H melody. Semantically, the de-verbal nouns in (214) are derived from verbs describing activities.

The semantics of the verbs in (214) contrasts with the semantics of the verbs from which the de-verbal nouns in (215) are derived. The verbs in (215) do not describe activities but describe states or properties instead. De-verbal nouns derived from stative verbs describing states and properties are characterised by a segmental prefix *o-*, *ɔ-*, which again I see as a noun class prefix, and the nominal tonal prefix L. As before, the root of the de-verbal nouns is toneless. Segmentally, it is made up either of the more complex form of the two alternate forms of the verb, or of the simpler form of the verb followed by */m/*. The toneless root is linked to a derivational H melody in most cases but in some cases also shows a HL melody.

While this semantic distinction fits many of the de-verbal nouns beginning with *u-*, *ʊ-* and almost all of the de-verbal nouns beginning with *o-*, *ɔ-*, there are some counter examples.

There are some de-verbal nouns beginning with *u-*, *ʊ-* which are derived from verbs referring to states or properties rather than activities.

(217)	$\text{m}^{\text{w}}\text{o}$	‘to be sharp’	$\text{ùm}^{\text{w}}\text{ó}$	‘sharpness’
	mã	‘to be thick’	ʊ̀mám	‘thickness (of a liquid)’
	ŋmɪnɪgɪ	‘to be sweet’	ʊ̀ŋmɪ́nɪ́gɪ́	‘sweetness’
	$\text{d}^{\text{j}}\text{e}$	‘to be deep’	$\text{ùd}^{\text{j}}\text{ém}$	‘deepness’

Also, in my database there is one de-verbal noun beginning with ɔ̀- which is not derived from a verb referring to a property but from a verb describing an activity.

(218)	kɔ̃n	ɔ̀kɔ̃́n	‘fighting’

Overall, however, there are far less examples that go against the semantic correlations that I have given above than there are examples that match the proposed semantic correlations.

Returning to Abiọdun's analysis, my analysis differs from his and adds new information to his findings. Firstly, tonally I propose a L rather than a H tone on the noun class prefix. I argue for L because L explains the downstep in constructions such as (219).

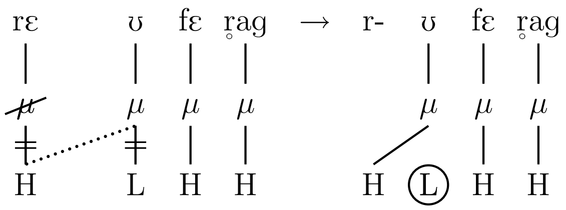
(219) ı́báı́rò dɛ̀ː ì- rɛ́ ʊ̀fɛ́r̥ág →
biro.FOC DEM.PROX:4 4.NFUT- BEN? writing

[ı́báı́rò dɛ̀ː ìrʊ́ꜜfɛ́r̥ág]

This biro, is it for writing? (nom.028)

In (219) vowel deletion on the benefactive marker sets a H afloat, which docks to the next TBU and in turn delinks the L on this TBU. The now floating L causes the the following H to be realised as ꜜH.

(220)



The reason why Abiọdun finds H tones on the noun class marker may be that he was given nominalisations in a predicative construction with a predicative H tone prefix rather than a nominal L tone prefix. If I am however correct in assuming that the noun class prefix tone is L, this also implies that Ikaan nominalisations do not support Elugbe's hypothesis that the gerund prefix in Proto-Edoid is H-toned.[1]

Secondly, segmentally I have found that nominalisations are produced with the more complex form of the two verb forms. This differs from Abiọdun's data, who found the simpler form where I found the complex one. Therefore, for what Abiọdun gives as *újú* 'killing' in (211), my analysis would predict *ʊ̀jʷág*. Unfortunately, I do not have enough data to test my hypothesis further.

Thirdly, semantically I make a distinction between nominalisations from dynamic verbs denoting activities vs. static verbs denoting properties, which Abiọdun does not explicitly make.

Fourthly, regarding the productivity of the derivation mechanism, the deverbal nouns I found are not very wide-spread.

Nominalisations from verbs describing activities are almost entirely from elicitation through translation and from descriptions of scenarios. In natural texts like riddles, proverbs and narratives of different types there are no instances for nouns such as *ʊ̀fɛ́r̥ág* 'writing'. Nominalisations from static verbs were easier to elicit but are not well-attested in natural contexts either. The only nominalised

[1]That is of course assuming that Ikaan is Edoid, as Elugbe does.

forms that occur naturally in my corpus are de-verbal nouns such as *ʊ̀jág* 'food', which suggests that these forms have lexicalised by now and are not productively derived any more. Finally, there are isolated instances of the concrete nouns Abiọdun describes in my data but these come from participant observation data rather than elicitation. Eliciting additional examples for such concrete nouns was not successful.

There are too many regularities in the morphology and semantics of de-verbal nouns to brush them aside as mere coincidences. At the same time, there are too many apparent counter examples to claim that this derivational process is fully productive.

A solution to this problem may be to see the nominalisation process as productive after all and as able to form de-verbal nouns regularly by rule, providing that the semantics of the verb permits it. Dynamic verbs form verbal nouns with the prefix *u-*, *ʊ-*, the alternate form of the verb as the root and a H melody linked to the root. Stative verbs form de-verbal nouns with the prefix *o-*, *ɔ-*, the alternate form of the verb as the root and a H (or HL) melody linked to the root.

This however does not imply that every noun that has the same structure as a de-verbal noun necessarily has been derived from a verb through one of these nominalisation processes. Firstly, it may well be that there are other derivational processes that I have not yet identified. Secondly, since the third set of nouns that I have shown in (216) is made up of nouns with different prefixes and melodies, nouns with the prefixes *u-*, *ʊ-*, *o-*, *ɔ-* and a H melody on the root are within its scope. Nouns such as *ɔ̀kɔ̂́n* 'fighting' may therefore be analysed as a member of this third set of nouns which are not derived productively from verbs. As that, *ɔ̀kɔ̂́n* 'fighting' would not any more be a counter example to the claim that the prefix *o-*, *ɔ-* is used for deriving nouns from verbs referring to states and properties.

Until further research sheds more light on these issues however, I take it that the available data suggests that there are nominalisation patterns that can be reduced to phonological rules. Still, these processes are not as productive for the speakers I was working with as they were for the speakers Abiọdun was working with.

5.1.2 Adjectives

In my analysis so far, Ikaan has a very small class of lexical adjectives. The two members of this class that I have been able to identify so far are the adjective with the root *-hấn* 'another; a specific, a specific type of' and the adjective with the root *-hwɛ̂́ːn* 'a different, a different type of'. There may be more members in this group that I have not yet been able to classify.

In addition to lexical adjectives, there are derived adjectives which are used inside the noun phrase, and it is the derivation of these adjectives from verbs that I will discuss in this section.[2]

The word *àhɔ́ː* 'to be dry' in (221a) is a verb because it can take the excessive suffix *-ge/-gɛ* 'too', as shown in (221b).

(221) a.

à-	fá	à-	hɔ́ː	
A2-	leaves	2.NFUT-	be.dry.NFUT	

The leaves are dry. (nadj.008)

b.

à-	fá	à-	hɔ́ː	-gɛ̀
A2-	leaves	2.NFUT-	be.dry.NFUT	-EXC

The leaves are too dry.

The word *àhɔ́hɔ́* 'dry' in (222a) is an adjective because it occurs inside the noun phrase before the demonstrative *dàː* 'these' as shown in (222b). Demonstratives such as *dàː* 'these' are always the final constituent in a noun phrase, all other modifiers of the noun precede them.

(222) a.

à-	fá	à-	hɔ́hɔ́
A2-	leaves	2-	dry

dry leaves (nadj.009)

b.

à-	fá	à-	hɔ́hɔ́	dàː
A2-	leaves	2-	dry	DEM.PROX:2

these dry leaves

Further examples for verbs and adjectives derived from the verbs are given in (223).[3]

(223) a. ɔ̀ní ɔ̀rɔ́ 'The person is strong.' (nadj.023)
ɔ̀nì ɔ̀rɔ́ːrɔ́ 'the strong person' (nadj.024)

b. èwùr èːri̋ 'The hair is/has become black.'
ɔ̀nì òːri̋ːri̋ 'a black person' (nadj.036)

c. i̇̀tòmátò ìwa̋r̥ 'The tomato is ripe.'
i̇̀tòmátò ìwa̋wa̋r̥ 'ripe tomato '

For the adjectives in (223), the derivation follows a specific pattern:

- The CV part of the verb root is reduplicated, one of the vowels of the new stem may or may not be lengthened.

[2]Abiọdun (1999:255–7) describes the formation of adjectives through the suffix *-úà*, *-ʊ́à*. I have not found this formation at all and will therefore not discuss it here.

[3]In *ɔ̀ní* 'person' the tonal pattern changes from a H nominal melody for the unmodified noun to a L nominal melody for the modified noun.

- As a modifier of the noun, the newly formed adjective receives an agreement prefix.
- The prefix receives a single L tone, the stem receives a H melody.

Whereas the rules above account for the data in (223), there are other examples for the formation of adjectives from verbs that do not follow this pattern. Instead of the forms observed above, the tones or the segments may be different, or there may not be any changes at all.

In (224), the tones on the adjective are not from an all-H melody but from a HL melody instead.

(224) a. ʊ̀kpárʊ̀kpá ʊ̀↓ɪ́ːʃáː ‘The butterfly is beautiful.’ (nadj.060)
ʊ̀kpárʊ̀kpá ʊ̀ʃâːʃà ‘a beautiful butterfly’ (nadj.061)

b. ɔ̀ːrɛ̀ː òdĩ̂ː ‘The path is long.’ (nadj.064)
ɔ̀ːrɛ̀ː òdĩ̂ːdĩ̀ ‘a long path’

In (225), the segmental part of the adjective is not formed by CV reduplication, and the tones do not stem from a H melody.

(225) a.

ù-	mɔ̃́	ʊ̀-	rʲã̂ːʃĩ̀n
U3-	water	3.NFUT-	be.cold

The water is cold.

b.

ù-	mɔ̃́	ʊ̀-	rʲã̀ʃã́
U3-	water	3-	cold

cold water

In (226) and (227) on the other hand, there is no segmental or tonal difference between the verbal and adjectival use of the words. Note that the tonal melody in the verbal use is not the regular Non-Future tense tonal melody either.

(226) a.

ì-	kúkú	ìː-	dʒ	ì-	jã́wã́
I4-	chair	4-	1S.POSS	4.NFUT-	be.new

My chair is new.

b.

ì-	kúkú	ìː-	dʒ	ì-	jã́wã́	dɛ̀ː
I4-	chair	4-	1S.POSS	4-	new	DEM.PROX:4

this new chair of mine

(227) a.

ò-	hún	ɔ̀ː-	dʒ	ò-	dĩ́dĩ́↓bɔ́g
O6-	tree	6-	1S.POSS	6.NFUT-	be.big

My tree is big.

b.

ò-	hún	ɔ̀ː-	dʒ	ò-	dĩ́dĩ́↓bɔ́g	nɔ̀ː
O6-	tree	6-	1S.POSS	6-	big	DEM.PROX:6

this big tree of mine

For *dídí*ꜜ*bɔ́g* ‘big’, one reason for the unusual tonal melody may be that this word does not seem to be a monomorphemic verb anyway, judging by the fact that there is downstep in the word, which only occurs across morpheme boundaries. For *jãwã* ‘new’ I do not have an explanation for why the tones are different.

In addition to the different derivation patterns, there are also verbs which cannot derive adjectives at all. Instead of forming adjectives, relative clauses are used for these verbs.

(228) a. ò- hún ɔ̀- gbá
O6- tree 6.NFUT- be.big.NFUT
The tree is big.

b. ò- hún nɔ̀ nɔ̃́- gbá
O6- tree REL:6 6.NFUT.REL- be.big.NFUT
the tree that is big (np.026, given as a translation of ‘the big tree’)

c. * ò- hún ɔ̀- gbágbá
O6- tree 6- big
the big tree

Lexical adjectives, derived adjectives and properties expressed as relative clauses are all attested in naturally occurring speech. In the sentence in (229), a lexical adjective (*ɔ̀hã́* ‘a particular type of’), a derived adjective (*ìrɔ́ːrɔ́*) and a property expressed with a verb in a relative clause (*wɔ̃* ‘be soft’) all occur.

(229) ɔ̀nì ɔ̀hã́ íʃɔ̀r̥ ìrɔ́ːrɔ́ nà- jàg ànì àhã́
person particular pounded.yam.FOC strong 3P- eat people particular
íʃɔ̀r̥ ù dɛ̀ ní- wɔ̃́ nà- jàg
pounded.yam.FOC epV REL 4- be.soft 3P- eat
Some people, it is hard pounded yam that they like, some people, it is soft pounded yam that they like. (`ikaan034_yam.wav, III/120`)

It is equally possible to express the same concepts as the forms given in (230).

(230) a. ì- ʃɔ̀r̥ ù dɛ̀ ní- rɔ́
I4- pounded.yam epV REL:4 4- be.strong
pounded yam that is hard (`ikaan034_yam.wav, III/120`)

b. í- ʃɔ̀r̥ ì- wɔ̃́ːwɔ̃́
I4- pounded.yam 4- soft
soft pounded yam (`ikaan034_yam.wav, III/120`)

When adjectives enter grammatical constructions where they modify nouns, lexical and derived adjectives behave the same way. Adjectives as a whole however behave differently from other nominal modifiers tonally. Given the appropriate tonal context, adjectives can bear HL sequences on the noun class marker after vowel assimilation. Other nominal modifiers cannot have a HL melody and have H↓H melodies instead.

(231) a. ɔ̀tá ɔ̀já̰wá̰ → [ɔ̀tɔ̂ːjá̰wá̰]
lamp new
a new lamp

b. ɔ̀tá ɔ̀bɔ́ → [ɔ̀tɔ́↓ːbɔ́]
lamp 1P.POSS
our lamp

I will return to this difference in tonal behaviour in section 6.2 when I discuss downstep at the phonology-grammar interface.

The derivation of nouns and adjectives from verbs is an example of derivation involving tonal melodies as one of the encoding strategies. The number and range of exceptions and irregularities and the fact that for adjectives an alternative strategy (relative clauses) is available and may be required shows that these derivational processes are not generally applicable and not very productive in the language. Nonetheless, regular segmental and tonal patterns do exist, and there are too many to consider them a mere coincidence.

In addition to tonal melodies for deriving nouns and adjectives from verbs, it may also be that there is tonal derivation for adverbs from verbs. The data that I have been able to collect is not sufficient yet though, therefore more work on tone in the derivational morphology is needed to reach a better understanding of the derivations that I have discussed and potential other derivations.

5.2 Word-level tonal grammar—inflection

This section is concerned with verbal inflection for tense-aspect-mood categories. I have previously mentioned inflection in section 2.5 on some grammar background of Ikaan, where I have given paradigms of the forms of selected tense-aspect-mood categories. I have briefly outlined Abiọdun's (1999) findings on tense-aspect-mood and his use of tonal melodies to account for verbal inflection in Ikaan in section 3.1 in the chapter on tone in the Ikaan phonology. In the chapter on the internal structure of lexical items in Ikaan, I have argued in section 4.1 that verbs are underlyingly toneless and are inflected for tense-aspect-mood with grammatical verbal melodies.

In this section, I will build on the information given already and use data from verbal inflection to substantiate claims on the Ikaan tonal phonology that I have made in the preceding sections. The issues I will revisit and work out further are whether verbs are indeed underlyingly toneless, how tonal association proceeds, whether L tones from tonal melodies are deleted if they cannot be associated and how *Ⓗ and H docking apply. I will also discuss an alternative to L deletion and H docking and show how this analysis is not as explanatory as the proposal I give.

5.2.1 Imperative mood—are verbs underlyingly toneless?

In section 4.1 I made the claim that verbs are underlyingly toneless and that their tones are predictable from their tense-aspect-mood category. Data from Imperative mood challenges that notion as a range of different patterns is attested and as it is not immediately clear why a given verb would select one of those melodies rather than another.

Imperatives in Ikaan can be bare as in (232a) for the singular imperative form or they can come with a prefix as in (232b) for the plural imperative form.

(232) a. jé
eat.IMP
Eat (sg.)!

b. mánà- jé
2P- eat.IMP
Eat (pl.)!

In addition to the bare infinitive, there are invitation-like imperatives or permissives which are translated into English as 'Let's . . . '. I have not yet analysed these forms or potential subjunctive forms and will not discuss them further here, but I give two examples in (233).

(233) a. à bá- ꜜ wʊ̋
IMP? 1P- IMP? drink.IMP?
Let's drink. (imp.003)

b. à bá- jè ʊ̀jág
IMP? 1P- eat.IMP? food
Let's eat food. (imp.002)

In both the bare imperative and the invitation-like imperative, verbs surface with melodies that seem unpredictable at first sight. Some verbs are H-toned, other verbs are L-toned, some verbs are H-toned if they are followed by an object but L-toned if there is no object. Yet other verbs are L-toned when they are followed by an object and H-toned if they occur on their own.

(234) a. L
r̥ìr̥ 'Plait!'
r̥ìr̥ èwúr 'Plait the hair!'

b. H

nɛ́ː 'Hold!'

nɛ́ː èrèké 'Hold the sugar cane!'

c. L and H

jã̀nà 'Buy!'

jã́ná èrèké 'Buy sugar cane!'

d. H and L

r̥ɔ́ 'Pound!'

r̥ɔ̀ ìʃɔ̀r̥ 'Pound the pounded yam!'

With tonal alternations like these, an analysis where verbs are toneless and receive tones from a grammatical melody seems difficult to maintain. Still, my proposal is that if additional phonological and morphological information is taken into consideration, the tones become predictable again.[4]

The first group of verbs includes verbs with a L melody, no matter if the verb is followed by an overt object noun or not. These verbs are given in (235), sorted by their CV structure.

For each verb, I give the imperative form without an overt object, the imperative form with an overt object, and additionally the alternate root of the verb form. The alternate root of verb is given because, as I will show, there are correlations between the alternate form of the root and the tones of the verb in Imperative. Verbs with benefactive or recipient indirect objects have not been systematically investigated for tonal alternations in imperatives and are therefore not included in the discussion here.

(235) a. CV verbs

[4]The semantics may also play a role in the selection of tonal melodies, in that there might be a distinction between a continuous and a non-continuous form of the imperative. First, one of the consultants offered back-translations of elicited sentences in Ikaan into English, translating phrases for example as 'Be reading!', and was not comfortable with the translation 'Read!'. Also, with hindsight, the scenarios I used to elicit some of the imperative forms may have introduced a continuous notion that I was not aware of at the time. I have not followed up this aspectual distinction however, and with the available data I cannot give an analysis yet. I will therefore restrict myself to the phonological and morphological level.

bɔ̀g	‘Uproot!’
bɔ̀ ɔ̀jí	‘Uproot the grass!’
bog	
bà	‘Know!’
bà ùŋmó	‘Know the song!’
baː	
bà	‘Fetch!’
bà ùmɔ̃́	‘Fetch water!’
bag	
kpà	‘Cultivate!’
kpà ìkpàː	‘Make heaps!’

kpaːg
kã̀ ‘Collect!’
kã̀ ìjã́ ‘Collect fire!’
kãː
hwã̀ ‘Scratch!’
hwã̀ àtìm àːdʒ ‘Scratch my back!’
hwãː

b. CVː verbs
kpĩ̀ː ‘Hit!’
kpĩ̀ː òjòwér̥ ‘Hit the man!’
kpʲõː
kã̀ː ‘Sew!’
kã̀ː ìʃòkòtò ‘Sew trousers!’
kãː

c. CVC verbs[5]
tìf ‘Tell!’
tìf ìn ‘Tell him!’
tifog
r̥ìr̥ ‘Plait!’
r̥ìr̥ èwúr ‘Plait hair!’
r̥ɪr̥ɔg
mĩ̀ː ‘Swallow!’
mìːm ʊ̀jág ‘Swallow the food!’
?
hũ̀r̥ ‘Tie [a knot]!’
hũ̀r̥ ʊ̀kʊ́ ‘Tie the rope [into a knot]!’
hũr̥og
mùg ‘Prepare!’
mùg ʊ̀jág ‘Prepare food!’
mugog
kũ̀n ‘Tie [around something]!’
kũ̀n ʊ̀kʊ́ ‘Tie the rope [around something]!’
kũno
rɛ̀r ‘Put down!’
rɛ̀r ìrʷé ‘Put down the load!’
rɛrag

[5] In CVm verbs such as mĩːm ‘swallow’ and r̥ãm ‘chew’ the final /m/ does not surface if it is in phrase-final position. mĩːm ‘swallow’ therefore surfaces as [mĩ̀ː] ‘Swallow!’ here.

ʃɛ̀g	'Sift!'
ʃɛ̀g ʊ̀kã̂m	'Sift the flour!'
ʃɛgag	
tɔ̀r	'Fetch!'
tɔ̀r ı̀hún	'Fetch firewood!'
tɔrag	
r̥ã̀	'Chew!'
r̥ã̀m ɛ̀nɔ̃́m	'Chew the meat!'
r̥ãː	

The verbs in this group have CV, CV: and CVC structures. Their alternate form of the verb is formed either with one of the allomorphs of the suffix -V*g* or by lengthening the vowel.

The second group of verbs is made up of imperative forms with a H melody, no matter if the noun is followed by an overt object or not.

(236) a. CV: verbs

jáː	'Take a photo!'
jáːn	'Take a photo of him!'
jajaː	
jẽ́ː	'Lock!'
jẽ́ː ɔ̀kɔ́	'Lock the door!'
jẽjẽː	
nɛ́ː	'Hold!'
nɛ́ː èrèké	'Hold the sugar cane!'
nɛnɛː	
tɛ́ː	'Make [ẹba]!'
tɛ́ː ɛ̀bà	'Make ẹba!'
tɛtɛː	
rʷéː	'Carry!'
rʷéː ùmɔ̃́	'Carry water!'
rʷerʷeː	
kpɛ́ː	'Put on!'
kpɛ́ː ʊ̀tɛ́	'Put on the cloth!'
kpɛkpɛː	

b. CVCV verbs

bébé	'Back!'
bébé ꜜójṹ	'Back the baby!'

bebe	
ʃémé	'Curse!'
ʃémé ɔ̀jɔ̀wér̥	'Curse the man!'
ʃeme	
fɛ́gɛ́	'Break!'
fɛ́gɛ́ ɔ̀tá	'Break the lamp!'
fɛgɛ	
kéné	'Do! Make!'
kéné ʊ̀jág	'Make food!'
kebe	
bɔ́rɛ́	'Uproot!'
bɔ́rɛ́ ɛ̀fɔ́	'Uproot the spinach!'
bɔrɛ	
jɔ́nã́	'Greet!'
jɔ́nã́ ɔ̀jɔ̀wér̥	'Greet the man!'
jɔnã	
jã́ná	'Be near!'
jã́náːdʒ	'Be near me!'
jãna	
ŋmáná	'Have!'
ŋmáná ɔ̀tɛ̃́ʲ	'Have the medicine!'
ŋmana	

The verbs in this group have CV: and CVCV structures. The alternate form of the CV: verbs is formed through reduplication. CVCV verbs do not change their form.

The third set of verbs bear a H melody on the verb if there is no overt object, and a L melody if there is an overt object present.

(237) a. CV verbs

dɨ́	'Sing!'
dɨ̀ ùŋmó	'Sing a song!'
dʲog	
dɨ́	'Build!'
dɨ̀ ègù	'Build a house!'
?	
jú	'Kill!'
jù èhú	'Kill the rat!'

jʷog

kʊ́	'Bathe!'
kʊ̀ ìr̥ì ìrɔ̀	'Wash your body!'
kʷag	
jé	'Eat!'
jè ʊ̀jág	'Eat food!'
jag	
kɔ́	'Plant!'
kɔ̀ ìjɔ́	'Plant yam!'
kʷag	
hɔ́	'Hack!'
hɔ̀ ɔ́bɛ̀gɛ̀	'Hack the plantain!'
?	
r̥ɔ́	'Pound!'
r̥ɔ̀ ìʃɔ̀r̥	'Pound pounded yam!'
r̥ʷã́	
fá	'Slap'
fà ɛ̀ːwí	'Slap the goat!'
fag	
fá	'Break!'
fà ìràwá	'Break the melon seeds!'
fag	
rá	'Soak!'
rà ʊ̀tɛ́	'Soak the cloth!'
rawag	
há	'See!'
hà èrèké	'See the sugar cane!'
haːg	
tá	'Play [ayo]!'
tà ăːwò	'Play ayo!'
tã	
gbá	'play!'
gbà ı̀bɔ̂ːl	'play football!'
gbag	

b. CVC verbs

fɛ́r̥	'Write!'
fɛ̀r̥ ı̀wé	'Write a book!'

fɛr̥ag	
kɔ́r	‘Break!’
kɔ̀r ùkã̀^{j}	‘Break the leg!’
kɔrag	
hɔ̃́n	‘Tie [to something]!’
hɔ̃̀n ɛ̀ná	‘Tie the cow [to something]!’
hɔ̃nã	
r̥ã́n	‘Prepare [amala]!’
r̥ã̀n ʊ̀kã̂m	‘Prepare amala!’
r̥ãnã	

The verbs in this group have CV and CVC structures. The alternate forms of the verbs are formed with one of the allomorphs of the suffix -V*g* and in two cases through nasalisation.

The last set of verbs has a L melody if it is used without an overt object, and a H melody if it is used with an overt object. This set is very small, there are only three verbs in this group.

(238) a. CV verb

dĩ̀	‘Be long!’
dĩ́ ʊ̀kʊ́	‘Lengthen the rope!’
dĩː	

b. CVCV verbs

bɛ̀rɛ̀	‘Start!’
bɛ́rɛ́ ʊ̀r̥ʊ̃̂m	‘Start work!’
bɛrɛ	
jã̀nà	‘Buy!’
jã́ná èrèké	‘Buy sugar cane!’
jãna	

With so few members in this group, it is difficult to find any generalisations regarding the CV structure or the alternate forms of the verb. It might however be worth commenting on the individual words in this set. Firstly, *bɛrɛ* is likely to be a Yoruba loan, as it occurs in Yoruba as *bɛ̀rɛ̀* ‘to begin’. Low-toned verbs in Yoruba become mid-toned when followed by an object noun (Bamgbọṣe, 1974:23). If the Yoruba word was borrowed into the language with this grammatical tonal pattern this might be an explanation for the L–H alternation if the Yoruba M is interpreted as H in Ikaan. Secondly, the verb *dĩ* ‘be long’ has two slightly different meanings when it is used with and without an object. *dĩ̀* means ‘Prostrate!’, i.e. telling someone to bow or even lie flat on the floor in order to greet a respected person, possibly literally ‘Be long!’. *dĩ́ ʊ̀kʊ́* on the other hand means ‘Make the rope long!'. It may therefore be that we are not dealing with the same verb in the two forms but with a basic form in one verb and a derived, possibly a causative verb, in the other form. Finally, the only remaining word is *jãna* 'buy'. I have no explanation for why this word does not follow the same tonal patterns as the other CVCV words, and I will not return to analyse the verbs in this set grammatically.

For the three larger sets of data, there are correlations between the tonal melody in Imperative, the phonotactic structure of the root and the alternate form of the verb.

CVCV syllable structures in roots correlate with H melodies, no matter if there is an overt object or not. H melodies on CV: roots correlate with reduplicated alternate forms of the verb, whereas L melodies on CV: verbs correlate with alternate forms formed with the suffix -V*g*. CV and CVC verbs have either L only melodies or melodies that alter between L and H, with a H melody if there is no object and a L melody if there is an object. The alternate form of the verb does not help to distinguish between L-only and H–L alternations in Imperative since the alternate form is made with the suffix -V*g* in both cases.

Looking at other parts of the grammar however, we find that there is an additional correlation between Imperative tones and Non-Future tonal melodies. The 'regular' verbal melody for Non-Future is HL, which surfaces as H, HL, or HLL depending on the number of TBUs in the verb. In some cases however, the Non-Future form of a verb surfaces with all L tones, e.g. *ɔ̀jã̀nà* 'he bought'. Within the set of verbs that take H tones in imperatives without overt objects, all verbs surface with the regular H or HL melody, there is no verb that is inflected with the 'irregular' Non-Future melody. In the set of verbs that take L tones in imperatives without overt objects however, many verbs take the 'irregular' all-L melody.

(239)	Verb	3S.NFUT	Gloss
	bɔ	ɔ̀- bɔ̀g	'he uprooted'
	kpa	ɔ̀- kpà	'he cultivated'
	hwã	ɔ̀- hwã̀	'he scratched'
	kpĩː	ɔ̀- kpĩ̀ː	'he hit'
	tif	ò- tìf	'he told'
	r̥ɪr̥	ɔ̀- r̥ɪ̀r̥	'he plaited'
	hũr̥	ò- hũ̀r̥	'he tied'
	kũn	ò- kũ̀n	'he tied'
	ʃɛg	ɔ̀- ʃɛ̀g	'he sifted'
	tɔr	ɔ̀- tɔ̀r	'he tasted'

There is however a substantial set of verbs with only L melodies in Imperative which do not take the 'irregular' L-only melody in Non-Future. Therefore this generalisation does not fully hold and seems to be a tendency instead, at least with the current state of knowledge of Ikaan.

(240)

Verb	3S.NFUT	Gloss
ba	ɔ̆ː- bà	'he knew'
ba	ɔ̀- bá	'he fetched'
kãː	ɔ̀- kã̂ː	'he collected'
kãː	ɔ̀- kã̂ː	'he sewed'
rɛr	ɔ̀- rɛ́r	'he carried'
r̥ãm	ɔ̀- r̥ã̂m	'he chewed'

By basing the tones of the imperative on the segmental structure of the verb, a morphological alternation and the presence of an 'irregular' inflectional pattern in another TAM category, I am able to 'derive' imperative tones rather than having to have them lexically specified. That way, it would be possible to maintain the hypothesis that verbs are underlyingly toneless and receive their tones from inflectional melodies. Taking this approach however brings up three problems.[6]

The first problem is that the 'derivation' does not produce the correct imperative tones for all verbs. There are exceptions to the generalisation that CVCV verbs are invariably H-toned and that CV verbs are not H-toned for both constructions with and without overt objects.

(241) a. CVCV verbs with all-L melodies

rʊ̃̀tʊ̃̀	'Rinse!'
rʊ̃̀tʊ̃̀ òkpó	'Rinse the calabash!'
jèti̍	'Leave alone!'
jèti̍ rɛ́dʒ	'Leave me!'
ʃèni̍	'Look for!'
ʃèni̍ i̍wé	'Look for the book!'

b. CV verbs with all-H melodies

dʒó	'Give birth!'
dʒɔ́ ꜜójṹ	'Give birth to the baby!'
mʷṍ	'Court!'
mʷṍ òjéʃíg	'Court the young woman!'

The exceptions are very few though, the list given in (241) is exhaustive for the available database.

[6]In addition, the data itself is not systematic, not exhaustive and has not been compiled from naturally occurring data. Also, as I mentioned above, the semantics of the imperative form has not yet been included in the analysis. The data is therefore not necessarily always reliable.

The second problem is that my explanation of Imperative tones is based on ‘irregular’ Non-Future melodies for which I don’t have any explanation either. In essence, I base what seems to be one irregularity on the presence of another irregularity without actually accounting for either.

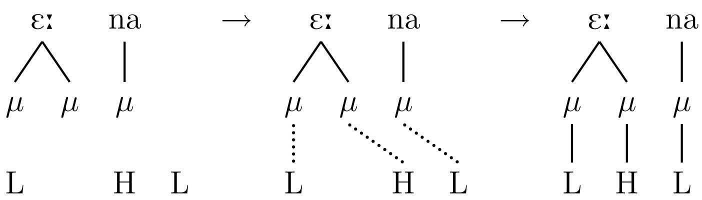
The third and most concerning problem is that this approach has serious implications for the autosegmental nature of tonal melodies. To ‘know’ whether to apply a H melody or a L melody for the imperative form, the grammar has to be able to count the number of moras in the root *and* has to check against the alternate form of the verb, which may be part of the lexical information of that verb, *and* has to check against the Non-Future melody of the verb, which may also be part of the lexical information. This means that the selection of tonal melodies is dependent on other tiers in the phonology as well as other information from the morphology and/or the lexicon. As a result, the tonal melodies cannot be said to be ‘autosegmental‘ any more, in the sense that they would be independent of other tiers in the phonology or other levels of the grammar. I have faced the same problem when I argued against a constraint against ‘long’ melodies on ‘short’ noun roots in section 4.2.3. In that case, I have rejected an analysis whereby the tonal phonology could ‘count’ the number of moras, whereas here I crucially depend on the counting. If I ‘derived’ tonal melodies from these other properties here, my analysis would become worryingly inconsistent.

What remains is that there are many regularities in the tonal patterns in imperative forms that require an explanation. I have shown that these regularities correlate with the segmental structure of the verb root, the alternate form of the verb root and inflectional irregularities in another tense-aspect-mood category. The existing tendencies are too regular to propose that imperative tones are inherently unpredictable and must therefore be lexically determined. However, ‘deriving’ the imperative tones from properties at other levels of linguistic analysis is not possible if tonal melodies are meant to be kept autosegmental.

For the remainder of this thesis, I will treat verbs as not lexically specified for tone but as underlyingly toneless. More research however is clearly needed and I am open to re-interpretations of the data.

5.2.2 Non-Future Tense—tonal association

In section 3.4.2 I described the phonological rules which govern tonal association in Ikaan. In section 4.2.2 I applied these phonological rules to the association of lexical tonal melodies in nouns, showing that tones associate one-by-one left-to-right within the word. With this algorithm, I explained the presence of rising tone patterns on bimoraic noun class markers by showing that the first tone of the nominal melody does not link to the nominal root itself but instead links to whatever mora is second in line, even if that is on the noun class prefix. An example for this is given again in (242) for the word *ɛ̌ːnà* ‘a type of snail’, which is made up of the noun class prefix *ɛː*–, the nominal tonal prefix L and the root *na*$_{\mathrm{HL}}$ with a HL melody.

(242) 

An alternative explanation to the idea of bimoraic prefixes was to postulate nominal roots that are not C-initial but V-initial so that *ɛ̌ːnà* ‘a type of snail’ would have consisted of a monomoraic prefix *ɛ*–, the nominal tonal prefix L and the root V*na*$_{\mathrm{HL}}$. I had only one potential argument (the patterns in vowel deletion and assimilation) against this analysis.

With verbal inflection for Non-Future tense, I can now present further evidence to show that grammatical melody association proceeds just like with nouns, mora-by-mora left-to-right, irrespective of the length of the prefix. For verbs that have bimoraic prefixes (parallel to the nouns with bimoraic prefixes), I can give additional evidence against a VCV stem hypothesis that was not available for nouns.

I will first give the underlying and the surface tonal melodies for Non-Future tense. I will then show examples of verbs with bimoraic prefixes and argue against treating them as monomoraic prefixes followed by a potential VCV verb root.

The tones which mark Non-Future tense in Ikaan are a L tone on the verb prefix and a HL melody as the grammatical verbal melody. A full paradigm for a CVCV verb (*beno* ‘stroll’) with all persons and numbers is given in (243). Note that the prefix for 2P *máne*- ‘you (pl.)’ invariably surfaces with an initial H tone, which I presume is lexical, and that it shows the tone that is characteristic for the TAM category on its second vowel.

(243)	PS/NR	Singular	Plural
	1	dʒè- bénò	bà- bénò
	2	è- bénò	mánè- bénò
	3	ò- bénò	à- bénò

Tonal association proceeds mora-by-mora left-to-right, with non-associated tones being deleted if there are not enough moras and the final tone copied, inserted and linked if there are not enough tones. If the verb prefix is bimoraic, the H tone of the HL melody surfaces on the second mora of the prefix, the L tone on the first mora of the verb root. As before, I consider the prefixes to be lexically bimoraic.

The data in (244) shows the resulting surface patterns of the underlying HL melody for verbs of different lengths for 3S, including examples for verbs with bimoraic prefixes.

(244)

	V- prefix	Gloss	Vː- prefix	Gloss
CV	ò- dʒó	'she gave birth'	ɔ̌ː- bà	'she knew'
CVC	ɔ̀- fɛ́r̥	'she wrote'	ǒː- mùr̥	'she is full'
CV:	ò- hwî̂ː	'she went outside'	n/a	
CVCV	ò- tíhȍ	'she sneezed'	n/a	
CV:CV	ɔ̀- tâːrɛ̀	'she jumped'	n/a	
CVCVCV	ɔ̀- kákàrȉ	'she wiped'	n/a	

Note that there are only examples for verbs with a CV(C) root structure and no examples for verbs with two or more moras. I have no explanation for why this is the case. It is however clear that the bimoraic prefix cannot be a case of compensatory lengthening to provide TBUs for the tones of the melody because then the prefixes of CV and CVC verbs like *ò- dʒó* 'she gave birth' or *ɔ̀fɛ́r̥* 'she wrote' would also have to have been lengthened.

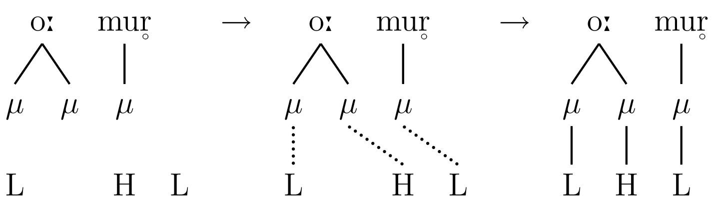
A full paradigm for a verb with a bimoraic prefix is given for the verb *mur̥* 'to be full (after having eating food)' (sub.025–sub.030) in (245). It shows that the long vowel in the prefix occurs with all persons and numbers.

(245)

PS/NR	Singular	Plural
1	dʒěː- mùr̥	bǎː- mùr̥
2	ěː- mùr̥	máněː- mùr̥
3	ǒː- mùr̥	ǎː- mùr̥

The association of verbal melody starts on second mora in the sequence even though this mora belongs to the prefix and not the verb root itself. The tonal association is illustrated in (246).

(246)



Like with the nouns (see section 4.2.4), an alternative hypothesis would be to suggest that some verbs have a VCV root rather than a CV root. A monomoraic prefix followed by a vowel-initial root would provide an explanation for the fact that the initial vowel in the verb is bimoraic. However, like with the nouns, I will argue against a VCV analysis.

Firstly, the behaviour of vowels in vowel assimilation is again an argument against this hypothesis. In the V1 ## V2 context V1 deletes and V2 remains so that V2 is expected to remain constant throughout. The data in the V # V context in (245) clearly shows that the potential V2 does not stay constant. Instead, the bimoraic vowel is different in almost every person, which suggests that there probably is no initial vowel.

More importantly however, the data for imperative forms shows that the verb root cannot be VCV. If verb roots were indeed VCV, the imperative forms for 2S.IMP form would let the initial vowel surface because imperatives for 2S are a bare form with just the root and without any person, number or TAM prefix. There are no V-initial imperatives though. All imperatives, even those for verbs with bimoraic prefixes, are C-initial.

(247)	3S.NFUT	Gloss	IMP	Gloss
	ɔ̌ː- bà	'he knew'	bà	'Know!'
	ɔ̌ː- tɛ̀	'he reached'	tɛ̀	'Reach!'
	ɔ̌ː- mì ùr̥ȗm	'he worked'	mì ùr̥ȗm	'Work!'

With the additional evidence from the imperatives, the VCV hypothesis can be fully ruled out. By extension, and using the evidence from vowel assimilation, it can also be concluded that nominal roots are C-initial. For the prefixes this implies that their length is lexically specified.

Having established that verbal roots are C-initial and minimally CV in length and that the TAM melody for Non-Future is HL, the data for grammatical melodies in Non-Future can be used as further evidence that the choice of a tonal melody is fully autosegmental and independent of the number of moras in the root. The verb *ba* 'know' only has one mora. If the choice of a tonal melody depended on the length of its host word, *ba* would take only H. However, the choice of the tonal melody is independent of its host, *ba* takes the full HL melody and associates as much of it as it can. As *ba* has a bimoraic prefix, for a reason that has yet to be established, it has enough moras to let all tones surface. *ba* therefore shows that 'short' roots can take the 'long' melodies and that the choice of tonal melody is independent of the length/number of TBUs of the root.

Unlike *ba* 'know', CV verbs with a monomoraic verbal prefix do not have enough moras to associate all the tones of the L + HL melody that encode Non-Future tense tonally. Like with similar cases in nouns, the tones that cannot be associated are deleted. Evidence for this follows in the next section.

5.2.3 Non-Future Tense—tone deletion

In section 3.4.2 I proposed tone deletion for L tones that remain unlinked after tonal association in cases where a melody maps onto a word that does not have enough TBUs to host all the tones of the melody. In this section, I will present further evidence for this proposal.

As I showed in the preceding section, the tones in Non-Future tense are L for the verb prefix and HL for the verb root. This immediately poses a problem for monomoraic verbs: L+HL add up to three tones but a monomoraic prefix plus a monomoraic root can only provide two TBUs.

The verb *je* 'eat' is a monomoraic verb that takes a monomoraic prefix. (248) shows *je* 'eat' in Non-Future tense without an object in (248a), with the object noun *ʊ̀jág* 'food' in (248b) and with the inanimate object suffix *dɔ́n* 'it' in (248c).

(248) a. ò- jé → [òjé]
3S.NFUT- eat.NFUT
S/he ate.

b. ò- jé ʊ̀jág → [òjʊ́ꜜjág]
3S.NFUT- eat.NFUT food
S/he ate food.

c. ò- jé -dɔ́n → [òjédɔ́n], *[òjéꜜdɔ́n]
3S.NFUT- eat.NFUT -OBJ:3
'S/he ate it (=food).'

(248a) and (248b) can be derived from a HL melody without deletion by leaving the L floating. (248c) however cannot be derived that way. L deletion is unavoidable to produce the correct output.

A underlying HL melody which surfaces as a H melody is conceivable for (248a) if it is assumed that the L tone remains afloat at the right edge of the word as given in (249) and that floating final tones are not realised.

(249) dʒe je
| |
μ μ
| |
L H L

An underlying HL melody without L deletion also poses no problem for (248b). A potential floating L tone at the right edge of the verb would be adjacent to a linked L in the next word and would be absorbed by this L with the

'L merging' rule, which has to apply because OCP(L) is violated. A derivation showing the vowel deletion and the resulting tonal processes is given in (250).

(250) a. Underlying representation

```
dʒe  je          ʊ   jag
 |    |          |    |
 μ    μ          μ    μ
 |    |          |    |
 L    H   (L)    L    H
```

b. Violation of OCP(L) triggers L merging

```
dʒe  je      ʊ   jag
 |    |      |    |
 μ    μ      μ    μ
 |    |      |    |
 L    H      L    H
```

c. Vowel deletion delinks H, which docks and delinks L

```
dʒe  je      ʊ   jag
 |    |      |    |
 μ   ~~μ~~   μ    μ
 |    ǂ .....ǂ    |
 L    H      L    H
```

d. Final representation with (L)

```
dʒe  j-   ʊ   jag
 |        |    |
 μ        μ    μ
 |        |    |
 L        H(L)H
```

(251) shows the tonal representation of the verb followed by the object suffix after associating the underlying HL melody without applying L deletion after tonal association. The L that has found no host is left floating at the right edge of the verb, wedged between two H tones.

(251)

```
dʒe  je       dɔn
 |    |        |
 μ    μ        μ
 |    |        |
 L    H  (L)   H
```

Because the verb is followed by a morpheme beginning with a H tone there is no adjacent L available to absorb the floating L. If the floating L is not absorbed, it must remain floating. As a floating L, it should of course show its presence by downstepping the following H tone, producing *[dʒèjé↓dɔ́n]*. However, this is not the observed form as the observed form has no downstep. Therefore there could not have been a floating L in the first place, which means that if the H on *jé* 'ate' is to come from a HL Non-Future melody, the L must have been deleted.

The lack of downstep in verb + object suffix construction for CV verbs can therefore be taken as evidence for L deletion as described in section 3.4.2.[7] An alternative would be to propose a H-only melody for monomoraic verbs and a HL melody for verbs with two or more moras. I will argue against this hypothesis after I have discussed the Habitual melodies in the next section.

