CHAPTER 3

POST-LEXICAL TONE IN THADOU

Having discussed tones in the lexical component which essentially takes into account words, this chapter takes the research forward and takes into account utterances. In other words, post-lexical tone in Thadou is engaged with at length in this chapter. Starting with an introduction to the post-lexical component, this chapter looks into its tonal aspect under various heads like downtrend and automatic and non-automatic downstep.

3.1 Introduction

Post-lexical or sentence level suprasegmental studies are usually clubbed under intonational phonology. Intonational studies are mostly based on pragmatic information and deal with boundary tones. As Carlos Gussenhoven states in his book *The Phonology of Tone and Intonation* (2004), even tonal languages have intonational boundary tones, causing questions to end at higher F0 than statements. Most of the earlier literatures on intonational studies focus on the attitudes and emotions of the speaker, the pitch difference between statements and questions etc. However, the present study will not be featuring this aspect of post lexical intonation, but will be focusing more on the downtrending properties in the post-lexicon of Thadou. Downtrend is a special characteristic of African tonal languages. Hyman (2007) has already mentioned in passing the existence of downstep and downdrift in Thadou. This work will focus on establishing these features in Thadou.
However, studies on intonational phonology of Thadou has been done by Yuni Kim (2005). According to her, the main intonational feature found in neutral sentences was the lowering of the pitch range following a L tone- regardless of whether this L surfaces or whether it manifests itself only through a downstep on a following H. Yuni Kim observed that: 1) Thadou intonation seems to operate mainly through the addition of boundary tones and the manipulation of register, i.e. the pitch range that is utilized for the realization of lexical tones and that 2) it may be possible to analyse the language as having two coexisting but distinct declination processes: a phonological process of downstep, and a phonetic process of downdrift. Yuni Kim has looked upon the processes of downstep and downdrift as different kinds of declination effect, the former being a phonological phenomenon and the latter a phonetic one. However, in this study I look at the three phenomena- declination, downstep and downdrift as different processes and tries to establish its presence in the language.

Bruce Connell (1999) gives the following definitions to distinguish among them. In Connell’s view declination is the gradual modification of the phonetic backdrop of F0 over the course of an utterance. Automatic downstep is defined by him as the lowering of F0 in sequences of alternating Hs and Ls (sometimes referred to as downdrift). According to Connell, non-automatic downstep (sometimes referred to simply as downstep) is the F0 lowering in tonal sequences with no obvious conditioning environment which paves way for a new, lower, “ceiling” set for all subsequent Hs within a specifiable domain or prosodic unit. However, in his later works, he acknowledges the presence of a conditioning environment which is the presence of an underlying ‘floating’ L. Connell uses the term downtrend as a collective term for all the above mentioned phenomenon in
tonal languages where pitch lowers in an utterance in one way or the other. Connell (1999, 2001, 2011) examined the characteristics of the three different downtrending phenomenon- downdrift, downstep and declination in Mambila, an African tonal language spoken majorly in Nigeria and Cameroon. He concluded that declination is a phonetic phenomenon while downstep and downdrift are phonological.

3.2 Downtrend

Studies pertaining to the lowering of fundamental frequency (F0) within an utterance is one of the developed areas of research as far as pitch is concerned. Many works have been done on characterizing pitch realizations and typologizing tone languages based on it. Recall, Kenneth L. Pike’s (1948) distinction based on register tone languages, which consists of languages in which the tones are basically level, spoken in Africa; and contour tone languages, which consist of languages with gliding tones, spoken in Asia, especially China. William Everett Welmers (1973) also makes a distinction between discrete and terracing type of systems among register tone languages. Terracing languages show a stepping or staircase phenomenon, typically resulting from downstep; and for discrete level languages, each tone has its own space which in principle does not impinge on the space of other tones.

Different types of pitch downtrend have been identified so far, mostly in the tonal languages of sub-Saharan Africa. It is also found in the Americas, especially Central America. Such phenomena has been very rarely reported in the languages of the Asian sub-continent. Larry Hyman (2007) reports of these downtrending phenomena to be present in Thadou.
Even though Hyman has talked of downstep in Thadou not much work has been done on other downtrending phenomena and this research aims to fill in this gap. The phenomenon has not yet been attested in many Tibeto-Burman languages, though more research may prove otherwise. However, it has to be pointed out that there are isolated unpublished works in some of the TB languages on similar aspects. In this dissertation, I shall look more into the downtrends in Thadou and examine whether declination and downdrift co-occur with downstep in the language.

