1. Introduction and Background

Anii is a Kwa language spoken by approximately 50,000 people in Togo and Benin, West Africa (Lewis 2009). The data in this presentation comes from the Gɩsɩda dialect of Anii, spoken in and around the town of Bassila, Benin, by approximately 12,000 speakers.

This talk will discuss aspects of tone on Anii verbs, with a focus on how syllable weight affects tone attachment. Some basic facts about tone in Gɩsɩda Anii that may be needed to understand the following discussion are:

- Gɩsɩda Anii has two phonological tone levels, High (H) and Low (L), and downstep (generally where there are adjacent H tones at morpheme boundaries).
- Gɩsɩda exhibits both lexical tone (tone which provides lexical contrasts) and grammatical tone (tone which indicates a grammatical category, in this case the grammatical tone is part of the indication of tense-aspect categories).
- In the analysis given here, L tone is not treated as a phonological entity in itself, but rather as the absence of H tone, so stems that have no lexical H tones are referred to as ‘toneless’.

I assume the framework of autosegmental phonology for my analyses, and the tone-bearing unit (TBU) is assumed to be the mora (at least initially), so before looking at the data to be analyzed, I provide a brief background regarding tone and syllable weight in moraic theory.

1.1 Syllable Weight and Moraic Theory

Cross-linguistically, many authors (cf. Hyman 1985, Hayes 1989, 1994, Morén 2001, etc.) have shown that two kinds of syllables are possible, heavy and light. In moraic theory, this difference is assumed to be due to moras, i.e. units of syllable weight.

Light syllables are considered to have one mora, while heavy syllables have two. It is generally assumed that vowels underlyingly have moras linked to them, while most consonants do not, but that coda consonants can be linked to their own mora under certain conditions.

Anii has three types of syllables:
- CV, generally considered to be always a light syllable cross-linguistically.
- CVV, which is generally considered to be cross-linguistically heavy, though there are some examples of what may be light CVV syllables in Anii given below.
- CVC, a type of syllable which can be heavy or light, depending on the language and/or the phonological phenomenon in question (see Hyman 1992, among others).

This talk will use Gɩsɩda Anii data to illustrate the interaction of syllable weight with tone bearing units, and to address questions such as whether consonants, and perhaps even vowels, can be variably moraic, whether long vowels can be monomoraic, and whether or not units of syllable weight can in fact be equated with tone-bearing units.

* Abbreviations used in the glosses: 1 = first person, , PST = far-past, SG = singular, SUBJ = subject pronoun. Also, lexically H-toned stems are bolded throughout the examples, while toneless stems are not.

1 There has been debate over whether or not languages can have trimoraic syllables, but as this question is not relevant to the Anii data, it will not be further discussed here.
Sections 2 and 3 will provide data (and analyses) regarding two tonal patterns that occur in Gisida verbs, first the perfective in Section 2, then the far past in Section 3. Section 4 is a summary and analysis, and Section 5 is the conclusions.

2. Tone in the Perfective

The perfective in Gisida Anii is the unmarked verb form. There is no grammatical tone associated with the perfective, so it is the ideal form to illustrate lexical tone patterns. There are two lexical categories of verbs with respect to tone, which I will call toneless and H-toned stems. Toneless stems exhibit no lexical H tones, as in (1). All transcriptions are in IPA, and transcribe surface tone patterns:

(1) a. ŋ             fõbà
   1.SG.SUBJ change
   I changed
b. ŋ             li
   1.SG.SUBJ draw.water
   I drew water

The second category, H-toned verbs, exhibit a lexical H tone on the second mora of the verb stem, unless there is no available second mora, in which case the H tone manifests on the first mora. This is illustrated in (2a-b) with bimoraic stems, and in (c) with a monomoraic stem.