5.2.4 Habitual Aspect—L delinking because of No floating H

In section 3.5.3 I proposed a tonal constraint which demands that H must be realised in the surface forms and must not be left floating. To link a high tone that cannot be linked by the usual association conventions, I proposed an additional H docking rule. In this section I will show that the tonal surface patterns in Habitual Aspect for monomoraic, bimoraic and trimoraic verbs can be derived from one underlying melody if *H and H docking are used.

Habitual in Ikaan is marked with a bimoraic verb prefix with a HL melody and a grammatical LH melody for the verb root. In trimoraic verbs, which have more TBUs than there are tones in the melody, the LH melody surfaces as LHH. This suggests that the last tone of the melody has copied onto the last TBU. Data for a bisyllabic and a trisyllabic verb is given in (252) and (253).

(252) a.

dʒôː-		ʃènó	
dʒoː-	HL-	ʃeno	-LH
1S-	HAB-	play	-HAB

I used to play.

b.

dʒôː- ʃènó	‘I used to play.’
ôː- ʃènó	‘You (sg.) used to play.’
ôː- ʃènó	‘He used to play.’
bâː- ʃènó	‘We used to play.’
mánâː- ʃènó	‘You (pl.) used to play.’
âː- ʃènó	‘They used to play.’

(253) a.

dʒɔ̂ː-		kpàr̥íná		àdé
dʒɔː-	HL-	kpàr̥íná	-LH	àdé
1S-	HAB-	carry	-HAB	[Ade]

I used to carry Ade.

[7] Surprisingly, monomoraic CVC verbs + object suffix in Non-Future show patterns that suggest that for those verbs the L is not actually deleted. I will return to this data to offer an analysis in section 7.1.

b.		
dʒɔ̂ː- kpàr̥íná àdé	‘I used to carry Ade.’
ɔ̂ː- kpàr̥íná àdé	‘You (sg.) used to carry Ade.’
ɔ̂ː- kpàr̥íná àdé	‘She used to carry Ade.’
bâː- kpàr̥íná àdé	‘We used to carry Ade.’
mánâː- kpàr̥íná àdé	‘You (pl.) used to carry Ade.’
âː- kpàr̥íná àdé	‘They used to carry Ade.’

The verbs in (252) and (253) both have enough TBUs to host the two tones of the Habitual melody. Monomoraic verbs however do not have enough TBUs—they only have one, so they can only host one of the two tones. One-by-one left-to-right association without using *Ⓗ predicts that L is linked and H, being the second tone, finds no TBUs to link to and will therefore not be realised. The data shows however that monomoraic verbs do surface with H.[8]

(254) a.

ìjòhʷíꜜː́jóhú	nò-		jú		ɛ̀kɔ̀kɔ̀
ìjòhʷíꜜː́jóhú	no-	L-	ju	-H	ɛ̀kɔ̀kɔ̀
day.RED	3S-	HAB-	kill	-HAB	chicken

Every day, he kills chicken. (obj.046)

b.

òjén ɔ̀ːdʒ	ɔ́nɔ̀-		r̥án		ɔ̀wɔ́g
òjén ɔ̀ːdʒ	ɔnɔ-	HL-	r̥an	-H	ɔ̀wɔ́g
wife 1S.POSS:1	3S.SPEC-	HAB-	cook	-HAB	soup

My wife used to cook soup.

Applying *Ⓗ and H docking explains these surface patterns. After initial one-by-one left-to-right tone association H has not been linked. This violates *Ⓗ and causes H docking to apply. This in turn creates a TBU linked to two tones, which is also prohibited, so that L delinks. I assume that the floated L is then absorbed into the adjacent L on its left by the OCP(L)/L merging if it has not merged already.

(255) a. Underlying representation

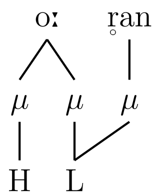
```
  oː    r̥an
 /  \    |
μ    μ   μ

H    L   L   H
```

b. One-by-one left-to-right association

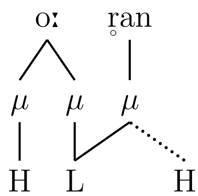
```
  oː    r̥an
 /  \    |
μ    μ   μ
⋮    ⋮   ⋮
H    L   L   H
```

[8]If the verbal prefix is not in initial position in a sentence (not phrase) like in (254a) it is not bimoraic with a HL contour but monomoraic with just a L.

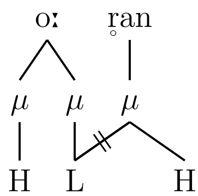
c. Violation of OCP(L), L merging



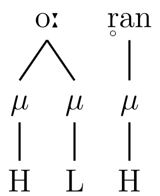
d. Violation of *(H), H docking



e. Violation of 'One tone per mora', L delinking



f. Final representation



Crucially, this approach works only if the OCP applies 'late'. It will not work if the OCP applies before tones are first associated with their hosts. As I have described for nouns and lexical melodies in section 4.2.5, there is evidence that the OCP applies only after tones have been linked to TBUs. I assume (and indeed this data shows) that the same is true for verbs and grammatical melodies.

With *(H) and H docking in place, the three surface melodies for Habitual Aspect H, LH and LHH can all be derived from the same underlying LH melody. Without *(H) and H docking the surface melodies would have been L, LH and LHH. The fact that they are not is evidence for the application of *(H) and H docking.

5.2.5 Alternatives for HAB and NFUT melodies without 'No floating H' and L deletion?

An alternative to tone deletion after melody association in Non-Future and H docking in Habitual would be to postulate different melodies for monomoraic vs. bi- and trimoraic verbs. In Non-Future, monomoraic verbs would take a H melody whereas bi- and trimoraic verbs would take a HL melody. In Habitual, monomoraic verbs would take a H melody whereas bi- and trimoraic verbs would take a LH melody. This approach would be similar to a constraint against 'long' melodies for 'short' roots which I mentioned in section 4.2.3 and consequently rejected as a potential explanation for why there is only some evidence for 'long' melodies on 'short' roots in nouns.

The advantage of the approach with two different melodies is that L deletion and H docking do not have to be invoked. At first glance this might make the grammar look leaner. In fact though, the grammar does not actually become more economical that way because H docking and L delinking, L merging and L deletion are needed elsewhere in any case. In addition, there are further disadvantages which outweigh this advantage.

First, while using two different melodies is descriptively adequate, it offers no way of unifying and explaining the tonal patterns on monomoraic and bimoraic verbs. The approach with only one melody per TAM category and with the application of phonological rules does offer an explanation while also being descriptively accurate.

Secondly, having two melodies each for Non-Future and Habitual contrasts with Continuous Aspect, which makes do with one melody for verbs of all different lengths. Having two separate melodies for monomoraic vs. bi- and trimoraic verbs therefore is at odds with the tonal melodies for this TAM category.

Thirdly, having two melodies makes the grammar more complicated because having a choice between two options implies there must be a mechanism for making this choice, i.e. a mechanism for selecting the appropriate melody for the appropriate length of root. This mechanism could be located in the lexicon or in the grammar.

Information on which melody should be chosen could form part of the lexical entry of a word, just like the noun class of a noun or the irregularity that the 3S possessive pronoun happens to have to obey a different tonal constraint than all other possessive pronouns (see section 6.4 below). But the fact that monomoraic verbs take H melodies and bimoraic verbs take HL and LH melodies is too regular and predictable to 'dump' it in the lexicon.

As an alternative to the lexicon, the grammar could be enabled to 'count' the number of TBUs and then decide which melody to take—H if the grammar 'counts' one mora, HL/LH if it 'counts' two moras. This approach is highly problematic from a theoretical perspective because it implies that the selection of a melody is *not* independent of the length of the root (as it should be with tonal melodies) but crucially dependent on it, and thus not 'autosegmental' any more.

Using two separate melodies cannot go beyond merely describing the facts and, more importantly, makes the overall analysis less consistent, more complicated and raises major conceptual problems. Using one melody and employing two phonological rules which also apply in other contexts is both consistent and economical and therefore the preferable analysis.

As I have shown in this section, verbal inflection illustrates a number of the tonal rules and constraints that I have proposed in the preceding chapters.

The range and distribution of tonal melodies in Imperative Mood is difficult to reconcile with the notion that verbs are underlyingly toneless. Nonetheless I have shown correlations between the choice of Imperative melody and phonological and morphological properties of the verb at other levels of linguistic analysis. Whether these correlations mean that verbs can be analysed as underlyingly toneless remains to be seen.

Tonal association in Non-Future tense shows that tonal melodies do not associate within their morpheme but one-by-one left-to-right within the word. Therefore the H of the HL Non-Future melody surfaces on the second mora of the prefix if the verb prefix is bimoraic.

The absence of downstep before non-human object suffixes in Non-Future tense showed that the L of the HL Non-Future melody is deleted if there are not enough moras to host the full melody. Had the L not been deleted, downstep should have occurred.

The surface melodies in Habitual Aspect provided evidence for *Ⓗ and H docking. With this constraint and rule active in the Ikaan phonology, the underlying verb melody can be LH and surface as H, LH and LHH for roots with one, two and three moras respectively.

5.3 Phrase-level tonal grammar

At the phrase level of the Ikaan grammar, I will discuss two related topics where tone would either be expected to be involved or where tones and tonal melodies are involved. The constructions I will talk about are the wide-spread and well-attested associative construction or genitive construction and one specific type of reduplication in Ikaan. I will present each construction individually and then show similarities between them and how reduplication may be used to shed light on the associative construction in Ikaan.

For the associative construction, I will discuss whether there is a segmental and/or tonal morpheme indicating this construction, i.e. if there is any evidence for tonal case marking. For the type of reduplication introduced here, I will show the surface melodies and discuss alternative ways of accounting for these melodies.

For reduplication, it is not always clear whether this is a word-level phenomenon or a phrase-level phenomenon. For the type of reduplication discussed here, phrase-level in the sense of 'grammar happening between words' is appropriate because as I will show it is the whole noun, including its prefix, that is reduplicated here. This contrasts with the reduplication I have shown in the derivation of adjectives from verbs, where only the root or part of the root is reduplicated and the prefix is not included in the reduplication. Also, with the reduplication in adjectives, the tonal pattern is an all-H melody whereas here I will show different tonal perturbations that are similar to the the noun + noun associative construction.

5.3.1 Associative construction

In Ikaan, there are noun + noun constructions that indicate possession, which is often called an 'associative construction' in African linguistics. In many but not all languages, associative constructions are marked with an associative morpheme. This morpheme can be a morpheme made up of segments and tone or it can be entirely tonal. There are languages however which do not have any morphemes indicating this construction, or that have morphemes which only show up in some contexts.

In Dschang, the associative morpheme is è, a vowel plus a tone. In rapid speech however the vowel is deleted so that only the tone stays behind (Pulleyblank, 1986:38). Remember that Dschang does not have downstep after linked L but does have downstep after floating L, which explains the different pitch patterns in the two utterances.

(256) a. sə́ŋ è sə́ŋ → [¯ _ ¯]
bird AM bird
the bird's bird

b. sə́ŋ ꜜ sə́ŋ → [¯ –]
bird AM bird
the bird's bird

Etsakọ marks the associative construction with a floating H tone (Elimelech, 1978:55). In addition, other phonological processes, both segmental and tonal, take place, but in any case the morpheme is H.

(257) àmɛ́ ´ èθà → [ámêθà]
water AM father
father's water

Note that in Etsakọ, the associative construction does not only affect noun + noun construction but also other noun + modifier constructions.

In Yoruba, in most phonological contexts there is no morpheme marking the associative construction, the only process which applies is vowel assimilation.

(258) ārá ȉlú → āráàlú
inhabitant town
townsman (Bamgbọṣe, 1966:90)

It is only when the second noun is consonant-initial that the final vowel of the preceding noun is lengthened and receives a M tone (Awobuluyi, 1978:40; Bamgbọṣe, 1966:90).

(259) ōwó ị̄ dàdá → ōwóō dàdá
money AM Dada
Dada's money (Awobuluyi, 1978:40)

Nichols and Bickel (2008) analyse the Kolokuma dialect of Ịjọ as a language where there is no morpheme whatsoever marking the associative construction. Instead, the nouns simply follow each other. The grammar itself (Williamson, 1965) does not explicitly comment on associative constructions and the existence or absence of associative morphemes, though the glosses for noun + noun constructions do not indicate any morphemes.

(260) a. àmá -bí ɛ̀rɛ̀ -bȉ
town DET name DET
the name of the town (Williamson, 1965:68)

b. kɛ̀nì óbòrȉ
goat child
a small goat (Williamson, 1965:71)

The Kolokuma-Ịjọ case of having no morpheme whatsoever is cross-linguistically uncommon but it does exist. There is also no clear distribution across particular language-families and no clear geographical distribution (Nichols and Bickel, 2008).

In Ikaan, there is no evidence for a morpheme marking the associative construction. Instead, the associative construction is expressed as a plain sequence of possessed noun + possessor noun.

(261) a. ɛ̀hwɛ́m ɔ̀ní → [ɛ̀hwɛ́m ɔ̀ní]
cap person
the person's cap (`ikaan073_nn.wav, 1538s`)

b. ȉhṹrȕm òjén → [ȉhṹrȕm òjén]
knee wife

the wife's knee (`ikaan073_nn.wav, 401s`)

c. ùr̥ùg ɔ̀ní → [ùr̥ùg ɔ̀ní]
ear person
the person's ear (`ikaan073_nn.wav, 39s`)

That being said, noun + noun constructions (and other noun + modifier constructions) are characterised by vowel assimilation (in contrast to vowel deletion in verb + object noun construction) and a phonological constraint on the tones which rules out HL sequences across the morpheme boundary after vowel assimilation. This interaction between the phonology and the grammar will not be discussed here but in section 6.3. What I will do here is show that there is no evidence for a segmental or tonal morpheme marking the construction.

As can be seen in (261) above, there is no segmental morpheme, neither between the nouns in the construction nor anywhere else. (262) shows that there cannot be a floating H tone marking the associative construction either. If there was Ⓗ, it would not be possible to explain the all-L tones in the phrase.

(262) ı̀ʃɛ̀ ɛ̀kɔ̀kɔ̀ → [ı̀ʃɛ̀ːkɔ̀kɔ̀]
egg chicken
the chicken's egg (`ikaan073_nn.wav, 931s`)

However, most constructions that could be conceived as associative constructions rule out the possibility of detecting a floating L as the marker of the construction. In noun + noun and noun + modifier constructions in Ikaan, the second noun or the modifier invariably begin with L.

(263) a. ɛ̀- ná ɛ̀- dʒı́dʒı́n → [ɛ̀nɛ̂ːdʒı́dʒı́n]
E5- cow 5- wicked
the wicked cow (nadj.051)

b. è- jı́mò ɛ̀- bɔ́ → [èjı́mɛ̀ːbɔ́]
E5- egg.plant 5- 1P.POSS
our egg plant (pos.023)

c. ʊ̀- gbátà ʊ̀- dɔ́n → [ʊ̀gbátʊ̀ːdɔ́n]
U3- horse 3- DET
the very horse (spec.007)

If indeed there was a floating L marking the associative construction, this floating L would violate the OCP(L) constraint and as a consequence trigger L merger, which would absorb the floating L tone into adjacent L tones. This makes a potential presence of a floating L associative morpheme empirically indistinguishable from the absence of the floating L and a zero-marked associative construction, which is empirically not satisfying.

However, depending on how the following subset of reduplication is analysed in Ikaan, it is possible to make a case for a floating L as the associative morpheme. This type of reduplication with the semantics ‘every’ will be discussed in the next section.

5.3.2 Reduplication

Reduplication occurs in many words in Ikaan and does not have one consistent form or one consistent meaning. There is one set of data, however, that is consistent in both meaning and form. In this set, a noun referring to a unit of time (such as ‘morning, day, year’) is reduplicated to give the meaning ‘every morning, day, year’.

Data for nouns referring to time is given in (264).

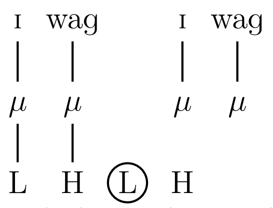
(264)	ìwág	‘year’	ìwág↓íwág	‘every year’
	ĕːwú	‘day’	ĕːw↓éːwú	‘every day’
	òdʒó	‘month’	òdʒó↓ː́dʒó	‘every month’
	àrá↓ː́hwó	‘night’	àrá↓ː́hwá↓ː́ráːhwó	‘every night’
	ànʲá↓ː́ʃí	‘afternoon’	ànʲá↓ː́ʃʲá↓ː́nʲáːʃí	‘every afternoon’
	i̇̀jòhú	‘morning’	i̇̀jòhʷí↓ː́jóhú	‘every morning’
	ùhũ̀r̥ṹ	‘daytime’	ùhũ̀r̥ṹ↓ː́hṹr̥ṹ	‘every daytime’
	èkènèr̥ú	‘evening’	èkènèr̥ʷé↓ː́kénér̥ú	‘every evening’
	(all data from `ikaan074_redup.eaf`)			

Segmentally, the nouns are reduplicated as a whole, with both prefix and root. If this reduplication creates a C ## V context the nouns are simply strung together, no further processes apply at the segmental level. This is illustrated in the word *ìwág* ‘year’, which becomes *ìwág↓íwág* ‘every year’. No segments are deleted, no vowels are lengthened.

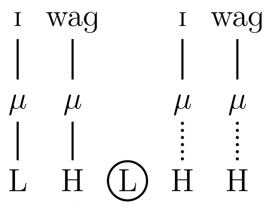
If reduplication creates a V ## V context, the first vowel assimilates and as a result the second vowel is linked to two moras across a morpheme boundary. This can be seen in the word *ùhũ̀r̥ṹ* ‘daytime’. Reduplicated, this becomes *ùhũ̀r̥ṹ↓ː́hṹr̥ṹ* ‘every daytime’, with a long vowel at the junction.

Tonally, my proposal is that reduplication of this type involves making a toneless copy of the word and associating this toneless morpheme with a H melody. The H of the melody then copies rightwards to all available TBUs. The H melody is preceded by a floating L that does not link. I will return to proposals for why the L does not link in a moment. The reduplication for the consonant-final word *ìwág* ‘year’ is given in (265).

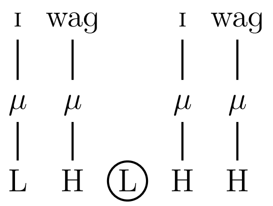
(265) a. Base and toneless copy, floating L, H melody



b. H links to the toneless copy and copies rightwards

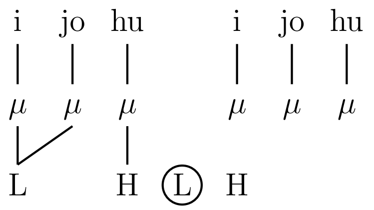


c. Final representation, L causing downstep

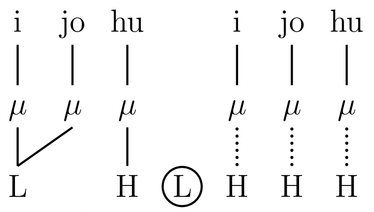


If the reduplicated noun is vowel-final, segmental processes as well as tonal processes apply. The first vowel assimilates to the second vowel at the V ## V junction, resulting in a downstep on the now bimoraic second vowel. This process is illustrated below, though the order given here is not meant to imply that there is a given order or sequence in the process.

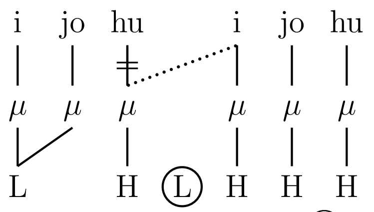
(266) a. Base and toneless copy, floating L, H melody,



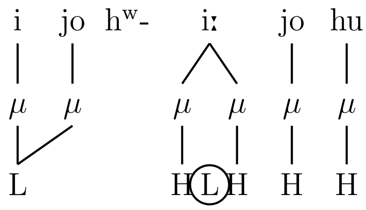
b. H links to the toneless copy and copies rightwards



c. Vowel assimilation

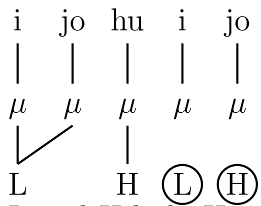


d. Final representation, L causing downstep before the second mora of the bimoraic vowel

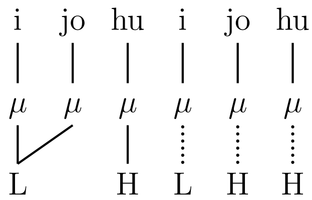


Linking H rather than L to the toneless copy of the base produces the correct surface form but violates the association conventions as I have given them before. If the usual conventions applied, the expected one-by-one right-to-left association would result in the representation given in (267), which produces the surface melody LLHLHH when the observed surface melody is LLH$^{\downarrow}$HHH.

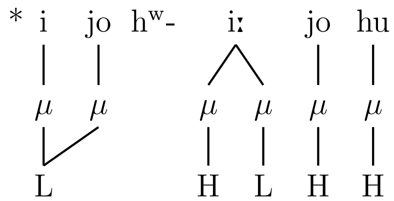
(267) a. Base and toneless copy with L and H



b. L and H link, H copies to toneless TBU



c. Vowel assimilation



Applying the association conventions without taking anything else into consideration therefore derives the wrong surface forms. The resulting question is why L and H do not link as prescribed by the usual association conventions.

One solution to this problem would be to propose lexical prelinking. H would thus be lexically prelinked to the first mora so that the L cannot link to this mora any more and must remain floating.[9]

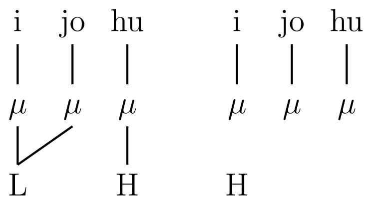
[9]Another approach would be to suggest that the second noun is linked to a LH melody and then subject to a constraint against a HL sequence across the morpheme boundary or a constraint against a HLH sequence, as I will propose for a different set of constructions later in sections 6.3 and 6.4. A more detailed discussion of the processes involved in this derivation would mean jumping ahead to a later chapter however, therefore I will not discuss this approach here. For now it should suffice to say that whereas a LH melody and a tonal constraint would produce the correct output in the forms given here, it cannot be tested if reduplication is indeed similar to the processes described in 6.3 and 6.4 because it would take L-final nouns to see

A second possibility would be to treat this reduplication as a case of associative construction where the base and the reduplicated word are in the same kind of relationship as the words *ìkàʃ* ‘town’ and *ɔ̀ní* ‘person’ in *ìkàʃ ɔ̀ní* ‘the person’s town’. This might provide an explanation for the existence of the floating L and the fact that Ⓛdoes not link but result in downstep here.

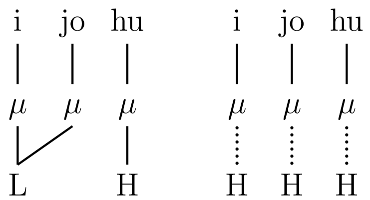
When I discussed associative constructions and a possible floating L as the associative morpheme above, the problem with testing for the existence of the floating L was the fact that all second constituents of noun + noun and noun + modifier constructions begin with L (see (263)). This initial L would absorb any floating L in order to comply with OCP(L) so that a floating L could simply not be detected. Here now we have cases where the potential associative morpheme Ⓛwould be wedged between two H so that OCP(L) would not be violated and Ⓛ would survive.

This analysis of this type of reduplication would be as follows: The reduplicated morpheme is formed out of a toneless copy of the base morpheme and a H tonal melody. The H tonal melody associates with the toneless copy and copies, inserts and links H tones until all TBUs in the toneless morpheme have been supplied with tones. The base morpheme and the reduplicated morpheme are then linked into an associative construction by the associative morpheme Ⓛand vowel assimilation. The associative morpheme is wedged between to H and cannot be merged into an adjacent H. It therefore shows its presence by downstepping the following H.

(268) a. Underlying representation: Base morpheme, toneless copy, H melody

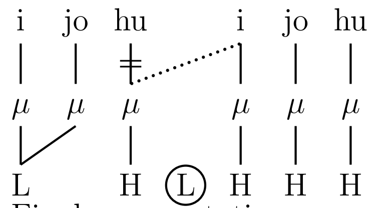


b. H melody links and copies to all TBUs

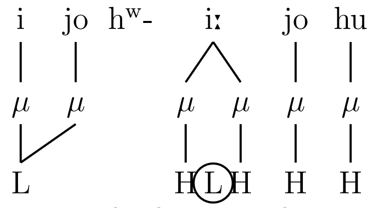


c. Vowel assimilation and Ⓛmark associative construction

what happens in L ## L contexts and there are no L-final nouns in this set of reduplications. Reduplication in numerals, where L-final words occur, might provide an answer for this question, further work on this topic is in progress.



d. Final representation



Explaining reduplication this way assumes either a specific order, whereby first the reduplication is done and then the associative morpheme comes in. Alternatively, if there is no specific order, this approach assumes bracketing or morphological boundaries which prevent L from linking to the first TBU.

Reduplications of the type discussed here can therefore be analysed in two different ways. On the one hand, reduplication can be seen as a grammatical operation in its own right, consisting of a copy of the segments of the base morpheme, a H tone melody which is associated with the first mora of the reduplicated constituent, a floating L tone preceding the reduplicated morpheme and vowel assimilation between base and reduplicated morpheme.

On the other hand, this type of reduplication can be treated as an instance of associative constructions. As with the first approach, the reduplicated morpheme is a toneless segmental copy of the base constituent linking to a H melody. The floating L preceding the reduplicated constituent is supplied by associated construction, which is now analysed as having a L associative morpheme. The vowel assimilation which takes place is also due to the processes inherent to associative constructions in Ikaan. Proposing a floating L for associative constructions does not harm the account of the other data sets—they still derive the same surface forms, thanks to OCP(L) and L merger. This approach adds some complexity to the account of associative constructions which is not required for the more prototypical associative constructions. On the positive side, it simplifies the account of reduplication and avoids redundancy and repetition in the grammar in general.

I will not discuss reduplication again in the remainder of this thesis. I will however discuss noun + noun and noun + modifier associative constructions in detail in section 6.3. As I said, in these associative constructions a potential floating L associative morpheme would immediately be merged into adjacent L tones, which are inevitably there, to repair OCP(L) violations. Whether or not a floating L marks the associative construction is therefore irrelevant in these constructions. Because of this, I will assume that the associative construction in Ikaan is not marked with a morpheme. Instead, I will assume that it is only marked phonologically by vowel assimilation and the above mentioned constraint ruling out HL sequences across the boundary.

5.4 Sentence-level tonal grammar—yes/no questions

Yes/no questions are questions such as 'Did he go?', which are answered with either 'yes', *hĩ́ː* in Ikaan, or 'no', *ôːhɔ̃̌ː* in Ikaan.[10] Yes/no questions in Ikaan do not differ syntactically or morphologically from corresponding statements such as 'He went.' Instead, questions are marked with tonal and prosodic means and accompanying segmental phonological changes. Sometimes the purely linguistic cues are accompanied by paralinguistic cues for extra emphasis, such as raising of the eyebrows, an inquisitive facial expression and a slight tilt of the head.

Rialland (2007) investigates question prosody in African languages. She compares 78 African languages in which yes/no questions are marked with prosodic cues rather than interrogative morphemes. Within these languages, she finds a wide range of prosodic markers, both what she calls high-pitched question markers and what she calls low-pitched question markers. Contrary to what is perceived to be a linguistic universal, question prosody in these languages does not necessarily correlate with high pitch. There are languages with high-pitched prosodies, but in Rialland's sample low-pitched prosodies are also widespread and even more frequent that high-pitched ones. Furthermore, languages often make use of more than one type of marker at a time so that both high and low question markers occur in various combinations.

High-pitched yes/no question markers identified by Rialland (2007:37) are

- cancellation or reduction of downdrift, register expansion
- raising of last H(s) (not necessarily sentence-final)
- cancellation/reduction of final lowering
- final H tone or rising intonation (final H%)
- final HL melody

Non-high-pitched yes/no question markers identified by Rialland (2007:37–8) are

[10] Ikaan also has a type of question that is answered with a third question particle *ɛ̀hɛ́ː*, which is similar to the German 'doch' or the French 'si'. This type of question is not discussed here.

- final L tone or falling intonation
- final polar tone or M tone
- lengthening: V (a vocalic mora) or V... (considerable lengthening)
- breathy termination
- cancellation of penultimate lengthening
- open vowel

On the basis of her findings, Rialland (2007:51) concludes that a case for a universal high prosody for questions cannot be made. For African languages in particular she proposes a 'lax prosody' characterised by vowel opening, relaxation of the vocal cords, pitch lowering and glottal opening. Lax prosody contrasts with 'tense prosody', which involves rising intonation, vocal cord tension and glottal adduction. Rialland's evidence for lax prosody in African language comes from the fact that open vowels, low tone and falling intonation and lengthening often occur in combination in these languages. She attributes this to a potential historical low-toned /-à/, perhaps with breathy termination.

Like the languages in Rialland's sample, Ikaan has no interrogative morpheme as such. Nonetheless, a perception experiment showed conclusively that speakers are perfectly capable of distinguishing statements from the corresponding yes/no questions. The cues that are used by the speakers are prosodic. In questions, speakers consistently expand the register so that the pitch difference between L and H tones increases. They start utterances at a higher pitch and end the questions in breathy voice or voiceless. What is less consistent though still noticeable is a reduction of final lowering and possibly also a slight raising of an utterance-final H tone.

I will discuss register expansion, breathy termination, the reduction of final lowering and the raising of final H in turn and then compare the Ikaan findings to Rialland's proposals.

The illustrative data in this section was obtained from a single male speaker in a controlled elicitation setting rather than in a spontaneous conversational context and is representative of the patterns I have observed. The same data was used for the perception experiment. Recordings of more speakers in both controlled and more natural settings show the same patterns. Normalisation and fine-grained statistical analysis of all the data remain tasks for the future.

5.4.1 Register expansion

Rialland (2007:39) describes register expansion as follows:

- expansion of the pitch range within which tones are realised, mainly by raising H tones, though the magnitude of the expansion is language-specific
- generally also associated with reduction or cancellation of downdrift
- potentially higher register or starting pitch in questions, e.g. in Southern Sotho (Doke and Mofokeng, 1967) and Turkana (Dimmendahl, 1983)

I have not yet investigated intonational downdrift in Ikaan so that I cannot yet say whether reduction of downdrift plays a role in marking questions. The other two criteria however apply to Ikaan. Questions consistently start at a higher pitch than statements, and the pitch difference between H and L tones is consistently larger in questions than in statements. This can be seen in the pitch tracks for the data in (269).

(269) a. ɔ̀- nɛ́
3S.NFUT- defecate.NFUT
He defecated. (ynt.014)

b. ꜛ ɔ̀- nɛ́
QU 3S.NFUT- defecate.NFUT
Did he defecate? (ynt.015)

The pitch tracks for both utterances are given in in Figure 5.1. For the utterance in (269a), the starting pitch is 143Hz, whereas for the corresponding question (269b) the starting pitch is 154Hz. The pitch difference between the L and the H in the initial rising tone is 33Hz in the statement, but 47Hz in the question.

Pitch expansion alone however cannot be sufficient to distinguish questions from statements because there are utterances that are all L and speakers are still able to tell questions from statements, e.g. in (270).

(270) a. ɔ̀- jȁnà ɔ̀bɛ̀gɛ̀
3S.NFUT- buy.NFUT plantain
She bought plantain. (ynt.094)

b. ꜛ ɔ̀- jȁnà ɔ̀bɛ̀gɛ̀
QU 3S.NFUT- buy.NFUT plantain
Did she buy plantain? (ynt.095)

The pitch tracks in Figure 5.2 illustrate that the pitch is level for both utterances. The pitch starts at 129Hz in the statement, but at 139Hz in the question.

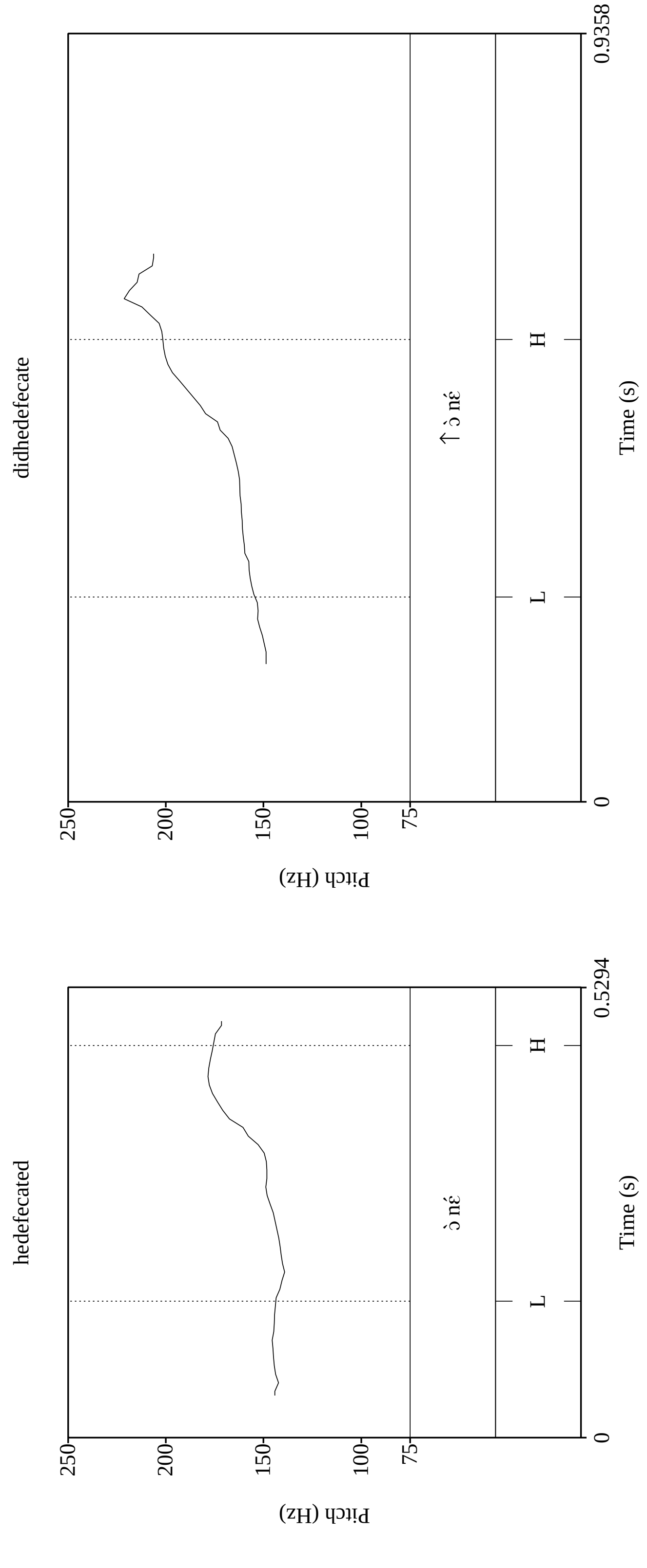


Figure 5.1: Pitch tracks of *ɔ̀nɛ́* in (269a) and *ꜛɔ̀nɛ́* in (269b)

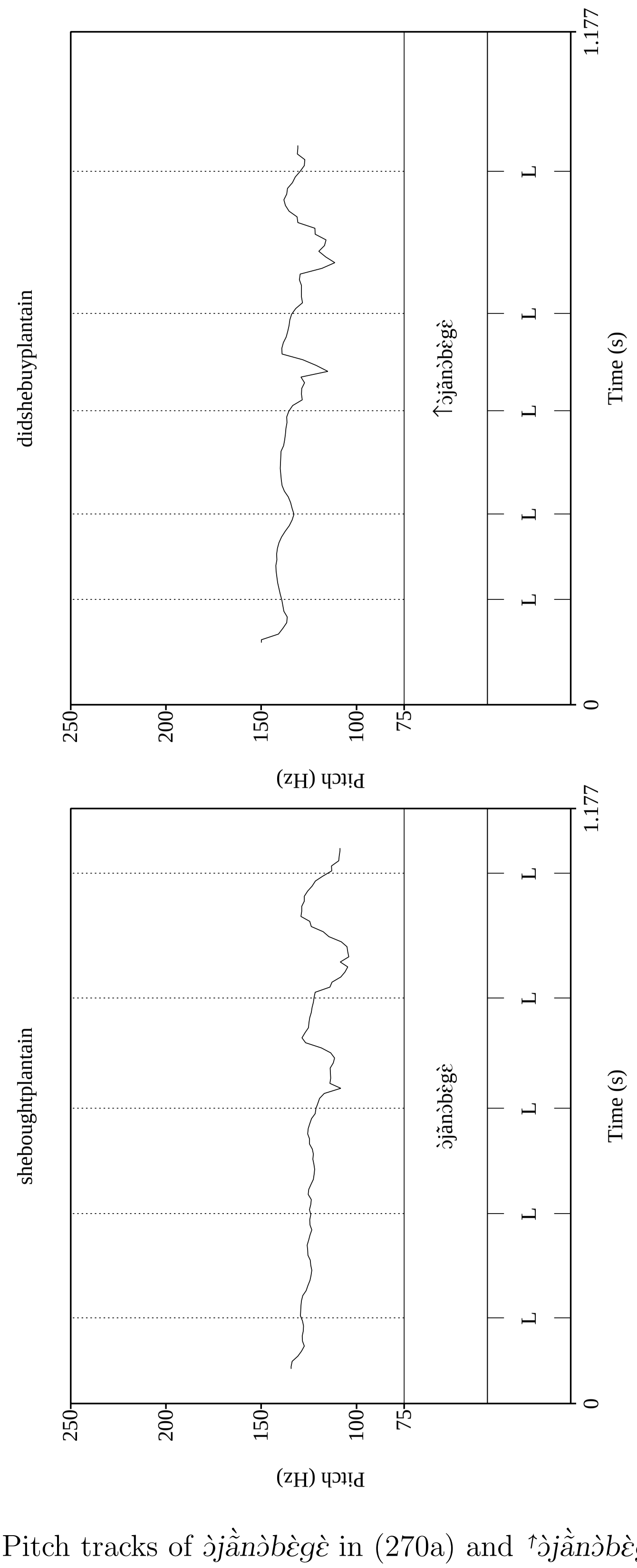


Figure 5.2: Pitch tracks of *ɔ̀jǎ̀nɔ̀bɛ̀gɛ̀* in (270a) and *↑ɔ̀jǎ̀nɔ̀bɛ̀gɛ̀* in (270b)

Just like expanded pitch range cannot be the sole indicator for questions, the starting pitch alone cannot be the only indicator either. In the recording for (271) the speaker pronounced the three repetitions of the utterance at a successively lower pitch. If starting pitch was all-important, this should not be possible.

(271) ꜛ ʊ̀- hjáː
QU 3s.NFUT- tear.NFUT
Did it tear? (ynt.011)

In the first repetition, the starting pitch is 162Hz, in the second it is 140Hz and in the third it is 136Hz. List intonation is likely to play a role here, however, if the starting pitch was all-important it should override the list intonation.

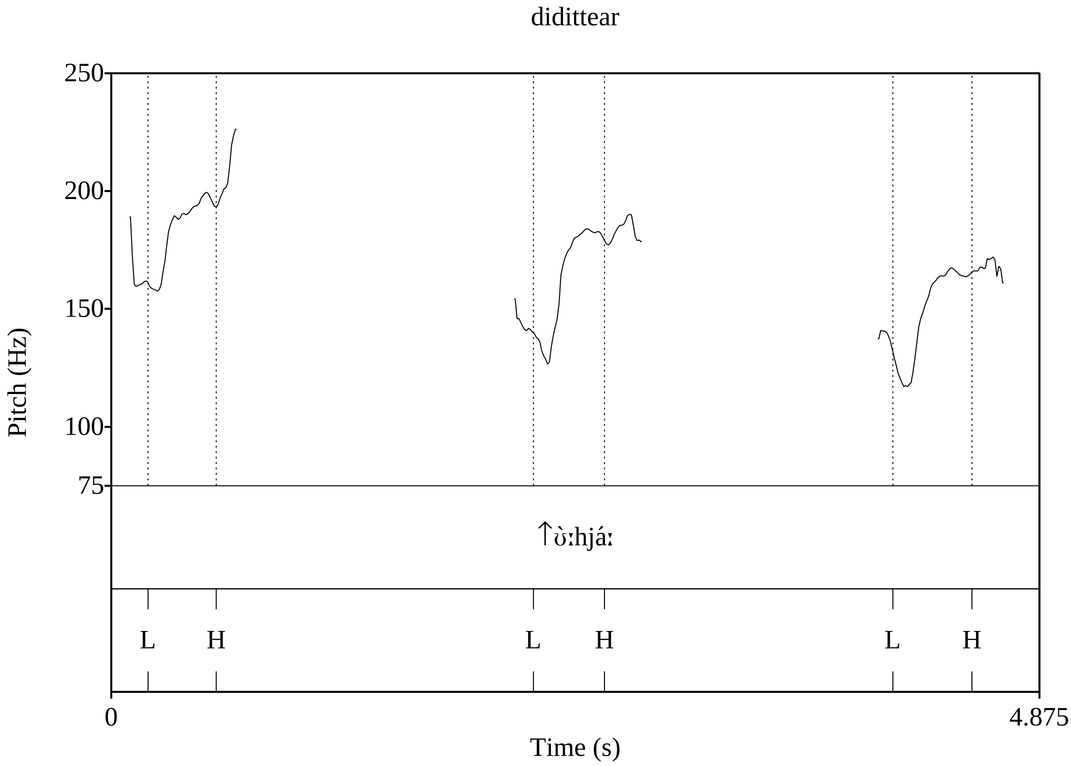


Figure 5.3: Pitch tracks for three repetitions of *ꜛʊ̀hjáː* in (271)

Even though the expansion of the pitch range and the raised starting register cannot be the only indicators of yes/no questions in Ikaan, it becomes clear from this data that they are used in marking questions.

5.4.2 Breathy termination

Another way in which languages may differentiate statements from questions is by how an utterance is finished. In languages which use this strategy statements end in an abrupt intensity decrease and a final glottal stop. Questions on the other hand end with a lengthened vowel, gradually decreasing intensity and a progressive opening of the glottis until voicing stops and the vowel ends voiceless. This kind of breathy termination may set off a range of segmental processes to ensure that there is a final vowel in the first place that can then end in breathy termination.

This strategy for question marking has been described mainly for Gur languages, e.g. Moba by Rialland (1984), and mainly by Rialland and her associates. According to Rialland, breathy termination outside the Gur family is only attested for Hausa. Rialland puts this down to the fact that it may simply have gone unnoticed in the description of other languages (Rialland, 2007:46–9)

In Ikaan, glottal and breathy termination clearly mark statements from questions. Like Rialland suggests for other languages, breathy termination in Ikaan coincides with a range of segmental processes in Ikaan which either delete a consonant or insert a vowel, resulting in vowel-final utterances in both processes. I will discuss and illustrate the two different types of termination in detail here even though this strategy for question marking is not a tonal strategy. This is for two reasons. Firstly, according to Rialland (2007), breathy termination to mark questions is not widely discussed in the literature and almost unattested outside Gur languages. Therefore describing this strategy for Ikaan provides a new example and shows that this way of marking questions is not limited to the Gur family. Secondly, breathy termination plays a role in the reduction of final lowering, the third strategy used in Ikaan to encode yes/no questions.

Glottal and breathy termination differentiate (272a) from (272b). This is of course in addition to the higher starting pitch and wider pitch range discussed above. In this section, I will not refer again to this higher initial pitch and larger pitch difference for questions, this will be assumed here.

(272) a. ɔ̀- kpí → [ɔ̀kpíʔ]
3S.NFUT- hear.NFUT
He heard. (ynt.016)

b. ꜛ ɔ̀- kpí → [ꜛɔ̀kpíh]
QU 3S.NFUT- hear.NFUT
Did he hear? (ynt.017)

Figure 5.4 gives annotated spectrograms for the statement and question in (272).