### 3.3 Data and Method

It has to be stated here that no such standard procedure to measure downtrend exists. Every researcher uses a different method depending upon their research question. As far as my research is concerned, the main objective is to examine whether downdrift, downstep and declination, are present in Thadou. The methods used towards that end are explained below.

#### 3.3.1 Speech materials

Four sets of utterances were designed to be tested. The first and second set, consisting of utterances having like tone sequences (all Ls and all Hs respectively) were used to test declination. Utterances with similar tones were carefully compiled as it would give more clarity to the data analysed. The third set consisted of utterances to test downdrift. They were carefully chosen in alternate combinations of HL and L. Recall the discussion in section 2.5.3 that an HL tone would surfaces as an H tone within utterances which would give the desired output of H-L-H-L sequence. The fourth set built to test downstep had utterances with a combination of HL-H sequence within them.
3.3.2 Measurement and analysis

For this study, the data collected from eight native speakers (four male and four female) of Thadou were analysed. The subjects read the utterances with a minimum of three repetitions each. The data were annotated using Praat (Boersma & Weenink, 2007). The mean F0 values for tone contours were extracted using the Praat script ProsodyPro (Xu, 2005-2011). The average F0 of all the subjects are taken into account. Male and female data are measured separately as there is quite a significant difference among the male and female voice frequencies.

Now that the preliminaries of the research are outlined, the sections below looks at the research in detail related to the process of automatic and non-automatic downstep.

3.4 Automatic and Non-automatic Downstep

As has been mentioned earlier the processes of automatic and non-automatic downstep has been a topic of discussion in most of linguistic literatures based on tonal languages like Ibibio, Igbo, Akan, Mambila and some other African languages (Welmers 1973, Schachter & Fromkin 1968, Armstrong 1968, Clements 1979, Connell & Ladd 1990, Liberman et al. 1993).

The terms ‘automatic downstep’ and ‘non-automatic downstep’ do not have a proper characterization in the literatures as declination has. Different linguists have different definitions for these processes. Even the terminologies for the two phenomenon differ in the literatures. Automatic downstep has been more commonly referred to as ‘downdrift’ and non-automatic downstep as simply ‘downstep’.
John Stewart (1966) proposed the term ‘automatic downstep’ for the L-induced type of H tone lowering and ‘non-automatic downstep’ for the apparently spontaneous type. Carlos Gussenhoven (2004) gives graphic illustrations to elucidate the processes of automatic vs. non-automatic downstep:

The process of automatic downstep is illustrated in (1), where the H tone on the third syllable is lowered in pitch than the initial syllable because of an intervening L tone.

The process of non-automatic downstep, which results from an apparently spontaneous lowering of H tone, is illustrated in (2), where the final H tone is downstepped without an overt L tone preceding it.

From now on, in this dissertation, the term ‘downdrift’ and ‘downstep’ shall be used for automatic downstep and non-automatic downstep respectively.

Both the processes involve a lowering of F0 values within an utterance, the main difference being, downdrift involves an overt low tone that triggers the lowering of F0, while downstep is induced by a covert or a ‘floating’ low tone. A detailed discussion of each of these processes can be seen in the following sections.
3.4.1 Downdrift

Bruce Connell (1999) defines downdrift as the lowering of F0 in sequences of alternating Hs and Ls. The downdrift is said to affect successive high tones when there are intervening low tones. For a sequence of HLH therefore, the second H is on a lower pitch level than the first, and this pattern spans the length of the utterance.

Downdrift has been documented in many African languages, including Efik (Winston 1960), Akan (Schachter and Fromkin 1968), Twi (Stewart, 1966), Hausa (Inkelas and Leben 1990), Etsako (Elimelech 1978), Supyire (Carlson 1983), and Igbo (Hombert 1974).

Now that the main tenets of the phenomenon called downdrift have been put down, the occurrence of the phenomenon in Thadou is detailed below.

3.4.1.1 Downdrift in Thadou

The dataset to analyse downdrift consists of alternate sequences of L and HL tone syllables. As we have seen in section 2.5.3, taking an H tone would induce high tone spreading and we would not get the desired result. On the other hand, due to the property of contour simplification HL tones within an utterance would automatically reduce into an H tone and we shall get the desired output of an alternating sequence of Hs and Ls.