(2) a. ŋ        fàŋá
   1.SG.SUBJ think
   I thought
b. ŋ        sàá
   1.SG.SUBJ wait
   I waited
c. ŋ      !      tsí
   1.SG.SUBJ go
   I went

Given the data above, I assume that the attachment rule for the lexical H tone would be as follows:

(3) $H$ Attachment

\[
\begin{array}{c}
\text{stem} \\
\mu \\
\vdots \\
\mu \\
\vdots \\
H
\end{array}
\]

In the cases where there is no second mora for the H tone to attach to, the rule in (3) could not apply, but the H tone does not remain floating, but rather attaches to the available mora.

This is done with a rule (ordered after $H$ Attachment) in which any unattached H tone attaches to the first available mora, and the domain of attachment in this case is the verb stem:

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2 From just the data presented here, another possible analysis is that the lexical H tone manifests on the final mora. For the sake of brevity, and because the second-mora option fits better with data not presented here, I will not discuss the final-mora analysis further in this presentation.

3 This rule seems to apply in wider domains than the verb stem, as well, but for now I limit it to what this data shows.
(4) **Unattached H Docking**

\[
\begin{array}{c}
\mu \\
H \\
\end{array}
\]

Verb stems that are longer than two syllables are relatively rare. They do illustrate, however, that the lexical H tone spreads from the second mora rightward to the end of the verb stem, as shown with the H-toned verbs in (5):

(5) a. ńʧääréé
   1.SG.SUBJ be.annoyed
   I am annoyed

b. ń tʊtʊř⁴
   1.SG.SUBJ push
   I pushed

This rule could be formalized as in (6) below:

(6) **Lexical H Spreading**

\[
\begin{array}{c}
\mu \\
\mu \\
H_{\text{lex}} \\
\end{array}
\]

Given the rules above, certain types of one-syllable verb stems need extra explanation. For example, H-toned verbs with diphthongs appear to be monomoraic, with both vowels attached to the same mora, since the lexical H tone surfaces on both elements of the diphthong, not just the second, as shown in (7):

(7) ńʧéú
   1.SG.SUBJ recite
   I recited

Additionally, in the perfective, consonant-final monosyllabic verb stems also appear to be monomoraic, given that there is a level H tone, not a rising tone on this syllable:

(8) ń páŋ
   1.SG.SUBJ get stuck
   I got stuck

It appears that in this form, the lexical H tone attaches to the vowel mora, because at the time of attachment, the consonant is non-moraic.

However, the final consonant can bear tone that is spread onto it by the rule in (6), so it must either become moraic at a stage in the derivation between the application of H Attachment and the application of Lexical H Spreading, or the spreading rule must be able to spread tone onto non-moraic consonants. This is discussed further (in comparison with other data) below.

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⁴ I mark the tone on the final consonant here to make surface tonal distinctions clear, as will be seen (and discussed) below.
The data presented thus far indicates that in Gisuda Anii, long vowels tend to be bimoraic, while diphthongs are monomoraic, and the moraic status of final consonants is unclear. The grammatical tone data presented in the next section provides further insight.

3. Tone in the Far Past

The far-past form marked by the far-past marker /bɔŋə/ is used here to represent one type of grammatical tone that exists in Gisuda Anii.

The basic tone pattern here is quite simple. There is a grammatical H tone which attaches (like the lexical tone described above) to the second mora of a verb stem, or to the first mora if the second mora is not available (either because there is no second mora, or because the second mora is already attached to a lexical H tone). This is illustrated with toneless verb stems in (9), and H-toned verb stems in (10):

(9) a. ń bɔŋə fɔbá
    1.SG.SUBJ PST change
    I changed (long ago)

b. ń bɔŋə sáá
    1.SG.SUBJ PST reserve
    I reserved (long ago)

(10) a. ń bɔŋə fáŋá
    1.SG.SUBJ PST think
    I thought (long ago)

b. ń bɔŋə sáá
    1.SG.SUBJ PST wait
    I waited (long ago)

Further evidence as to the nature of the grammatical tone attachment in this form is provided by longer verb stems, as illustrated first by (11) with a toneless stem:

(11) ń bɔŋə nɔŋkórə
    1.SG.SUBJ PST subside/relax
    I relaxed (long ago)

In (11), it can be seen that the grammatical tone attaches to the second mora of the verb stem, and then, unlike the lexical tone in the previous section, the grammatical tone does not spread. It is not yet fully clear why this should be, so for now I simply stipulate that lexical H tones are different from grammatical ones. This is an on-going research area.