In the statement in (272a), the vowel ends abruptly in a glottal stop. In the spectrogram, there is very little acoustic energy just after the final vowel. This represents the closed phase of the glottal stop where there is silence and therefore no acoustic energy. Following the closed phase, the glottal stop is released, which

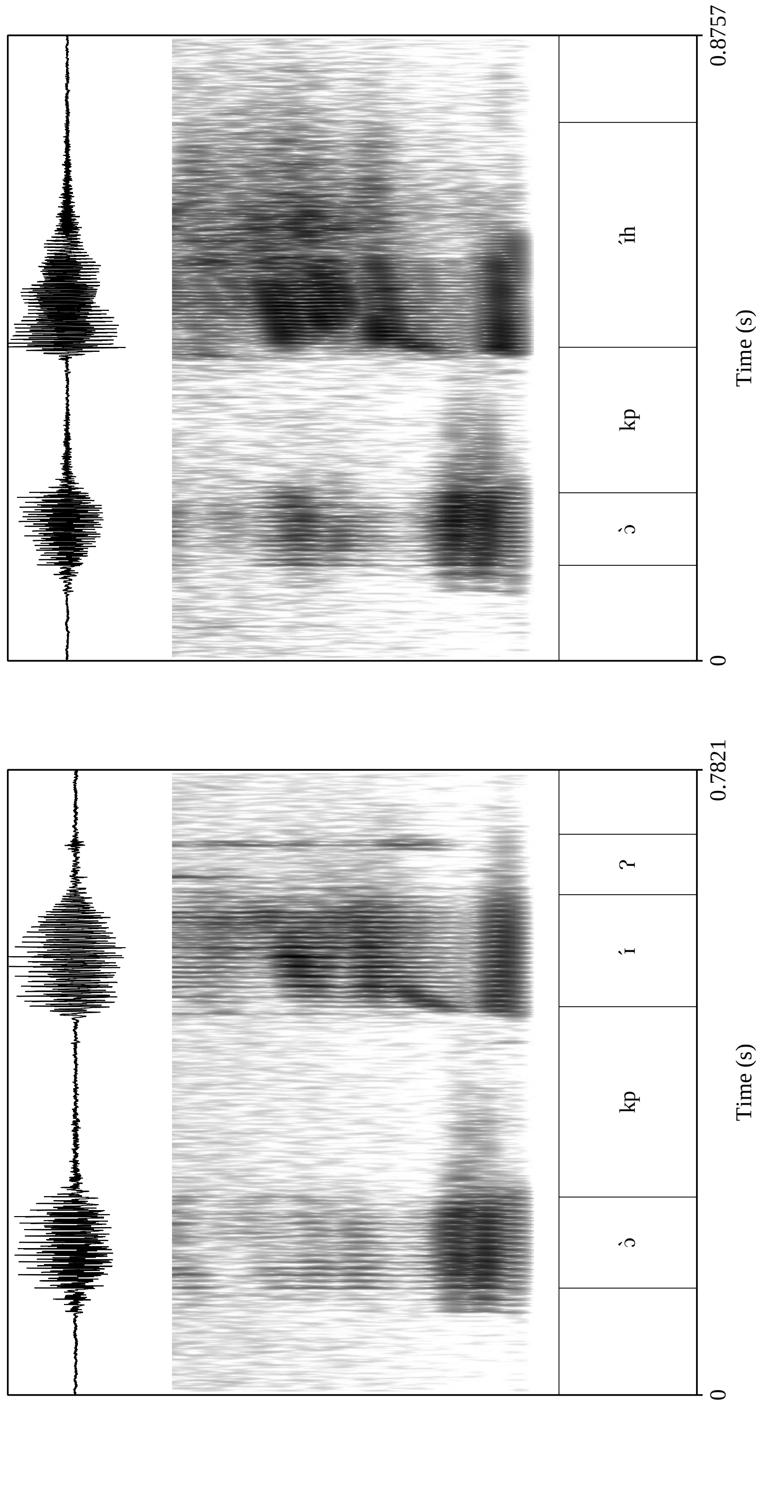


Figure 5.4: Waveforms and spectrograms of *[ɔ̀kpíʔ]* in (272a) and *[ꜛɔ̀kpíh]* in (272b)

can be seen in the burst of energy at the medium and higher frequencies in the spectrogram.

In the question in (272b), the spectrogram shows the breathy termination as acoustic energy in the medium and high frequencies following the final vowel. The formant structure of /ɪ/ is evident all through even though they become less clearly defined. The voicing continues into the breathy part of the vowel and then stops.

For Ikaan statements, two other strategies apart from glottal termination are observed. These occur on specific sets of vowels.

Glottal termination does not seem to affect nasal vowels. Instead, nasal vowels either end less abruptly than oral vowels or may even end in a brief breathy or voiceless part.

(273) ò- jómòjĩ̀ → [òjómòjĩ̀h]
3S.NFUT- try.hard.NFUT
He really tried. (ynt.056)

In Figure 5.5, an annotated spectrogram for (273) is given. The spectrogram shows that the overall acoustic energy decreases towards the end and the formants become less clearly defined even though the vowel is voiced almost until the end. If the utterance were to end in a glottal stop, there would not be any voicing during the part with the decreased acoustic energy and much less overall energy in the spectrogram towards the end of the final vowel.

In some cases, the glottal stop indicating the statement is accompanied by creaky voice in the final vowel, especially when this vowel is /a/.

(274) ɔ̀- kʊ́rà → [ɔ̀kʊ́rà̰ʔ]
3S.NFUT- try.hard.NFUT
He slept. (ynt.046)

The creaky voice can be observed in the differently shaped waveform in Figure 5.6 and the irregular formants in Figure 5.7.

Like with statements, additional processes to breathy termination may apply in questions. Again, the application of these processes correlates with specific sets of speech sounds.

Questions are characterised by breathy voice as illustrated in (272b) above. However, there are words (and therefore also utterances) in Ikaan that end in consonants and breathy termination is not applied to consonants in Ikaan. Therefore there are consonant deletion and vowel insertion processes in Ikaan which result in vowel-final utterances that then undergo breathy termination. In Ikaan, the consonant is deleted if the utterance ends in /g, m/. This may or may not be ac-

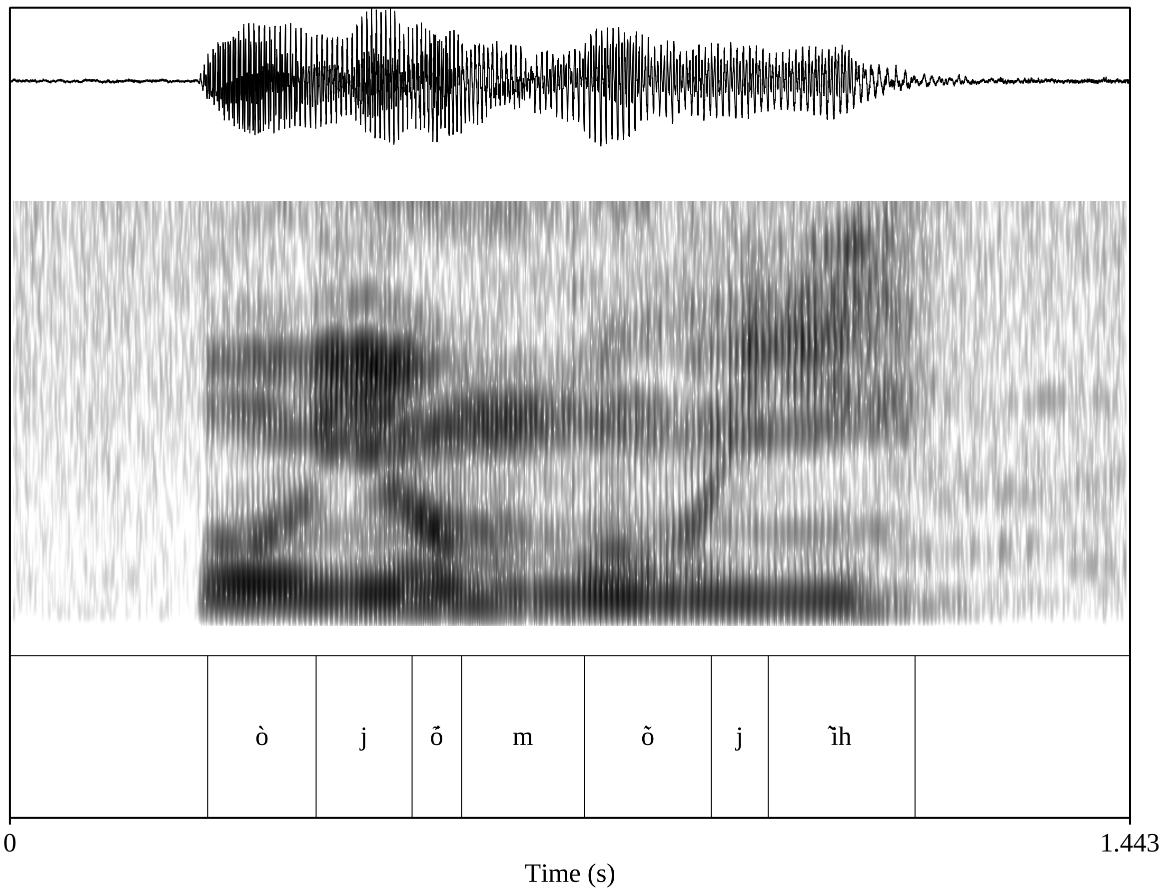


Figure 5.5: Waveform and spectrogram of *òjómòjȉ̀h* in (273)

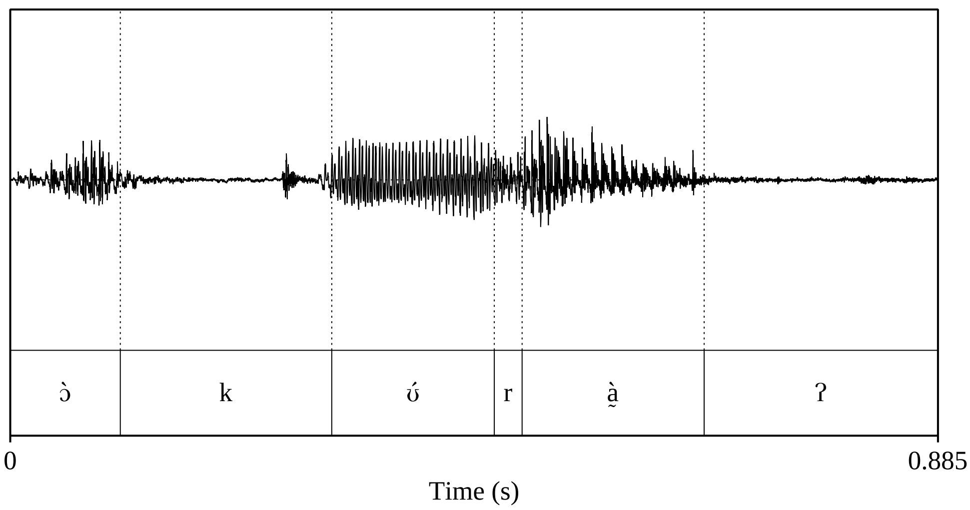


Figure 5.6: Waveform for *ɔ̀kʊ́rà̰ʔ* in (274)

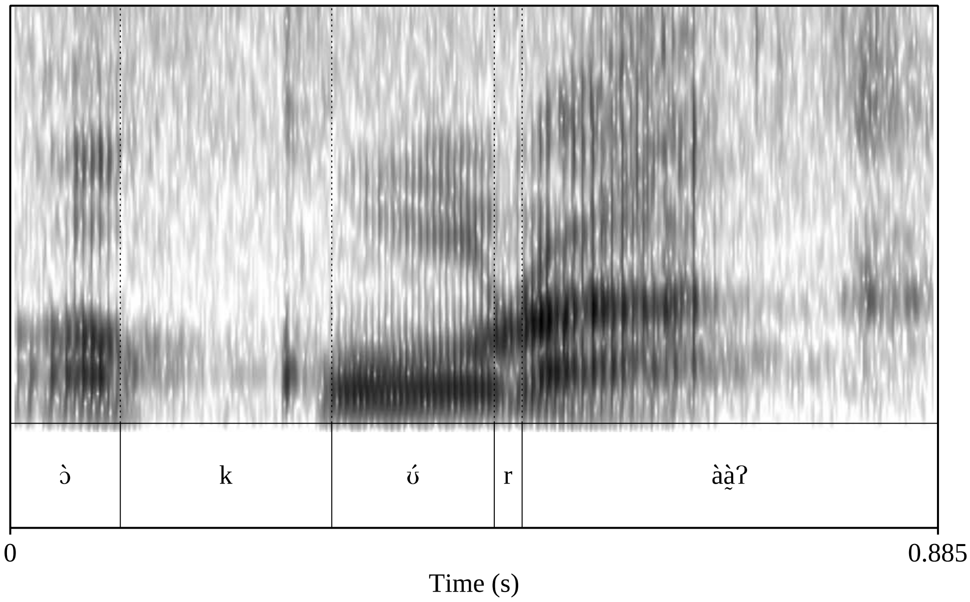


Figure 5.7: Spectrogram of *ɔ̀kʊ́rà̰ʔ* in (274)

companied by vowel lengthening. An epenthetic vowel is inserted if the utterance ends in any other consonant or a vowel followed by a glide.

The statement in (275a) ends in /*g*/. In the corresponding question in (275b) the final /*g*/ is deleted and the preceding vowel is lengthened.

(275) a. ɔ̀- kíg → [ɔ̀kíg]
3S.NFUT- go.to.NFUT
He went. (ynt.018)

b. ↑ ɔ̀- kíː → [↑ɔ̀kíːh]
QU 3S.NFUT- go.to.NFUT
Did he go? (ynt.019)

Figure 5.8 gives annotated spectrograms for both utterances in (275).

In the statement in (275a), the duration of the vowel preceding /*g*/ is short and its intensity abruptly decreases at the closure phase of the /*g*/. In the question in (275b) the duration of the final vowel is much longer and its intensity decreases slowly until it ends voiceless.

There are a number of verbs which on the surface end in a vowel but do not undergo vowel deletion when followed by another vowel as vowels usually would. Instead there is evidence that at least for some speakers these verbs end in /*g*/ underlyingly. In yes/no questions these verbs undergo the same vowel lengthening as /-*g*/-final words if they are in utterance-final position.

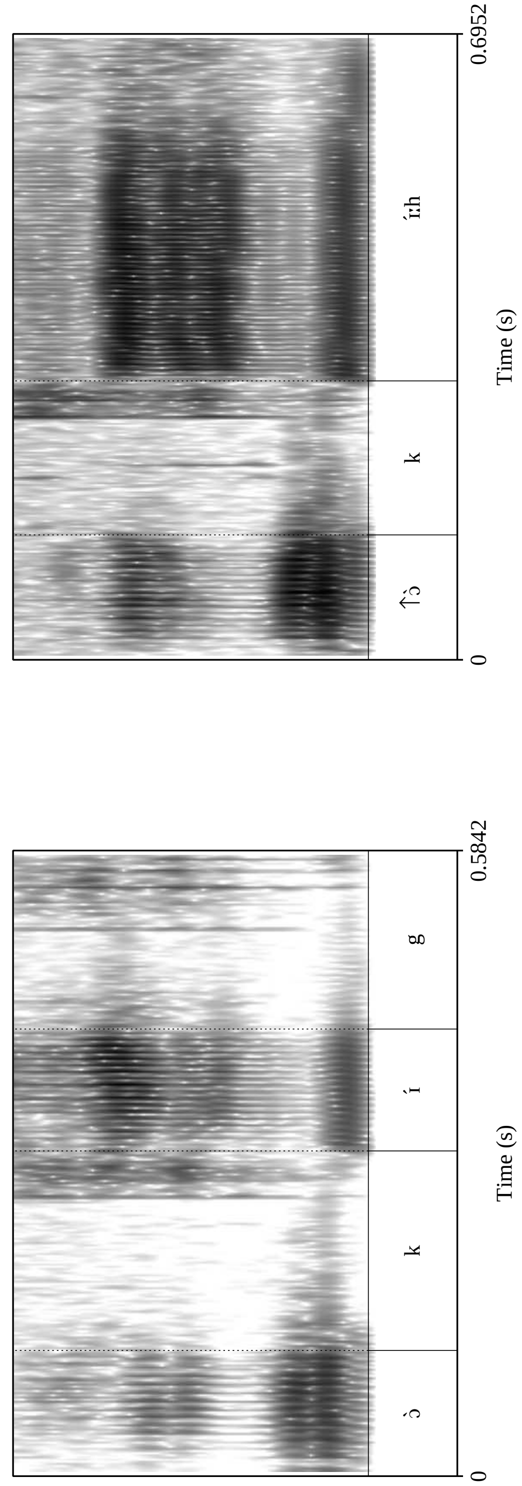


Figure 5.8: Spectrogram of *ɔ̀kɪ́g* in (275a) and *ꜛɔ̀kɪ́ːh* in (275b)

(276) a. ɔ̀- há → [ɔ̀háh]
3S.NFUT see.NFUT
He saw. (ynt.022)

b. ꜛ ɔ̀- háː → [ꜛɔ̀háːh]
QU 3S.NFUT see.NFUT
Did he see? (ynt.023)

Annotated spectrograms for (276a) and (276b) are given in Figure 5.9.

há in the statement does not actually end in a glottal stop. Instead, both statement and question end in breathy voice. However, there is a durational difference in that the vowel in the question is one-and-a-half times as long as the vowel in the statement.

Like word-final */g/*, word-final */m/* are also deleted. However, there is no clear pattern regarding lengthening of the preceding vowel.

In the examples in (277) the underlying final */m/* does not surface, but this is not accompanied by vowel lengthening. In both cases the vowel remains short.

(277) a. ɔ̀- ʃʊ̃̂m → [ɔ̀ʃʊ̃̂]
3S.NFUT- wake.up.NFUT
He woke up. (ynt.048)

b. ꜛ ɔ̀- ʃʊ̃̂m → [ꜛɔ̀ʃʊ̃̂h]
QU 3S.NFUT- wake.up.NFUT
Did he wake up? (ynt.049)

c. ɔ̀- mâm → [ɔ̀mâʔ]
3S.NFUT- laugh.NFUT
He laughed. (ynt.052)

d. ꜛ ɔ̀- mâm → [ꜛɔ̀mâh]
QU 3S.NFUT- laugh.NFUT
Did he laugh? (ynt.053)

In (278) the underlying final */m/* also does not surface but here the final vowel is lengthened.

(278) a. ɔ̀- mɪ̃́ná èkèrè b- ɪ̀kàhʊ̃́m →
3S.NFUT- put.NFUT pot LOC kitchen
[ɔ̀mɪ̃́nékèrè bɪ̀kàhʊ̃́ʔ]
She put the pot in the kitchen. (ynt.072)

b. ꜛ ɔ̀- mɪ̃́ná èkèrè b- ɪ̀kàhʊ̃́m →
QU 33S.NFUT- put.NFUT pot LOC kitchen
[ꜛɔ̀mɪ̃́nékèrè bɪ̀kàhʊ̃́ːh]
Did she put the pot in the kitchen? (ynt.073)

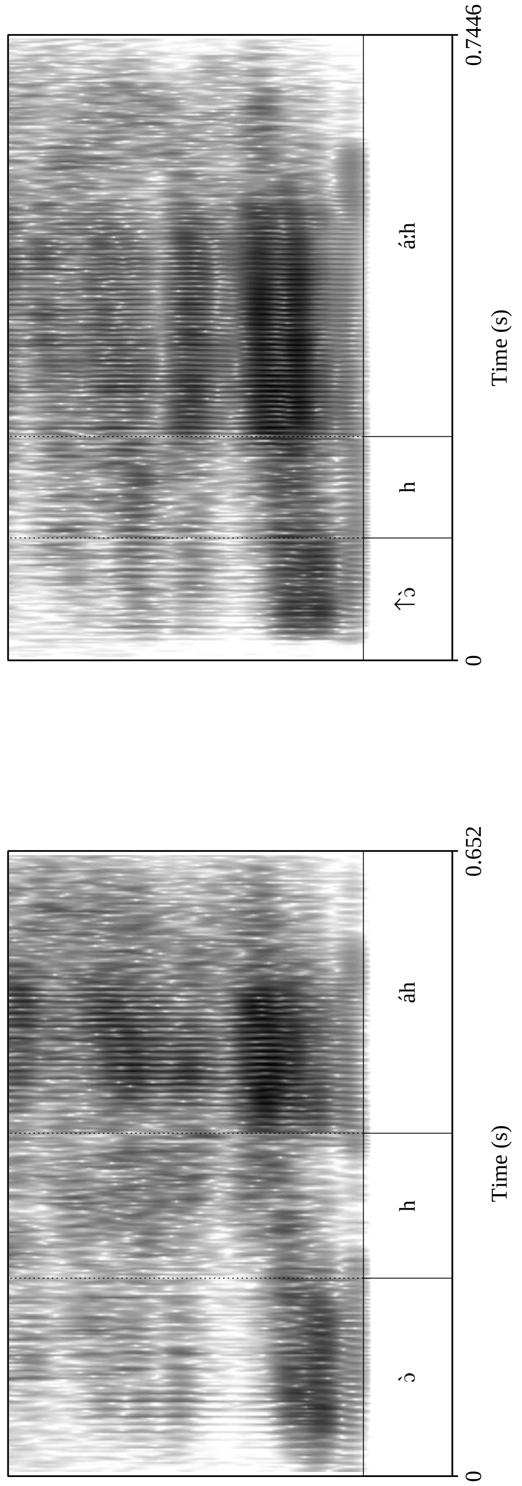


Figure 5.9: Spectrograms of *ɔ̀háh* in (276a) and *ꜛɔ̀háːh* in (276b)

I have no explanation for this yet. What I can say is that nasality of the final vowel, which might be expected to play a role, is independent of this. The nasal vowels in (277b) and (278b) follow different lengthening patterns, whereas the oral and nasal vowel in (277b) and (277d) follow the same pattern.

Final nasal vowels that are not followed by an underlying */m/* do get lengthened in questions, as illustrated in (279). At first glance, this may not seem logical, after all a short vowel can end in breathy voice just as well as a long vowel can. However, in (273) I have shown that nasal vowels in statements do often not end in glottal stops but slightly breathy voiced. Therefore lengthening the vowel in the questions takes away this ambiguity and makes questions and statements clearly distinguishable again.

(279) a. ò- ʃéʃèdũ̏ → [òʃéʃèdũ̏h]
3S.NFUT- stand.up.NFUT
He stood up. (ynt.058)

b. ꜛ ò- ʃéʃèdũ̏ː → [ꜛòʃéʃèdũ̏ːh]
QU 3S.NFUT- stand.up.NFUT
Did he stand up? (ynt.059)

If an utterance ends in a consonant an epenthetic vowel is inserted. The epenthetic vowel receives its tone from the preceding TBU so that the utterance ends in L in (280b) and in H in (280d).

(280) a. ò- ʃédʒí̋ b- ɛ̀wí ɛ̀ːdʒ
3S.NFUT- steal.NFUT LOC goat 1S.POSS
He stole my goat. (ynt.080)

b. ꜛ ò- ʃédʒí̋ b- ɛ̀wí ɛ̀ːdʒ ȉ →
QU 3S.NFUT- steal.NFUT LOC goat 1S.POSS epV
[ꜛòʃédʒí̋ bɛ̀wí ɛ̀ːdʒ ȉh]
Did he steal my goat? (ynt.081)

c. ɔ̆ː- wɔ̏ ʊ̀hjá̋ òjí̋t
3S.NFUT- drink.NFUT alcoholic.drink palm.tree
He drank palm wine. (ynt.090)

d. ꜛ ɔ̆ː- wɔ̏ ʊ̀hjá̋ òjí̋t í̋ →
QU 3S.NFUT- drink.NFUT alcoholic.drink palm.tree epV
[ꜛɔ̆ːwɔ̏ʊ̀hjá̋ òjí̋t í̋h]
Did he drink palm wine? (ynt.091)

Utterances which end in a vowel that is accompanied by a glide follow the same pattern as consonant-final sentences and take an epenthetic vowel.[11]

[11]The fact that an epenthetic vowel is inserted may be evidence that vowels accompanied by

(281) a. ɔ̌ː- mà òjù ètɛ̃́ʲ
3S.NFUT- beat.NFUT child small

He beat the child. (ynt.070)

b. ꜛ ɔ̌ː- mà òjù ètɛ̃́ʲ í →
QU 3S.NFUT- beat.NFUT child small epV

[ꜛɔ̌ːmòjètɛ̃́ʲ íh]

Did he beat the child? (ynt.071)

Rialland (2007:45) identifies a [+open] low-toned vowel as one strategy for marking questions. The epenthetic vowels which are inserted here are not the same as this [+open] low-toned vowel. First, they are high vowels and therefore closed, not open. Secondly, they are not invariably L-toned because their tone depends on the preceding tone.

Yes/no questions in Ikaan are consistently formed with breathy termination. Consonant deletion and vowel insertion only apply when there is no final vowel available on which breathy voicing can be realised. I therefore assume that consonant deletion and vowel insertion are secondary strategies that are triggered by the need for breathy termination. On the other hand, I take consonant deletion and vowel insertion as an indication that breathy voice is one of the crucial markers for yes/no questions. If it was not that important there would be no need to go to all the length of altering the segmental structure of the utterance.

Still, as with register expansion, breathy termination cannot be the only feature marking question. An important and clear indication for this is that in the perception test, hearers often decided whether an utterance was a question or a statement before the utterance had actually finished. They were therefore able to distinguish between questions and statements without making reference to the glottal or breathy finish of the utterance.

5.4.3 Possibly: Reduction or suspension of final lowering

As discussed in section 3.3.3 above, a sequence of phrase-final L is lowered to X in Ikaan. There is evidence that in some cases this lowering is reduced or partly suspended in questions. However, this effect is not as consistent as register expansion and breathy termination. It only seems to apply if there is only one final L in the utterance, a sequence of L is lowered to X just like in statements. Additionally, lowering only seems to be reduced during the modal voice part of the vowel. As soon as breathy voice sets in the pitch plummets again to extra low

a glide originate from VC sequences. I will not follow up this hypothesis in this thesis.

levels. This pitch drop may however be caused by the breathy voice itself, which is known to accompany low tones in other languages.

In the statement in (282), the final L is lowered to X.

(282)	à-	bénò
	3P.NFUT-	stroll.NFUT
	They strolled. (ynt.034)	

This lowering is evident in the pitches for the utterance. The pitch track and spectrogram for (282) are given in Figure 5.10. The pitches for the three tones are 130Hz for L, 158Hz for H and 108Hz for X.

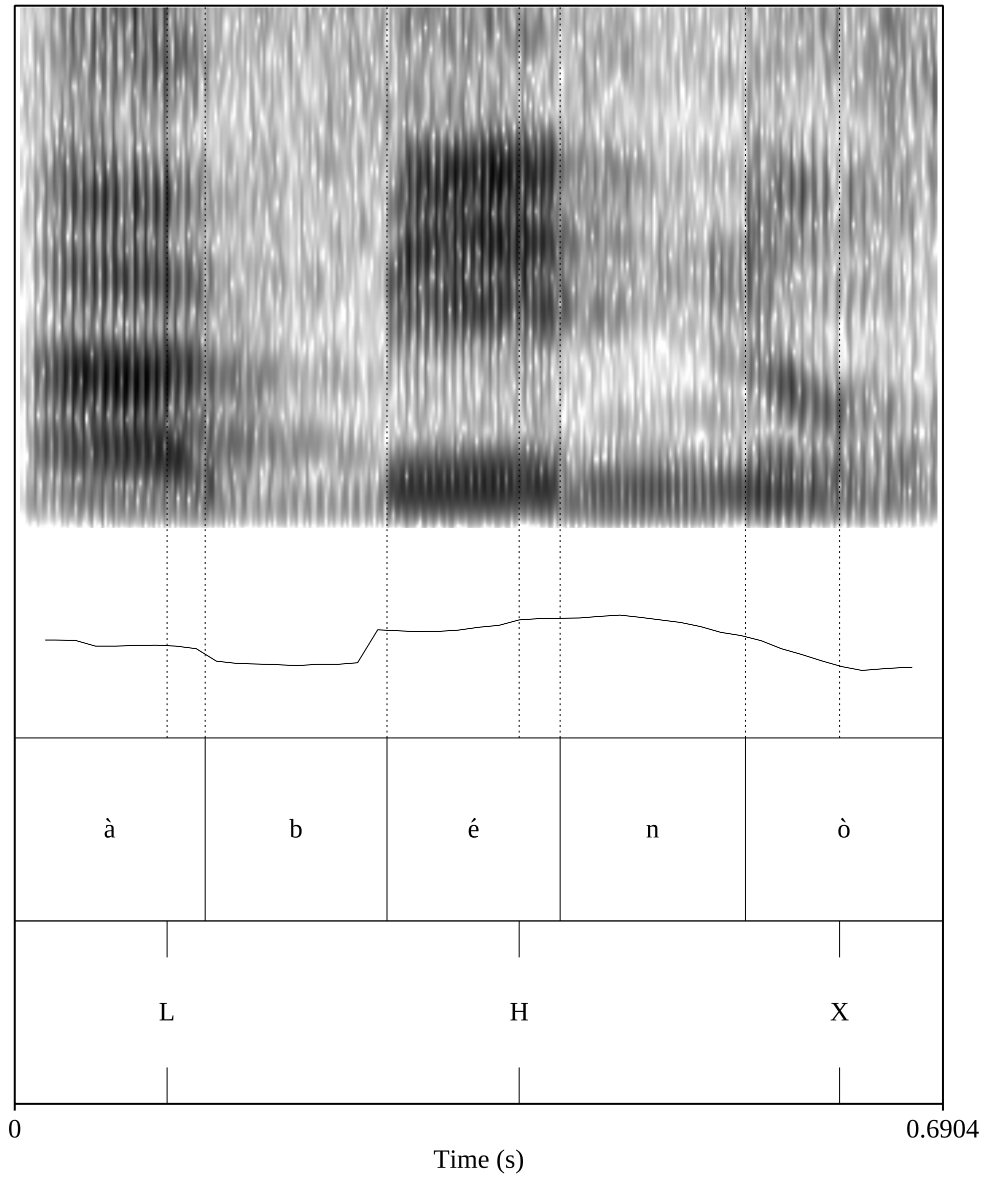


Figure 5.10: Spectrogram and pitch track of *àbénò* in (282)

The lowering of the final L is somewhat suspended in the corresponding question in (283).

(283)	ꜛ	à-	bénò
	QU	3P.NFUT-	stroll.NFUT

Did they stroll? (ynt.035)

The spectrogram and pitch track of (283) are given in Figure 5.11. The pitch track falls less steeply during the modal voice part of the vowel. Furthermore, with 138Hz the pitch of the modal voice part of the final vowel is roughly at the same pitch level as the initial L, which is at 133Hz. During the breathy voice part of the final vowel, the pitch falls more rapidly and with 88Hz it ends in an even lower X tone than in the statement. This is despite the fact that questions are pronounced at a higher register than statements.

The suspension of final lowering that can be observed in utterances ending in a single L tone does not seem to affect utterances ending in a sequence of L tones. The statement in (284) ends in three L in a row, all of them lowered to X as expected.

(284)	ò-	hwí	nɔ́	b-	ì̀ʃì̀ʃì̀
	3S.NFUT-	go.out.NFUT	LOC	LOC	outside

He went outside. (ynt.004)

The spectrogram and pitch track for (284) given in Figure 5.12 show this lowering. The initial L is at 127Hz, the final Ls at 110Hz, 102Hz and 102Hz respectively.

In the corresponding question in (285), there is no suspension of final lowering. All final L are lowered to X.

(285)	ꜛ	ò-	hwí	nɔ́	b-	ì̀ʃì̀ʃì̀
	QU	3S.NFUT-	go.out.NFUT	LOC	LOC	outside

Did he go outside? (ynt.005)

Again, the final lowering can be seen in the spectrogram and pitch track for (285) in Figure 5.13. The initial L here is at 145Hz, the three final L at 123Hz, 111Hz and 105Hz. It is possible to argue that the L are successively lowered and that this is how reduction of final lowering shows in sequences of final Ls. While this may be the case, it should also be taken into account that the two H between the initial and final L are quite high, at 171Hz and 188Hz, so the gradual lowering may be a purely phonetic effect of dropping from a very high pitch to a low pitch rather than a phonologicalised effect that has a specific function in the language.

Reduction of final lowering can to some degree be described as one of the prosodic strategies for marking questions in Ikaan. However, it affects questions

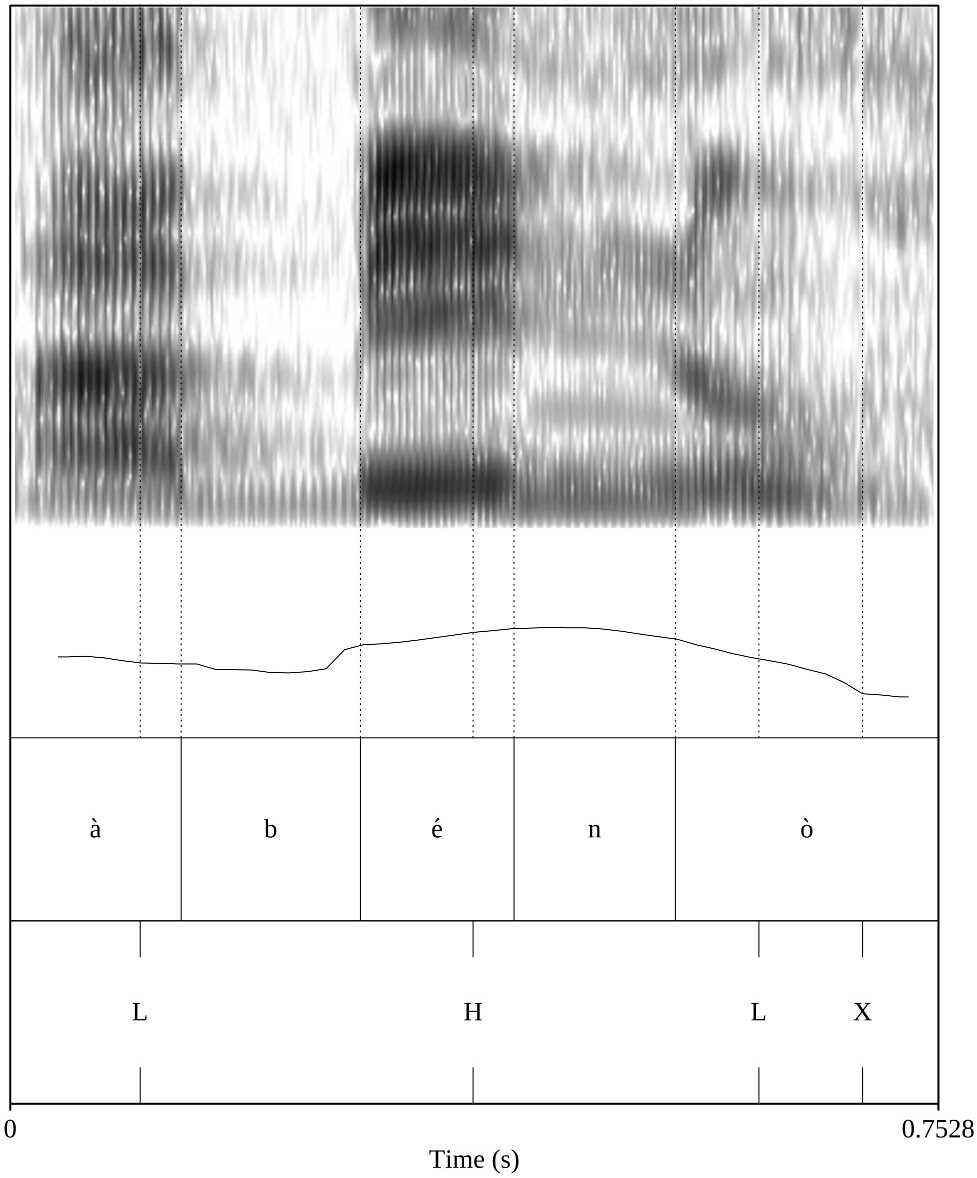


Figure 5.11: Spectrogram and pitch track of ꜛ*àbénò* in (283)

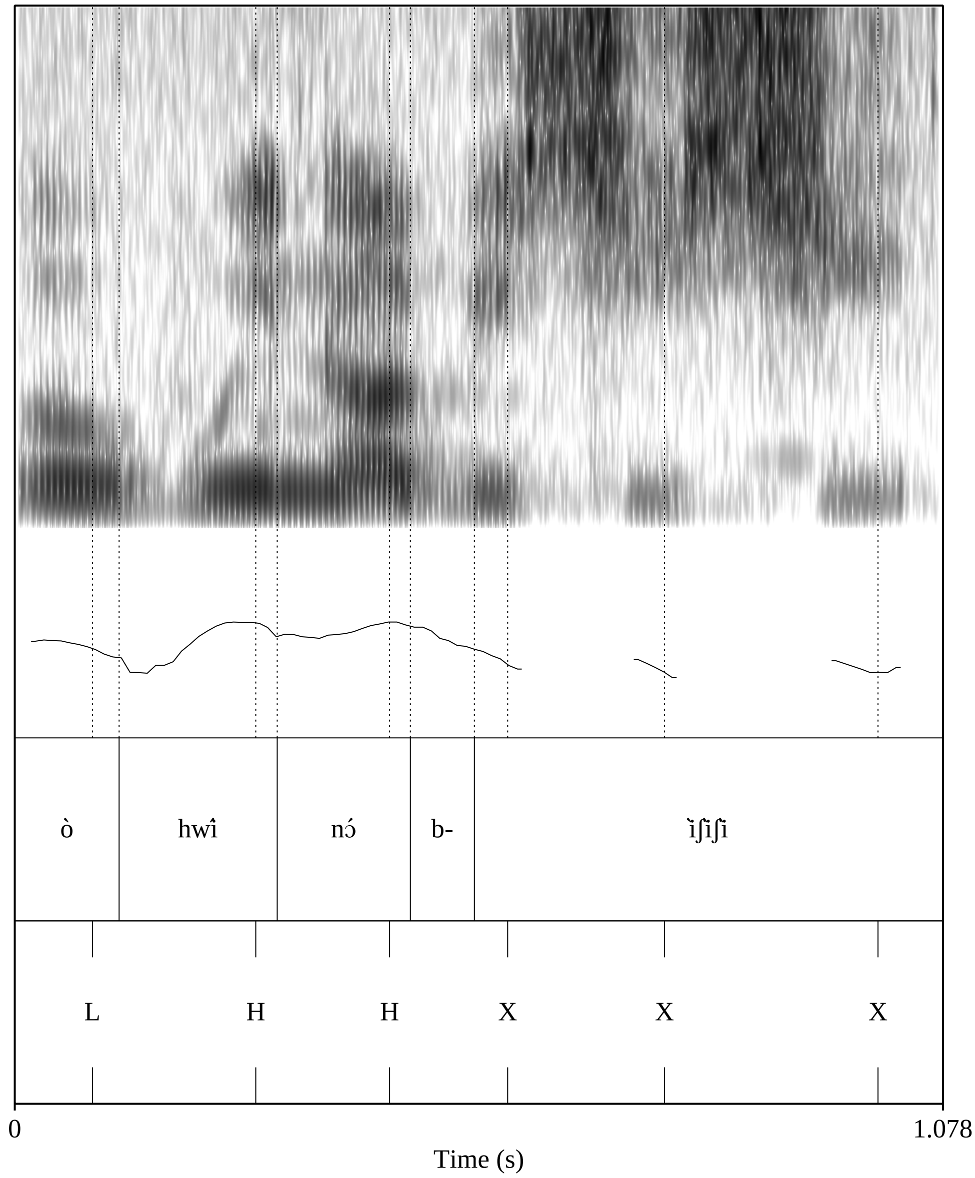


Figure 5.12: Spectrogram and pitch track of *òhwí nɔ́ bı̀ʃı̀ʃı̀* in (284)

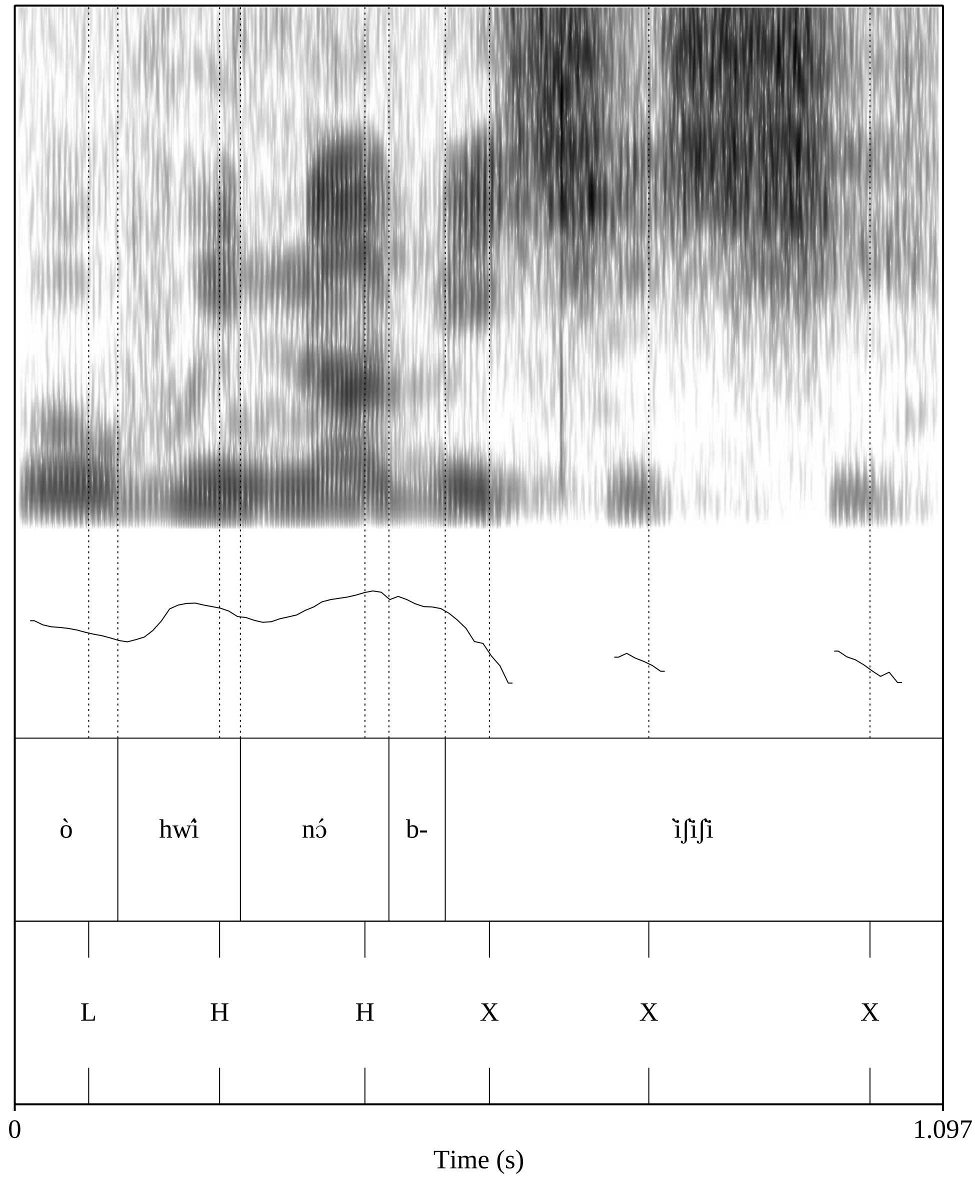


Figure 5.13: Spectrogram and pitch track of ꜛ*òhwí nɔ́ bı̀ʃı̀ʃì* in (285)

ending in a single L more than it affects questions ending in a series of L and is therefore not as prominent as a strategy as register expansion and breathy termination are.

5.4.4 Possibly: Final H raising

Raising of the final H tone is another potential marker for questions in Ikaan, though here the data is even less conclusive than for the reduction of final lowering. In essence, the final H tone in a statement is pronounced with a level pitch whereas the final H in a question is pronounced with a pitch that rises from the normal high pitch to a higher high pitch. An example for this is given in (286).