I. HL-L-HL

a) lóu lień gíet
   field big eight
   eight big fields
Figure 15a. lóu lien gîet ‘eight big fields’

b) ñåa lien kûo
fish big nine
nine big fish

Figure 15b. ñåa lien kûo ‘nine big fish’

Figures 15(a) and 15(b) gives the pitch contour for utterances in the sequence HL+L+HL.

As seen, the final syllable is realised much lower in pitch than the initial syllable.

II. HL-L-HL-L

a) ká kèel tsôm sòom
my goat short ten
my ten short goats
Figures 16(a) and 16(b) show instances of downdrift in an H-L-H-L sequence. As is observed from the figures, words which have HL tone in isolation simplifies to an H tone through process of contour simplification within the utterance. In the utterance the third syllable which has an H tone is realized at a lower pitch than the initial syllable even when they have the same phonological tone. This could be because of the intervening L tone syllable.

Figure 16a. ká kèel tsóm sòom ‘my ten short goats’

b) ká hùon sáo nìi
my garden long two
my two long gardens

Figure 16b. ká hùon sáo nìi ‘my two long gardens’
III. L-HL-L-HL

a) kà úi tʃa kûo
   my dog DIM nine
   my nine dogs

Figure 17a. kà úi tʃa kûo ‘my nine dogs’

b) kà móot lien kûo
   my banana big nine
   my nine big bananas

Figure 17b. kà móot lien kûo ‘my nine big bananas’

Figures 17(a) and 17(b) gives more examples of downdrift. In these figures downdrift occurs in an L-H-L-HL sequence. Here again it can be reckoned that the HL tone in the second syllable is simplified to an H tone and the H tone on the fourth syllable is realized in a pitch lower to that of the second syllable.
A small calculation was done in order to test the rate of downdrift in utterances, which is represented in the table given below. The utterances chosen are kà hùon sáo nìi ‘my two long gardens’ with the HL+L+HL+L sequence and kà mòot lien kúo ‘my nine big bananas’ with the L+HL+L+HL sequence. Table 6 shows difference in pitch drop among H tones in alternate positions. The results show a difference of about 20 Hz between the High tones, which prove the presence of downdrift among H tones in Thadou.

Table 6

*F0 values in Hz and the difference among H tones*

<table>
<thead>
<tr>
<th>Sequence</th>
<th>F0 (H₁)</th>
<th>F0 (H₂)</th>
<th>F0 (H₁) - F0 (H₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H_L_H_L</td>
<td>192.68</td>
<td>172.04</td>
<td>20.64</td>
</tr>
<tr>
<td>L_H_L_H</td>
<td>197.45</td>
<td>172.81</td>
<td>24.64</td>
</tr>
</tbody>
</table>

Figure 18 illustrates pitch fall due to downdrift in a longer sequence. The sequence has alternating L and HL tones. All HL tones reduce to H tones within the sequence but the final HL tone is realized as such. In the sequence nà húŋ diŋ kà dèi êe ‘I want you to come’ (example adapted from Hyman) the first High tone has a frequency which goes up to almost 250 Hz but the following High tones are realized much lower in pitch. Even the intervening L tones are reduced in pitch than their previous counterpart. Downdrift is usually considered a property of H tones but all the examples here show instances of pitch lowering for L tones as well. This lowering of the L tones could be a result of pitch declination, which is a phonetic phenomenon pertaining to pitch lowering.
among utterances. A detailed study of pitch declination can be found in chapter 4 of this thesis.

![Pitch Declination Diagram](image)

Figure 18. nà hùŋ diŋ ká dèi êe (LHLHLHL) ‘I want you to come’

In order to get a clear picture of the process of downdrift, let us compare an utterance with downdrift (1) and one without downdrift (2).

(1) Utterance with downdrift

L+HL+L+HL+L

mòl sóo mò ká sèi
stick long ten I say
I say ‘ten long sticks’

(2) Utterance without downdrift

L+L+L+H+L

kèel ñà lién ká sèi
goat DIM big I say
I say ‘big goat’
Figure 19 plots the pitch contours of (1) and (2). Utterance (1) has an alternating sequence of L and HL tones while utterance (2) is mostly L tone except for the second last syllable which has an HL tone underlyingly. As can be seen from the figure, the H tone in the LLLHL sequence is pronounced with a higher F0 than its counterpart in the LHLHL sequence. In both the sentences the pronominal proclitic /ka/ is pronounced under the same tonal context. However, in the first sentence (1) it is realized at a much lower pitch than it is in the second sentence (2). This is due to the downdrifting effect in the first sentence which has an H tone earlier in the sequence.