(286) a. ò- ʃì̀ èrèké
3S.NFUT- cut.NFUT sugar.cane
He cut sugar cane. (ynt.060)

b. ↑ ò- ʃì̀ èrèké
QU 3S.NFUT- cut.NFUT sugar.cane
Did he cut sugar cane? (ynt.060)

In Figure 5.14, the pitch track for the statement in (286a), the pitch of the final H tone is more or less level and does not rise towards the end.

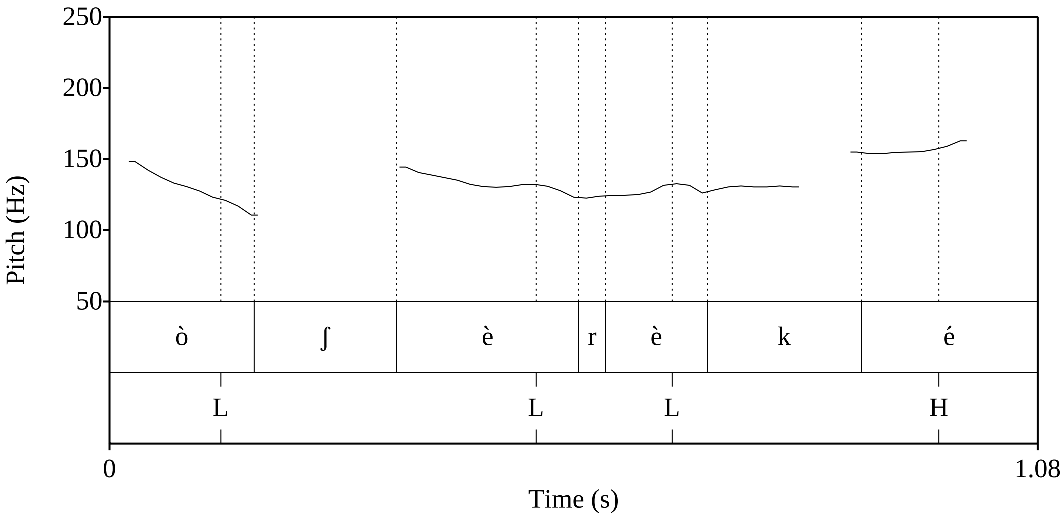


Figure 5.14: Pitch track of *òʃèrèké* in (286a)

The level pitch of the final H in the statement contrasts with a rising pitch in the final H in the question. In the spectrogram and pitch track for (286b) in Figure 5.15 I have annotated the end of the modal voice part of the final vowel with H1 and the end of the breathy voiced part of the final vowel with H2. That is not to say that there are two tones but it is meant to indicate the rise of the H tone during the breathy voiced part.[12]

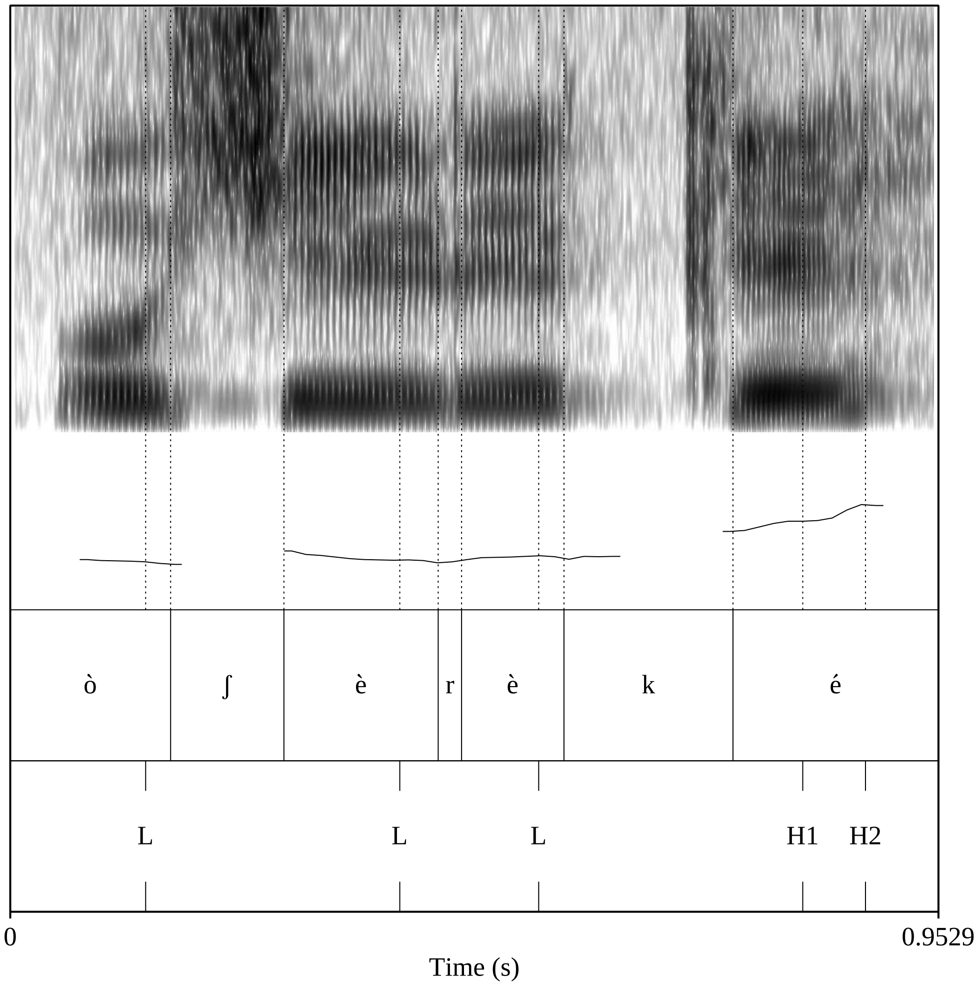


Figure 5.15: Spectrogram and pitch track of *ꜛòʃèrèké* in (286b)

In other questions, the rise in the final H is less strong or may be a small rise followed by a small fall, resulting in a 'pitch bump' rather than a rise. Over the utterance as a whole I have not observed a consistent upward movement, although I have not carried out large-scale phonetic measurements and statistical evaluations of the data so that I may have missed uptrends that are not immediately visible. Finally, I do not consider the final rise or bump to be an utterance-final HL or H tone which would mark questions because it is only H tones that are affected, L tones are not.

[12]Note that above I mentioned that breathy voice tends to co-occur with L tones whereas here the pitch of a H tone rises when the phonation mode changes from modal to breathy. Breathy voice therefore does not have this phonetic effect with H tones.

Given the data, I can observe final raising or bumping of H but this is not consistently present throughout the data set. Therefore for now I do not consider raising of final H a primary marker of yes/no questions in Ikaan and will leave a more thorough investigation for further analysis.

5.4.5 Discussion

Ikaan marks yes/no questions without an interrogative morpheme and uses only tonal and prosodic means and additional segmental phonological changes. The two most important markers are register expansion with a higher pitch onset and breathy termination. Breathy termination brings with it consonant deletion and vowel epenthesis. Additionally, reduction of final lowering and final H raising may play a role. By itself, none of the strategies is sufficient to encode questions. Instead, they work together to back each other up and in this way make the grammar more robust.

Returning to Rialland's (2007) classification of prosodic question markers, Ikaan can be categorised as a language which uses both tense question prosody with high-toned prosodic markers (register expansion, possibly H raising) and lax prosody with low-toned prosodic markers (breathy termination, possibly reduction of final lowering). There are other languages in Rialland's sample which combine both types of prosody. Of the 78 languages, 18 languages mix their question markers, compared to 24 language which use only tense prosody and 36 languages with work entirely with lax prosody.

Ikaan's geographical neighbours in Rialland's sample are mixed, there is no preference for one or the other prosody in the area. Yekhee (North-Central Edoid) uses a H boundary tone only, Isoko (South-Western Edoid) and Degema (Delta Edoid) on the other hand mark questions with a L boundary tone. Engenni (Delta Edoid) combines tense and lax prosody, but in a slightly different way than Ikaan. In Engenni, questions are encoded with register expansion and the reduction of downdrift, a L boundary tone and final low-toned open vowel /à/ and possibly also a final vowel /e/. The language in Rialland's sample that is most similar to Ikaan is Hausa. Like Ikaan, it uses register expansion (high-toned prosody) and breathy voice (low-toned prosody).[13]

[13] It might be noteworthy that there are Ikaan-speakers that are Hausa speakers but the speaker used for the illustrations here does not speak Hausa.

5.5 Chapter summary

The objective of this chapter was to highlight some functions of tone in the grammar of Ikaan. I have shown how tone is involved at the level of individual words, between words and across whole sentences.

At the word level, I have shown how grammatical tonal melodies are used for derivation and inflection. H melodies are used to derive nouns and adjectives from verbs, though derivation is not a highly productive process in Ikaan.

A range of different melodies are used to inflect verbs in the different tense-aspect-mood categories, and the surface forms of these melodies provide evidence for the tonal rules and constraints that I have proposed in the preceding chapter.

Between words, I have shown that the associative construction is likely to be encoded merely by juxtaposition and without an actual associative morpheme, be it tonal or segmental.[14] I have also discussed a potential alternative analysis where the associative construction is marked with a floating L tone and have shown how this analysis could be used to unify the associative construction with one type of reduplication.

At the phrase level, I have temporarily extended the scope of the thesis to include prosodic or intonation effects in order to show how the grammatical distinction between statements and corresponding yes/no questions relies on tone and intonation as well as phonation effects.

Still, this section could only provide a first glimpse of the forms and functions of tone in the Ikaan grammar. Tone does a lot of work in the grammar of Ikaan and much work remains to be done. Tone may be used in the derivation of other parts-of-speech. In inflection, Ikaan has a semantically complex tense-aspect-mood system with a morphologically complex verb structure which involves tonal as well as segmental morphemes and many interactions between the morphemes. I have only begun to describe and analyse this system and a reference grammar at a later stage will undoubtedly reveal many more categories and structures.

Parts of the grammar which I have not discussed here but for which I know that they involve tone are:

- negation of the verbs, which involves tonal changes as well as vowel lengthening, a sentence-final clitic and other markers depending on the construction in question
- reduplication other than ‘every day’, which show a range of different surface

[14] However, in chapter 6 I will show that at the interface between phonology and grammar it is a tonal constraint which marks the associative construction, and if a tonal constraint can be considered a ‘morpheme’, there would be a morpheme for the associative construction after all.

patterns

- relative clauses, in which the tone on the relative marker is H in some cases and L in others and which may be downstepped as a whole
- verbs, where changes in word order such as object fronting or the addition of what may be 'converbs' affects the grammatical melody of the word and the location of the downstep
- benefactive and locative phrases, where the 'BEN' and 'LOC' markers do not cross-refer back to the subject and are not marked for TAM with the prefix but which nonetheless take varying tones, which in turn may indicate that they are at least partially verbal and therefore partially inflectable
- individual constructions such as the constructions 'This is a XYZ.', in which the final vowel of the noun is lengthened and has a rising tone and which may indicate the presence of another tonal morpheme or possibly tonal 'syntagmeme'

A further issue which I have not discussed yet involves the use of tone not as a morpheme but as a tonal constraint which functions like a morpheme in that it is specific for certain morphosyntactic constructions. There are tonal changes in the noun phrases and verb phrase, e.g. verb + object, noun + modifier, where there is a phonological constraint that is tied to the specific grammatical construction so that the morphosyntactic construction itself is encoded with a phonological constraint. Because this is not morphosyntax in the sense that there is a morpheme or 'syntagmeme' that is tonal like with grammatical melodies for inflection, I have not discussed this here. Instead, I see these constraints as an interaction of phonology and morphosyntax, or the use of phonology to do morphosyntax, and I will discuss these constraints and constructions as part of the interface of phonology and grammar in Ikaan in the following chapter.

Chapter 6

Tone at the interface of phonology and grammar—downstep

Downstep in Ikaan is unusual not just because of the lack of automatic downstep in a language with non-automatic downstep. In addition to this already rare feature, Ikaan shows three locations of downstep, i.e. three different places in which the register is lowered. As I will show in this chapter, these three different locations occur in four distinct sets of constructions as a result of four different construction-specific rules and constraints. Furthermore, in a fifth context downstep contrasts with a HLH sequence that results from a fifth construction-specific phonological rule. How and why these different locations of downstep arise is decided at the interface between phonology on the one hand and morphosyntax and semantics on the other hand and will be the topic of this chapter.

I have introduced downstep in Ikaan in Chapter 3, showing that the trigger for downstep is a floating L and that there is no automatic downstep after linked L. Also in Chapter 3, I have illustrated the three different locations of downstep by giving data and pitch tracks for these examples. In Chapter 4 I have shown an example of downstep triggered by a lexical floating L, and in Chapter 5 I have briefly mentioned downstep in reduplication.

In this chapter, I return to the different locations of downstep and divide the data into the above mentioned five sets. These sets differ phonologically with respect to the presence or absence of downstep and with respect to the construction-specific rules and constraints that apply within the set:

- Set I: vowel deletion resulting in downstep (6.1)
- Set II: vowel assimilation not resulting in downstep (6.2)

- Set III: vowel assimilation and *H##$L_{V:}$ resulting in downstep (6.3)
- Set IV: *HLH resulting in downstep (6.4)
- Set V: *LH resulting in downstep[1] (6.5)

For each set, I will give a range of data, demonstrate which rules and constraints apply in the different phonological contexts and explain how these rules and constraints produce the observed surface forms. Following this, I will show in section 6.6 that phonology alone cannot account for the patterns we find. Instead, it is more insightful to link three of the five sets to morphosyntactic and semantic properties of the constructions in which the patterns occur. My proposal is that Ikaan uses the phonology to group together and treat in a similar manner morphosyntactic structures that are related. This then allows us not only to derive the correct forms in the correct context but also to make generalisations and predictions regarding the grammatical organisation of Ikaan.

The set of rules and constraints that bring out the different locations of downstep show complex segmental, autosegmental and morphological interaction. In Sets I and II, the construction-specific rules refer only to the segmental level. In Sets IV and V, the construction-specific constraints operate solely at the autosegmental level. In Set III, a constraint referring to the morphological, segmental and autosegmental level applies together with a construction-specific segmental rule. In addition to the construction-specific rules, the general across-the-board phonological rules and constraints that are not linked to specific morphosyntactic contexts but apply in all contexts also have to be obeyed.

Because of the complexity of the analysis, I will present a fairly large amount of data and derivations for all locations of downstep and all applicable phonological contexts. These phonological contexts naturally include different tonal combinations but also different segmental combinations. This is because as I will show, in some sets segmental changes are required to trigger downstep whereas in other sets downstep occurs independently of whether or not there have been changes at the segmental level.

Finally, what I will not discuss in this chapter are the implications of the downstep findings for the Ikaan phonology and for phonology in general. This will be discussed in Chapter 7 instead.

[1] As I will show, *HLH and *LH cannot be merged into *(H)LH. In constructions where *HLH applies, phrases with LH sequences do not violate *HLH and are therefore not affected by it. However, the same underlying LH sequence is affected if it occurs in a construction linked to *LH because it does violate this constraint.

6.1 Set I—Vowel deletion and downstep

The first downstep location is the result of a vowel deletion process. Morphosyntactically, this downstep occurs in verb + object noun constructions but is also attested in some types of reduplications. Here I will only discuss the verb + object noun constructions. I will leave reduplication for further research.

6.1.1 Data for Set I

The data in (287) gives verb + object noun constructions in different phonological contexts and shows how the tones surface in each context. The phonological contexts differ in that the verb may be vowel-final or consonant-final, and in the sequences of tones at either side of the morphological boundary.

(287) a. ɔ̀- bá ùmɔ̄́ → [ɔ̀búꜜmɔ̄́]
3S.NFUT- fetch.NFUT water
She fetched water.

b. ɔ̀- kánà ìwé → [ɔ̀kánìwé]
3S.NFUT- read.NFUT book
She read a book.

c. ò- jé àbàbá → [òjábàbá]
3S.NFUT- eat.NFUT beans
She ate beans.

d. ò- múg ɔ̀wɔ́g → [òmúg ɔ̀wɔ́g]
3S.NFUT- cook.NFUT soup
She cooked soup.

e. ɔ̀- tɔ̀r ìhún → [ɔ̀tɔ̀r ìhún]
3S.NFUT- fetch.NFUT firewood
She fetched firewood.

The data shows that in a V1 ## V2 context across a morpheme boundary, V1 is deleted but its tone remains. This tonal stability results in downstep in (287a). V2 was initially L-toned and is now H-toned, and the mora following it is realised ꜜH. There is no downstep in any of the other contexts. I will discuss each phonological context in turn and go through the processes and constraints that apply.

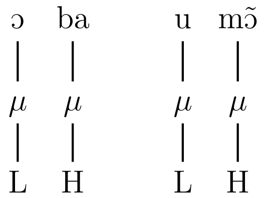
V1 ## V2 and H ## LH

The first phonological context is illustrated with the sentence in (288). This context is characterised segmentally by V1 ## V2 at the morpheme boundary and tonally by a H ## LH sequence which surfaces as a HꜜH sequence.

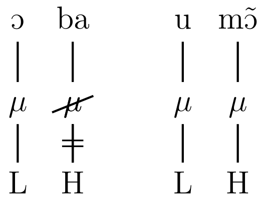
(288) ɔ̀- bá ùmɔ̃́ → [ɔ̀bú↓mɔ̃́]
3S.NFUT- fetch.NFUT water
She fetched water.

The verb ends in H on a vowel, the vowel is deleted. H remains, is delinked and set afloat. Because H must be realised and must not be left afloat, it relinks to the following TBU. As this TBU is already linked to a L, this double linking violates the constraint that each mora can only bear one tone (*μ). H must be realised and cannot be set afloat again, therefore L has to delink and be set afloat. With L afloat and H immediately following, H surfaces as ↓H. The full derivation is given in (289).

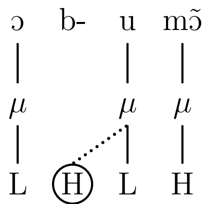
(289) a. Underlying representation



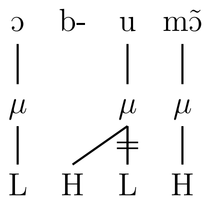
b. Vowel deletion



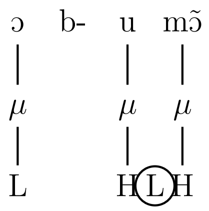
c. Violation of *H, H docking



d. Violation of 'One tone per mora', L delinking



e. Final representation



In this and all the following derivations, there are two types of phonological rules and constraints involved. On the one hand, there are phonological rules and constraints that apply only in the constructions in the given set. On the other hand, there are the 'general' phonological rules and constraints that apply across the board, no matter in which construction they occur.

In Set I in this phonological context, the only phonological rule that is selected by Set I constructions is vowel deletion. All other processes are general well-formedness conditions and phonological rules that follow from the phonology, no additional construction-specific tonal rules or constraints have to be posited.

V1 ## V2 and L ## LH

There is a second V1 ## V2 context but this time the tones are different. Instead of H ## LH there is a L ## LH sequence across the morpheme boundary. Downstep does not occur here. This context is illustrated with the sentence in (290).

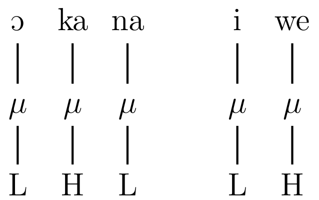
(290)	ɔ̀-	kánà	ìwé	→ [ɔ̀kánìwé]
	3S.NFUT-	read.NFUT	book	

She read a book.

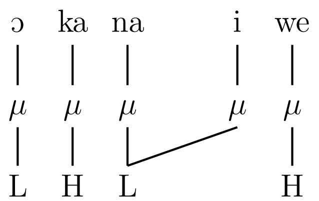
The adjacent L across the word boundary violate OCP(L) so that they are merged into a multiply linked L. V1 at the V1 ## V2 junction is deleted, its tone is delinked. Delinking one TBU from a multiply linked TBU does not set L afloat, therefore no Ⓛremains and no downstep is triggered.

The tonal derivation of (290) is as follows:

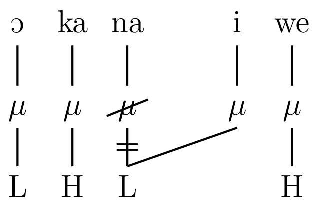
(291) a. Underlying representation



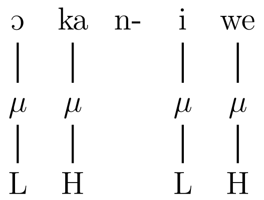
b. Violation of OCP(L), L merging



c. Vowel deletion, L is not set afloat because it is multiply linked



d. Final representation



Like in (289), vowel deletion applies as the construction-specific rule. However, the general phonological rules that follow differ here. Because of the different tonal context with adjacent L rather than a singly linked L, vowel deletion does not create a floating L. As a consequence, there is no downstep.

V1 ## V2 and H ## LLH

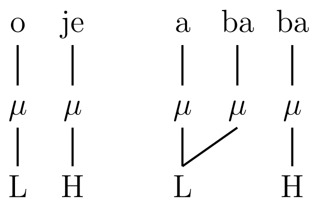
The third V1 ## V2 context has a H ## LLH tone sequence across the morpheme boundary. Again, there is no downstep. This context is illustrated with the sentence in (292).

(292) ò- jé àbàbá → [òjábàbá]
3S.NFUT- eat.NFUT beans
She ate beans.

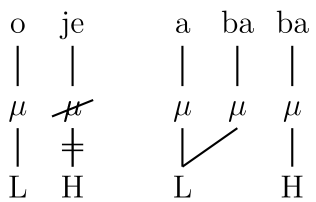
Again, the vowel is deleted. H is set afloat but must be realised. Therefore it docks onto the next TBU, creating a TBU linked to two tones. As this violates the ‘One tone per mora’ constraint, L is delinked. L is linked to two TBUs underlyingly, delinking L from one TBU does not set L afloat, it remains linked. No floating L remains so that there is no downstep.

The tonal derivation of (292) is as follows:

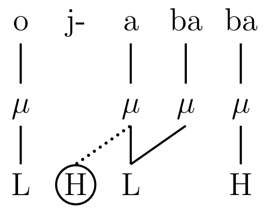
(293) a. Underlying representation



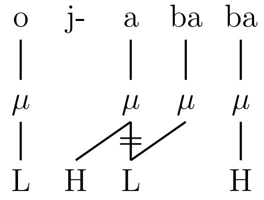
b. Vowel deletion



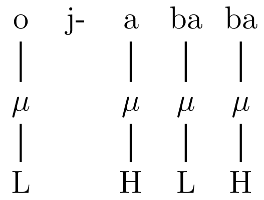
c. Violation of *Ⓗ, H docking



d. Violation of 'One tone per mora', L delinking, L is not set afloat because it is multiply linked



e. Final representation



In (293) the application of the construction-specific vowel deletion does not result in downstep for the same reason as in (291)—multiple linking prevents L from being floated so that there is no trigger for downstep. The only difference to (291) is that the adjacent L are not across a morpheme boundary but within a word.

C ## V

The last phonological context is illustrated with the sentences in (294). This context is characterised segmentally by C ## V at the morpheme boundary and tonally by a H ## LH surface sequence in (294a) and L ## LH in (294b). In neither context downstep occurs.

(294) a. ò- múg ɔ̀wɔ́g → [òmúg ɔ̀wɔ́g]
3S.NFUT- cook.NFUT soup
She cooked soup.

b. ɔ̀- tɔ̀r ȉhún → [ɔ̀tɔ̀r ȉhún]
3S.NFUT- fetch.NFUT firewood
She fetched firewood.

There is no context for vowel deletion. Without vowel deletion, the underlying tonal representation of (294a) as given in (295) does not change once the words are put together.

(295)

o	mug	ɔ	wɔg
μ	μ	μ	μ
L	H	L	H

In (294b), only OCP(L) applies.

(296) a. Violation of OCP(L), L merging

ɔ	tɔr	i	hun
μ	μ	μ	μ
L	L	L	H

b. Final representation

ɔ	tɔr	i	hun
μ	μ	μ	μ
L			H

The construction-specific vowel deletion rule does not apply because its context is not given. No tones are delinked, therefore downstep cannot arise because there are no floating L triggering it.

6.1.2 Description of Set I

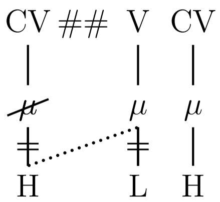
The following generalizations can be made from the above data:

- If no vowel is deleted, the words surface with the same tones as they have underlyingly. There is no floating L and therefore no downstep (see (294)).
- If a vowel is deleted and if this vowel carried a L, OCP(L) has caused L to merge into the following L, which is invariably there because all nouns begin with L. Delinking L does not result in a floating L and does not cause downstep (see (290)).
- If a vowel is deleted and if this vowel carried a H, H is delinked and associated with the following TBU, thereby delinking the L that was there. Following this, two scenarios are possible:
  - The delinked L was multiply linked, in which case it is not set afloat and does not cause downstep (see (292)).
  - The delinked L was linked to only one TBU, in which case it is set afloat and downsteps the following H (see (288)).

The only context which results in downstep is the V1 ## V2 context with H ## LH tones in (288). In this construction, a HLH sequence surfaces as a H$^{\downarrow}$H sequence. In all other phonological context there is no downstep either because there is no vowel deletion in the first place to set tones afloat, or because OCP(L) has merged adjacent L into multiply linked L, which do not result in floating L if only one of the association lines is broken.

The vowel deletion, delinking and relinking leading to downstep are illustrated in (297).

(297)



Again, of the processes in (297), the only phonological process that is selected by this specific grammatical construction at the grammar-phonology interface is a segmental rule—that of vowel deletion. All other tonal rules that apply in this set follow straight from the general phonology and are not construction-specific.

6.2 Set II—Vowel assimilation and HL sequences

The second set of data occurs with a vowel assimilation process. In this set there is no downstep, instead there are HL sequences on bimoraic vowels. Morphosyntactically, this set of data is attested in noun + adjective and noun + verb constructions, which I will both address here.

6.2.1 Data for Set II

The data in (298) and (299) shows noun + adjective and noun + verb constructions in different phonological contexts and gives the surface tones for each context. Like in Set I, the contexts differ in that the noun may be vowel-final or consonant-final, and in the different sequences of tones at either side of the word boundary.

(298) a. ɔ̀- tá ɔ̀- jã́wã́ → [ɔ̀tɔ̂ːjã́wã́]
O6- lamp 6- new
a new lamp

b. i̇̀- tòmátò ì- wã́ːwã́r̥ → [i̇̀tòmátìːwã́ːwã́r̥]
I4- tomato 4- red
a red tomato

c. ɛ̀- r̥ágʊ̃́m ɛ̀- wã́ːwã́r̥ → [ɛ̀r̥ágʊ̃́m ɛ̀wã́ːwã́r̥]
E5- sheep 5- red
a red sheep

d. ɪ̀- kàʃ ɪ̀- tẽ́ꜜtẽ́ʲ → [ɪ̀kàʃ ɪ̀tẽ́ꜜtẽ́ʲ]
I4- town 4- small
a small town

(299) a. ɪ̀- sɔ̀dʒɪ́ ò- jé à- bàbá àː- dʒ →
I4- Sọji 3S.NFUT- eat.NFUT A2- beans 2- 1S.POSS
[ɪ̀sɔ̀dʒôːjábàbâːdʒ]
Sọji ate my beans. (tam3.011)

b. ɪ̀gè ò- jé à- bàbá àː- dʒ →
Ige 3S.NFUT- eat.NFUT A2- beans 2- 1S.POSS
[ɪ̀gòːjábàbâːdʒ]
Ige ate my beans. (tam3.014)

c. ɛ̀- r̥ágúm è- jé à- bàbá àː- dʒ →
E5- sheep 5.NFUT- eat.NFUT A2- beans 2- 1S.POSS
[ɛ̀r̥ágúm èjábàbâːdʒ]
A sheep ate my beans. (tam3.016)

d. è- kpòd è- jé àbàbá àːdʒ →
E5- hare 5.NFUT- eat.NFUT A2- beans 2- 1S.POSS
[èkpòd èjábàbâːdʒ]
A hare ate my beans. (tam3.017)

The data shows that in a V1 ## V2 context, the first vowel is assimilated to the second vowel. Unlike in the data in Set I, the mora of V1 is not lost but survives. The tones of both V1 and V2 are realised in the surface form, there is no downstep.[2, 3]

I will show example derivations for the different phonological contexts for noun + adjective constructions. Noun + verb constructions follow the same derivation.

V ## V and H ## L

In (300), the noun is vowel-final and bears H on the final syllable, the adjective begins with a LH sequence.

[2]Thanks to Mary Pearce for suggesting that the mora is not deleted here.

[3]The fact that both vowel deletion and vowel assimilation apply in V ## V contexts may imply that there may well be different morphosyntactic boundaries involved. I will return to this in section 6.6 and continue to work with the same kind of boundaries for now.

(300) ɔ̀- tá ɔ̀- jã́wã́ → [ɔ̀tɔ̂ːjã́wã́]
O6- lamp 6- new
a new lamp

In the V1 ## V2 context, V1 is assimilated as V2 spreads to the mora on its left. The tone of V1 is linked to the first mora of V2, the tone of V2 is still linked to the second mora of V2. V2 therefore is realised with a HL falling melody over two moras.

(301) a. Underlying representation

```
ɔ  ta     ɔ  jã  wã
|  |      |  |   |
μ  μ      μ  μ   μ
|  |      |  |   |
L  H      L  H   H
```

b. Vowel assimilation

```
ɔ  ta     ɔ  jã  wã
|  ‡......|  |   |
μ  μ      μ  μ   μ
|  |      |  |   |
L  H      L  H   H
```

c. Final representation

```
ɔ  t-    ɔː    jã  wã
|        / \   |   |
μ       μ   μ  μ   μ
|       |   |  |   |
L       H   L  H   H
```

The construction-specific rule that is selected by this set in this phonological context is vowel assimilation. No further tonal processes or constraints apply.

V ## V and L ## L

In the second phonological context illustrated in (302), there is again a V1 ## V2 boundary, but this time the tones at the boundary are L ## L.

(302) ì- tòmátò ì- wã́ːwã́r̥ → [ìtòmátìːwã́ːwã́r̥]
I4- tomato 4- red
a red tomato

The L-initial adjective is preceded by a noun that ends in L on a vowel. The two adjacent L violate OCP(L) and are merged. Segmentally, the final vowel of the noun is assimilated to the following vowel.

The tonal derivation of (302) is as follows:

(303) a. Underlying representation

i to ma to ɪ wãː wãr̥

μ μ μ μ μ μ μ μ

L H L L H H H

b. Violation of OCP(L), L merging

i to ma to ɪ wãː wãr̥

μ μ μ μ μ μ μ μ

L H L H H H

c. Vowel assimilation

i to ma to ɪ wãː wãr̥

μ μ μ μ μ μ μ μ

L H L H H H

d. Final representation

i to ma t- ɪː wãː wãr̥

μ μ μ μ μ μ μ μ

L H L L H H H

Like with (301), vowel assimilation applies as the construction-specific rule. The application of other rules follows from the general phonology.

C ## V

Phonological contexts with consonant-final nouns are given in (304).

(304) a. ɛ̀- r̥ágʊ̃́m ɛ̀- wã́ːwã́r̥ → [ɛ̀r̥ágʊ̃́m ɛ̀wã́ːwã́r̥]
E5- sheep 5- red

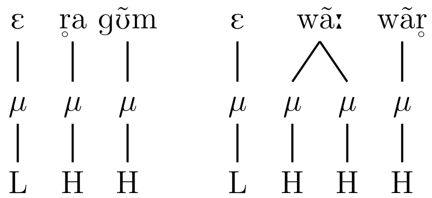
a red sheep

b. ì- kàʃ ì̀- tɛ̃́ꜜtɛ̃́ʲ → [ìkàʃ ì̀tɛ̃́ꜜtɛ̃́ʲ]
I4- town 4- small

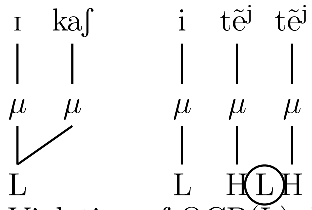
a small town

With consonant-final nouns, the context for vowel assimilation is not given. No matter if the noun ends in H as in (304a) or L as in (304b), the tones of the underlying form are like the tones in the surface form. If OCP(L) is violated, L merging applies. The tonal representations of (304a) and (304b) are given below.

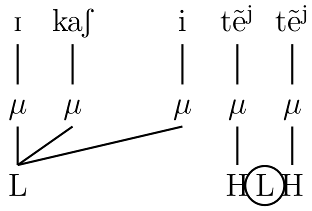
(305)



(306) a. Underlying representation



b. Violation of OCP(L), L merging



Vowel assimilation, the only rule that is specifically selected in noun + adjective constructions, does not apply in C ## V contexts. Other rules that apply are not specific to noun + adjective constructions but apply because general phonological constraints are violated.

6.2.2 Description of Set II

The following generalizations can be made:

- Downstep does not occur in this construction.
- If there is no vowel assimilation, the words surface with the same tones as they have underlyingly.
- If there is vowel assimilation and the assimilated vowel carries L, it encounters a L on the adjective prefix or the verb prefix. OCP(L) merges the two L, otherwise the words surface with the same tones as they have underlyingly.
- If there is vowel assimilation and the assimilated vowel carries H, its mora and with it the H are linked to the following vowel. No tone is set afloat, but the vowel across the morpheme boundary is linked to two moras and bears a HL melody over the two moras.

The only context which results in a HL sequence is the V1 ## V2 context with H ## L tones in (300). In this construction, a H ## L sequence surfaces as a HL sequence on a bimoraic vowel. In all other contexts there is no HL melody.

The vowel assimilation, delinking and relinking which result in the HL sequence are illustrated in (307).

(307)
$$\begin{array}{ccc} \mathrm{CV} & \#\# & \mathrm{V} \\ \mu & & \mu \\ | & & | \\ \mathrm{H} & & \mathrm{L} \end{array}$$

The only phonological process selected by noun + adjective and noun + verb constructions at the grammar-phonology interface is again a segmental rule—this time vowel assimilation. The only tonal constraint and rule which apply (OCP(L) and L merging) are not specific to this construction but apply across the board.

The crucial difference between the vowel assimilation process here and the vowel deletion process in 6.1 is that with vowel deletion the mora is lost so that tones are set afloat. With vowel assimilation, the mora of the final vowel is retained and no tones are set afloat. As a consequence, there may be downstep in verb + noun constructions with vowel deletion but there cannot be downstep in noun + adjective and noun + verb constructions with vowel assimilation.[4]

6.3 Set III—Vowel assimilation and H$^{\downarrow}$H sequences

The second downstep location occurs with the same vowel assimilation process as in Set II. However, in the constructions here an additional construction-specific constraint applies which rules out HL sequences across morpheme boundaries. Morphosyntactically, vowel assimilation and the *H##$L_{V:}$ constraint occur in noun + modifier constructions (except adjectives as modifiers). It may also occur between the prefix and the verb root in Continuous Aspect, which I will not cover here but leave for further research.

6.3.1 Data for Set III

Data for constructions from Set III in different phonological contexts and the surface tones for each example are given in (308), (309) and (310). Again, there are V ## V contexts contrasting with C ## V contexts, and different tones on each side of the word boundary for each segmental context.

Data for noun + noun constructions[5] is given in (308).

[4] I will discuss what this implies for the syntax in section 6.6.

[5] I treat the second noun in this noun + noun construction as a modifier because as a possessor it modifies the first noun.

(308) a. àː- jɔ́ ɔ̀- ní → [àːjɔ́↓ːní]
A2- yam O1- person
the person's yams

b. ɔ̀- tá ò- ȷ̀ojén → [ɔ̀tóːjòjén]
O6- lamp O1- woman
the woman's lamp

c. è- jı́mò ɔ̀- ní → [èjı́mɔ̀ːní]
E5- egg.plant O1- person
the person's egg plant

d. ı̀- ʃúm ɔ̀- ní → [ı̀ʃúm ɔ̀ní]
I4- head O1- person
the person's head

e. ì- kàʃ ɔ̀- ní → [ìkàʃ ɔ̀ní]
I4- head O1- person
the person's town

Data for noun + determiner constructions is given in (309).[6]

(309) a. è- rèké ɛ̀- nɛ́n → [èrèkɛ́↓ːnɛ́n]
E5- sugar.cane 5- DET:5
the very sugar cane (spec.006)

b. ʊ̀- gbátà ʊ̀- dɔ́n → [ʊ̀gbátʊ̀ːdɔ́n]
U3- horse 3- DET:3
the very horse (spec.007)

c. ò- jòwér̥ ò- jón → [òjòwér̥ òjón]
O1- man 1- DET:1
the very man

d. ì- kàʃ ı̀- dɛ́n → [ìkàʃ ı̀dɛ́n]
I4- town 4- DET:4
the very town

Examples for noun + possessive pronoun constructions are given in (310).[7]

(310) a. à- bàbá à- bɔ́ → [àbàbá↓ːbɔ́]
A2- beans 2- 1P.POSS
our beans (pos.062)

b. è- jı́mò ɛ̀- mán → [èjı́mɛ̀ːmán]
E5- egg.plant 5- 3P.POSS
their egg plant (pos.025)

[6]For an overview of determiners see (14) in section 2.5.2.

[7]For an overview of possessive pronouns see (12) and (13) in section 2.5.2.

c. ì- kàhúm ì- bɔ́ → [ìkàhúm ìbɔ́]
I4- kitchen 4- 1P.POSS
our kitchen (pos.056)

d. ɔ̀- kɔ̌̂rɔ̀m ɔ̀- bɔ́ → [ɔ̀kɔ̌̂rɔ̀m ɔ̀bɔ́]
O6- nose 6- 1P.POSS
our nose[8]

The data shows that as in Set II, the second vowel in the V1 ## V2 assimilates V1. Again, the mora is not lost but remains. Unlike in Set II however, the vowel that is now linked to two moras surfaces either with all L tones, all H tones or a H↓H sequence, depending on the surrounding tones. In the context where there is downstep, the register is lowered between the first and second mora of the bimoraic vowel. The mora that was L-toned initially is now ↓H-toned, which makes the downstep shifted one mora to the left compared to the downstep in Set I. The leftward-shifted location of the downstep in these constructions is much less common cross-linguistically than the location of the downstep described in Set I in section 6.1 though it is attested. I will return to a similar leftward shift in another language in section 6.3.3 below.

For the data in Set III, I will go through the phrases in (308) as an example and illustrate the derivation of the surface tones for each phonological context. The derivation of (309) and (310) is parallel to that of (308) and will not be repeated here.

V ## V and H ## LH

The first phonological context is V ## V segmentally and H ## LH tonally. This occurs in (311).

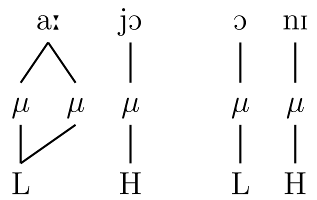
(311) àː- jɔ́ ɔ̀- ní → [àːjɔ́↓ːní]
A2- yam O1- person
the person's yams

The final vowel of the first noun assimilates to the initial vowel of the second noun as V2 spreads leftwards. This leads to a HL sequence on a vowel that is linked to two moras across a morpheme boundary which, as I argue, is ruled out by a construction-specific *H##$L_{Vː}$ constraint that applies to constructions in Set III. The violation of *H##$L_{Vː}$ is removed by L delinking. Applying L delinking leaves an unspecified mora, which violates the *ⓜconstraint. Rightward copying cannot apply here to supply the unspecified mora with a tone because in my

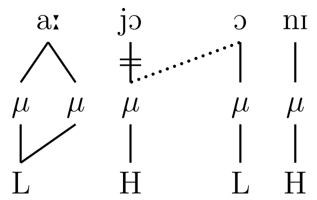
[8]Note that semantically here the singular makes sense in Ikaan. Since everyone only has one nose, it is preferred to refer to a group of people and each person's nose as 'our nose' rather than 'our noses'.

analysis Rightward copying cannot occur over a floating L. Therefore Leftward copying applies, inserts a copy of the tone, and the association conventions link the tone. The outcome of the derivation is a downstep at the word boundary, i.e. between the first and the second mora of bimoraic vowel, because this is where the floating L is located. The individual steps in the derivation are given in (312).

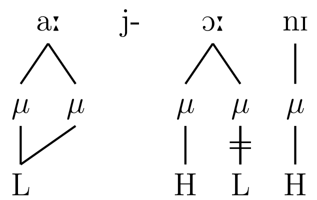
(312) a. Underlying representation



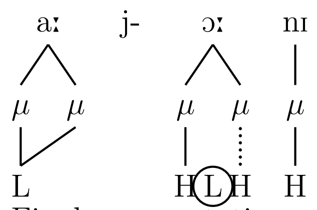
b. Vowel assimilation



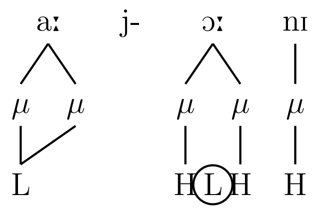
c. Violation of *H##L$_{V\text{ː}}$, L delinking



d. Violation of *(μ), Leftward copying inserts H, association conventions link H



e. Final representation



The construction-specific rule and constraint that apply are vowel assimilation and *H##L$_{V\text{ː}}$. Because the application of this rule and constraint creates violations of general phonological constraints, across-the-board phonological rules are triggered.

In the V ## V and H ## LH context here, the application of the construction-specific and general phonological rules and constraints leads to downstep because the L at the word boundary is singly linked so that delinking it sets it afloat and provides the trigger for downstep.

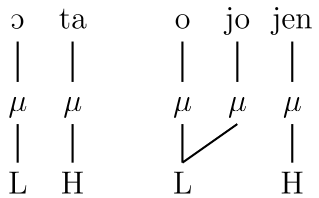
V ## V and H ## LLH

The second phonological context in noun + modifier constructions is again characterised by a V ## V segmental context but this time has a H ## LLH sequence across the word boundary. Data for noun + noun constructions is repeated below in (313).[9]

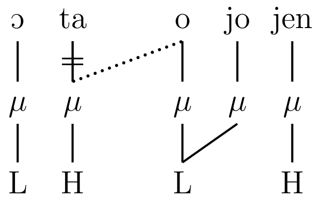
(313) ɔ̀- tá ò- ȍjojén → [ɔ̀tóːjòjén]
O6- lamp O1- woman
the woman's lamp

Vowel assimilation and *H##L$_{Vː}$ apply as before. In the second noun, which surfaces with a LLH melody, the two L are multiply linked to one L underlyingly because of OCP(L) and L merging. Delinking one of the L to remove the violation of *H##L$_{Vː}$ does not set L afloat because the tone is still linked to another TBU. Without a floating L there is no downstep. The individual steps in the tonal derivation are given in (314).

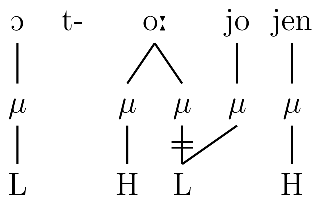
(314) a. Underlying representation



b. Vowel assimilation



c. Violation of *H##L$_{Vː}$, L delinking



d. Violation of *μ, Rightward copying inserts H, association conventions link H

[9] This tonal context only occurs with nouns as modifiers because determiners and plural possessive pronouns have LH surface melodies rather than LLH or L melodies.

ɔ t- oː jo jen

μ μ μ μ μ

L H H L H

e. Final representation

ɔ t- oː jo jen

μ μ μ μ μ

L H H L H

Again, vowel assimilation and *H##$L_{Vː}$ apply as the construction-specific rule and constraint. Across-the-board phonological rules and constraints follow to remove the remaining violations.

Unlike in the H ## LH context above, the application of the construction-specific and general phonological rules and constraints does not result in downstep because in the H ## LLH context the underlying L is multiply linked. Removing one association line does not set L afloat and does not provide a trigger for downstep.