As seen from the above discussions, we can conclude that downdrift is very much a property of Thadou language. We shall now move on to check the presence of downstep in Thadou.

### 3.4.2 Downstep

At the outset, in Connell’s view (2011), downstep is a pitch-lowering phenomenon that is widely recognized to occur in tone languages, particularly those of sub-Saharan Africa, in which it was first identified. It is also attested in several languages
of the Americas. The phenomenon has been reported very rarely among Asian languages and Thadou is one such language. According to Hyman (2007) Thadou behaves much like the tone languages of Africa and not like those attested in the Asian sub-continent.

3.4.2.1 Definitions of Downstep

A brief outline of the various definitions of downstep as given by different linguists are discussed here. According to Bruce Connell (1999) downstep is the setting of a new lower height for subsequent tones within the same phonological phrase, which results in a 'lowering of the ceiling’. However, Carlos Gussenhoven (2004) defines it as a phenomenon where an H-tone is realized at a lower pitch than a preceding H-tone if L intervenes. While Larry Hyman (2004) calls it a raising of H of the preceding syllable rather than a lowering of the following H.

Most of the literatures dealing with these phenomena are predominantly concerned about whether they are phonetic or phonological. Declination is found in most of the world languages and phonetic explanations has been given as to why it happens in these languages. But, the status of downdrift and downstep is still debatable. Although, downdrift is very common, it does not seem to be universal. (Yip, 2002). This means that the pitch-lowering effect of the L tone must be language specific and thus phonological. Downstep is analysed phonologically by Paster and Kim (2011) in their analysis of Tiriki language. In Tiriki downstep is represented phonologically by a floating low (L) tone between two high (H) tones. Gussenhoven (2004) also analyses downstep as involving a floating L tone. This constitutes a divergence from many previous analyses of tone in Bantu languages, where there is often no phonological L tone at all, and where downstep
is commonly analysed as the phonetic interpretation of two adjacent H tones. Lee S. Bickmore (2000; on Namwanga) and Robert Carlson (1983; on Supyire) assume that downstep results automatically when two H tones are adjacent to each other. In their analysis no floating L tone is involved and hence downstep is simply the phonetic implementation of a sequence of H tones. The question to ask then is in what way downstep is significantly different from declination in regard to H tones if it is phonetic and not phonological.

Opinions vary with regard to the conditions that trigger downstep. It is often said to occur for “no apparent reason” as Bruce Connell and Robert Ladd stated in the article ‘Aspects of pitch realisation in Yoruba’ (1990). Meanwhile, in a diachronic point of view, downstep is said to arise from the loss of an intervening low tone between two high tones as explicated in the works of Schachter & Fromkin (1968) and Hyman (1975)

According to Johann Gottlieb Christaller, who published a book in German called The Tones of the African Languages and their Names (1893), in Africa, tones are tenacious of life. They tend to survive when the segments or even the words to which they were attached disappear which results in downstep. One could call this survival of the tones- Christaller’s Law, as it was him who first discovered it more than a hundred years ago.

Having discussed the many facets of downstep, the next section looks into its presence and relevance in Thadou.
3.4.2.2 Downstep in Thadou

Downstep has been reported in Thadou by Larry Hyman (2007). Downstep occurs when HL precedes H, with L being realised as a downstep on the following H as shown in the example below. Exclamation (!) mark preceding a syllable indicate that the same syllable is downstepped. Some examples of downstep (adopted from Hyman, 2004):

/mèeŋ vóm thúm hi/ méeŋ !vóm thúm hi ‘these three black cats’
/bóoŋ tsôm thúm hi/ bóoŋ tsóm !thúm hi ‘these three short cows’
/mèeŋ tsôm thúm hi/ méeŋ !tsóm !thúm hi ‘these three short cats’

The dataset to test downstep has been so formed so that a word with an underlyingly HL tone is followed by an H tone. In the output the L tone does not surface but leaves its presence acting upon the following H tone by pulling it down a level lower than the preceding High tone, which ultimately results in what linguists call as - a ‘terracing effect’ or a ‘lowering of the ceiling’. The following section looks into downstep in noun phrases.