V ## V and L ## LH

The third phonological context is again characterised by a V ## V segmental sequence but this time has a L ## LH tonal sequence at the word boundary. An example for this is given in (315).

(315) è- jí́mò ɔ̀- ní → [èjí́mɔ̀ːní]
E5- egg.plant O1- person
the person's egg plant

OCP(L) is violated by the L-final noun meeting and L-initial noun so that L merging is triggered, also vowel assimilation applies. The derivation for arriving at the surface representation of (315) is given below.

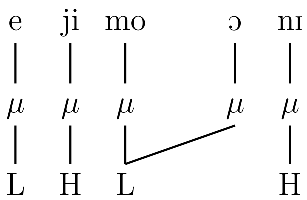
(316) a. Underlying representation

e ji mo ɔ nɪ

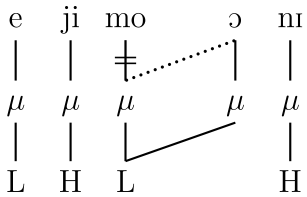
μ μ μ μ μ

L H L L H

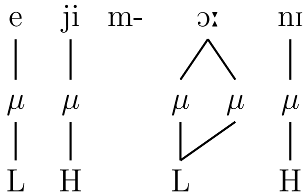
b. Violation of OCP(L), L merging



c. Vowel assimilation



d. Final representation



In this V ## V and L ## LH context, the construction-specific vowel assimilation rule can apply. However, because there is no H##L sequence at the morpheme boundary, the construction-specific constraint *H##$L_{Vː}$ is not violated and does not trigger any further rules. Downstep cannot arise because no tones are set afloat.

C ## V

The last phonological context in this set is characterised segmentally by a consonant-final vowel followed by a vowel-initial modifier, i.e. a C ## V context. Tonally, I will give examples for both H ## LH and L ## LH contexts.

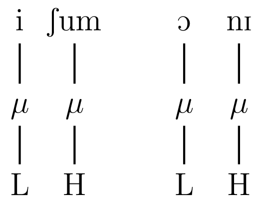
Examples for a consonant-final nouns with H or L on the last syllable followed by a LH noun are given in (317).

(317) a. ì- ʃúm ɔ̀- ní → [ìʃúm ɔ̀ní]
I4- head O1- person
the person's head

b. ì- kàʃ ɔ̀- ní → [ìkàʃ ɔ̀ní]
I4- head O1- person
the person's town

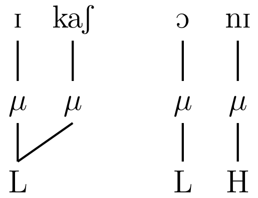
In both examples, the underlying tones are identical to the surface tones. In (317a) the underlying representation is identical to the final representation given in (318).

(318)

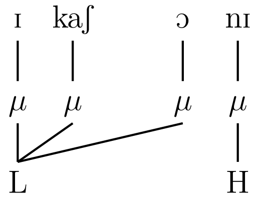


In (317b) OCP(L) is violated and triggers L merging, as shown in (319).

(319) a. Underlying representation



b. Violation of OCP(L), L merging



Vowel assimilation, the construction-specific rule selected by Set III constructions, cannot apply with consonant-final nouns because the V ## V context is not met. H##L sequences arise if the first noun is H-final but they do not arise on a vowel that is linked to two moras across the morpheme boundary. Therefore *H##$L_{V\text{ː}}$ is not violated. Again, there is no downstep in this context because there is no floating L.

6.3.2 Description of Set III

The following generalizations can be made from the above data:

- If there is no vowel assimilation, the words surface with the same tones as they have underlyingly. There is no floating L and therefore no downstep, as shown in (308d) and (308e) and the corresponding noun + determiner and noun + possessive examples.

- If there is vowel assimilation and the mora of the assimilated vowel is linked to L, it encounters L across the morpheme boundary because all modifiers of nouns start with a L-toned noun class prefix. The prefix which has become bimoraic surfaces with all L tones, as shown in (308c).

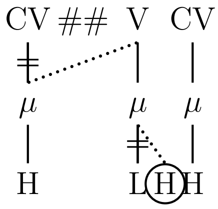
- If there is vowel assimilation and the mora of the assimilated vowel is linked to H, it again meets L across the morpheme boundary. The vowel however does not surface with the expected HL melody. Instead, two surface patterns are attested:

- The vowel surfaces all H-toned if the initial L of the nominal modifier was multiply linked, as shown in (308b).
- The vowel surfaces with H$^{\downarrow}$H tones if the initial L of the nominal modifier was linked to only one TBU, as shown in (308a).

As with Set I, the only context which results in downstep is the V1 ## V2 context with H ## LH tones in (308a). In this construction, a HLH sequence surfaces as a H$^{\downarrow}$HH sequence. In all other phonological context there is no downstep, either because there is no vowel assimilation in the first place or because a L that has been delinked is not set afloat because it was multiply linked.

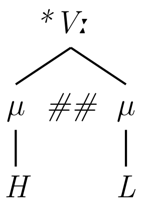
My analysis is that there is a construction-specific constraint against HL sequences across morpheme boundaries (*H##L$_{V:}$). The only phonological rule in the inventory of Ikaan rules which can remove this violation is L delinking. This leads to a tonally unspecified mora and again there is only one phonological rule in the inventory of Ikaan rules which can remove this violation of the *μ constraint, which is Leftward copying. Rightward copying cannot apply because it is blocked by the floated L. H is therefore copied leftward and linked to the TBU. The vowel assimilation followed by L delinking because of *H##L$_{V:}$ and the Leftward copying and linking of H is shown in (320).

(320)



The applicable phonological rules and constraints are one construction-specific rule (vowel assimilation) and one construction-specific constraint (*H##L$_{V:}$). The constraint which prohibits the HL melodies on a vowel linked to two moras across a morpheme boundary is formalised in Constraint 5.

Constraint 5 **H##L$_{V:}$*



The application of the construction-specific rule and constraint may trigger phonological rules and constraints that apply across the board. The phonology of the constructions in Set III therefore shows similarities and differences with the phonologies of the constructions in Set I and Set II.

All three sets have in common that the derivations make use of construction-specific as well as general phonological rules and constraints.

Sets I and III have in common that both show downstep if there is a singly linked L wedged between two H. The location of the downstep however differs. In Set I, the register is lowered after the mora that carried the singly linked L, in Set III the register is lowered before the mora that carried the singly linked L so that the downstep seems to be shifted leftwards by one mora. The phonologies in Set I and Set III further differ in that Set I selects vowel deletion at the V ## V junction, whereas Set III selects vowel assimilation. There is no phonological explanation for why one set of data should use vowel deletion when the other set, which is phonologically identical, should use vowel assimilation.

The phonologies of Set II and Set III have in common that both select vowel assimilation, which results in a vowel that is linked to two moras across a morpheme boundary. The phonologies of Set II and Set III differ in that in Set II, any tone sequence is permitted at the morpheme boundary on the bimoraic vowel whereas in Set III HL sequences are ruled out if they occur on the vowel. This ultimately leads to downstep in the data in Set III but not in Set II. Again, the phonological contexts in Set II and Set III are identical, there is no phonological reason for why one construction selects the constraint and the other does not.

6.3.3 Leftward shift of downstep in Kipare

As I illustrated above, the register lowering in the data in Set III occurs before the mora which originally carried the L which is subsequently set afloat and triggers the register lowering. This leftward shift of the downstep is unusual but not unattested. It looks similar, though not exactly identical, to a tonal rule in Kipare (Odden, 1986b).

In Northern Kipare, HLH sequences are optionally changed to H↓HH sequences if there is exactly one L in the surface melody and if there is a word boundary between the L and one of the H tones.

(321) ní θùkárì ∼ ní ↓θúkárì ‘it is sugar’
kùβónà kùβó↓ná nðókè ‘to see (honey)’
nðókè ní yé dì ∼ nðó↓ké ní yé dì ‘the honey is good’
(Odden, 1986b:266)

Leftward shift does not apply if there is more than one L.

(322) bàkúlì yàngú shà ‘my new bowl’
kùfínìkìrà bàkúlì ‘to cover a bowl’
kùβónà mbòrú mbàhà ‘to see a large ripe banana’
(Odden, 1986b:266)

Also, it does not apply if the HLH sequence is within a word.

(323)	βèθi̇́kàé↓ndé kúnwá	‘they won’t need to drink’
	néki̇̀rúɣà	‘I was cooking.’
	βèθéki̇̀βárúɣi̇̀yà	‘they were not cooking for them’
	(Odden, 1986b:267)	

Odden (1986b:267) expresses the pattern in a Leftward Shift rule, repeated as (324) here.

(324) L → Ⓛ/ H __ H

In Odden (1986a:372), the same rule is expressed slightly differently, reproduced as (325) here.

(325) H L H
V

Odden explains the difference between the patterns in (321) and (322) by stipulating that the OCP, which combines adjacent L tones into one L tone in Kipare, applies only after Leftward Shift has applied (Odden, 1986b:267). He explains the difference between (321) and (323) by arguing that the process is sensitive to morpheme boundaries.

Kipare and Ikaan have in common that both have processes which shift the downstep one TBU to the left of the expected location, and both do so only if there is a HLH sequence where the L is linked to one TBU only, not if it is linked to more than one TBU. Also, both languages require a word boundary between the tones in the sequence and do not apply the process within words.

However, there are also differences between the leftward shifted downsteps in Kipare and Ikaan. Firstly, the shift is optional in Kipare whereas in Ikaan it is obligatory.

Secondly, the role of the OCP is different in both languages. It is crucial for Kipare that the OCP has *not* applied to L tones to explain why HLH sequences are affected but HLLH sequences are not affected. For Ikaan it is crucial to *have* the OCP apply to L to explain why HLLH sequences are not affected by the leftward shift when HLH sequences are affected. In Ikaan, OCP(L) merges adjacent L originating from different words, as in (315). If they are in the same word as in (313), OCP(L) has merged them before. In either case, the result is a multiply linked L which does not result in a delinked L if one association line is broken because of $*H\#\#L_{V\!:}$. In Kipare, the OCP must not have applied to L yet so that the rule which is sensitive to the context HLH can distinguish between HLH and HLLH sequences.

Thirdly, the leftward shift in Ikaan occurs only if there has been a segmental change (vowel assimilation), whereas in Kipare the downstep is independent of segmental processes. In Ikaan this is because the constraint which ultimately results in L delinking applies to a configuration that can only occur if vowel assimilation has applied first. Without vowel assimilation, the prohibited configuration can simply not come about.

Finally, it is not clear whether the leftward shift in Kipare applies across the board or only in specific grammatical constructions.

Despite these differences however, Kipare presents a clear case for a similar process of leftward shift of downstep. I will return to Kipare with a similar shift and a similar parallel to Ikaan in section 6.5.4.

6.4 Set IV—autosegmental *HLH

The data for the third location of the register lowering differs from the downstep processes in Sets I and III in that in Set IV the downstep does not necessarily co-occur with a segmental process such as vowel deletion or vowel assimilation. Instead of segmental processes and additional constraints, only a construction-specific constraint *HLH applies, and it operates entirely at the autosegmental level on the tonal tier. *HLH rules out a sequence of HLH at the tonal level, no matter how many TBUs L is linked to at the surface level. Any sequence of L between H surfaces as ꜜH, i.e. HLH surfaces as HꜜHH, HLLH as HꜜHHH, HLLLH as HꜜHHHH etc.

Morphosyntactically, the construction-specific *HLH constraint and the resulting leftward shifted location of the register lowering occur in predicative constructions, with the 3S possessive pronoun and with non-human object suffixes on the verb.

I will present data and derivations for all three types of constructions even though the derivation is essentially the same. This is because the three constructions are morphosyntactically different. While I have not investigated morphosyntactic boundaries in Ikaan, there are preliminary observations. In the predicative construction, *HLH applies inside a word between the predicative prefix and the root. Nouns cannot occur without a prefix (though they can occur with the nominal prefix instead of the predicative prefix) so that the prefix can be considered obligatory to some extent. In verb + object suffix constructions, *HLH applies inside the word between the root and the suffix. Verbs occur without object suffixes though, so that the suffix is not obligatory. Finally, in noun + 3S possessive pronoun constructions, *HLH applies between words. It seems therefore that *HLH applies at different types of morphosyntactic boundaries, which is why I will present the derivations for all three constructions.

6.4.1 Data for Set IV

Data for constructions from Set IV with different phonological contexts and the surface tones for each example are given in (326), (327) and (328). For 3S.POSS constructions, I give V ## V contexts contrasting with C ## V contexts. For predicative constructions, the constraint I propose applies within words so that there are no word boundaries which could have V ## V and C ## V contexts. In the verb + object suffix constructions, I will show only V-final verbs here and will return to C-final verbs in the next chapter in section 7.1. Object suffixes are C-initial so that for verb + object suffix only V ## C contexts are given here. Like before however, I will give examples with different underlying and surface melodies of tones for each segmental context.

A set of data for predicative constructions is given in (326).[10]

(326) a. Nouns with only L in the root

Nominal form	Predicative form	Gloss
ègù	égù	‘house’
ɔ̀bɛ̀gɛ̀	ɔ́bɛ̀gɛ̀	‘plantain’

b. Nouns with H as first tone in the root

Nominal form	Predicative form	Gloss
òhwó	óhwó	‘bone’
ɛ̀r̥ágʊ́m	ɛ́r̥ágʊ́m	‘sheep’
àtámà	átámà	‘tobacco’
ɔ̀kâːkú	ɔ́kâːkú	‘glutton’

c. Nouns with one or more L as the first tones of the root, followed by H

Nominal form	Predicative form	Gloss
ìràwá	í↓ráwá	‘melon seeds’
èkènèr̥ú	é↓kénér̥ú	‘morning’
ògìdìmòr̥ó	ó↓gídímór̥ó	‘papaya’

d. Nouns with one or more L as the first tones of the root, followed by HL

Nominal form	Predicative form	Gloss
ìtòmátò	í↓tómátò	‘tomato’
ʊ̀kɛ̀jɛ̀kɛ́jɛ̀	ʊ́↓kɛ́jɛ́kɛ́jɛ̀	‘a type of maggot’

Data for 3S.POSS constructions is given in (327).

(327) a. Nouns with only L in the root

[10] This data set only includes nouns with monomoraic noun class prefixes. A description and analysis of bimoraic prefixes is in progress.

Underlying form	Surface form	Gloss
ègù ɛ̌ːn	ègʷɛ̌ːn	'his house'
ìkàʃ ǐːn	ìkàʃ ǐːn	'his town'
ɛ̀kɔ̀kɔ̀ ɛ̌ːn	ɛ̀kɔ̀kɛ̌ːn	'her chicken'

b. H-final nouns

Underlying form	Surface form	Gloss
ɔ̀tá ɔ̌ːn	ɔ̀tɔ́↓ɔ́n	'his lamp'
ȉʃúm ǐːn	ȉʃúm ↓íːn	'his head'
ɛ̀bàgá ɛ̌ːn	ɛ̀bàgɛ́↓ɛ́n	'her scarf'
ɛ̀r̥ágʊ̋m ɛ̌ːn	ɛ̀r̥ágʊ̋m ↓ɛ́ːn	'his sheep'
ògȉdȉmòr̥ó ɔ̌ːn	ògȉdȉmòr̥ɔ́↓ɔ́n	'his papaya'

c. L-final nouns

Underlying form	Surface form	Gloss
èdúkù ɛ̌ːn	èdú↓kʷɛ́ːn	'her scarf'
ɔ̀kɔ̋rɔ̏m ɔ̌ːn	ɔ̀kɔ̋↓rɔ̋m ɔ́ːn	'his knee'

Finally, data for verb + object suffix constructions is given in (328).

(328) a. Verb root with L surface melody

ɔ̀- jȁnà -nɛ́n → [ɔ̀jȁnànɛ́n]
3S.NFUT- buy.NFUT -OBJ:5

She bought it.

b. Verb root with H surface melody

ò- jé -dɔ́n → [òjédɔ́n]
3S.NFUT- eat.NFUT -OBJ:3

She ate it.

c. Verb root with HL surface melody

ɔ̀- fɛ́gɛ̀ -nɔ́n → [ɔ̀fɛ́↓gɛ́nɔ́n]
3S.NFUT- break.NFUT -OBJ:6

He broke it.

d. Verb root with HLL surface melody

ɔ̀- kíkìnì -nɔ́n → [ɔ̀kí↓kínínɔ́n]
3S.NFUT- scrape.NFUT -OBJ:6

He scraped it.

The data shows that register lowering occurs if HLH occurs in the underlying sequence of tones, as in (326c), (326d), (327b), (327c), (328c) and (328d). If there is register lowering in the surface form, it occurs before the first L of a sequence of underlying L. If there is no underlying HLH sequence downstep does not occur.

Compared to the downstep locations in Set I and Set III, the register lowering is now shifted to the left not just by one mora but by a number of moras. Like with the leftward shift by one mora, this constraint and the resulting unbounded leftward shift location of the downstep are much rarer than the downstep described in section 6.1 but are again attested in Kipare, which I will show in section 6.5.4.

I will go through each relevant tonal contexts from the data above, discussing firstly LH-initial noun roots, H-/HL-final nouns and HL-final verbs, secondly H-initial noun roots and H-final verbs and finally L-only words. For each underlying sequence of tones, I show the derivation of the surface tones from the underlying tones.

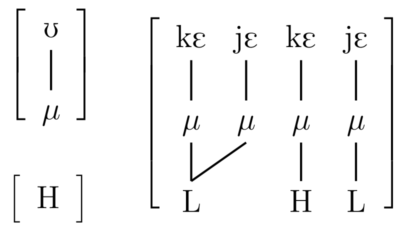
LH-initial noun roots, H-final and HL-final nouns, HL-final verbs

Underlying HLH sequences on the tone tier which result in H$^{\downarrow}$HH sequences on the surface occur in predicative uses of nouns with LH-initial roots, in H-final and HL-final nouns followed by 3S.POSS pronoun and in HL-final verbs followed by the object suffix.

In (329), the noun root *-kɛ̀jɛ̀kɛ́jɛ̀* ‘a type of maggot’ is used predicatively with a H tone prefix.

(329) ʊ́- kɛ̀jɛ̀kɛ́jɛ̀ → [ʊ́$^{\downarrow}$kɛ́jɛ́kɛ́jɛ̀]
ʊ- H- kɛ̀jɛ̀kɛ́jɛ̀
U3- PRED- type.of.maggot
It’s the ukẹyẹkẹyẹ maggot.

The underlying morphological structure of the segmental prefix, the tonal prefix and the nominal root (here with tones linked already) is given in (330).[11]

(330) 

In the underlying representation of the noun, there is a HLH sequence on the tonal tier. This HLH sequence is prohibited by the construction-specific constraint *HLH. L delinking applies to repair the violation of *HLH and delinks L from *all* its TBUs. This renders two TBUs toneless, which violates *μ Rightward copying cannot apply over a floating L to supply the toneless TBUs with tones so that Leftward copying applies once, contributing one H. This H is linked with

[11]The noun *ʊ̀kɛ̀jɛ̀kɛ́jɛ̀* ‘a type of maggot’ is not a counter example to the analysis of tonal melodies and tonal association presented in section 4.2 because *ʊ̀kɛ̀jɛ̀kɛ́jɛ̀* is not a monomorphemic word but a word with reduplication.

the association conventions. This still leaves one mora toneless and Rightward copying inserts one more H, which is subsequently linked. The resulting tonal configuration leads to downstep before the first mora that originally carried L because the floating L is located in this position.[12]

(331) a. Underlying representation

```
ʊ  kɛ  jɛ  kɛ  jɛ
|  | /     |   |
H  L       H   L
```

b. Violation of *HLH, L delinking

```
ʊ  kɛ  jɛ  kɛ  jɛ
|  ≠ ≠     |   |
H  L       H   L
```

c. Violation of *(μ), Leftward copying and linking of H

```
ʊ   kɛ  jɛ  kɛ  jɛ
|   :       |   |
H(L)H       H   L
```

d. Violation of *(μ), Rightward copying and linking of H

```
ʊ   kɛ  jɛ  kɛ  jɛ
|   |   :   |   |
H(L)H   H   H   L
```

e. Final representation

```
ʊ   kɛ  jɛ  kɛ  jɛ
|   |   |   |   |
H(L)H   H   H   L
```

A similar sequence of processes occurs in the phrase *ɔ̀kɔ̃́rɔ̃̀m ɔ̆ːn* 'her nose' in (332).

(332) ɔ̀- kɔ̃́rɔ̃̀m ɔ̆ː- n → [ɔ̀kɔ̃́ꜜrɔ̃́m ɔ́ːn]
O6- nose 6- 3S.POSS
her nose

First, the adjacent L across the word boundary violate OCP(L), which causes them to merge. Following that, the construction-specific *HLH constraint is violated, triggering L delinking. The resulting toneless moras violate *(μ), causing Leftward copying to apply once to insert one H, which is linked to the leftmost

[12] I am aware of the fact that with the resulting H(L)H sequence, the prohibited *HLH sequence has not been eliminated from the tone tier, it is still there, though with L now as a floating L. Also, using the usual association conventions, the floating L would be expected to associate with the toneless mora because it is the leftmost unassociated tone. Instead, the data seems to suggest that it is H which is linked. I would assume that L cannot link to the mora because this would again result in a (linked) HLH sequence, which would be undone by L delinking triggered by *HLH. I have no explanation however for why H(L)H is stable when the autosegmental sequence HLH seems prohibited.

toneless TBU. Rightward copying, which can now apply because there is no more floating L blocking it, inserts another H.

(333) a. Underlying representation

ɔ kɔ̃ rɔ̃m ɔːn
L H L L H

b. Violation of OCP(L), L merging

ɔ kɔ̃ rɔ̃m ɔːn
L H L H

c. Violation of *HLH, L delinking

ɔ kɔ̃ rɔ̃m ɔːn
L H L H

d. *(μ) Leftward copying and H linking

ɔ kɔ̃ rɔ̃m ɔːn
L H(L)H H

e. *(μ) Rightward copying and H linking

ɔ kɔ̃ rɔ̃m ɔːn
L H(L)H H H

f. Final representation

ɔ kɔ̃ rɔ̃m ɔːn
L H(L)H H H

Finally, the same process applies to verb + object suffix sequences in (334).

(334) ɔ̀- fɛ́gɛ̀ -nɔ́n → [ɔ̀fɛ́ꜜgɛ́nɔ́n]
3S.NFUT- break.NFUT -OBJ:6
He broke it.

The derivation for (334) is given in (335).

(335) a. Underlying representation

ɔ fɛ gɛ nɔn
L H L H

b. Violation of *HLH, L delinking

ɔ fɛ gɛ nɔn
L H L H

c. Violation of *(μ) Leftward copying and linking of H

ɔ fɛ gɛ nɔn
| | ⋮ |
L H(L)H H

d. Final representation

ɔ fɛ gɛ nɔn
| | | |
L H(L)H H

The construction-specific constraint that applies here is *HLH. As before, general phonological rules are employed to remove the violation of this construction-specific constraint and any resulting violations of other constraints. Unlike in the data before, the construction-specific phonology here operates entirely at the autosegmental level. Segmental processes such as vowel deletion or vowel assimilation are irrelevant here.

H-initial noun roots and H-final verbs

H-initial noun roots in predicative use are preceded by a H prefix, H-final verbs with object suffixes are followed by H-toned object suffixes. In both cases, H is adjacent to H, which does not violate *HLH. Without a violation of *HLH no further processes apply and without a floating L there is no downstep.

In (336) the H-initial root -*tama*$_{HL}$ of the noun *àtámà* 'tobacco' is preceded by the H predicative prefix.

(336) á- támà → [átámà]
a- H- támà
A2- PRED tobacco
It is tobacco.

Two adjacent H tones do not violate *HLH, the only construction-specific constraint for predicative constructions, because without L there is no HLH sequence. Therefore no processes apply, the underlying representation as given in (337) does not change.

(337) a ta ma
| | |
L H L

In (338) the H-final verb *òjé* 'he ate' is followed by the H-toned object suffix.

(338) ò- jé -dɔ́n → [òjédɔ́n]
o- L- je -dɔ́n
3S- NFUT- eat -NFUT -OBJ:3
She ate it.

Like in the predicative construction in (336), the two adjacent H do not violate *HLH and no further processes need to apply so that the underlying representation as given in (339) does not change.

(339) o je dɔn
| | |
L H H

Unlike in the constructions with underlying HLH melodies above, the construction-specific constraint *HLH is not violated in either of the contexts here. Without violations, no further rules are triggered, the underlying representations do not change and there is no downstep.

L-only words

L-only noun roots in predicative use are preceded by a H prefix, resulting in a HL melody underlyingly.

(340)	ɔ́-	bɛ̀gɛ̀	→ [ɔ́bɛ̀gɛ̀]
	ɔ- H-	bɛ̀gɛ̀	
	O6- PRED-	plantain	
	It is plantain.		

The underlying HL melody does not violate *HLH, no further constraints and rules apply, the underlying representation does not change.

(341) ɔ bɛ gɛ
| |/
H L

L-only nouns followed by the LH 3S.POSS pronoun result in a LH melody underlyingly.

(342)	ɪ̀-	kàʃ	ɪ̌ː-	n	→ [ɪ̀kàʃ ɪ̌ːn]
	I4-	town	4-	3S.POSS	
	his town				

The adjacent L across the word boundary violate OCP(L) and cause L merging to apply. The underlying LH melody does not violate *HLH so that no further rules apply.

(343) a. Underlying representation

ɪ kaʃ ɪːn
|/ /\
L L H

b. Violation of OCP(L), L merging

ɪ kaʃ ɪːn
|/ \
L H

Verbs with the irregular L-only inflection in Non-Future followed by the H-toned object suffix also result in an underlying LH melody.

(344)

ɔ̀-		jã̀nà		-nɛ́n	→ [ɔ̀jã̀nànɛ́n]
ɔ-	L-	jãna	-L	-nɛ́n	
3S-	NFUT-	buy	-NFUT	-OBJ:5	

She bought it.

Again, the underlying LH melody does not violate *HLH, no further constraints and rules apply, the underlying representation does not change.

(345)

ɔ	jã	na	nɛn
L			H

None of these underlying melodies violate *HLH, either because the H on the right or the H on the left is not present. Without a violation of *HLH, only general phonological rules and constraints (OCP(L) and L merger) apply in case of the possessive pronoun. No L are set afloat, no downstep occurs.

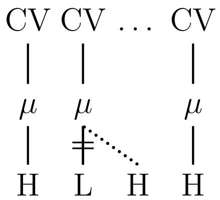
6.4.2 Description of Set IV

The following generalizations can be made from the above data:

- Underlying HL and LH melodies are not affected and do not show downstep, as shown in (326a), (327a) and (328a).
- Underlying HH melodies are not affected either and do not show downstep, as shown in (326b) and (328b).
- Underlying HLH melodies are affected and show downstep, as shown in (326c), (326d), (327b), (327c), (328c) and (328c).
- In an underlying HLH melody, all TBUs that were originally linked to L surface as ꜜH.
- The number of surface L between H is irrelevant.
- Vowel assimilation or deletion are not required.

My suggestion that I have worked with above is that there is a constraint against underlying HLH melodies. Like in Set III, the only phonological rule in the inventory of Ikaan rules which can remove this violation is L delinking so that L is delinked from all the TBUs it is linked to. Again like in Set III, delinking L leads to toneless moras and again the only phonological rule in the inventory of Ikaan rules which can remove this new violation of the *Ⓜconstraint is Leftward copying. Rightward copying cannot apply because it is blocked by the floated L. H is therefore copied leftward and linked to the TBU. If any toneless moras remain, Rightward copying can now apply because there is no more floating L to the right. L delinking followed by Leftward copying and linking is shown in (346). The notation ... represents any other TBU linked to the underlying L and surface as L.

(346)



The construction-specific constraint which applies here is *HLH, as given in Constraint 6.

Constraint 6 **HLH*

Again, across-the-board tonal rules and constraints are also at work. Contrary to all other sets introduced so far, there are no segmental rules involved in this set, the construction-specific phonology here is entirely autosegmental.

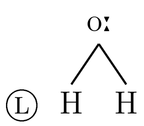
6.5 Set V—autosegmental *LH

The location of the downstep in the final set is the same as in Set IV described in the previous section, and again it is an autosegmental tonal constraint without any segmental changes that causes the downstep. The difference to the data in Set IV is that in the set here the prohibited tonal melody is LH rather than HLH. The construction that this constraint and location of downstep occurs with is utterances followed by the emphatic marker *ꜜóː*. This constraint can further be employed to account for a small set of nouns which surface with an all-ꜜH melody rather than L plus one of the six lexical nominal melodies. Additionally, it provides an alternative to prelinking as an explanation for the ꜜH tones on the distal demonstrative.

6.5.1 Data for Set V

As I have briefly sketched in section 4.3, I analyse the emphatic marker *ꜜóː* as underlyingly linked to H on each mora and lexically preceded by a floating L, as repeated in (347).

(347)



The data in (348) shows the emphatic marker preceded by H, ꜜH, an underlying HL melody and an underlying L melody respectively.

(348) a. à- tákpínã̋ =g ꜜóː →
NEG.IMP- thrash.around.IMP =NEG EMPH

[àtákpínã̋g ꜜóː]

Don't kick around [in your sleep] o! (ooo.040)

b. dʒè- jé ʊ̀jág ꜜóː →
1S.NFUT- eat.NFUT food EMPH

[dʒèjʊ́ꜜjág ꜜóː]

I ate food o! (ooo.092)

c. dʒɛ̀- kpɪ̋ ɪ̀gbàrà ɪ̀r̥ʷàjɔ̀m ꜜó →
1S.NFUT- hear.NFUT gun god EMPH

[dʒɛ̀kpɪ̋ꜜgbárɪ́r̥ʷájɔ́ óː]

I heard thunder o! (ooo.051)

d. ɔ̀- jã̏nà ɔ̀bɛ̀gɛ̀ ꜜóː →
3S.NFUT- buy.NFUT plantain EMPH

[ꜜɔ́jã̋nɔ́bɛ́gɛ́ óː]

He bought plantain o! (ooo.043)

The data shows that after H and ꜜH, *ꜜóː* surfaces as ꜜH, with the register lowered compared to the preceding pitch level. In contexts with L before *ꜜóː*, all L preceding *ꜜóː* surface as ꜜH at the same pitch level as *ꜜóː*. The register lowering is shifted leftward again to a position before the first L in the sequence of L preceding *ꜜóː*.

Again, I will go through all tonal contexts to show how *LH and other tonal rules and constraints work in this construction.

(349) shows *ꜜóː* following a H-final utterance.

(349) à- tákpínã̋ =g ꜜóː →
NEG.IMP- thrash.around.IMP =NEG EMPH

[àtákpínã̋g ꜜóː]

Don't kick around [in your sleep] o! (ooo.040)

After H, *ꜜóː* and the tones preceding it surface with their underlying tones. The *LH constraint is not violated, no further tonal processes need to apply. The tonal representation of (349) is given in (350).

(350) a ta kpɪ nã goː
L H H H L H H

In (351), *ꜜóː* follows a downstepped H.

(351) dʒè- jé ʊ̀jág ꜜóː →
1S.NFUT- eat.NFUT food EMPH

[dʒèjʊ́ꜜjág ꜜóː]

I ate food o! (ooo.092)

Downstep of the type discussed in Set I occurs between the verb *dʒèjé* ‘I ate’ and the noun *ʊ̀jág* ‘food’, resulting in *[dʒèjʊ́ꜜjág]*. After that, no further tonal processes apply. *ꜜóː* surfaces with its downstepped H, one step lower in register than *[ʊ́ꜜjág]*. The relevant tonal representation of *ꜜóː* and the utterance after downstep of the type in Set I is given in (352).

(352) dʒe j- ʊ jag oː
L H (L) H (L) H H

In neither (349) nor (351) the construction-specific constraint *LH is violated. Therefore no tonal processes apply and *ꜜóː* surfaces as downstep H without affecting the preceding tones.

If there are L preceding the emphatic marker however, these L are affected by *ꜜóː*. In (353), the emphatic marker is preceded by an underlying L linked to four TBUs.

(353) dʒɛ̀- kpɪ̃́ ìgbàrà ɪ̥̀rʷàjɔ̀m ꜜóː →
1S.NFUT- hear.NFUT gun god EMPH

[dʒɛ̀kpɪ̃́ꜜgbárɪ̥́rʷájɔ́ óː]

I heard thunder o! (ooo.051)

The emphatic marker and all the preceding L surface at the same pitch, one step lower than the H which preceded the sequence of L. In my analysis, the sequence of linked L followed by *ꜜóː* violates the *LH constraint. L delinking delinks L from all its TBUs, rendering them toneless. This violates *(μ) and triggers Leftward copying to insert a H. The inserted H links with the leftmost toneless mora. Rightward copying then inserts tones for the remaining toneless TBUs. The floated L is located after the last H tone before the former sequence of L and before the first mora of the former sequence of L so that this is where the register lowering occurs.[13]

(354) shows all the steps in the derivation of the surface tones of (353).

[13] Like in Set IV, this derivation has the problem that L delinking does not eliminate the LH sequence, it only eliminates a sequence of linked LH tones. Also, there is no explanation why the floating L as the leftmost tone does not associate with the leftmost unassociated mora.

(354) a. Underlying representation

dʒɛ kp- ĩ gba r- ɪ r̥ʷa jɔm oː
L H L L H H

b. Violation of OCP(L), L merging

dʒɛ kp- ĩ gba r- ɪ r̥ʷa jɔm oː
L H L H H

c. Violation of *LH, L delinking

dʒɛ kp- ĩ gba r- ɪ r̥ʷa jɔm oː
L H L H H

d. Violation of *μ, Leftward copying and linking of H

dʒɛ kp- ĩ gba r- ɪ r̥ʷa jɔm oː
L H L H H H

e. Violation of *μ, successive Rightward copying and linking of H

dʒɛ kp- ĩ gba r- ɪ r̥ʷa jɔm oː
L H L H H H H H H

f. Final representation

dʒɛ kp- ĩ gba r- ɪ r̥ʷa jɔm oː
L H L H H H H H H

In (355), the emphatic marker is preceded by an utterance that is underlyingly linked to a single L, there are no other tones in this utterance.

(355) ɔ̀- jã̀nà ɔ̀bɛ̀gɛ̀ ꜜóː →
3S.NFUT- buy.NFUT plantain EMPH

[ꜜɔ́jã́nɔ́bɛ́gɛ́ óː]

He bought plantain o. (ooo.043)

As in (353), the emphatic marker and all the preceding L in (355) surface at the same pitch, which effectively ‘raises’ the whole sentence from L to ꜜH. Again, the reason for this lies in the violation of *LH, which triggers a range of rules and constraints of the tonal phonology to apply. The stages in the derivation of the surfaces tones in (355) are given in (356).

(356) a. Underlying representation

ɔ jã n- ɔ bɛ gɛ oː
L L H H

b. Violation of OCP(L), L merging

ɔ jã n- ɔ bɛ gɛ oː
L H H

c. Violation of *LH, L delinking

d. Violation of *μ, Leftward copying and linking H

ɔ jã n- ɔ bɛ gɛ oː
L H H H

e. Violation of *μ, Rightward copying and linking H

ɔ jã n- ɔ bɛ gɛ oː
L H H H H H H H

f. Final representation

ɔ jã n- ɔ bɛ gɛ oː
L H H H H H H H

In both (353) and (355), the underlying melody violates the *LH constraint. The processes in (354) could of course also be explained with the *HLH constraint which I proposed for Set IV in the preceding section. The data in (355) however does not violate *HLH. It is similar to the data in (342), which in Set IV did not result in downstep. As (355) does result in downstep *HLH cannot be the constraint in this construction and *LH must be the constraint.

6.5.2 Additional data—↓H nouns

As I briefly mentioned in Chapter 3 in (78), there is a small set of nouns in Ikaan which are ↓H-toned throughout. These words are repeated here in (357).

(357) ↓úmú 'river'
↓ójṹ 'baby'
↓ɔ́kʊ́ 'bath'
↓ír̥í 'body'
↓ídʒí 'eye'
↓ɛ́mʊ̃́ 'hunger'
↓íjɔ̃́m 'issue'

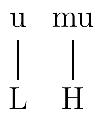
It is conceivable, though there is no evidence nor motivation for this proposal, that ↓H nouns became ↓H because of *LH.

If ↓H nouns had carried an L prefix and a H lexical melody *and* for an unknown reason had to obey *LH, their surface forms would be all-↓H just like the utterance in (355) above.

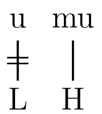
(358) ù- mú → [ꜜúmú]
U3- river
river

The tonal derivation of the surface forms in (358) would be as follows:

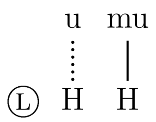
(359) a. Underlying representation



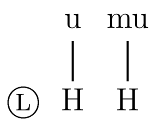
b. Violation of *LH, L delinking



c. Violation of *μ, Leftward copying and linking of H



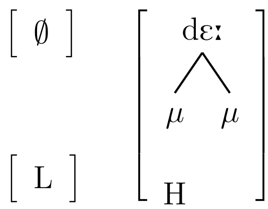
d. Final representation



Using *LH here would allow me to account for an unusual surface pattern in nouns. What is missing however is an explanation for why *LH should apply in the first place.

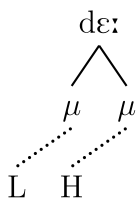
Also, the distal demonstrative, which surfaces as ꜜH, could be derived this way. The distal demonstrative does not have a segmental prefix though it does take a tonal prefix. Its root may be analysed as lexically specified for (but not prelinked to) a H melody, as shown for the distal demonstrative in agreement class 4 in (360).

(360)



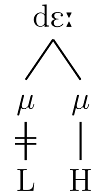
For melody association, the tones and segments would line up and link one-by-one left-to-right, leading to a LH sequence on the demonstrative.

(361)

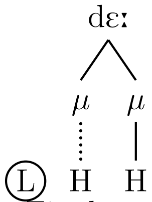


If *LH applied to the demonstrative, it would trigger L delinking and Leftward copying and linking of H.

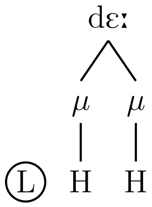
(362) a. Violation of *LH, L delinking



b. Violation of μ, Leftward copying and tone association



c. Final representation



The outcome of this derivation is the same representation that I arrived at through prelinking in section 4.3. Whether prelinking or *LH is the more appropriate analysis remains to be seen.

6.5.3 Description

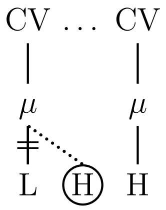
The following generalizations can be made from the above data:

- H-final and ꜜH-final utterances are not affected by *ꜜóː*, as shown in (348b) and (348a).
- L-final utterances are affected by *ꜜóː*, with all formerly L-bearing TBUs being 'raised' to the same ꜜH pitch level of *ꜜóː*, as shown in (348c) and (348d).
- The number of surface L between H is irrelevant.
- Vowel assimilation or deletion are not required.

The only context which results in the leftward-shifted downstep is the context with underlying LH melodies, where LH surfaces as ꜜHH. In my analysis this is due to a construction-specific constraint which rules out *LH. In all other tonal context there is no downstep because *LH is not violated and no delinking process takes place so that no L is set afloat. The construction-specific constraint is expressed in Constraint 7.

Constraint 7 **LH*

As before, the only phonological rule in the inventory of Ikaan rules which can remove this violation is L delinking so that L is delinked from all the TBUs it is linked to. Consequently, other rules from the inventory of tonal rules and constraints apply. L delinking followed by Leftward copying and linking is shown in (363).

(363)


The unbounded leftward shift of the downstep in this set is very similar to the downstep in Set IV in section 6.4, the only difference being that the applicable constraint in this set is *LH rather than *HLH.

6.5.4 Leftward shift of downstep and *LH in Kipare

Like with the downstep shifted one mora to the left, unbounded leftward shift of downstep is not just attested in Ikaan but also attested in Kipare (Odden, 1986b).

In Kipare, words that are underlyingly H-final undergo a rule that lowers the last H to ↓H if the word occurs utterance-finally (Odden, 1986b:368).

(364) a. ípángá lédì ‘good machete’
ípá↓ngá ‘machete’

b. mbú jédì ‘good mosquitoes’
↓mbú ‘mosquitoes’

If the final H is preceded by one or more L tones, ↓H surfaces on all of these L tones (Odden, 1986b:368). This happens both within words as shown in (365) and across word boundaries as shown in (366).

(365) βàɣò↓θí ‘men’
→ [↓βáɣóθí]

(366) a. màɣèmbè ‘hoes’
màɣèmbè màè↓ðá ‘long hoes’
→ ↓máɣémbé máé↓ðá

b. nìfínìkìrè màɣèmbè màè↓ðá ‘I covered long hoes’
→ nìfí↓níkíré máɣémbé máéðá

For this leftward spread to apply over a sequence of L tones, the surface L tones have to be underlyingly one L that is multiply linked to its TBUs. Therefore in Kipare the OCP has to have applied to L at some stage of the grammatical derivation (before the unbounded leftward spread associated with final flattening of H shown here) but must not have applied at other stages in the grammatical derivation (the bounded leftward shift over only one L tone described in section 6.3.3).

For *LH and the leftward spread of H, Ikaan and Kipare are therefore much more alike here than in the data in section 6.3.3 above. In both languages OCP has applied to the L tones, in both languages the process is independent of whether or not there are segmental changes happening simultaneously, and in both languages the process applies across morpheme boundaries.

6.6 Discussion—from the phonology to the interface

In the preceding sections, I have shown five distinct sets of data that differ with respect to whether or not there was downstep, to the phonological context in which there was downstep, and to the location of the downstep. I have also discussed the nature and the application of the construction-specific and across-the-board phonological rules and constraints that lead to the different outcomes. I will now demonstrate how a purely phonological account fails to explain the data sets and how an account that combines phonology with morphosyntax and semantics does explain the patterns in three of the sets. Finally, I will show data from other languages which show similar processes.

6.6.1 Phonological observations and generalisations

In addition to the observations and conclusions I have drawn for the individual data sets, there are observations and generalisations that can be made across the five sets within the domain of phonology. These observations are to do with floating L and with the leftward shifts of the register lowering.

In all contexts where downstep occurs, the register is lowered immediately after the floating L. Floating L arise as a result of the application of construction-specific phonological rules and constraints combined with the application of across-the-board phonological rules and constraints. Floating L have a fixed position (in the leftmost position that is available) and do not relink once they have been set afloat. The fact that the floating L positions itself as far left as possible explains the different locations of the register lowering.

All leftward shifts are the result of a violation of a construction-specific tonal constraints followed by L delinking and Leftward copying. Bounded leftward shift occurs with a tonal constraint that refers to a morphological domain and interacts with the segmental phonology and morphology (*H##$L_{V\text{ː}}$). Unbounded shifts occur with truly 'autosegmental' constraints, i.e. constraints that are independent of segmental or morphological reference. The boundedness and unboundedness of the leftward shifts further is a consequence of OCP(L). With bounded leftward shift, OCP(L) ensures that the shift only occurs in HLH surface melodies and not in HLLH, HLLLH etc. surface melodies. With unbounded leftward shift, it is OCP(L) which ensures that the shift occurs with HLH, HLLH, HLLLH etc. sequences in the same way.

The account presented so far assigns constructions to different sets, describes construction-specific rules and constraints for each set, and allows for a number of descriptive generalisations. Descriptively speaking it is adequate, it puts us in the position where for every set of data we can produce the correct surface tones. What is lacking is an explanation for *why* there are different sets in the first place, what the sets have in common and what sets them apart, and above all why some rules apply to some sets but not to others.

Phonology alone cannot provide an answer because in the same phonological contexts different rules and constraints apply. The same V ## V context across a morpheme boundary results in vowel deletion in Set I and vowel assimilation in Sets II and III, the same HL melody on a vowel linked to two moras across a morpheme boundary is allowed in Set II but prohibited in Set III, the same underlying LH melody is grammatical in Set IV but violates a constraint in Set V, the same underlying lexical representation with a floating L preceding a high-toned word is correlated with a *LH constraint in *ꜜóː* 'EMPH' but not in *ꜜjóː* 'DEM.DIST:1', as I have shown in section 4.3.1.

The construction-specific rules and constraints therefore differ in a fundamental aspect from the across-the-board phonological rules that I have introduced in Chapter 3. The application of across-the-board rules and constraints is entirely 'phonological' in the sense that rules apply whenever they remove a violation of a constraint, no matter what the morphosyntactic context is. In contrast, the construction-specific rules and constraints are not exclusively phonological. There are phonological contexts where they could apply but they do not because the phonological context occurs in a different morphosyntactic construction. Therefore construction-specific rules and constraints cannot be explained with phonology only.

6.6.2 Including morphosyntax and semantics

To explain why construction-specific rules and constraints apply, I will first return to a comparison of the different sets. Table 6.1 gives an overview of the underlying melodies and surface melodies, the construction-specific rules and constraints and the morphosyntactic contexts for each data set discussed above.

Set	Underlying and surface melodies	Construction-specific phonology	Morphosyntactic contexts
I	HLH → H$^{\downarrow}$H	V deletion	V + N
II	HLH → HLH	V assimilation	N + V N + ADJ
III	HLH → H$^{\downarrow}$HH	V assimilation *H##$L_{V:}$	N + N N + DET N + $POSS_{PLURAL}$
IV	HL. . . H → H$^{\downarrow}$H. . . H	*HLH	N + $POSS_{3S.POSS}$ PRED V + Suffix
V	HL. . . H → $^{\downarrow}$H. . . H	*LH	EMPH

Table 6.1: Comparison of downstep sets

There are two ways of approaching the distribution of construction-specific rules and constraints.

- The distribution of the construction-specific rules and constraints is arbitrary.
- The distribution of the construction-specific rules and constraints is not arbitrary, instead it indicates grammatical distinctions in the language.

Admittedly, for the constructions in Set IV and V, arbitrariness is currently my only explanation for the data. However, for the data in Sets I, II and III my approach is to assume that the phonological patterns encode the morphosyntactic and semantic organisation of the language. The implication of this is that I propose two things. Firstly, the solution to the distribution of construction-specific rules and constraints for Sets I, II and III is to be found at the interface between phonology, morphosyntax and semantics. Secondly, in Sets I, II and III grammatical relations and 'meaning-bearing units' are not expressed in morphemes consisting of segments and/or tones but through the application of construction-specific rules and constraints.

At the interface, Ikaan treats verb + noun constructions one way (vowel deletion) and noun + verb and noun + modifier constructions in a different way (vowel assimilation). This indicates that there are different relations or boundaries between verbs and what follows verbs compared to nouns and what follows nouns. The underlying distinction in Ikaan may be that obligatory constituents such as arguments of the verb are encoded by one phonological process (here vowel deletion) whereas optional constituents such as modifiers of the noun are marked with a different phonological process (here vowel assimilation). This in turn implies that the subject of a sentence, which undergoes vowel assimilation with the following verb, is an optional constituent, which in fact it is—Ikaan is a pro-drop language where the overt subject is optional and the subject agreement prefix on the verb is obligatory.

Within the noun + X constructions there is a further subdivision into noun + verb and noun + adjective on the one hand (HL sequence) and noun + noun, noun + determiner and noun + possessive pronoun on the other hand ($H^{\downarrow}H$ sequence because of $*H\#\#L_{V\text{ː}}$). My proposal here is that there is a distinction between predicating modifiers and referential modifiers of the noun. There are modifiers of the noun that predicate, such as adjectives and verbs, and there are modifiers of the noun that do not predicate but specify reference such as a possessor noun, a determiner and a possessive pronoun. Referential modifiers of the noun are distinguished from predicating modifiers of the noun by the application of $*H\#\#L_{V\text{ː}}$. The phonology is therefore not just sensitive to the morphosyntax but also to the semantics.

Distinguishing between optional and obligatory constituents and predicating and referential modifiers not by using morphemes but by applying one or another phonological rule or constraint has a major implication for the nature of morphemes and the encoding of syntactic relations. 'Meaning-bearing units' and grammatical relations in Ikaan are not just marked by affixes, word-like morphemes or word order. Instead, in Ikaan the associative noun + noun construction for example is encoded with the application of a rule (vowel assimilation) and a constraint ($*H\#\#L_{V\text{ː}}$) rather than an 'associative morpheme' consisting of a segment and/or a tone. If we see phonemes as the smallest meaning-distinguishing units in language, and morphemes as the smallest meaning-bearing units in language, then this would imply that the smallest meaning-bearing unit in Ikaan is the (application of a) phonological rule and/or constraint.

6.6.3 Other languages

In my analysis as it stands now, Ikaan distinguishes between phonological rules and constraints that apply at all times and rules and constraints that only apply in specific constructions at the interfaces of phonology with the morphosyntax and semantics. Rules and constraints that apply at the interface also function as morphemes and 'syntagmemes' in that they bear meaning and encode grammatical relations. There are other languages which also show these patterns.

Distinguishing between purely phonological tonal changes that apply across the board and tonal changes that are required by certain morphosyntactic constructions has also been described for example for Dinka (Remijsen and Ladd, 2008). In Dinka there are phonological rules that are conditioned by certain morphosyntactic constructions but not by others. Dissimilatory lowering for example applies across the language but is prohibited from applying in yes/no questions. Contour simplification on the other hand only occurs with verb forms that are marked for zero inflection (Remijsen and Ladd, 2008:210–211). Therefore for languages such as Dinka and Ikaan it is important to distinguish between phonological effects on tone and morphosyntactic effects of tone.

By putting all modifiers of the noun into one group marked with vowel assimilation, I have taken the classic West African notion of the associative construction and applied it not just to noun + noun possessive constructions such as 'the man's house' but to all constituents that are in some kind of dependency relation with the noun. Something very similar is attested in Etsakọ (Elimelech, 1978). In Etsakọ, the associative construction is marked with a floating H tone and applies in the following constructions (Elimelech, 1978:55–73):

- N + N
- N + possessive pronoun
- N + possessive interrogative pronoun
- definite article + N
- N + demonstrative
- N + adjective
- N + relative clause

The set of words following the noun that are in the scope of the associative construction is not the same as in Ikaan of course. Still, Ikaan and Etsakọ have in common that the associative construction connects more than just nouns with each other.

With the associative construction, I have further claimed that Ikaan does not use a morpheme to encode this construction but a phonological rule and constraint. There are languages that also use processes rather than actual morphemes to mark certain constructions.

Yoruba distinguishes between noun + noun possessive constructions and noun + noun modifier constructions by applying vowel assimilation to the one and vowel deletion to the other (Awoyale, 1985).

(367) a. ɔ̄mɔ̄ ōbì̃rī̃ → [ɔ̄mō:bì̃rī̃]
child female
the woman's child

b. ɔ̄mɔ̄ ōbì̃rī̃ → [ɔ̄mōbì̃rī̃]
child female
girl

This means that just like with Ikaan, the only way of rendering the difference in meaning is by changing the vowel length so that a phonological rule becomes the meaning-bearing unit in Yoruba.

Within nominal modifiers, I have made a distinction at the phonology-semantics interface between predicating and referential modifiers. The phonology-semantics interface has not received as much attention in linguistics as the phonology-grammar interface, but again there is precedence for phonological distinctions signalling semantic differences (or being triggered by semantic differences, depending on the perspective). Marten and Kula (to appear) discuss vowel harmony in Dciriku and find that the vowel copying domain in the verb stem does not correlate with derivational or inflectional distinctions but with the semantic feature telicity. Dciriku is similar to Ikaan in two ways here. Firstly, the semantics interacts with the phonology and secondly, a semantic feature is not just marked with a morpheme but with the definition of the domain of a phonological process in Dciriku and the presence and absence of a phonological constraint in Ikaan.

Finally, in reference to Sets IV and V, there are other languages where phonological rules apply to arbitrary sets of constructions. In Acatlán Mixtex, there is a phonological rule that raises any tone following a particular set of words to H, no matter whether this was L, M or H before. The set of morphemes that condition this rule are arbitrary, words simply seem to be lexically marked for selecting this raising rule (Aranovich, 1994:10). Parallel to this it is plausible that 3S.POSS or the emphatic marker ꜜóː are simply lexically marked for selecting the *HLH and *LH constraint.

6.7 Chapter summary

In this chapter, I have returned to the three different locations of downstep that I have illustrated with examples and pitch tracks in Chapter 3. I have added one set and subdivided another set and so split the downstep data into five sets. For each set, I have distinguished between construction-specific rules and constraints and general phonological rules and I have demonstrated how the two types of phonological rules interact to derive the observed surface melodies in different phonological contexts.

Following this, I have shown how phonology alone cannot account for the patterns, and that morphosyntactic and semantic information can be included in the analysis to explain three of the five sets. My proposal was that Ikaan distinguishes between V + X and N + X constructions, marking V + X with vowel deletion and N + X with vowel assimilation. Within N + X, Ikaan distinguishes semantically between N + predicating modifier and N + referential modifier, marking the latter with the application of a *H##$L_{Vː}$ constraint.

Taken together, this leads to different types of rules and constraints that are employed at the interface and different types of interaction between tones, segments and grammar. There are

- tonal rules and constraints applying across the board
  - association conventions and well-formedness conditions such as linking the leftmost unassociated tone with the leftmost unassociated mora, not allowing more than one tone per TBU and *μ
  - Rightward and Leftward Copying
  - *H and H docking
  - OCP(L) and L merging
- segmental rules selected by specific grammatical constructions
  - vowel deletion (V + N constructions)
  - vowel assimilation (N + X constructions)
- a tonal constraint selected by a specific semantic function
  - *H##$L_{Vː}$ (grammatical modifiers of the noun with referential function)

- autosegmental tonal constraints selected by specific grammatical constructions or lexical items
  - *HLH
  - *LH

Additionally, I have explained how morphosyntactic and semantic information at the interface is not encoded in 'tangible' morphemes but in the application or non-application of phonological rules and constraints.

There are other contexts in Ikaan where downstep occurs which have not been included in this chapter, such as the downstep after the benefactive marker *rɛ* or downstep in subordinate clauses such as relative clauses. Furthermore, verbal inflection and negation of verbs also involve downstep (among other features such as vowel lengthening and a clause final clitic). Further investigation of Ikaan, especially in the verbal domain, is likely to show complex interaction between segmental phonology, tonal phonology, morphology, syntax, semantics and pragmatics. Ikaan is rich in multiple marking of linguistic structures, it is not possible to investigate all these at once, and the analysis of downstep presented here can maximally be a foundation for further research.

In the following final chapter, I will look at the implications of the downstep data and my analysis for Ikaan and for phonology. I will show how the downstep data in Ikaan provides evidence for some of claims for the Ikaan phonology which I made earlier. Moving away from Ikaan and towards the models that have been proposed for downstep in general, I will show how many of the existing models fail to account for Ikaan downstep and how Register Tier Theory (Snider, 1999) might provide part of an explanation.

Chapter 7

Further implications for Ikaan and linguistic theory

In the previous chapter, I have discussed the different locations of downstep in Ikaan and analysed the underlying phonological, morphosyntactic and semantic causes for these different locations. I have not yet discussed, however, what this data tells us about the tonal phonology of Ikaan, what this data adds to claims I made in earlier chapters and what the Ikaan data implies for the linguistic analysis of languages like Ikaan. In this chapter, I will therefore return to the downstep data as well as to claims and data from earlier on. I will pull together evidence from downstep and other evidence that was scattered over the previous chapters to substantiate my analysis of Ikaan and to relate the Ikaan data to issues that are discussed in linguistic theory.

In section 7.1 I revisit the association of verbal inflectional melodies that I have discussed in section 3.4, section 5.2.2 and section 6.4. I will add data from CVC verb roots and show unpredicted patterns in CVC verbs that I will account for here.

In section 7.2 I turn to nominal prefixes, which I have presented as tonally specified with a L in nominal use throughout the thesis. A potential alternative would be to analyse the prefixes as underlyingly toneless, but I will show with downstep data that this analysis derives ungrammatical surface forms.

In section 7.3, I briefly look at OCP(L) and L merging again and use downstep data to show how applying the OCP accounts for the fact that in some downstep constructions only HLH surface sequences result in downstep whereas in other constructions HLLH, HLLLH etc. also result in downstep.

After looking at the implications of the downstep data from the analysis of Ikaan itself, I will reach beyond Ikaan and discuss some theoretical implications of the Ikaan data and challenges from the Ikaan data to linguistic concepts and models.

In section 7.4 I will give evidence for my claim that the OCP does not apply to H, discuss and reject alternatives to not applying the OCP, compare Ikaan to other languages and relate my findings to some of the literature on the OCP.

Related to the OCP discussion, I return to the distinction between tone copying and tone spreading in section 7.5. In section 7.6 I look at the directionality of the copying process, relate it to High Tone Anticipation processes and compare it to rightward and leftward spreading in Kalaḅarị-Ịjọ.

Finally, in section 7.7 I focus on the unusual downstep that Ikaan shows, without automatic downstep but with non-automatic downstep. I will discuss different downstep models and show how Register Tier Theory (Snider, 1999) may be used to account for some of the Ikaan downstep data.

7.1 No L deletion in CVC verbs

In Chapter 3 I discussed the association of tonal melodies to words. I suggested that if there are not enough TBUs to host all the tones of a melody non-associated L will be deleted. In Chapter 5 I showed that in CV verb roots inflected with the HL Non-Future melody, the final L of the melody is not present. In Chapter 6 I showed that there is downstep in CVCV verb roots inflected with the HL Non-Future melody if they are followed by an object suffix. Taken together, this predicts that CVC verb roots, which only have one mora, should follow the same pattern as CV verb roots, which also only have one mora. They should delete the L of the HL melody and therefore not show downstep if they are followed by an object suffix. CVC verb roots + object suffix constructions in Non-Future, however, do not behave as predicted and therefore seem to challenge the L deletion proposal.

Verbs in Non-Future are inflected with a HL melody for the verb root. Melody association rules predict that if the verb root is monomoraic, as in the verb *je* 'eat', only H, the first tone, can be linked. L, the second tone of the melody, cannot be associated and is deleted.

(368)

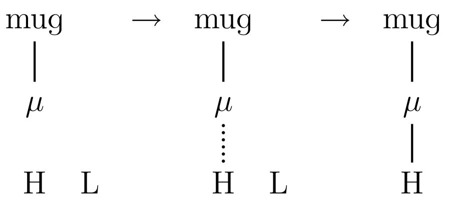
je	→	je	→	je
|		|		|
μ		μ		μ
		⋮		|
H L		H L		H

The fact that L has indeed been deleted could be seen when the verb was followed by the H-toned object suffix. If L had been there this would have resulted in downstep, since there is no downstep it can be concluded that there is no L.

(369) ò- jé -dɔ́n → [òjédɔ́n]
3S.NFUT- eat.NFUT -OBJ:3
She ate it.

The verb *mug* 'cook' also has only one mora, like *je* 'eat'. The prediction would therefore be the same—as there is only one mora, only the first tone of the HL Non-Future melody can link, the second tone will not be associated and will therefore be deleted.

(370) Predicted outcome for CVC verbs



The Non-Future surface form for *òmúg* 'she cooked' indeed only shows the H, there is no trace of the L.

If the verb is followed by an object suffix, the prediction is that there will be an epenthetic vowel because *mug* 'cook' ends in a consonant and the object suffixes are consonant-initial. The epenthetic vowel should agree with the preceding vowel in backness/frontness and it should bear the same tone as the preceding vowel. The predicted outcome is therefore as given in (371).

(371) ò- múg epV -nɔ́n → *[òmúgúnɔ́n]
3S.NFUT- cook.NFUT epV -OBJ:6
She cooked it.

**[òmúgúnɔ́n]* however is not the attested form for *òmúg* + object suffix. The attested form is *[òmú↓gɪ́nɔ́n]*. This form is similar to the surface forms we find for CVCV verbs followed by an object suffix.

CVCV verbs realise the full HL melody, i.e. let the L tone of the melody associate and survive. If they take an object suffix, the construction has to obey the *HLH constraint, as I have outline in section 6.4. The violation of *HLH results in L delinking, Leftward copying and downstep on the second syllable of the verb. The resulting surface form is shown again in (372) and is tonally identical to the form we find for *[òmú↓gɪ́nɔ́n]* 'She cooked it.'.

(372) ɔ̀- fɛ́gɛ̀ -nɔ́n → [ɔ̀fɛ́↓gɛ́nɔ́n]
3S.NFUT- break.NFUT -OBJ:6
'He broke it.'

Because *[òmú↓gɪ́nɔ́n]* 'She cooked it.' shows neither the predicted epenthetic vowel nor predicted tonal melody, there is therefore tonal and segmental evidence that CVC verbs behave differently from CV verbs.

Tonally, the data suggests that CVC verbs violate *HLH just like CVCV verbs. The violation of *HLH triggers tonal rules and constraints to apply and eventually results in downstep. For *HLH to be violated, however, there has to be a linked L. Since non-associated L delete after melody association, the only possible explanation for the violation of *HLH and the resulting downstep is that the L from the HL Non-Future melody was not deleted but remained and must be linked somewhere.

Segmentally, the vowel that is inserted between the final consonant of the verb and the initial consonant of the object suffix is not an epenthetic vowel. Epenthetic vowels are invariably [+high] and agree in backness/frontness with the preceding vowel. Since the vowel in *mug* 'cook' is a back vowel, the inserted vowel should be [+high, +back] if it was an epenthetic vowel, i.e. */u/*. The vowel that occurs however is */i/*, a [+high, +front] vowel. */i/* therefore cannot be a true epenthetic vowel.

The vowel *[i]* however is used as the default realisation of vowels that are unspecified for their quality (see also section 4.2.4) and my proposal here is that in this construction *[i]* is indeed used as a default vowel. *[i]* as a default vowel could either be part of the object suffix or part of the verb. Tonally, both options have different implications.

If *[i]* was part of the object suffix, this would imply that the object morpheme is in fact a bimoraic pronoun that is a proper word in itself rather than a suffix. But if *[i]* was indeed the prefix of an object pronoun, why would it not surface if the pronoun follows a CVCV verb? CVCV verb + VCVC object pronoun constructions provide a standard V1 ## V2 context in which V1 would be deleted or assimilated and V2 would survive. However, that is not what the data shows. In CVCV verb + (hypothetical) VCVC object pronoun constructions it is V1 which surfaces, the hypothetical V2 does not survive.

(373) a. ò- ʃíirè
3S.NFUT- cut.NFUT
He cut.

b. ò- ʃíirè ìnɛ́n → *[ò ʃí↓rínɛ́n]
3S.NFUT- cut.NFUT OBJ:5(?)
He cut it.

The predicted outcome *[ò ʃí↓rínɛ́n]* is not grammatical, what is attested instead is *[ò ʃí↓rénɛ́n]*.

Secondly, even if the segmental phonology could be explained, there would still be a tonal problem. If *[i]* was a prefix, it would be expected to be L-toned like all other prefixes. For CV verbs, a L-toned prefix would invariably lead to a floating L before the object pronoun which would be realised as downstep just like with nouns with their L prefix tones. As there is no downstep, there cannot have been a L-toned prefix. With the vowel deletion evidence and the tonal evidence against the L-toned prefix, the hypothesis that the *[i]* was part of a pronoun can be ruled out.

If *[i]* is not an epenthetic vowel and not part of an object pronoun, this leaves the option that *[i]* is part of the verb. If *[i]* was part of the verb, this would explain why the verb behaves as if it is bimoraic. With *[i]* present, there would be a second vowel that could serve as a host for the second tone in the HL melody. L could associate with *[i]* and would avoid being deleted. However, *[i]* must not be fully present in the same way that other vowels are present because in many constructions it must not be allowed to surface or let the L surface.

A possible analysis for the behaviour of this *[i]* is to propose an unspecified vowel slot. As mentioned before in section 4.2.4, unspecified vowels surface as *[i]*, which explains the vowel quality. Tonally, a vowel slot would be linked to a mora, which serves as a TBU and allows the L to link and prevents it from being deleted. This would result in an underlying representation for a CVC verb as given in (374) for *ɔ̀fɛ́r̥* 'write'.

(374)
```
ɔ   fɛ  r̥V
|   |   |
μ   μ   μ
|   |   |
L   H   L
```

If this CVC verb is then followed by an object suffix the *HLH constraint applies because of the linked L. The violation of *HLH leads to L delinking and Leftward copying of H and ultimately results in the downstep exactly in the location that is observed in the data.

(375) ɔ̀- fɛ́r̥V -dɛ́n → [ɔ̀fɛ́ꜜr̥ídɛ́n]
3S.NFUT- write.NFUT -OBJ:4
S/he wrote it. (ikaan167)

The derivation of the tonal surface forms is given in (376)

(376) a. Underlying representation
```
ɔ   fɛ  r̥V  dɛn
|   |   |   |
μ   μ   μ   μ
|   |   |   |
L   H   L   H
```
b. Violation of *HLH, delinking

ɔ fɛ r̥V dɛn
| | | |
μ μ μ μ
| | ǂ |
L H L H

c. Violation of *μ, Leftward copying and linking of H

ɔ fɛ r̥V dɛn
| | | |
μ μ μ μ
| | ⋮ |
L H L H H

d. Final representation

ɔ fɛ r̥V dɛn
| | | |
μ μ μ μ
| | | |
L H L H H

Both segmental and tonal data therefore suggest the presence of an underspecified vowel as a TBU, even though this underspecified vowel is different from other TBUs in the language. CVC verbs in Ikaan may therefore be argued to be CVCV underlyingly, at least to some degree, or possibly historically.

CVC verbs which are underlyingly CVCV are similar to a proposal Snider (1999:79-80) makes for Chumburung. In Chumburung TBUs are sonorant but there are words such as *dáʔ* 'older brother' with only one sonorant segment which behave as though they had two TBUs. Snider proposes that glottal stops in words like *dáʔ* 'older brother' belong to a degenerate non-sonorant TBU which may formerly have been a sonorant TBU.

Finally, proposing underlying CVCV forms with L that are not deleted does not imply that this L necessarily surfaces, even if there was a context where it would be conceivable that it would dock. In (377a) and (377b), the CVC verb is followed by an underlyingly toneless epenthetic vowel. Even though L from the unspecified V slot might be expected to dock to the toneless epenthetic vowel, there is no evidence of that. Instead, the epenthetic vowel surfaces with the same tone as the preceding TBU.

(377) a.

↑	ɔ̀	fɛ́r̥	ɪ	→ [↑ɔ̀fɛ́r̥í]
QU	3S.NFUT	write.NFUT	epV.QU	

Did he write? (epv5.066)

b.

ɔ̆ː	↓	fɛ́r̥	ɪ	=g	→ [ɔ̆ː↓fɛ́r̥íg]
3S.NFUT.NEG	NEG	write.NFUT	epV	=NEG	

He did not write. (epv5.067)

This shows that while a CVCV analysis with a linked L tone does account for the verb + object suffix data, there is data in other constructions that still needs to be accounted for.

7.2 L as prefix tone

Tones on nominal prefixes are almost invariably L in Ikaan and I have argued throughout this thesis that this L is underlyingly present as a morpheme. Another approach would have been to argue that L is predictable and can be inserted by a default tone insertion rule rather than as a grammatical morpheme. Abiọdun (1999) takes this approach and suggests that prefixes are underlyingly unspecified and receive tonal specification late by default tone insertion. My analysis is that toneless prefixes and later insertion do not account for the observed data. The evidence for this claim comes again from verb + object noun and verb + object suffix forms in Non-Future tense.[1]

As I have just shown again, verb roots in Non-Future tense take a HL melody. In section 5.2.3 and in the preceding section, I have shown that this melody is realised as H only on monomoraic verb roots, with L deleted.

Object nouns that follow verbs invariably start with L, object suffixes on the other hand are H-toned. After vowel deletion has taken place in verb + noun constructions, the surface forms in (378) arise.

(378) a. ɔ̀- bá àfá → [ɔ̀bá↓fá]
3S.NFUT- pick.NFUT leaves
S/he picked leaves.

b. ɔ̀- bá -dán → [ɔ̀bádán]
3S.NFUT- pick.NFUT -OBJ:2
S/he picked them.

The verb + noun construction results in downstep whereas the verb + suffix form does not show downstep.

Deriving the surface forms with underlyingly toneless prefixes and late default tone insertion produces the wrong outcome, working with L-toned prefixes produces the forms I have found in the data.

The derivation of the verb + noun form without L specified on the noun class prefix is given in (379).

[1] Note that Abiọdun's data differs from the data I have found. In his examples, there is no downstep in verb + noun constructions whereas in my data there is. Abiọdun's analysis therefore accounts for his data and my analysis accounts for my data.

(379) a. Underlying representation without L on the noun class prefix

```
ɔ  ba   a  fa
|  |    |  |
μ  μ    μ  μ
|  |       |
L  H       H
```

b. Vowel deletion, Violation of *H, H docking

```
ɔ  b-   a  fa
|  |    |  |
μ  μ    μ  μ
|  ╪       |
L  H       H
```

c. Final representation

```
ɔ  b-   a  fa
|       |  |
μ       μ  μ
|       |  |
L       H  H
```

The resulting melody on the tonal tier is LHH. However, this is identical to the tonal melody of the verb followed by the object suffix, as given in (380).

(380)

```
ɔ  ba dan
|  |  |
μ  μ  μ
|  |  |
L  H  H
```

In the tonal tier, the two melodies are indistinguishable yet we still get two different surface melodies—LHH vs. LH$^{\downarrow}$H.[2]

An underlying representation with L as the tone of the prefix can produce the distinction between verb + noun and verb + suffix tonal melodies. The derivation of verb + noun with L present is repeated in (381).

(381) a. Underlying representation with L on the noun class prefix

```
ɔ  ba   a  fa
|  |    |  |
μ  μ    μ  μ
|  |    |  |
L  H    L  H
```

b. Vowel deletion, Violation of *H, H docking

[2] The two representations can be distinguished by their morphological boundaries, which is an issue that I have not yet investigated. In any case, the morpheme boundaries are not part of the information of the tone tier, they are found elsewhere. Also, in both cases the two H originate from two different morphemes.

ɔ b- a fa

μ μ μ μ

L H L H

c. Violation of 'One tone per mora', L delinking

ɔ b- a fa

μ μ μ

L H L H

d. Final representation

ɔ b- a fa

μ μ μ

L H L H

Without L on the noun class prefix, verbs followed by object nouns and verbs followed by object suffixes have the same underlying representation after vowel deletion in verb + noun constructions. With L on the prefix, the distinction between the two constructions can be derived. Verb + noun become underlyingly LH L H whereas verb + suffix are underlyingly LHH. The representation with the floated L differs from the representation for verb + suffix in (380) and the different surface melodies are accounted for. L must therefore have been present as a tone on the prefix.

7.3 Downstep and OCP(L)

In Chapter 3 I proposed that in Ikaan the OCP applies to L and that a violation of OCP(L) causes adjacent L to merge. I have given evidence for this claim in section 4.3.1, where I showed that L-final words preceding the distal demonstrative absorb the lexical floating L before the H-toned demonstrative so that the distal demonstratives surfaces as H rather than $^{\downarrow}$H after L. In this section, I will give further evidence for OCP(L) and L merging using downstep data from the preceding chapter as evidence.

For the type of downstep in sections 6.1 and 6.3, I showed that register lowering only occurs in HLH surface sequences and never in HLLH, HLLLH etc. surface sequences. For the type of downstep in sections 6.4 and 6.5, I showed that all L in a sequence of L are delinked, no matter how many surface L there are violating the prohibited underlying *HLH or *LH sequence. Both observations follow naturally if a violation of OCP(L) has caused adjacent L tones to merge.

In the type of downstep that only occurs when there is vowel deletion or vowel assimilation (see (287) and (308), (309) and (310)), downstep occurs if there is exactly one surface L between two H tones. There is never any downstep if there are more than one L in the surface form. Underlyingly, a single surface L corresponds to one singly linked L whereas a sequence of surface L corresponds to one multiply linked L in the underlying representation. Delinking L from a TBU only results in a floating L if the L was linked to a single TBU. If L is multiply linked, L is attached to at least one more TBU after delinking and is therefore not available to trigger downstep. It is therefore an indirect outcome of the application of OCP(L) and L merging that in these kinds of constructions only surface sequences of HLH result in downstep and sequences with more than one L between the H do not show downstep.

In the type of downstep brought about by the autosegmental *HLH and *LH constraints (see (326), (327), (328) and (348)), all L in a surface sequence of L are affected. This can be explained if it is assumed that OCP(L) has caused all adjacent L to merge into a single, multiply linked L. What looks like many L in the surface forms is in fact only one underlying L on the tone tier. *HLH and *LH apply at the underlying autosegmental tonal level, forcing L to delink itself from all its TBUs. If OCP(L) had not applied, delinking L from all its TBUs at once would not have been possible.

OCP(L) and L merging therefore account for the behaviour of L. In the next section, I will show how not applying the OCP to H accounts for the behaviour of H.

7.4 Downstep and no OCP for H

In Chapter 3 I proposed that in Ikaan the OCP applies to L only but not to H. The OCP does not affect H, at least not until late in the derivation in the phonetic interpretation, where evidence for or against the OCP is hard if not impossible to come by. In this section, I return to this claim and present downstep data from the preceding chapter as evidence for this claim.

Goldsmith (1990:310) presents a hypothetical bisyllabic word with two high-toned vowels as the surface melody and poses the question of how it can be determined which of the two underlying representations in (382) is the appropriate representation.

(382) a. CV CV
μ μ
H H

b. CV CV
μ μ
H

Following a deductive approach to grammatical analysis and applying a theoretical assumption to a language, we might assume that the OCP rules out the representation in (382a) and only allows the representation in (382b). If we follow an inductive approach in linguistic analysis however, study the patterns in the language and induce the rules of the language from the patterns, we would have to find arguments for and/or against both (382a) and (382b). Based on these arguments, we would then decide which representation is the appropriate one.

There is no Ikaan data which would support the idea that a string of surface H tones must be interpreted as stemming from a single, multiply linked H tone. There is however evidence that a sequence of surface H is more insightfully interpreted as a series of individually linked H tones.

7.4.1 Evidence against the OCP for H

Evidence against applying the OCP to H comes from verb + object noun constructions.[3] Verb + object noun constructions are marked by vowel deletion if there is a V ## V context across the morpheme boundary, as shown in (383).

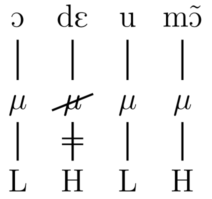
(383) a. ɔ̀- dɛ́ ùmɔ̃́ b- ↓ír̥í → [ɔ̀dú↓mɔ̃́ b↓ír̥í]
3S.NFUT pour.NFUT water LOC body
He poured water on [his] body.

b. ɔ dɛ u mɔ̃
μ ~~μ~~ μ μ
L H L H

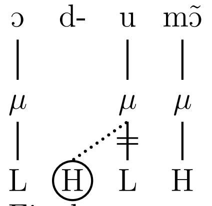
[3]Finding evidence for the fact that the OCP does not apply to H is only possible with verb + noun constructions because in these constructions there is vowel deletion which delinks a tone and thus creates floating tones. It is not possible to find evidence against OCP for H with noun + modifier constructions because these are marked with vowel assimilation which does not delink a tone and therefore does not create floated tones in the first place. Nonetheless, none of the other constructions require the OCP for H, in all other cases the analyses are descriptively equally adequate both ways.

The tone of the deleted vowel does not delete but remains. If this tone is H this leads to a floated H, e.g. in (383) or in verbs inflected with H-final verb melodies, i.e. verbs inflected for Continuous Aspect, Habitual Aspect and with H-toned inflection for Imperative Mood. H must be realised and docks to the following TBU, which ultimately results in downstep if the appropriate tonal context is given, as shown for (383) in (384).

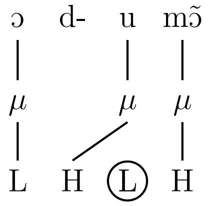
(384) a. Vowel deletion sets H afloat



b. Violation of *Ⓗ, H docking; Violation of 'One tone per TBU', L delinking



c. Final representation resulting in downstep



Further data for verbs inflected with H-final verbal melodies is given in (385). It shows that downstep does not only occur with single surface H, but also with sequences of surface H.

(385) a. Imperative with H melody

kpár̥íná àdé → [kpár̥ínáꜜdé]
kpar̥ına -H àdé
carry -IMP [Ade]

Carry Ade! (3sv.008)

b. Continuous with H melody

ɔ́ꜜɨ́- kpár̥íná àdé → [ɔ́ꜜɨ́kpár̥ínáꜜdé]
ɔ́ꜜɨ́- kpar̥ına -H àdé
3S.CONT- carry -CONT [Ade]

He is carrying Ade. (3sv.010)

c. Habitual with LH melody

ɔ̂ː-	kpàr̥íná		àdé	→ [ɔ̂ːkpár̥ínáꜜdé]
ɔ̂ː-	kpar̥ɪna	-LH	àdé	
3S.HAB-	carry	-HAB	[Ade]	

He used to carry Ade. (3sv.009)

The verb *kpar̥ɪna* ‘carry a person, carry a heavy load’ takes a H melody in Imperative and Continuous, and a LH melody in Habitual. All three melodies are H-final. If the inflected verb is followed by a noun with a LH surface melody such as *àdé*, a person’s name, the H on the noun is downstepped.

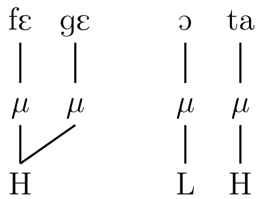
Following Goldsmith’s two alternatives for underlying representations given in (382), there are two ways of analysing the underlying representations of the surface melodies in (385).

- H spreads and links itself to the available TBUs (one tone, multiple association, no violation of the OCP).
- H copies, inserts and links itself to the available TBUs (multiple tones, one association line per tone, violation of the OCP).

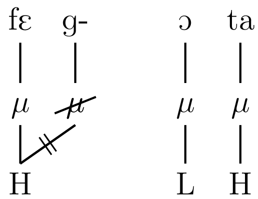
The two representations have different implications for what happens to the tones when an object noun follows the verb. I will go through these implications with the Imperative phrase *fɛ́gɛ́ ɔ̀tá* ‘Break the lamp!’ (obj.139), the derivations for the other forms are parallel to this.

If there was one multiply linked tone, the expected outcome would be **[fɛ́g- ɔ̀tá]* as in (386):

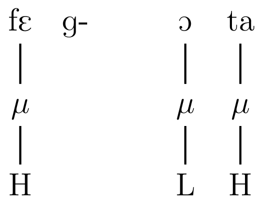
(386) a. Underlying representation



b. Vowel deletion, H delinking from the deleted TBU does not set H afloat because it is multiply linked



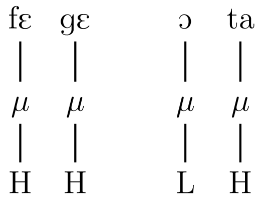
c. Final representation, surface form *[fɛ́g- ɔ̀tá]



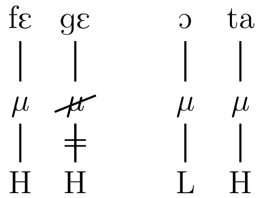
Tone spreading (or tone copying followed by H merging triggered by a potential violation of OCP(H)) therefore predicts the wrong surface form because it does not create a delinked H and therefore cannot explain why the final H of the verbal melody docks to the following TBU.

If each TBU is linked to its own H, the tones are derived correctly, as in (387).

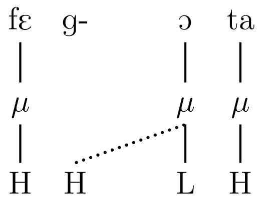
(387) a. Underlying representation



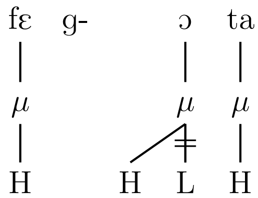
b. Vowel deletion, H delinking from the deleted TBU sets H afloat



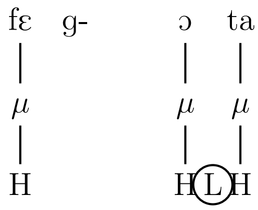
c. Violation of *Ⓗ, H docking



d. Violation of ‘One tone per mora’, L delinking



e. Final representation, surface form [fɛ́gɔ́ꜜtá]



Tone copying, *Ⓗ, the constraint that a TBU can maximally bear one tone and L delinking can account for the fact that the last H of the melody delinks and docks to the following L-bearing TBU, consequently setting the L afloat and triggering downstep.

Not applying the OCP to H therefore provides an explanation for the fact that in sequences with more than one H on the surface, the final H relinks to the next TBU if its host is lost. If the OCP were to apply and were to trigger merging adjacent H into one multiply linked H, the derivational outcome would be wrong.

7.4.2 Alternative explanations

There are conceivable alternatives for explaining the surface melodies that do not involve rejecting the OCP. However, these explanations either make wrong predictions for other data, or are merely descriptive and do not provide explanations, or they are problematic within the autosegmental phonology framework and have not been put forward for any other language.

H object tone

First, it could be that there is a H tone marking the object which would account for the presence of H on the noun class prefix in the data in (385).

However, if there is a H object tone, this should also occur with L-final verbal melodies. The data for L-only and L-final inflectional melodies however does not show any H tone.

(388) a. Imperative with L melody with L-only noun

jù ɛ̀kɔ̀kɔ̀ → [j^{w}ɛ̀kɔ̀kɔ̀]
ju -L ɛ̀kɔ̀kɔ̀
kill -IMP chicken

Kill the chicken! (obj.149)

b. Imperative with L melody with LHL noun

jù ùmúsù → [jùmúsù]
ju -L ùmúsù
kill -IMP cat

Kill the cat! (obj.151)

c. Non-Future with HL melody with L-only noun

ɔ̀- fɛ́gɛ̀ èkèrè → [ɔ̀fɛ́gèkèrè]
ɔ̀- fɛgɛ -HL èkèrè
3S.NFUT break -NFUT pot

He broke the pot. (obj.020)

d. Non-Future with HL melody with LH noun

ɔ̀- fɛ́gɛ̀ ɔ̀tá → [ɔ̀fɛ́gɔ̀tá]
ɔ̀- fɛgɛ -HL ɔ̀tá
3S.NFUT break -NFUT lamp

He broke the lamp. (obj.019)

With the data from these examples, a general H object tone cannot be postulated. A potential H should dock and surface in the nouns that are underlyingly all L, as in (388a) and (388c), but it does not surface there. A potential H object tone which docks onto the next TBU should result in downstep in (388b) and (388d) but there is no downstep. Therefore there cannot have been a H.

A H object tone that occurs with H-final melodies but not with L-final melodies is also unlikely, therefore H as an object marker is ruled out.

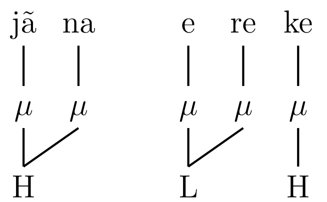
Tone assimilation and contour simplification

A HLH sequence becoming HHꜜH, i.e. a rightward shift of H followed by downstepping, is attested in Aboh Igbo. For this language, it is suggested that there is H tone spreading followed by contour levelling so that *éwú* 'goat' combines with *ɛ̀tɔ́* to surface as *éwú ɛ́ꜜtɔ́* 'three goats' via a medial stage of *éwú ɛ̂ꜜtɔ́* (Hyman, 1978:261). The Ikaan data could be seen as similar to Aboh Igbo.

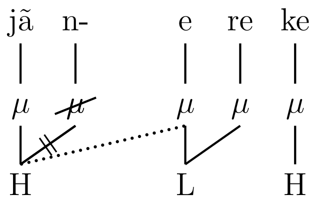
H tone spreading is a type of horizontal tonal assimilation. It is understood as a H tone enlarging its domain to encompass an adjacent tone. Tone spreading may be followed by tonal simplification. In one type of simplification, tonal absorption, the endpoint of a contour tone is absorbed into an adjacent like tone. A H͡L L sequence in this case would become a H L sequence. A second type of simplification, contour levelling, applies where tonal absorption cannot apply because there is no like tone to absorb the end of the contour. In levelling, sequences of H͡L H and H L͡H for example are simplified to H ꜜH (Hyman, 1978:260).

For the Ikaan data, tone spreading followed by tone absorption explains the tonal patterns of HH ## LLH tonal surface melodies after vowel deletion. In these contexts, the second H before the morpheme boundary spreads to the first L after the morpheme boundary. This creates a contour, and the second tone of the contour is then absorbed into the following identical tone. *jã́ná èrèké* 'Buy sugar cane!' first becomes *[jã́n- êrèké]* and then *[jã́n- érèké]*. The OCP is not violated with this approach.

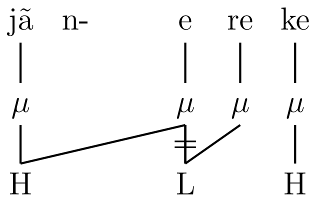
(389) a. Potential underlying form with OCP applying to H



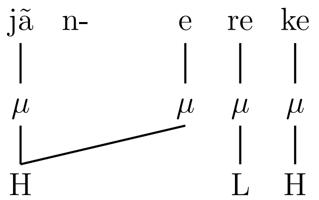
b. Tone spreading (and vowel deletion)



c. Absorption of end point of contour into an adjacent identical tone by L delinking

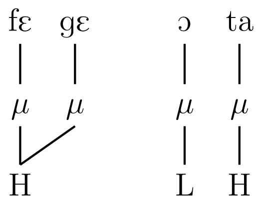


d. Final representation

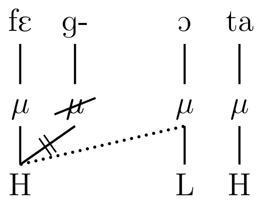


For HH ## LH contexts such as *fɛ́gɛ́ ɔ̀tá* 'Break the lamp!', tone spreading explains the shift of the second H before the morpheme boundary onto the L after the morpheme boundary. Contour levelling then simplifies the $\widehat{\text{HL}}$H sequence to H$^{\downarrow}$H, which explains the presence and location of the downstep. Again, this approach leaves the OCP in place for H.

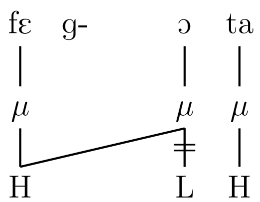
(390) a. Potential underlying form with OCP applying to H



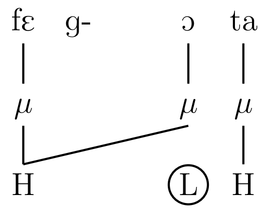
b. Tone spreading (and vowel deletion)



c. Contour levelling through L delinking



d. Final representation



The first disadvantage of this approach is that spreading and simplification do not provide a unified account for the presence and absence of downstep in H ## LH, HH ## LH and HH ## LLH contexts. The downstep in H ## LH would presumably still come about because of TBU deletion and tone relinking followed by contour levelling. Downstep in HH ## LH occurs because of tone spread and contour levelling. The absence of downstep in HH ## LLH is explained by tone spread and tone absorption. My analysis, on the other hand, uses the same association conventions, well-formedness conditions and OCP specifications in all three contexts.

The second disadvantage of combining spreading with simplification is that it is mostly a descriptive account of the data, it does not explain *why* these processes should apply. More importantly though, spreading and simplification fail to explain why this shift only happens if there is a vowel deletion and not if there is no vowel deletion, and again my approach explains that.

Association lines

A third alternative to abolishing the OCP for H tones could be to propose a condition that requires the number of association lines for H tones to be kept constant, at the expense of L tones. This condition would demand that once a H tone is linked to two TBUs, it must always be linked to two TBUs, and if L tones have to be delinked to make space for the second association line for H then so be it.