Downstep in Noun Phrases

1. lâm + ʧôm → lám !ʧôm
   road short ‘short road’

![Figure 20. lâm !ʧôm ‘short road’](image-url)
Figure 20 shows the pitch contour of the utterance. Both the syllables in the utterance have HL tone underlingly. As seen in the figure, the second syllable is realized at a pitch much lower in frequency than the first and hence it can be said to be downstepped.

2. \( kà +kêŋ +sâo +nìi \rightarrow kà kêŋ !sâo nìi \)

\( \text{my legs} \ \text{long two} \rightarrow \text{my two long legs} \)

Figure 21 is an illustration of the pitch contour in the sequence \( kà kēŋ !sâo nìi \) ‘my two long legs’ with one downstep. The word /kēŋ/ ‘legs’ which has an HL tone in isolation is simplified to an H tone when another word /sâo/ ‘long’ also with an HL tone follows. It is evident from this figure that /sâo/ lowers in pitch than the preceding syllable for about 10 Hz. While /kēŋ/ has a frequency of about 193Hz, /sâo/ has frequency of 182Hz.
is lowered in pitch than /kêŋ/ even without an intervening L tone. Hence this lowering can be recognized as downstepping and the syllable /sâo/ can be said to be downstepped. The initial syllable having a Low tone has a pitch of 170Hz which is still lower than that of the downstepped H tone.

3. \(\text{kà + lôu + sâo + gîet} \rightarrow \text{kà lóu !sáo !gîet}\)

\text{my field long eight ‘my eight long fields’}

Figure 22 illustrates the pitch contour of the phrase (3) with two downsteps- one on /sâo/ and another on /gîet/. /sâo/ is realized lower in pitch than /lôu/ and /gîet/ is further lowered than /sâo/. Downstep creates a new high for the following syllables. The third and fourth syllables seem to downstep in a similar fashion.
All the above examples were instances of Noun phrases. Hyman’s (2004) analysis of downstep in Thadou also deal with downstep in noun phrases. In this thesis I go on to examine the domain of downstep by taking instances from the entire IP as well. We can also examine if downstep occurs across phrases.

Downstep in sentences

4. \( \text{kën} + \text{bël} + \text{kà} + \overrightarrow{\text{ʧǒ}} \rightarrow \text{kën} !\text{bël} \text{kà} \overrightarrow{\text{ʧǒ}} \)

\(1\text{SG} \text{ pot} \ 1\text{PRO} \text{ buy} \) ‘I buy pot’

\( \text{Fig. 23. kën} !\text{bël} \text{kà} \overrightarrow{\text{ʧǒ}} \) ‘I buy pot’

Figure 23 is of a sentence with only one downstep, where the second syllable is downstepped with respect to the first syllable.
5. kên +tû + in + môt + kà + ʧô+ ěe → kên !tú in môt kà ʧô !ée
1SG now NOM banana 1PRO buy! DECL ‘I buy banana now’

Figure 24. kên !tú in môt kà ʧô !ée ‘I buy banana now’

Figure 24 illustrates the pitch contour of a sentence with two downsteps. The second syllable /tû/ is downstepped when preceded by another HL toned syllable /kên/.

Similarly, the final declarative marker /ée/ is also downstepped because of the HL toned verb /ʧô/. This figure is also a perfect example for downdrift. As can be seen the H tones on the fourth and sixth syllables are downdrifted because of the presence of an L tone preceding them.
Figure 25 illustrates the utterance (6) with three downsteps and two downdrifts. As we can see, the second syllable /уй/ with HL tone is lowered in pitch even when the first syllable shows no traces of L tone on it. /уй/ is downstepped here. Also the fourth syllable /ʧɔm/ is lower in pitch than the preceding H tone. This could be due to downdrift as there is a visible L tone syllable intervening. Similarly, the fifth syllable /giɛt/ is downstepped and the seventh syllable /ʧɔ/ is downdrifted.
In downstep, without an overt intervening low tone, the subsequent high tone is lowered in frequency creating a new high for the following syllables, which ultimately results in creating, what is commonly called in intonational phonology as the ‘terracing effect’. As seen from the above discussions, the domain of downstep in Thadou is all phrasal categories including the intonational phrase (IP). In effect, this attests to Connell’s (2001) findings that even though downstep results from the local interaction of adjacent tones, it is typically global in its domain as all subsequent tones are affected.

In the next chapter, the phonetic properties of post-lexical tones in Thadou with special focus on the process of declination in utterances is discussed.