The problem with this approach is that association lines as such have no real existence in autosegmental phonology, not in the way that autosegments have. I am not aware of any rule, process or constraint for any language that refers to association lines or the number of association lines rather than autosegments. Without 'precedence' for this kind of rule, I prefer to work with a violation of the OCP.[4]

[4] Note though that there are other constraints in Ikaan that could be re-interpreted as making reference to association lines as well as tones. *H could be seen as a constraint that prohibits the deletion of an association line of a multiply linked H rather than requiring any (singly linked) H to be realised. Therefore, a H linked to three TBUs must always be linked to three TBUs. That would then also mean that H can be multiply linked and the OCP does not need to be invoked for H after all. Also, *HLH and *LH seem to rule out underlying linked HLH/LH melodies but do not rule out underlying sequences of HLH/LH.

Deleting V2

In my analysis of downstep in verb + object constructions in section 6.1 I have assumed that in V1 ## V2 contexts it is V1 that is deleted. An alternative that I have not yet considered is that it is the mora of V2 that is deleted. This deletion would then set afloat both the vowel matrix and the tone attached to V2. Subsequently, it could be argued that V1 assimilates to the floated V2 vowel matrix, whereas the floated tone remains afloat.

This analysis is similar to the analysis of regressive assimilation in Yoruba as put forward by Pulleyblank (1988). The advantage of the V2 deletion approach applied to Ikaan is that it would allow for the OCP to apply to H as well as to L. As a consequence, tone copying would not be required and tone spreading would account for the observed data.[5]

As I will show in this section, the V2 deletion approach with the OCP in place for H would account for some of the observed data. However, it makes wrong predictions for vowels that are underspecified for segmental features. Here, I will first briefly sketch the Yoruba data and Pulleyblank's (1988) analysis of it. I will then show the Ikaan data that can be analysed in a similar way and show further data where the regressive assimilation approach would generate the wrong surface forms.

In the data in (391), Pulleyblank (1988:238–9) gives constructions where V1 is assimilated to V2 across a word boundary.[6]

(391)	īlé ājɔ̀	→	[īlá ājɔ̀]	'Ayọ's house'
	ōwó ɔ̄mɔ̄	→	[ōwɔ́ ɔ̄mɔ̄]	'child's money'
	ārá òkè	→	[āró òkè]	'northern Yoruba'
	ōwó ɛ̄mū	→	[ōwɛ́ ɛ̄mū]	'wine money'
	ōwó ēkpō	→	[ōwé ēkpō]	'oil money'

In parallel constructions in (392), V1 does not assimilate to V2. Instead, both vowels surface (Pulleyblank, 1988:239).

[5] Thanks to Larry Hyman for pointing out this alternative.

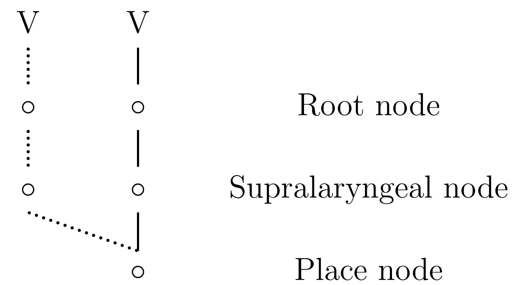
[6] Note that in the Yoruba example where regressive assimilation occurs and the first vowel survives, there is no deletion of moras or tone-bearing units so that the tones are not affected. In cases of vowel deletion in Yoruba, it tends to be the second vowel that survives, just like in Ikaan. In vowel deletion the tones are of course affected, but as Yoruba with a three-tone system of H, ∅ and L, underspecification and no spreading is a very different tone system from Ikaan, it is difficult to compare the tonal processes triggered by deletion of tone-bearing units in the two languages. Here I will restrict my discussion to regressive vowel assimilation in Yoruba.

(392)	ārá ìlú	→	[ārá ìlú]	*[ārí ìlú]	‘townsman’
	ε̄rù īgī	→	[ε̄rù īgī]	*[ε̄rì īgī]	‘bundle of wood’
	īlé īʃέ	→	[īlé īʃέ]	*[īlé īʃέ]	‘office’

Pulleyblank (1988) accounts for these regressive assimilation patterns in a feature geometry approach using vocalic underspecification. In his analysis, vowels which are specified for features are eligible triggers for regressive assimilation. The underspecified vowel [*i*], which has no features to spread, cannot be a trigger for regressive assimilation so that hypothetical forms such as in (392) are ungrammatical. Eligible targets for the feature spread of regressive assimilation are heads of syllables, i.e. any vowel irrespective of whether it is specified or not.

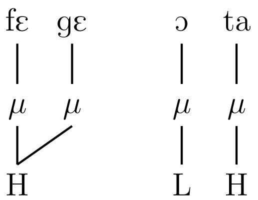
Pulleyblank (1988:241) formalises regressive assimilation as reproduced in (393)

(393) Regressive assimilation in Yoruba



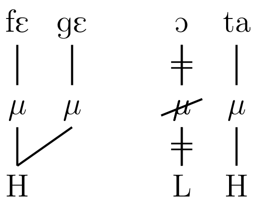
Ikaan data that can be analysed in a similar way to the Yoruba data in (391) is the construction *fέgέ ɔ̀tá* ‘Break the lamp!’, which surfaces as [*fέgɔ́ꜜtá*]. As the objective here is to test an alternative derivation that keeps the OCP in place for H and works with tone spreading within morphemes, the underlying representation in (394) has a multiply linked H in the verb root.

(394)

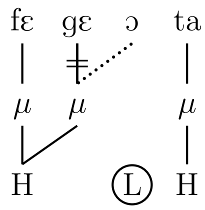


We assume that in the V1 ## V2 context the mora of V2 is deleted. The vowel matrix and the tone of V2 are left floating.

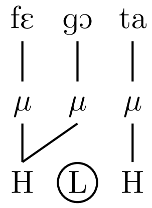
(395)



The floating vowel matrix conditions regressive assimilation so that [*ε*] assimilates to [ɔ]. Alternatively, [ɔ] docks leftwards and delinks the matrix of [*ε*] from its mora.

(396) 

The resulting representation derives the correct surface representation with downstep in the appropriate location.

(397) 

With this approach, there is one underlying H that is multiply linked so that the OCP is observed for H. The tonal specifications and the segmental specifications of a mora are independent of each other, which is in line with an autosegmental perspective. Segments are anticipated or link leftwards, which is a common tendency and direction for segments. L remains afloat and does not dock, which is exactly what I observe elsewhere in the language. For *fɛ́gɛ́ ɔ̀tá* surfacing as [*fɛ́gɔ́ꜜtá*], the V2 deletion analysis therefore is reasonable.

There is however a set of data that poses a problem for this analysis because of underspecification in vowels.

Ikaan differs from the Yoruba data in Pulleyblank's (1988) analysis in that it has two types of surface [*i*].[7] The exact feature specifications for Ikaan vowels have yet to be determined, but for now it seems that the first surface [*i*] is underlyingly specified. The specified /*i*/ occurs in lexical roots and as the expression of the noun class/agreement prefix for noun class I in singular. The second surface [*i*] is a default interpretation of a vowel that is underlyingly unspecified. The unspecified vowel occurs for example as the noun class/agreement prefix for plural nouns and nominal modifiers that surface with an [*i*-]-prefix (see section 2.5.2 and Figure 2.11 for the noun class and gender system).[8] The two [*i*] differ in their phonological behaviour. [*i*] that is phonologically /*i*/ may spread to another vowel whereas [*i*] that is underlyingly /∅/ may not, as shown above in (166) and repeated and extended here.

In (398a) and (398b), the V1 ## V2 context for vowel assimilation is given and V1 is assimilated to V2. In (398c) the V1 ## V2 is not created so that no segmental changes occur.

[7]There is a third surface [*i*], the epenthetic [*i*], which I will not discuss here.

[8]Incidentally, this also means that the noun class prefix [*i*-] is not ambiguous even though on the surface [*i*-] occurs both as a singular and a plural marker. Underlyingly the prefixes are differentiated into /*i*-/ and /∅-/.

(398) a. ɔ̀- tá ɔ̀- rɔ̀ → [ɔ̀tɔ̂ːrɔ]
ɔ̀- tá ɔ̀- rɔ̀
O6- lamp 6- 2S.POSS
your lamp

b. i̇̀- kúkú ì- rɔ̀ → [i̇̀kúkʷîːrɔ̀] / *[i̇̀kúkûːrɔ̀]
i̇̀- kúkú ì- rɔ̀
I4- chair 4- 2S.POSS
your ikuku chair

c. ò- hún ɔ̀- rɔ̀ → [òhún ɔ̀rɔ̀]
ò- hún ɔ̀- rɔ̀
O6- tree 6- 2S.POSS
your tree

(399a) gives the plural form of (398a), which on the surface looks identical segmentally with (398b). Again there is a V1 ## V2 context but unlike in (398b), V2 does not survive, it is V1 that surfaces. In (399b), which is the plural equivalent of (398c), the V1 ## V2 context is not given so that vowel assimilation does not occur and the prefix vowel surfaces as [*i*].

(399) a. ì- tá ì- rɔ̀ → [ìtâːrɔ] / *[ìtîːrɔ]
∅̀- tá ∅̀- rɔ̀
?- lamp ?- 2S.POSS
your lamps

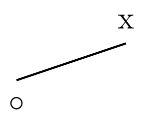
b. i̇̀- hún ì- rɔ̀ → [i̇̀hún ìrɔ̀]
∅̀- hún ∅̀- rɔ̀
?- tree ?- 2S.POSS
your trees

The different behaviours of the [*i*] in (398b) and (399a) can be explained if the [*i*] in (398b) is interpreted as a specified underlying /*i*/ whereas the [*i*] in (399a) is analysed as an underspecified underlying vowel which receives its specification through spreading as in (399a) if there is an adjacent vowel or which is expressed with a default vowel [*i*] if it cannot find specifications elsewhere, as in (399b).

Based on this data and following the feature geometry presented in Pulleyblank (1988:235), I analyse the singular agreement prefix *i-* as a skeletal slot which divides into a branch for the tonal node and a branch for the root node which then dominates the vowel matrix. I analyse the underspecified plural prefix as a skeletal slot with a branch for the tonal node and no root node, as shown in (400).[9]

[9]Pulleyblank (1988:264) further addresses the questions of whether it is possible to have a root node that does not dominate any feature specifications and in how far empty matrices may be required for underspecified vowels. Whereas this may prove to be a distinction worth pursuing

(400)

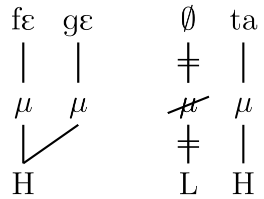


(tone node) (no root node)

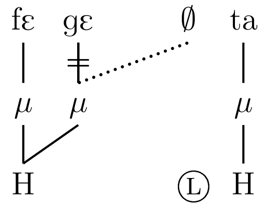
Assuming that the noun class prefix is unspecified for a root node[10] and that underspecified vowels behave the same way in assimilation and deletion, the prediction for the verb + object constructions with plural objects such as *fɛ́gɛ́ ìtá* 'Break the lamps!' would be that the underspecified plural noun class prefix does not surface as [*i*], just like the underspecified plural agreement prefix does not surface as [*i*] in (399a). We would therefore expect the surface form [*fɛ́gɛ́*ꜜ*tá*]. This form however is ungrammatical, what is attested instead is [*fɛ́gí*ꜜ*tá*].

To still derive the observed output form while maintaining multiple linking and the OCP for H, the derivation would have to proceed as follows:

(401) a. In the V1 ## V2 context, the mora of V2 is deleted



b. The non-existent vowel features of V2 spread leftwards and delink the existent vowel matrix of V1 *or* the specified V1 assimilates to the unspecified V2



c. In the final representation, /∅/ is phonetically expressed as [ɪ] → [fɛ́gíꜜtá]

for Ikaan, discussing various different possibilities for representing segmental underspecification in terms of feature geometry would take me too far from the topic of this thesis and will therefore be left for further research.

[10] (399) of course only shows underspecification in agreement prefixes. To show that noun class prefixes are underspecified just like agreement prefixes, I would have to test with N + N constructions with a plural noun beginning with an *i*- prefix as the second noun. Unfortunately, I have not got any data for this so that for now my hypothesis is that the noun class markers are also unspecified.

fɛ gØ ta

μ μ μ

H L H

To maintain multiple linking and the OCP for H, I would have to argue that a non-existent feature matrix was able to link to a mora and delink an existing feature matrix, or I would have to argue that an unspecified vowel was able to assimilate a specified vowel. Neither of these options seems justifiable. Without these processes however, I am not able to derive the segmental part of the surface forms in verb + object constructions. As a consequence, I have to reject the hypothesis that it is the second mora which deletes in these contexts. This leaves me with the hypothesis that the first mora deletes, which leads me directly back to the problem of the H tones and the OCP.

The potential alternatives to not applying the OCP to H either do not account for the data, or describe the data but miss out on generalisations and are not explanatory, or they are not attested and, in fact, difficult to capture within the framework of autosegmental phonology. As for now I do not see a way of accounting for the observed tonal and segmental patters with the OCP in place for H, I will continue with the split-OCP analysis as the most probable explanation and leave further discussion of this for future research.

In addition to the arguments I presented, there are other reasons to believe that not applying the OCP is a feasible solution. These reasons are that OCP violations have been described for other languages, and that the universal status of the OCP, as the term 'principle' might suggest, has been doubted in the literature.

7.4.3 OCP violations in other languages

Exceptions to the OCP have been reported for a range of languages, e.g. Acatlán Mixtex (Aranovich, 1994), Setswana (Mmusi, 1992), Bandi (Mugele and Rodewald, 1991), Kisseberth and Mmusi (1990)) and Etung (Goldsmith, 1979; Watters, 2009). Odden (1986a) and Goldsmith (1990) argue vehemently and convincingly against the status of the OCP as a universal principle citing a range of languages.

Odden's (1986) seminal article on the OCP discusses a range of language where the OCP does not apply as a universal principle but rather like an ordinary phonological rule.

For Kishambaa, Odden argues that multiple vs. individual linking of H tones to TBUs is a property of a lexical entry. In some lexical items there is one underlying H tone that is multiply linked, in other lexical items there are adjacent identical H tones that are individually linked to their TBUs. A multiply linked H is realised with a HH surface melody, adjacent identical H are realised as H$^{\downarrow}$H (Odden, 1986a:365-366).

(402) a. nyóká 'snake' nyo ko

H

b. ngó$^{\downarrow}$tó 'sheep' ngo to

H H

There are therefore both adjacent identical autosegments and multiply linked autosegments at the lexical level in the lexical entry in Kishambaa. Which type of linking is used depends on the word, it is not determined by the OCP.

For Kipare, Odden (1986a) argues that the OCP does not apply at all stages of the derivation. Instead it applies in some constructions but not in others, so that the OCP seems to be ordered like other phonological rules to apply from a certain stage in the grammar onwards but not before that. I have presented Odden's examples for these constructions in the preceding chapter in sections 6.3.3 and 6.5.4.

Ikaan differs from both Kishambaa and Kipare in the way it 'violates' the OCP. For Ikaan, the non-application of the OCP is neither a lexical property nor is it part of the derivational processes. Instead the distinction in Ikaan is made in the phonology. The OCP applies to all L (after melody association) but it never applies to H. If it does apply to H, it applies so late that it is impossible to prove that it has applied.

A language that is similar to Ikaan is Acatlán Mixtex (Aranovich, 1994), where the 'fault lines' for where the OCP does and does not apply are determined by the phonology.

In Acatlán Mixtex, the OCP does not apply to L tones. Instead of one multiply linked L tone, surface LL sequences have an individual L tone linked to each TBU of the sequence. The OCP does apply to M and H tones but it affects each of the two differently.

Adjacent H do exist underlyingly. To comply with the OCP they are dissimilated by upstepping the second H tone which sets a new floor for all following tones.

Adjacent M are not allowed underlyingly, instead, sequences of surface M tones result from underlyingly multiply linked M tones. In lexical representations the multiple linking is given, across morpheme boundaries in derived contexts adjacent M tones are merged into a single M by applying a merging rule. In either case, sequences of M tones are affected by tonal rules as if they were one tone underlyingly—either all of them change or none of them changes.

Sequences of surface L tones on the other hand are not affected as a block like M tones. Instead, one tone of the sequence is affected by a phonological processes whereas the other L tones remain intact. Note also that individually linked L do not contrast with multiply linked L in Acatlán Mixtex. All L are linked to only one TBU. Again, this applies both in the lexicon and across word boundaries.

Therefore the OCP treats L, M and H differently in Acatlán Mixtex: adjacent L are beyond its scope, adjacent M are merged and adjacent H are dissimilated. This is similar to Ikaan. L in Ikaan are like M in Acatlán Mixtex—they are prohibited and are merged by a tone merger rule. H in Ikaan are like L in Acatlán Mixtex—they are not affected by OCP, the OCP simply does not apply to them.

7.4.4 The OCP in the literature

In addition to counter evidence to the OCP from other languages, it is worth looking into the history of the OCP to investigate its potential status as a linguistic universtal.

The OCP dates back to Leben (1973) and Goldsmith (1979). Since its first postulation, the OCP has developed into a variety of different concepts and has received a variety of interpretations. By now, rather than being one principle the OCP has in fact become a family of constraints and conditions that all have to do with the ill-formedness of adjacent identical autosegments.

The differences in the interpretations and uses centre around four major issues.

- *Constraint or rule*: The OCP is seen either as a 'static' condition or constraint that by itself does not 'act' but triggers other processes to apply, or it is seen as a 'dynamic' process that 'acts' by itself. In my view, and in the way I have used the OCP here, the OCP is a static constraint whose violation triggers 'dynamic' rules. I will not discuss this point further here.

- *Within or across morphemes*: The domain of application is seen either as morpheme-internal or as across-the-board. I have briefly mentioned this distinction above when I discussed the application of the OCP to L in melody association in section 4.2.5. In Ikaan, my take is that the OCP applies across the board, but again I will not go into further detail here.

- *Phonetics or phonology*: It is discussed whether the OCP applies in the phonology to underlying representations or in the phonetic component as a constraint on the phonetic realisation.

- *Universal or language-specific*: It is discussed whether or not the OCP is a principle that applies to all languages.

My approach is that the OCP is a language-specific phonological condition and there is support for this position in the literature.

First, even though the OCP is often attributed to Leben (1973), Leben himself does not actually mention an 'Obligatory Contour Principle', nor does he formulate a strict and universal prohibition of adjacent identical autosegments in underlying representations. Instead, he discusses tonal melodies in verbal inflection in Tiv and compares the suprasegmental notation which he developed in a preceding chapter for Mende with a different notation system. He states that unlike the other notation system, in suprasegmental notation a distinction between a HLL melody and a HHL melody would not be possible to represent because both melodies would reduce to an underlying HL melody (Leben, 1973:94).

It is Goldsmith (1979:36) who coins the term 'Obligatory Contour Principle' and attributes its content to Leben (1973), summarising the essence of the OCP like this:

> At the melodic level of the grammar, any two adjacent tonemes must be distinct. Thus HHL is not a possible melodic pattern; it automatically simplifies to HL. (Goldsmith, 1979:36)

However, Goldsmith (1979:36) immediately argues against the inclusion of the OCP at the phonological and tonological level and emphasises that in his analysis the OCP does not hold at levels in the grammar where phonological and tonological rules apply (Goldsmith, 1979:55). As a consequence of this, for Goldsmith the representations in (403a) and (403b) are empirically distinct (Goldsmith, 1979:57).

(403) a. C V C V C V
M

b. C V C V C V
M M M

Goldsmith specifically rejects the Obligatory Contour Principle as a condition on possible underlying forms (Goldsmith, 1979:135), reformulating it for the phonetic rather than the underlying level as follows:

> Obligatory Contour Level (Revised): At the phonetic level, any contiguous identical (auto)segments must be collapsed into each other. (Goldsmith, 1979:163)

All the same, Goldsmith readily acknowledges that the OCP is an active constraint and a useful notion in the description of many languages. However, he sees the reason for its widespread application in its usefulness for language acquisition rather than its universal status. Because the OCP makes the grammar simpler, learners find it easier to learn (Goldsmith, 1979:135, 164).

Odden (1986a) takes the same line of thought as Goldsmith (1979). He also argues that the OCP is neither a universal nor a formal constraint on possible grammars and that its widespread use is attributable to the fact that it helps children learn a language (Odden, 1986a:380-1). According to Odden, underlying representations that conform to the OCP are preferred unless explicit evidence shows that such representations are untenable (Odden, 1986a:356). For explicit evidence against the OCP, Odden provides data from a range of languages that violate the OCP. He concludes that just like any other rule of the grammar the OCP must be explicitly expressed as a rule of the grammar of a language.

With the Ikaan data, the data from the other languages and the discussion in the literature, it is difficult to maintain the idea of the OCP as a universal principle that applies to all languages. Instead, I will follow Odden (1986a) and view the OCP as a part of the phonology of many languages which does not affect all languages to the same extent and in the same way.

In this interpretation and use of the OCP, the OCP is a well-formedness condition rather than a dynamic rule, and it is language-specific rather than universal. Like with other well-formedness conditions, a phonological representation may or may not violate the OCP. If it does, the OCP conditions other processes in the language to apply and produce representations which then comply with the OCP. As the OCP is not universal, a grammar of a language has to specify if it is affected by the OCP, and, if yes, which autosegments are affected, at what level of representation they are affected by the OCP and which rules apply to remove violations of the OCP.

In my analysis, the nature of the OCP in Ikaan is that it is a constraint which prohibits adjacent L tones. Its effect is that it triggers a rule which merges adjacent L. The OCP applies as OCP(L) across the board, after melodies have been associated with their hosts.

My analysis is based on the fact that there are good reasons for applying the OCP to L in Ikaan, and there are good reasons for not applying it to H. The only reason for using the OCP for both tones would be theoretical—to save the OCP. In a data-driven approach to linguistic description and analysis however, when trying to work from the data to the theory, the OCP is simply not necessary for H in Ikaan. Applying it would complicate the analysis of downstep and therefore the analysis of the grammar as a whole.

7.5 Copy or spread?

The distinction between spreading and copying and the choice of copying over spreading is a direct consequence of the split OCP analysis I have put forward.

As I have shown in Chapter 3, spreading and copying are different tonal processes, result in different autosegmental representations and have different consequences for phonological processes that follow.

Tone spreading, the null hypothesis in autosegmental phonology, links an existing tone to a toneless TBU by adding an association line. Through this multiple linking, spreading avoids OCP violations.

(404) Tone spreading

```
V   V
| .·
T
```

Tone copying on the other hand inserts a copy of a tone in the tone tier, which is then linked to a toneless TBU by the association conventions. Tone copying results in adjacent identical tones each linked to their own TBU, which goes against autosegmental phonology as it creates OCP violations.

(405) Tone copying

```
V   V
|   :
T   T
```

As copying is not a null hypothesis but a process that is in conflict with autosegmental phonology and the OCP, it needs to be motivated and justified.

I argue for copying rather than spreading because of the bisyllabic verb roots with H–H surface melodies in verb + object constructions which also motivated my split OCP analysis. Only copying can provide an additional tone to be set afloat when its host TBU is lost, and it is this floated tone that is required to derive the downstep that I have not been able to account for otherwise.

The fact that copying is required and justified for H in verbs followed by objects is of course not yet justification for applying copying in other contexts as well. Copying rather than spreading is not crucial for any other part of speech apart from verbs, any other construction apart from verb + object, any other tone apart from H, or any other direction apart from rightward. In all other contexts a spreading analysis would produce the same output as a copying analysis, though via a different route. In addition, there is evidence that the language in fact requires multiply linked L. Therefore for L at least, tone spreading rather than taking a detour via Copying, OCP(L) and L merging would therefore seem a natural analysis.

Nonetheless, I argue for copying for other grammatical contexts, parts of speech, for L and for leftward processes as well in order to keep the grammar consistent and lean, to generalise where possible and to avoid other splits which might be even more difficult to motivate than a split OCP and tone copying.

Regarding consistency and avoiding other types of splits, I choose to work copying in all contexts in order to avoid distinctions between

- copying for verbs and spreading for other parts of speech
- copying for H and spreading for L
- copying for rightward processes and spreading for leftward processes

In addition to consistency, I argue for copying in all contexts for reasons of economy and to be able to make generalisations. Empirically and descriptively speaking, the observed patterns for L can be accounted for equally well with L spreading as with L copying, OCP(L) and L merging. Analytically speaking however, L copying makes the grammar leaner, plus it allows me to make a generalisation that spreading does not capture. I will therefore briefly compare the alternative approach with L spreading to the proposed tone copying approach.

The alternative approach would be to have (1) copying applying to H, (2) spreading applying to L, (3) the OCP applying to L, and (4) merging applying to L. This compares with my approach which uses (1) copying applying to H and L, (2) the OCP applying to L, and (3) merging applying to L.

L spreading as an additional rule derives multiple linking within words in cases where there are unspecified TBUs (tonal melodies, TBUs whose tones have been delinked) and for the tonally unspecified epenthetic vowels. Multiple linking across morpheme boundaries however cannot be done with L spread. Therefore the L spreading approach needs OCP(L) and L merging in any case to merge adjacent L and create multiply linked L across morpheme boundaries. Without this, the leftward shifted downsteps across morpheme boundaries for example, as described in sections 6.4 and 6.5, cannot be explained.

The three rules of copying, OCP(L) and L merging on the other hand can create multiple linking both for tonally unspecified TBUs and across morpheme boundaries. With this analysis, there are three rather than four rules in the grammar and, more importantly, the behaviour of H and L can be unified where possible and distinguished where necessary.

By applying tone copying to all parts of speech, both tones and both directions of tonal processes, I have taken an unusual tonal process of tonal copying that is required for H tones on verbs in a rightward direction to its extreme to test its consequences for the grammar I propose. I find that I

- account for the observed surface patterns
- do not predict unattested surface forms
- capture generalisations where possible and make distinctions where necessary
- propose a lean and consistent grammar

Admittedly, working with a split OCP and copying rather than spreading is a highly unusual system. Still, the system as it stands now works. Alternative analyses beyond the ones I have discussed and rejected here remain a question for further research.

7.6 Directionality of spreading and copying

As I have stated in Chapter 3 and demonstrated in Chapter 6, Ikaan has copying in rightward as well as leftward direction. Having both directions is unusual but not unattested, as I have shown for leftward shift of downstep in Kipare in Chapter 6 and as I will show for Kalaḅarị-Ịjọ later in this section.

For Ikaan I showed that Rightward copying applies in contexts where there are tonally unspecified TBUs and not enough tones to link to these TBUs. Leftward copying applies in contexts where there are tonally unspecified TBUs and not enough tones to link to these TBUs and where there is a floating L. Contexts for Rightward spreading are the association of tonal melodies and toneless TBUs such as epenthetic vowels. Leftward copying applies when TBUs in grammatical constructions have been rendered toneless after L delinking has applied and has set L afloat. After Leftward copying has applied in these contexts once, Rightward copying then applies again until the remaining unspecified TBUs have received tones. Examples for each contexts are given again below as a reminder.

In (406), Rightward copying applies in the noun *ìr̥úmó* ‘Ebira language’. The root *-r̥umo*$_H$is bimoraic, the tonal melody only has one tone with a H nominal melody. Therefore Rightward copying inserts an additional H tone to specify the second TBU.

(406) a. Underlying representation and tone association

i r̥u mo

L H

b. Rightward copying

i r̥u mo

L H H

c. Tone association

i r̥u mo

L H H

In (407) and (408), Rightward copying applies with epenthetic vowels. In (407), L is copied and subsequently linked to the epenthetic vowel */u/* in the phrase *èkpòd ù nɛ̀ː* 'this hare' (epv1.014).

(407) a. Underlying representation

e kpod u nɛː

L L

b. Rightward copying

e kpod u nɛː

L L L

c. Tone association

e kpod u nɛː

L L L

d. Violation of OCP(L), L merging

e kpod u nɛː

L

In (408) in the phrase *ùbít í dɔ̀ː* 'this oil' (epv1.016) H is copied onto the epenthetic vowel */i/*.

(408) a. Underlying representation

u bit i dɔː

L H L

b. Rightward copying

u bit i dɔː

L H H L

c. Tone association

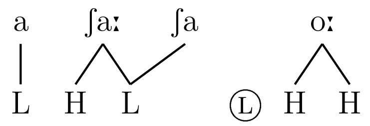
u bit i dɔː

L H H L

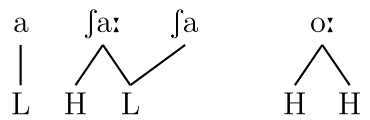
In (409) both Leftward copying and Rightward copying apply. The emphatic marker *ꜜóː* in the phrase *kʊ̀rà àʃâːʃà ꜜóː* 'Sleep well o!' (ooo.038) violates the constraint that prohibits a LH sequence. L is delinked from all its TBUs, the resulting Ⓛ blocks Rightward copying. Leftward copying therefore applies instead and copies and inserts a H from *ꜜóː* leftwards. The inserted H is linked to the first unassociated mora. After that, the context for Rightward copying is given and Rightward copying applies.

In the derivation in (409) only the word *àʃâːʃà* followed by the emphatic marker is given.

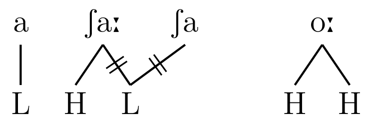
(409) a. Underlying representation



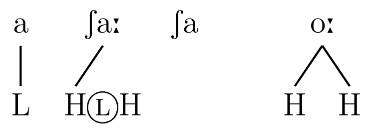
b. Violation of OCP(L), L merging



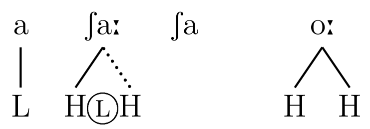
c. Violation of *LH, L delinking



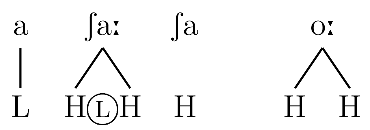
d. Violation of *(μ), Leftward copying



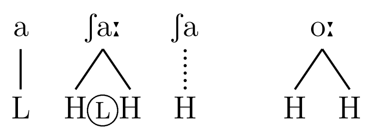
e. Tone association



f. Violation of *(μ), Rightward copying



g. Tone association



Leftward copying and Rightward copying therefore both apply in Ikaan, each in its own phonological context.

7.6.1 Leftward Copying as an unusual case of High tone anticipation?

Hyman (2007) discusses tone rules, many of them phonetically grounded rules but also rules which take phonological and intonational factors into account. One process he discusses in detail is High Tone Anticipation, a process whereby a H is realised earlier than on the TBU that it originates from. The Leftward copying rule that I have proposed for Ikaan can be seen as a case of High Tone Anticipation, but it shows different characteristics from what Hyman describes as typical features of High Tone Anticipation.

Hyman (2007:19) describes High Tone Anticipation as a general rule in the Interlacustrine Bantu region. According to him, High Tone Anticipation is almost non-existent in West African languages, it is more typical for 'restricted' and 'accentual' systems.

Tone spreading and tone anticipation are qualitatively different from each other because of where they underlyingly originate from. As a general phonetic tendency, tones spread to the right. This natural tendency of phonetic rightward spreading may phonologise into perseverative, rightward tone spreading, and there are articulatory and perceptual explanations that have been put forward for this. Anticipatory, leftward tone spreading however is not a natural phonetic tendency. For anticipatory leftward tone spreading to occur, other factors than just phonetic tendencies must therefore play a role (Hyman, 2007:19).

Based on this distinction, Hyman makes a number of generalisations and predictions, three of which I will discuss here.

First, Hyman (2007:20) predicts that not every type of perseverative process has an anticipatory analogue.

In Ikaan, there is both Leftward copying and Rightward copying which are near-analogues to each other, the only difference being that Leftward copying applies in the presence of a floating L and Rightward copying applies in the absence of a floating L. In addition, it could be argued that with Rightward copying both L and H can be copied, whereas with Leftward copying it is only ever H that is copied. This however seems to be a side effect of the application of the OCP rather than a restriction on leftward copying. Other tonal processes in Ikaan do not explicitly make reference to directionality so that it is difficult to say whether there is a rightward process that lacks a leftward equivalent. In that sense, the only process in Ikaan that explicitly makes reference to perseverative directionality does have an anticipatory leftward analogue.

Secondly, Hyman (2007:20,22) claims for Bantu that High Tone Anticipation is always initiated by right-edge factors, either by a push from the right edge or by a pull towards a strong internal position.

Ikaan of course is not Bantu. Still, in Ikaan this does not apply as such. There are no right-edge factors such as assignment of H boundary tones, nor is there an attraction to a strong (e.g. stressed) or weak (e.g. unstressed) position. What seems to be happening in Ikaan is that Leftward copying is initiated by a pull into a 'tonal vacuum' on the left rather than a tonal push from the right. Leftward copying applies if to the left of a H there are tonally unspecified TBUs which need to be specified and which cannot be specified by a rightward process from the other side because Ⓛ blocks the way. In Ikaan, Leftward copying is therefore not a response to a push from the right but to a pull from the left, though not to a prominent position.

Thirdly, based on the observation that some Bantu languages only have prepausal or phrase-final High Tone Anticipation Hyman (2007:23) predicts that no language will have internal High Tone Anticipation unless a final H is also anticipated.

This location correlation or location dependency is simply not given in Ikaan. There is no anticipatory process that makes special reference to final H. The High Tone Anticipation which does occur does not depend on the position of the H. Leftward copy does not need to have H in final position, the anticipated H can be in the middle of an utterance or even in the middle of a word. Final H may also be anticipated of course, but they are not generally or necessarily anticipated, they just happen to also be anticipated if the phonological context is given.

As a West African language with two active tones Ikaan therefore seems to be an outlier to the geographical and typological distribution of High Tone Anticipation processes.

Ikaan fits some of the predictions Hyman makes for languages that show High Tone Anticipation, e.g. the anticipation process is not a phonologisation of a phonetic tendency. Instead, it is a result of phonological rules, both general across-the-board phonological rules and construction-specific phonological rules at the interface.

On the other hand, Ikaan also goes against some of the predictions Hyman makes and might therefore provide a new and unusual example for High Tone Anticipation.

7.6.2 Leftward and rightward spreading in Kalaḅarị-Ị̣jọ

Harry (2004) shows that Kalaḅarị-Ị̣jọ has spreading processes in both leftward and rightward direction. Which direction is used depends on the domain, with rightward spreading occurring in the lexical domain and leftward spreading occurring in the phrasal domain (Harry, 2004:52).

Leftward tone spreading occurs with lexical tonal melodies, where the rightmost tone of the melody is associated with the rightmost TBU of the word and the remaining tones of the melody associate one-by-one right-to-left until all tones are linked. If there are moras that remain without tones the leftmost associated tone spreads leftwards (Harry, 2004:36).

Examples for a word with three TBUs and a word with four TBUs and LH lexical tonal melodies are given in (410). *bekele*$_{\mathrm{LH}}$ 'insanity' surfaces as *bèkèlé*, *agbakuru*$_{\mathrm{LH}}$ 'bucket' surfaces as *àgbàkùrú* (Harry, 2004:40).

(410) a. be ke le
L H
b. a gba ku ru
L H

Rightward spreading occurs in phrasal constructions. In phrases, all but the initial word have their lexical tones deleted. The tones of the initial word are then spread rightwards onto the following TBUs[11]. The phrase 'her mother' is made up of *á* with a H lexical melody and *jìŋgì* with a L lexical melody. Put together into a phrase, the words surface as *á jíŋgí* 'her mother' (Harry, 2004:51–52).

(411) a. Lexical tones
a ji ŋgi
H L
b. Tone deletion
a ji ŋgi
H
c. Tone spread
a ji ŋgi
H

There are similarities and differences between Kalaḅarị and Ikaan. First, Kalaḅarị uses spreading, not copying as I am suggesting for Ikaan. Still, both copying and spreading have to choose a direction in which to proceed, and in both languages both rightwards and leftwards directions are attested.

[11] There are other examples with additional phrasal melodies but these are not included here because they are not relevant for demonstrating rightward spreading. In any case, they do not contradict the rightward spreading analysis.

Kalaḅaṛị distinguishes between leftward spreading in the lexical domain and rightward spreading in the postlexical phrasal domain. The direction in which copying proceeds is therefore determined by morphosyntactic criteria. What I am suggesting for Ikaan is different. The direction of the copying in Ikaan does not depend on any particular level of derivation or whether we are talking morphology or syntax. Instead, it depends entirely on phonological criteria. In Ikaan the presence or absence of a floating L tone is enough to decide whether copying proceeds rightwards or leftwards.

A similar distinction has come up before in the discussion of the leftward shifts of downstep and the application of the OCP in Ikaan and Kipare. In Kipare, the OCP does not apply to L at some earlier stages in the derivation but does apply to L in later stages (Odden, 1986a). In Ikaan, my analysis is that the OCP applies to L at all stages but never to H. Again, the distinction is made along derivational lines in Kipare but along phonological lines in Ikaan.

7.7 Modelling Ikaan downstep

Explaining what exactly triggers the downstep and how and where it is implemented has been modelled by a number of authors. Other triggers than floating L tones have been proposed to account for downstep, phonetically and phonologically grounded models have been put forward, and phonological models that make use of tones compete with models that additionally make use of registers as a type of tonal autosegment, a tonal feature or a separate autosegmental tier. It has been especially problematic to account for languages that seem to have non-automatic downstep but no automatic downstep, i.e. to explain why a floating L causes downstep when a linked L does not and how the phonology or the phonetic interpretation algorithm manages to treat the two types of L differently. After all, the difference between these two L is only in the presence or absence of an association line, which is information that may not even be accessible to the component of the grammar that implements the downstep.

For Ikaan I proposed that downstep is triggered by a floating L. Register lowering after floating L is well-attested and does not require justification beyond what I have given so far. I also suggested that linked L in Ikaan does not trigger downstep. Again, there are many languages in which linked L do not cause register lowering so that the mere fact that there is no downstep after linked L is not remarkable. By combining the absence of automatic downstep with the presence of non-automatic downstep within one language, however, Ikaan falls exactly into the group of languages that has been especially difficult to model.

In this section I will therefore introduce some downstep models to look at how downstep has been analysed and implemented by different authors. Within these models I discuss approaches where the downstep is not as such present in the phonology but is implemented as part of the phonetic interpretation of a phonological representation and approaches which make the downstep part of the phonological representation itself.

I will also address the special difficulty of implementing the absence of automatic downstep and the presence of non-automatic downstep and, where possible, show in which ways Ikaan proves difficult to analyse with the existing models. In the next section, I will introduce one model, Register Tier Theory (Snider, 1999), in more detail and show how this model goes some way towards explaining Ikaan downstep.

7.7.1 Phonetic interpretation approaches

Pulleyblank (1986) and Odden (1986a) derive downstep from the metrical structure, thus making it part of the phonetic interpretation rather than encoding the downstep directly in the phonology.

Odden (1986a) finds that in Kishambaa there is downstep between adjacent H tones. He does not attribute this downstep to a floating L tone nor does he say that it is the result of tone dissimilation to repair an OCP violation. Instead, Odden's analysis is based on the metrical theory of tonal register as proposed in Clements (1981) and Huang (1980).

In Odden's analysis, a new foot is constructed at every H tone with the H as the left branch. Each new foot is then pronounced at a lower register. By allowing both multiply and singly attached H tones in the lexicon and using the metrical structure to derive the downstep Odden is able to distinguish between *ngó↓tó* 'sheep', which underlyingly has two singly attached H tones, and *nyóká* 'snake', which underlyingly has one multiply associated H tone.

(412)

In *ngó↓tó* 'sheep', two feet are constructed and the register is lowered within the word at the second foot. In *nyóká* 'snake' only one foot is constructed, therefore the register is not lowered within the word (Odden, 1986a:365–6).

Pulleyblank's (1986) approach is similar to Odden's approach for Kishambaa. Pulleyblank works within Lexical Phonology and describes two-tone languages with automatic and non-automatic downstep.

His proposal is that the phonological output of the postlexical component consists of a string of H and L tones and that no other information is available. The phonetic component takes this output and first interprets the string of H and L to build metrical structures, constructing a new foot every time a H follows a L. The phonetic component then interprets the foot structure and assigns successively lower pitch levels to every foot. Whether or not a tone is associated is not computed by the phonetic component.

In Ikaan it is not the case that there is downstep at every H that follows L, only H that follow floating L are downstepped. This implies that the phonetic component in Ikaan must have access to more information than just the sequence of H and L. If downstep is to be implemented phonetically in Ikaan, the phonetic component at least has to 'see' the absence or the presence of association lines and adapt its output accordingly. Pulleyblank's model therefore cannot, and in fact does not attempt to, explain the absence of automatic downstep and the presence of non-automatic downstep in languages such as Ikaan.

Finally, Gussenhoven (2004:102) also assumes that downstep is implemented by a phonetic component but he does acknowledge the different behaviour of L and Ⓛ Gussenhoven claims that the phonetic implementation module is activated by the floating L and not activated by the associated L, but does not explain how the phonetic component distinguishes between the two.

With my current analysis of Ⓛ as the trigger for Ikaan downstep, phonetic implementation of downstep via the metrical structure does not seem possible. With Gussenhoven's approach phonetic implementation of downstep would be possible but it is not clear how it would be done.

7.7.2 Phonological encoding of downstep

Within the phonological approaches, there are approaches that employ only tones (Hyman, 2007; Stewart, 1993) and models that employ both a tone tier and a register tier (Hyman, 1985; Clark, 1993).

Hyman (2007) does not discuss implementing the difference between floating L and linked L. Instead he deals with floating L as a trigger for downstep and some of the reasons for why L may be afloat in the first place.

L may be floating because it is a morpheme that is made up of only a tone or because it is a lexical floating L. Additionally, phonological processes such as vowel deletion may result in the loss of a TBU so that a tone is set afloat. (Hyman, 2007:17) describes two common sources of floating L that are phonetically motivated, reproduced in (413), and the surface melodies and locations of the downstep that result from these two sources. As I have shown in the previous chapter, Ikaan is very similar to what Hyman suggests here, as it derives both H–$^{\downarrow}$H sequences and H–$^{\downarrow}$H–H sequences from underlying H–L–H sequences.

(413) a. H–L–H → H–H–$^{\downarrow}$H

V V V

H L H

b. H–L–H → H–$^{\downarrow}$H–H

V V V

H L H

(413a) is analysed as high tone spread followed by contour simplification. High tone spread first produces a H–$\widehat{\text{HL}}$–H sequence. Contour simplification then causes $\widehat{\text{HL}}$ to break up and L to delink, setting it afloat. The floating L finally downsteps the following H. Both spreading and simplification are known phonetic tendencies of tones and may phonologise. As such, spreading and simplification are phonetically grounded tonal processes that are uncontroversial and well-attested and that do not necessarily have to meet additional morphosyntactic criteria.

In Ikaan, H–L–H becoming H–$^{\downarrow}$H is entirely phonologically motivated. There is no parallel phonetic tendency in the language because H tones in Ikaan do not show a tendency for spreading. Rather than generally spreading, H only delink and relink if the host TBU of the first H is deleted. H then docks to the following TBU and sets the L on this TBU afloat, causing downstep in the following H. At the same time, it would be possible to derive the same surface tones with the sequence of processes Hyman proposes, as I have shown in section 7.4.2.

For the H–$^{\downarrow}$H–H surface form in (413b) Hyman offers two analyses. One explanation is that the H–L–H sequence first undergoes automatic downstep to become H–L–$^{\downarrow}$H. Then vertical assimilation changes L to M, which is pronounced at the same pitch level as the $^{\downarrow}$H. Hyman however points out that this explanation is hard to reconcile with the fact that downstep can also be triggered by a floating tone so that this is not a convincing solution.

Alternative analyses have therefore derived the H–$^{\downarrow}$H–H sequence similar to the H–H–$^{\downarrow}$H sequence in (413a). Tone spreading applies, but instead of perseverative spreading in a rightward direction there is anticipatory high tone spread in a leftward direction. Spreading again produces a $\widehat{\text{LH}}$ contour which is simplified by delinking L and results in downstep after the floated L.

In my analysis of Ikaan, H–L–H surfacing as H–$^{\downarrow}$H–H is again phonologically and morphosyntactically motivated. Neither of the phonetically grounded analyses that Hyman proposes can account for the Ikaan H–$^{\downarrow}$H–H surface melodies because as far as I can see there are no general phonetic tendencies in Ikaan such as tone anticipation or contour simplification which could form the basis for phonologising.

Firstly, H–ꜜH–H cannot be a result of automatic downstep followed by vertical assimilation because Ikaan does not have automatic downstep.

Secondly, Ikaan does not have H tone anticipation followed by delinking. Instead, the order is the other way around. In my analysis Ikaan delinks L first because of grammatically motivated *HLH or *LH constraints, which apply only in certain morphosyntactic constructions or to specific lexical items. Delinking is then followed by Leftward copying of H, which applies because the well-formedness conditions require all tones to be specified for tone and Leftward copying is the only tonal rule which can produce the tone in this context. Delinking therefore creates the context for leftward H tone spreading, it is not spreading that causes delinking. Again, none of the processes involved in deriving the H–ꜜH–H sequence is a phonetic tendency, all processes are grammatically or phonologically motivated.

Overall, my derivation is different from Hyman's but does not pose a problem for his analysis since his analysis is based on phonetic tendencies that have phonologised rather than processes that are originally phonological or phonological processes that apply at the interfaces. If phonological rules that can be traced back to phonetic tendencies are seen as a 'last resort' for explaining tonal surface patterns that cannot be explained with the morphosyntax or phonology, then my analysis and Hyman's proposals do not conflict. It would simply be that the phonetically-based processes are not necessary because there is an appropriate morpho-phonological explanation.

Stewart (1993) describes downstep processes in three languages, including Dschang-Bamileke, which has only non-automatic downstep.

Stewart (1993:187) distinguishes between between two types of tonal autosegments. One type is marked with the feature [–stepping] and does not change the register, the other type is marked with the feature [+stepping] and does move the register. For low tones, he therefore distinguishes between L with [–high, –stepping] which does not cause register lowering and l with [–high, +stepping] which triggers downstep. For high tones, he distinguishes between H with [+high, –stepping] and h with [+high, +stepping]. Again, H does not move the register whereas h triggers upstep. L, l, H and h are all considered to be tones and are all located on the same tone tier.

In Stewart's analysis of Dschang, HL sequences in which both tones are linked are prohibited. Violations of this condition are resolved by a number of rules including one that changes L with a [–stepping] feature to l with a [+stepping] feature. l then results in downstep (Stewart, 1993:215).

In addition, LH sequences where both tones are linked are prohibited in languages like Dschang-Bamileke. Violations of this constraint are repaired by the insertion of h, the [+high, +stepping] autosegment which causes upstep (Stewart, 1993:219). LH sequences where L is not linked but floating do not violate this *LH constraint and do not result in h insertion and therefore do not show upstep.

In Stewart's analysis, there is therefore *always* automatic downstep at HL junctions, even in languages like Dschang-Bamileke where there seems to be no automatic downstep in the surface forms after linked L. The reason why this downstep does not surface as such is because of the obligatory upstep in LH contexts which compensates for the downward movement in register with an equal upward movement in register. In effect, what sounds like [HLH] without automatic downstep is therefore underlyingly /H$^{\downarrow}$L$^{\uparrow}$H/ with both automatic downstep and automatic upstep.

What Stewart (1993) does on one tier with two different features, Hyman (1985) and Clark (1993) do with one feature each on two tiers, a register tier and a tone tier. The difficulty with two tiers in a language like Dschang-Bamileke is that a floating L on the tone tier, which seems to be the trigger for downstep, has to be 'turned into' a register lowering feature on the register tier. In essence, a feature from the tone tier has to make the 'jump' to the register tier.

Hyman (1985:72–3) describes the downstep creation process in Dschang as a rule that takes a floating L tone from the tone tier which may precede or follow a H tone and moves it onto the register tier as an autosegment that lowers the register.

Clark (1993:37), criticises Hyman's rule and points out that a feature hopping rule where a feature moves from one tier to another is unprecedented in other phonological features. Clark's own proposal combines a feature introduction rule (l insertion) with a feature deletion rule (Free Feature Deletion) (Clark, 1993:48–50). However, this still amounts to a feature hopping rule, though this time one that is 'unpacked' into two separate rules.

Stewart (1993) explains the different behaviour of L and L by adding floating tonal autosegments that cause register movements rather than making L cause the register movement. Hyman (1985) and Clark (1993) account for the different behaviour of L and L by simply doing away with all L and replacing them with another feature with triggers the downstep.

The drawbacks of all three accounts is that by distinguishing between floating and non-floating tones again all three make reference to association lines rather than autosegments. In addition, all three accounts are fairly complex, with feature changing and feature hopping rules and with large numbers of rules to account for the presence and absence of downsteps.

7.7.3 Accounting for Ikaan downstep with Register Tier Theory

One theory that specifically aims to explain downstep phenomena in African languages is Register Tier Theory (Snider, 1999). Register Tier Theory (RTT) is a theory of features and geometry of tone and may offer a partial explanation for the presence of non-automatic downstep and the absence of automatic downstep in Ikaan shown above. I will give a very brief overview of RTT and then move on to how RTT can be applied to Ikaan to account for automatic vs. non-automatic downstep in the language.

Register Tier Theory in a nutshell

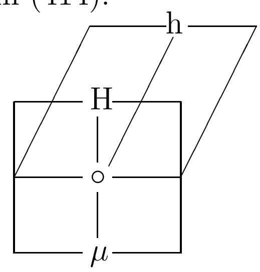
The basic tenets of RTT are that tones are not holistic units but, just like segments, are made up of features. These features are arranged on tiers linked to superordinate nodes, which results in a specific tonal geometry.

Features and their geometry On the register tier, there are the register features high [h] and low [l]. On the tonal tier, there are the tone features high [H] and low [L]. Snider (1999:25) defines the features as

- *Register feature h*: Effect a register shift higher in relative pitch to the preceding register setting.
- *Register feature l*: Effect a register shift lower in relative pitch to the preceding register setting.
- *Tonal feature H*: Realise TBU as high pitch relative to the current register.
- *Tonal feature L*: Realise TBU as low pitch relative to the current register.

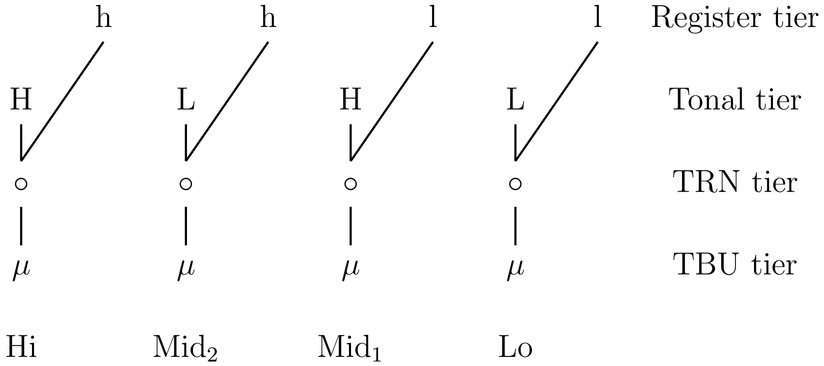
The register tier and the tonal tier are linked to a tonal root node, which is linked to the TBU. A graphic representation of the geometry of the features is given in (414).

(414)



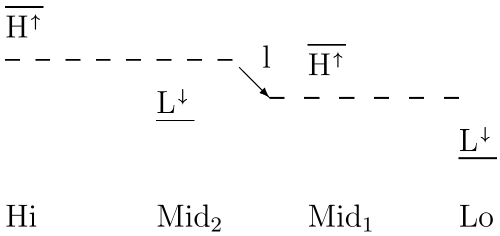
Tones expressed by the features Depending on how the register features and tonal features are combined, they represent different tones: a high tone Hi is represented as [H, h], a low tone Lo is represented as [L, l]. Tones between Hi and Lo can be higher mid tones or lower mid tones. The higher mid tone Mid_2 has the feature specifications [L, h] and is located at the high register but at a lower pitch than the Hi tone. The lower mid tone Mid_1 has the feature specifications [H, l] and is located at the lower register but at a high pitch relative to the register.[12] Graphic RTT representations of all four tones are given in (415).

(415)



To represent the phonetic realisation of the tones, Snider (1999:24) uses dotted lines to mark the registers [h, l]. Solid lines above and below the register lines are used to represent the higher and lower pitch relative to the register as encoded in the tonal features [H, L]. An example for this is given in (416).

(416) Phonetic realisation



Underspecification and default rules In RTT, tones do not necessarily need to be fully specified underlyingly. Instead, they can be unspecified for any or all of their features. Full specifications are required for phonetic interpretation, therefore default rules fill in the missing information.

If a TBU is unspecified for register, it receives a [l] register feature. This happens no matter if the tonal root node is specified for tonal features and, if it is, no matter what this tonal feature is. If a TBU is unspecified for a tonal feature, the selection of the default tonal feature depends on the register feature. TBUs

[12]RTT as in Snider (1999) in fact allows for representing six contrastive tones by using floating register features which block the merger of identical adjacent features. This is not relevant for the discussion here though and will therefore not be discussed further.

specified for [h] receive [H], TBUs specified for [l] receive [L]. Snider (1999:30) argues that this is to enhance the contrast between the tones.

As a consequence, there is a difference between register and tonal features. Register features are primary in that they are filled in first and without making reference to the tonal features on the same tonal root node. Tonal features are secondary, filled in after the primary register features. Furthermore, the choice of default feature is not independent but based on the feature specified on the register tier.

Phonological rules Two important phonological rules in RTT are Stray Erasure and Snider's take on the OCP.

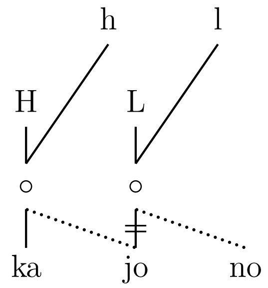
Stray Erasure is a rule that applies after all other phonological rules have been applied and erases all unassociated autosegments (Snider, 1999:37).

The OCP in Snider's view is not a linguistic universal. Instead, Snider sees it as a 'conspiracy' to achieve representations in which adjacent identical autosegments are prohibited and instead merged. Therefore adjacent identical features on each tier are merged if there is no intervening feature, and identical tonal root nodes can be merged. Note that this merger happens during the phonology and not at the very end in the phonetic component as proposed by Goldsmith (1979) and Odden (1986a). In the phonetic component, adjacent identical [l] features are crucial to the derivation of the successively lower registers required by downstep.

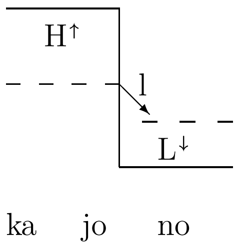
In addition to Merger triggered by the OCP and Stray Erasure, assimilation plays a major role in RTT. Assimilation may be total or partial and may go rightwards or leftwards (Snider, 1999:39–44).

Total assimilation proceeds from a tonal root node to a TBU. An example for this is Hi spread in Chumburung, where */ká jònò/* 'wife's dog' becomes *[ká jónò]*. This is illustrated in (417). The tonal root node spreads rightwards as a whole and associates directly with the second TBU, thereby delinking the original tonal root node from the TBU.

(417) a.

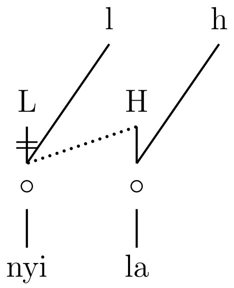


b. Phonetic representation

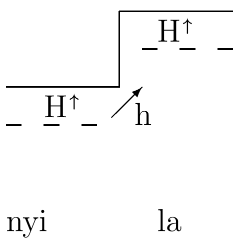


An example for partial assimilation is Lo raising before H in Ewe, where */nyìlá/* 'the cow' becomes *[nyīlá]*. This is illustrated in (418). Here, the H tonal feature spreads leftwards onto the tonal root node, thereby delinking the L tonal feature which was linked to this node before.

(418) a.



b. Phonetic representation



Just as tonal features can spread in a partial assimilation process, register features may also spread. This results in downstep, which is briefly summarised next.

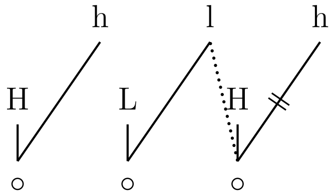
Downstep in RTT Of course not all languages need to encode the four contrastive tones made possible in RTT. Some languages need to encode only two contrastive tones, but these tones need to be realised at different registers. In downstep languages, the register needs to be lowered successively. If a language has upstep the register needs to be raised.

In two-tone languages with downstep, [H] and [L] are phonetically realised as what is heard as Hi and Lo tone. [h] and [l] are realised as register changes, i.e. the respective pitch range in which Hi and Lo tones are realised, and are therefore heard as upstep and downstep respectively.[13]

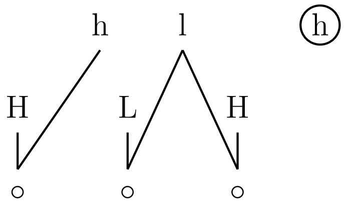
[13] This also means that a floating Lo tone as it is used in many descriptions of tone languages where features are not used does not exist in RTT. In fact all floating features fall victim to Stray Erasure. A Lo in RTT is defined as [L, l], a Hi as [H, h] whereas a downstepped Hi is [H,

Non-automatic downstep is fairly straightforward case of [l] register feature spreading onto the next tonal root node and the delinking of the register feature originally linked to the root node.

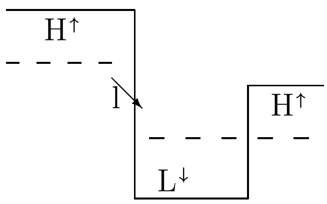
(419) a. Spreading of l register, delinking of h register



b. Representation with lowered register



c. Phonetic realisation



Non-automatic downstep is essentially also derived from [l] spread, though in the Chumburung and Dschang examples Snider discusses a range of other processes which also apply. These are fairly complex and will not be repeated here.

Applying RTT to a specific language There are no hard-and-fast rules for how an individual language employs features to make up its tones. Whereas it is possible that a two-tone language uses only the register features [h] and [l], others feature specifications are also possible if the data warrants them. Therefore feature specifications and the way they are employed need to be spelled out and justified for each language. The questions that need to be addressed are:

- Which tones are underlyingly present and which are underspecified?
- For the tones which are underlyingly present, what is their underlying specification and which features are left unspecified?

l]. Therefore, what is a L H sequence resulting in $^{\downarrow}$H in a ‘holistic’ approach to tone is a single tonal root node with [H, l] in a featural/RTT approach to tone.

- For the unspecified features, which are the default features that are filled in and at what point are they filled in?
- Which phonological processes apply, how do they apply and when? This includes among other issues spelling out the role of the OCP, the nature and direction of possible assimilation processes, the presence (and/or absence) of automatic upstep and downstep.

In the following section, I will discuss these questions for Ikaan and show how RTT can explain some downstep patterns in Ikaan.

Ikaan in RTT

Within RTT, there is a way of expressing the tones in features and of setting the rules and conditions in the phonology which makes it possible to explain the fact that there is no automatic downstep but non-automatic downstep, and that non-automatic downstep only occurs if there is vowel deletion. The features and processes may be somewhat unusual, but in a way this is to be expected: unusual underlying patterns produce unusual surface patterns, and this is exactly what is observed in Ikaan.

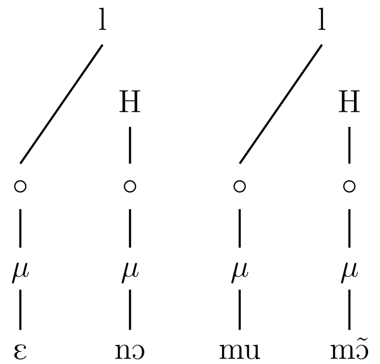
Feature specifications and assumptions The analysis I propose relies on the following assumptions:

- *Underlying specifications*: Both Hi and Lo are underlyingly present, Hi is defined as [H], Lo is defined as [l]. This means Hi is underspecified for register but specified for tone, whereas Lo is specified for register but underspecified for tone. Lo is rather unremarkable, but Hi has unusual specifications.
- *Default specifications*: Default features fill in so that Hi becomes [H, h] and Lo becomes [L, l]. The default features for Lo are standard, but filling in [h] for Hi specified as [H] goes against Snider (1999). Snider would assign register features first, invariably with [l], independent of any existing tonal features. His default would therefore produce [H, l]. However, Snider also discusses the trend towards enhancement and it can be argued that the feature specification I propose enhances the contrast between H and L, which might justify the unusual default features.
- *Spreading*: Register features spread rightwards, as far as they can and whenever there is an unspecified register feature. Tonal features do not spread.
- *OCP*: The OCP applies late, as the last act of the phonology together with default feature insertion.

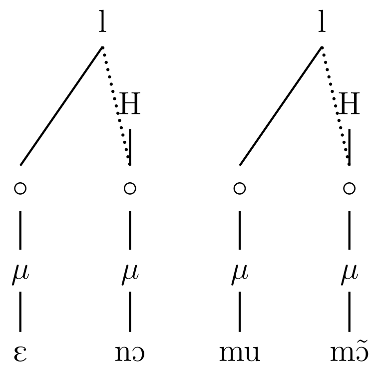
Example derivations With these specifications and assumptions in mind, we can now derive constructions without automatic downstep, constructions with non-automatic downstep and constructions with contour tone formation.

The word *ɛ̀nɔ́mùmɔ̃́* 'fish' has a LHLH surface melody. Both Hi tones are at the same pitch level, there is no automatic downstep. The underlying specifications and the derivation laid out in (420) clearly show why that is.

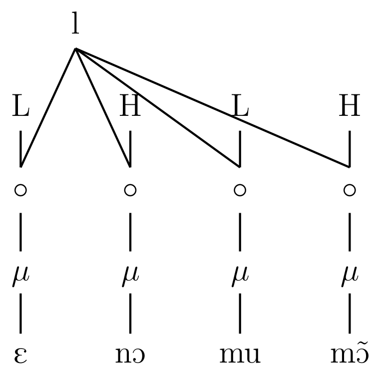
(420) a. Underlying representation



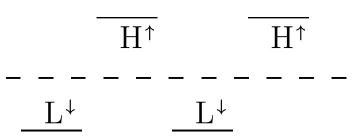
b. Register feature spreading



c. Default feature insertion and OCP



d. Phonetic realisation

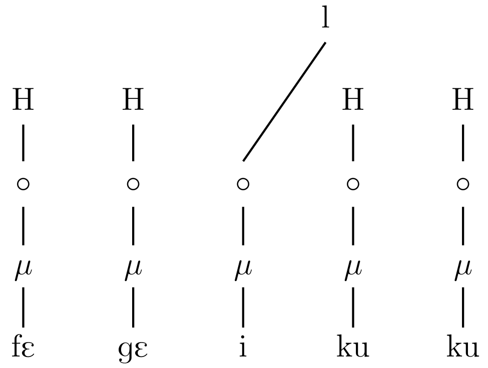


All tones are produced at the same register, the Hi tones at a high pitch relative to the register and the Lo tones at a low pitch relative to the register.

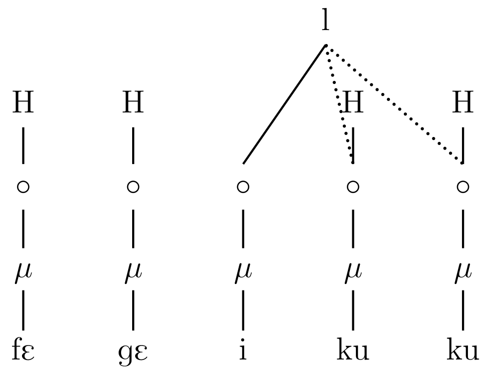
Since all tonal root nodes are linked to the same register feature [l], there is no additional movement of the register and therefore no automatic downstep.

In the phrase *fɛ́gɛ́ ìkúkú* ‘Break the chair’, the final vowel of the first word deletes and its Hi tone surfaces on the following TBU. The Lo tone on this TBU does not surface any more, and the Hi tones on the second word are downstepped. Again, the underlying specifications for the tones and the phonological processes taking place can produce the appropriate underlying representation which explains the downstep.

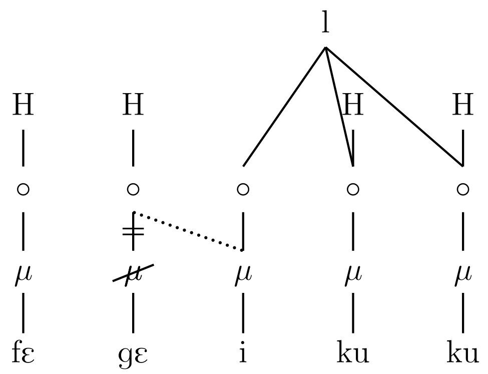
(421) a. Underlying representation



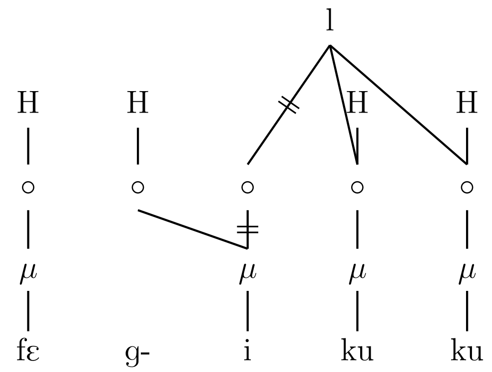
b. Register feature spreading



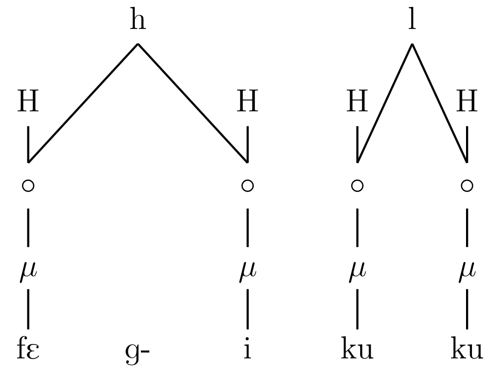
c. Vowel deletion delinks the tonal root node, which relinks to the following TBU



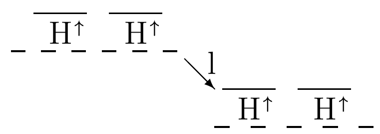
d. Each TBU can only be linked to one root node so that the original root node delinks. The [l] feature on this root node is multiply linked and therefore not set afloat by being delinked.



e. Default feature insertion and OCP



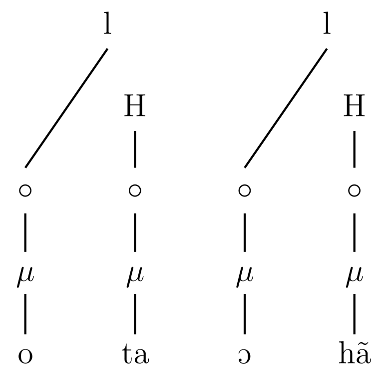
f. Phonetic realisation



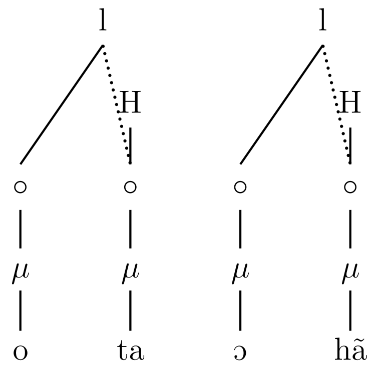
The utterance begins at a high register. At the transition point between [h] and [l], the register is moved downwards so that all following Hi tones are realised at a lower pitch—downstep has occurred.

Downstep only occurs when there is vowel deletion, i.e. a TBU is lost. Vowel assimilation does not lead to downstep. *ɔ̀tá ɔ̀hã́* 'a particular lamp' surfaces as *[ɔ̀tɔ̂ːhã́]* as shown in (422).

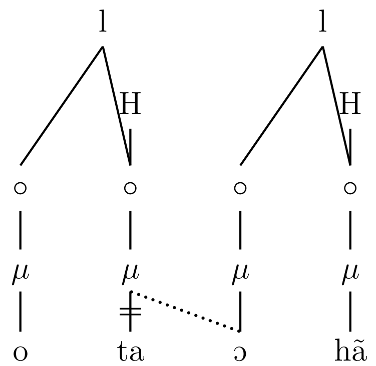
(422) a. Underlying representation



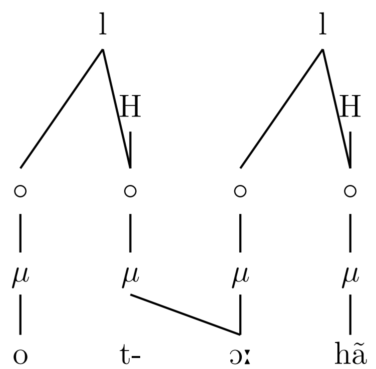
b. Register feature spreading



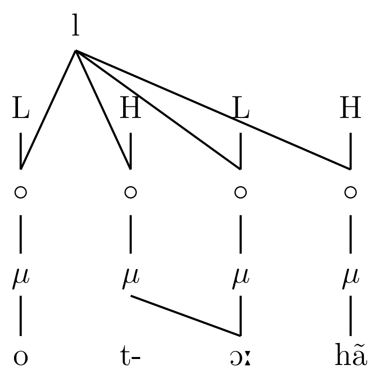
c. Vowel assimilation delinks segmental features from the mora, the mora itself and its tonal specifications remain unchanged.



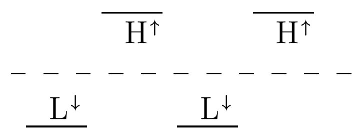
d. Vowel assimilation results in bimoraic vowel



e. Default feature insertion and OCP



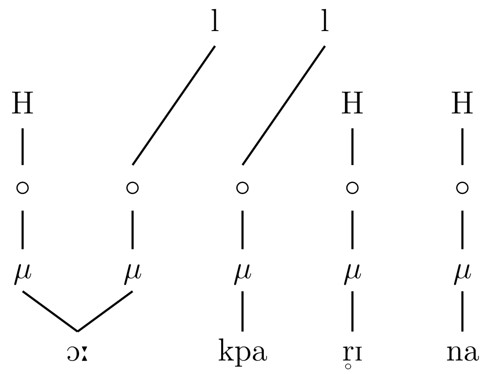
f. Phonetic realisation



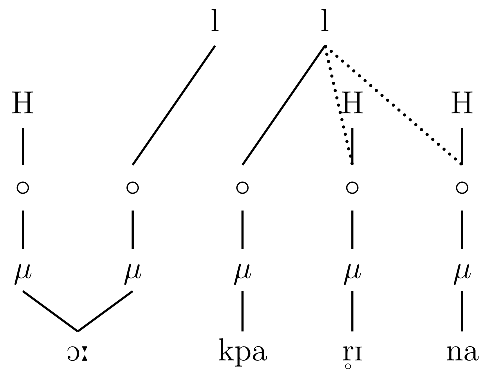
Again all tonal root nodes are linked to the same [l] register feature, therefore the register remains stable and there is no downstep.

A missing explanation While I can account for the presence of non-automatic downstep in the imperative construction and the fact that non-automatic downstep is tied to vowel deletion, I am still missing a piece in the puzzle. So far, I cannot account for non-automatic downstep in the Habitual constructions. Since the final Hi tones in *ɔ̂ːkpàr̥ɪ́ná* 'she used to carry' are preceded by Lo tones, they are automatically preceded by [l] features which should spread right through and result in the same pitch register throughout, which they don't as the data in (423) shows.

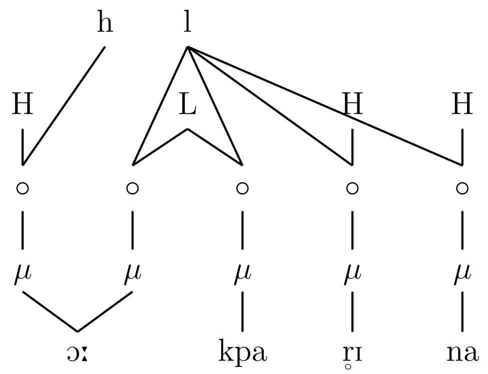
(423) a. Underlying representation



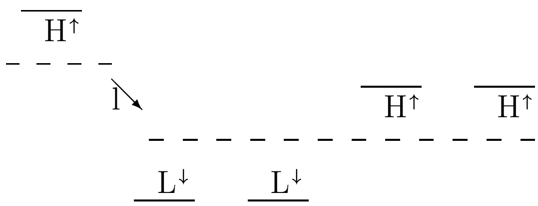
b. Register feature spreading



c. Default feature insertion and OCP



d. Phonetic realisation



The fact that my analysis of Ikaan within RTT predicts a downstep when there is none shows that while RTT may provide part of the answer, more research is needed to fully explain automatic and non-automatic downstep in Ikaan.

Compared to other languages, Ikaan has unusual feature specifications, unusual default features and arguably also unusual application of phonological rules, with spreading only affecting the register tier, not the tone tier, and the OCP applying very late. This correlates with the unusual fact that downstep in Ikaan, at least the way I have derived it here, is not the result of a tonal rule of [l] spreading as Snider postulates for Chumburung or Dschang. Instead, non-automatic downstep is explained as an accidental by-product of vowel deletion. The absence of automatic downstep is directly attributed to the unusual feature specifications with Hi tones underspecified for register so that existing [l] features can spread. Taken together though, this makes sense. Ikaan has unusual feature specifications phonological processes, which then result in (and explain) the unusual downstep patterns observed in the surface patterns.

7.8 Chapter summary

In this final chapter, I have picked up evidence from the downstep data in Chapter 6 to add to the analysis given before and argue further for some of the claims I have made for Ikaan. I have also gone beyond Ikaan and related my findings for Ikaan to the wider theoretical discourse, here on the OCP and downstep.

I have shown that CVC verbs are likely to be underlyingly (or historically, or theoretically) bimoraic CVCV verbs rather than verbs with one mora like CV verbs. CVC verbs still show traces of the second vowel by linking and therefore not deleting the second tone of a HL inflectional melody. This L tone shows its presence in some constructions but not in others so that further research is required to determine the underlying causes for this behaviour.

I have argued against analysing the L prefix tone as an underlyingly unspecified TBU that receives its tone through default tone insertion by showing that this would predict the absence of downstep when downstep occurs.

I have returned to the OCP, providing further evidence for the claim that the

OCP applies to L. I have then given my arguments for why the OCP does not apply to H in Ikaan, again using downstep data as evidence. I have discussed and rejected alternative explanations, compared Ikaan to other languages which also show OCP violations and revisited some of the early and more recent literature on the OCP to support my view that the OCP is not a linguistic universal.

Related to not applying the OCP to H, I have returned to my distinction between tone copying and tone spreading and shown that copying is required for H. While it is not required for L, copying still makes for a simpler and more coherent analysis than applying spreading to L. Regarding the directionality of copying, I have discussed some of Hyman's (2007) generalisations and predictions for High Tone Anticipation and have shown how Ikaan is a counter example to some of the predictions.

Finally, I have discussed a range of approaches to downstep to account for the fact that Ikaan has non-automatic downstep without showing automatic downstep. I distinguished between phonetic and phonological approaches to modelling and implementing downstep and explained why phonetic approaches are unlikely to be able to explain the Ikaan data. The approaches which encode downstep directly in the phonology go further in accounting for the presence of non-automatic and the absence of non-automatic downstep. I have then introduced Register Tier Theory and shown how some but not all downstep surface patterns can be derived in this theory.

Chapter 8

Summary and conclusions

This thesis has investigated the tone system of Ikaan, aiming to describe and analyse the forms, functions and behaviour of tone at the phonological, lexical and morphosyntactic level and at the interfaces between phonology and other levels of linguistic analysis.

Chapter 2 gave background to the language and its speakers, the context and methodology of the research presented in this thesis, previous research on the language and a very brief introduction to the basics of Ikaan grammar.

Chapter 3 laid out the phonology of tone in Ikaan. I analysed the mora as the tone-bearing unit in Ikaan, H and L as the tonemes, ꜜH and X as their respective allotones and surface contours as underlying sequences of level tones. I introduced tonal melodies and conventions for the association of tonal melodies, proposing as the mechanism for linking tones to TBUs one-by-one left-to-right association, a *μ constraint, a rightward copying rule, a constraint limiting the number of tones per TBU to one and a L deletion rule. In addition to tonal rules and constraints for melody association, I put forward a leftward copying rule, a constraint against adjacent L, a L merging rule, a constraint against *H, a H docking rule and a L delinking rule. Throughout the following chapters, I used data and processes presented in those chapters as evidence for the constraints and rules I proposed. I then described the unusual downstep patterns in Ikaan, showing that Ikaan does not have automatic downstep after overt L but does have non-automatic downstep after floating L. I further illustrated that Ikaan has three different locations of downstep, i.e. that the register is lowered in three different positions in Ikaan, and gave examples for each position.

Chapter 4 looked inside lexical entries in Ikaan and described the representation of tone in the lexical entries. I distinguished between four ways in which tone is part of lexical items. I identified and described lexical items which consist solely of tones, lexical items which are entirely toneless, lexical items in which tones are prelinked to TBUs and lexical items which consist of segments and underlyingly independent tonal melodies that are not yet linked to TBUs. For the latter, I described the association of the tonal melodies in more detail and pointed out how the association of 'long' melodies to 'short' roots apparently created an empirical problem in the analysis and opened unexplained gaps in the data. Applying the *H constraint and H docking rule to the tone association, I then accounted for the presence of the gap.

Chapter 5 described tone in the morphosyntax of Ikaan at the word level, phrase level and sentence level. At the word level in derivation, I showed regularities in the tonal patterns for forming nouns and adjectives from verbs, but also pointed out exceptions to these regular processes and concluded that the derivation of nouns and adjectives is not very productive. At the word level for inflection, I showed how the different surface melodies in Non-Future tense and Habitual aspect can be reduced to one underlying melody for each tense-aspect-mood category if the rules for tone association are applied the way I proposed them. At the phrase level, I illustrated parallels between the associative construction and one type of reduplicative construction which could be analysed as an instance of the associative construction if it is assumed that the associative construction is marked with a floating L. To describe tone at the sentence-level in yes/no questions, I temporarily broadened the scope of the thesis and included intonational as well as segmental phonological issues in the discussion to show how tone, intonation and segments work together to mark yes/no questions from corresponding statements.

Chapter 6 returned to the different locations of downstep in Ikaan and showed the morphosyntactic contexts in which each location occurred. I proposed segmental processes and tonal constraints which applied in these specific constructions and which triggered the application of phonological rules that eventually led to downstep in the different places. After describing the phonological side, I attributed the different locations to differences in the syntax and semantics of the constructions in which the downsteps occurred. I distinguished between verb + noun constructions marked with vowel deletion and constructions with nouns + other constituents which are marked with vowel assimilation. Within noun + other I distinguished between other constituents that predicate (verbs and adjectives) and other constituents with referential function (possessor nouns, demonstratives, possessive pronouns, determiners), showing that a *H##$L_{V\!:}$ constraint applied to referential modifiers but not to predicating modifiers.

Chapter 7 finally brought together evidence from all previous chapters to further support rules and constraints I proposed for Ikaan. Furthermore, it related findings from Ikaan to the wider theoretical discourse. I looked at different interpretations of the OCP and argued for not applying the OCP to H in Ikaan because doing so makes predictions that are brought out in the data, whereas applying the OCP to H wrongly predicts forms that are not attested. I made an explicit distinction between tone copying and tone spreading, showing that copying leads to predictions that are met by the Ikaan data whereas spreading results in predictions that at least for H tones are falsified by the Ikaan data. I looked at the directionality of copying in Ikaan, and compared it to High Tone Anticipation as described by Hyman (2007), showing that Leftward copying in Ikaan is purely phonologically motivated and cannot be attributed to any of the factors Hyman describes as causes for High Tone Anticipation. Finally, I looked at different attempts at accounting for downstep and modelling downstep theoretically. I showed how both phonetic and phonological models struggle to accommodate languages like Ikaan where downstep is only triggered by floating L and not by linked L. I then applied Register Tier Theory (Snider, 1999) to some Ikaan data and showed how this approach could handle this data but still failed to account for other data.

Overall, Ikaan clearly shows that limiting tone to phonology is a misconception that completely underestimates the importance of tone in a language like Ikaan. In Ikaan tone functions firstly as a phoneme when it distinguishes meanings, e.g. in lexical minimal pairs. Secondly, tone functions as a morpheme when it bears meaning, e.g. in tense-aspect-mood melodies. Thirdly, tones and their allotones have function and encode structures, e.g. in the H predicative prefix tone or the X allotone of L which marks a phrase boundary. Finally, tone and intonation mark different speech acts in distinguishing between statements and yes/no questions. In addition, Ikaan has shown that it is not just tones themselves that bear meaning or encode different types of constructions. Instead, at the phonology-semantics interface it is a tonal constraint, i.e. a prohibition of a specific tonal configuration that correlates with (or in my argumentation indicates) a distinction between referential and predicative modifiers of the noun.

Ikaan therefore exemplifies that an investigation of all aspects of the tone system throughout the whole grammar and its interaction with all levels of linguistic analysis is as essential as it is insightful. To do without an analysis of tone would not just do injustice to the language but also be short-sighted as it would mean doing without the useful pointers to linguistic structures that tones offer.

Apart from the broad functionality of tone, my research has brought to light unusual phonological features of tone in Ikaan.

The phonological behaviour of H and L is very asymmetrical in Ikaan. Both tones are underlyingly present and phonologically active. Still, while there are some rules, conventions and constraints that apply to both tones (one-by-one left-to-right linking, Rightward copying, *H##$L_{V\text{ː}}$, *HLH, *LH), there are also a number of rules that refer only to one of the two tones. H is subject to *Ⓗ and H docking, whereas L is affected by L deletion, OCP(L), L merging and L delinking. H seems to be the 'stronger' tone that has to be realised, L on the other hand is 'weaker' than H and has to 'make space' so that H can be realised. This is similar to what is described for Etung by Watters (2009), where both H and L are present but H is required to surface whereas L may remain unassociated.

The OCP rules out adjacent L in Ikaan, adjacent H however are permitted and not within the scope of the OCP. OCP violations are attested in other languages but they are not frequent. In addition, well-described OCP violations such as in Kishambaa and Kipare as described by Odden (1986a) are located at the lexical or derivational level respectively. In Ikaan however OCP violations occur at the phonological level and are observed for one tone (H) but not the other (L). To my knowledge, OCP affecting one tone but not another is only attested for Acatlán Mixtex (Aranovich, 1994).

The association of tonal melodies to words in Ikaan differs from other languages in that multiple association of tones to TBUs at the right edge or floating tones at the right edge do not occur. If there are more tones in a melody than there are tone-bearing units in a word, H will still be realised through the application of a range of phonological constraints and rules but non-associated L are deleted. To my knowledge, this strategy has not been explicitly described for other languages though it does seem to occur, as the Kera data (Pearce, 2006) in Chapter 4 suggests.

L which come from tonal melodies and cannot be mapped onto TBUs do not remain floating and are deleted instead in Ikaan. This contrasts with L which have been mapped onto TBUs at some point and are subsequently delinked and set afloat. These floated L remain present on the tone tier as floating L, where they trigger downstep. By applying L deletion to non-associated L but not to floated dissociated L, my analysis implicitly makes a distinction between unmapped and mapped L tones, thereby making reference to the 'history' of L. Again, making the application of a phonological rule to a target dependent on the history of this target is unusual but is attested for segments in Kinyamwezi (Kula, 2008).

Ikaan is one of the very few languages which do not have automatic downstep after overt L but have non-automatic downstep after floating L. Moreover, Ikaan differs from the other languages in this small set. Kikuyu

(Clements and Ford, 1980a) shows total downstep rather than Ikaan's partial downstep, Dschang-Bamileke (Pulleyblank, 1986) additionally has downstep of L which Ikaan does not have, Mao (Ahland and Pearce, in prep.) and Dschang-Bamileke (Hyman and Tadadjeu, 1976) have double downstep which Ikaan lacks.

The directionality of copying in Ikaan is unusual. Tones copy rightwards, but H cannot copy rightwards over a floating L. In this contexts, Leftward copying applies instead. Having two directionalities for spreading is again rare but attested for example in Kalaḅarị-Ịjọ. Similar to what is happening with the OCP, in Kalaḅarị-Ịjọ the different directions apply in the lexical vs. postlexical domain, whereas in Ikaan Rightward and Leftward copying are entirely phonologically conditioned and not explicitly tied to a lexical or grammatical domain. Ikaan therefore again shows an infrequent but attested pattern in a slightly different variation.

Finally, the way I described and analysed the data is somewhat unusual but 'naturally grew out' of the data and accounts for it. I work with a limited, language-specific set of phonological rules and constraints where the application of rule is triggered by a violation of one of the constraints. As I have shown, rule applications remove violations but may create others, which are in turn removed by further rule applications until all violations are removed. As I have discussed, this approach combines elements of Sommerstein's (1974) idea of phonotactically motivated phonological rules with Goldsmith's (1990) concept of 'harmonic phonology' without fully following either. Unlike Sommerstein (1974), there is no explicit link between constraints and the rules they condition—because the pool of available tonal rules is so small that there is only ever one tonal rule that is applicable anyway. Unlike Goldsmith (1990), I do not allow violations of constraints in the final representations. So far, this approach accounts for the observed data with a comparatively small set of rules and constraints, even though some of these rules and constraints are fairly unusual cross-linguistically. Whether this analysis and approach lasts as the research into Ikaan progresses remains to be seen.

As Abiọdun (1999) and this research are so far the only substantial pieces of work on Ikaan, it is only natural that a there are many directions for further research into Ikaan.

While it has become clear that H and L have asymmetrical phonologies, it is not yet clear why that is the case.[1]

The verb system in Ikaan is far from understood. There is a variety of tense-aspect-mood categories awaiting identification, description and classifica-

[1]Mary Pearce (personal communication) suggested that the reasons for this may be found in the histories of H and L and the point of time at which they entered the language.

tion. More remains to be revealed about the segmental and tonal internal structure of the verb. The subject agreement marking component of the prefix needs to be untangled from the tense-aspect-mood marking component. The effects of further inflectional morphemes, focusing an object noun, subordination and negation on the verb morphology are far from clear. There are indications for serial verb constructions which should be followed up and hints in tonal alternation that suggest that what I have glossed as the locative marker *b-* and the benefactive marker *rɛ* are in fact verbs.

The role of tone in the grammar has been limited to a fairly descriptive treatment in this thesis. Tone in the grammar should be explored further at the word, phrase and sentence level and should look at more parts-of-speech than the verbs and nouns that I have focused on here.

Yes/no questions in Ikaan have shown tonal, intonational and segmental features that ideally require further instrumental investigations into the breathiness of the vowels and the accompanying tonal patterns, a rigorous statistical analysis to test the results found so far and more natural and contextualised data from more speakers to ensure the representativeness of the findings.

At the interface, the analysis of Ikaan would profit from being complemented with an approach that does not take the tones as primary indicators to test whether my findings can be corroborated with other findings from an analysis that starts from the morphosyntax.

The nature of this research into the tones required primarily structured and controlled elicited data and paradigms to cover for example all logically possible CV and tone combinations. While the research has also been informed by more natural contextualised and participant observation data, structures larger than a sentence or genre where more than one speaker is involved have not yet been investigated. While I have shown that within a phrase or short sentence the pitches of H and L are relatively stable, it remains to be seen if the same holds true over longer stretches of speech or how and to what effect speakers manipulate the pitch levels in less controlled and more natural contexts.

In the wider theoretical discourse, Ikaan provides new data for research into the OCP and into downstep. There are languages that are fairly similar to Ikaan regarding the status of the OCP but they differ in the domain of the non-application of the OCP. Languages with downstep after floating L but no downstep after overt L are all somewhat different from Ikaan. Therefore the already very small groups of languages with OCP violations and of languages without automatic downstep but with non-automatic downstep seem to be quite heterogeneous in themselves and require further investigation.

Finally, the number of different classifications of Ukaan within the Benue-Congo family tree as well as the variety of places Ukaan has been put within the tree already indicates that a better understanding of the language might lead to a more informed classification of Ukaan. While this research deliberately did not set out to contribute to this discussion, it may still provide data and information that others may find useful.

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