Note also that the final consonant of the CVC syllable in (11) appears to be non-moraic, and unlike with word-final consonants discussed below, there is no evidence that this ever changes.5

The grammatical H tone is illustrated in (12) with H-toned stems:

5 There are some verbs, which appear to be historically-reduplicated, where syllable-final but non-word-final consonants are moraic, but this seems to be a specific class of verbs, and the consonants in question occur where there was likely an entire syllable historically. An example is here:

ń bɔŋə pɛkimɛ
    1.SG.SUBJ PST arrange/clean
    I cleaned (long ago)
The examples in (12) also illustrate that the presence of the grammatical H tone does not affect the spread of the lexical H tone (attached to the second mora).

With monomoraic toneless verbs (i.e. short vowels and diphthongs) in far past, the grammatical H tone manifests on the only available mora. The stems in (13) are both toneless:

\[(13)\] a. ň bôŋâ dà  
1.SG.SUBJ PST be.there  
I was there (long ago)  
b. ň bôŋâ ŋ̣ęú  
1.SG.SUBJ PST skim  
I skimmed (long ago)

Thus far, the data is as would be expected if the grammatical H tone in the far past obeys the rules in (3) and (4) above, and if diphthongs are assumed to remain monomoraic throughout the derivation.

With CVC verb stems, however, the picture becomes more complicated, as illustrated with the toneless stem in (14):

\[(14)\] ň bôŋâ fôř  
1.SG.SUBJ PST pour  
I poured (long ago)

The data in (14) illustrates that at the time of the grammatical tone attachment, the final consonant is non-moraic, since the H tone is found on the vowel, i.e. on the first mora of the stem.

CVC verbs with H-toned stems, like those with toneless stems, surface with a falling tone in the far past form (among others), as illustrated in (15).

\[(15)\] ň bôŋâ pâŋ  
1.SG.SUBJ PST get.stuck  
I got stuck (long ago)

If we assume the lexical H tone (when present) attaches first, it attaches to the first mora because there is no second mora, and then the grammatical H tone is left floating because it has no mora to attach to.

It is important to note that in this form, there is no spreading of the lexical tone, perhaps because of the presence of a floating grammatical H tone. The structure of this form, after H Attachment and Unattached H Docking have both applied is given in (16). The bolded tone is assumed to be the grammatical one:
Note that H-toned diphthongs also behave similarly to monomoraic words containing short vowels, rather than CVV (or CVC) forms:

\[
(16) \quad C \quad V \quad C
\]

\[
\text{H} \quad \text{H}
\]

(17) ń bōŋà tʃé ū
1.SG.SUBJ PST skim
I skimmed (long ago)

Additionally, there is at least one monosyllabic verb with a long vowel\(^6\) which behaves similarly to CVC verbs, as shown in (18). This stem is toneless, and unfortunately there are no similar examples with lexically H-toned stems:

(18) ń bōŋà jé ū
1.SG.SUBJ PST search
I searched (long ago)

Interestingly, there are other verb stems which seem to have a similar CVV structure in the far-past form, but in the perfective, they surface with short vowels, as illustrated in (19), with a lexically toneless stem in (19a), and a H-toned stem in (19b):

(19) a. ń ʧū
1.SG.SUBJ run
I ran

b. ń ! lî
1.SG.SUBJ draw.water
I ran

The forms in (18) and (19) suggest that some (though not all, cf. examples (9b) and (10b) above) CVV syllables in Anii behave as if they underlyingly have CVC structure. Additionally, it appears that such forms containing high vowels surface with unambiguously short vowels in contexts where a grammatical H tone is not present, even when a lexical H is present.

4. Summary and Analysis

The data given above illustrates that if the mora is the tone-bearing unit in Gisuda Anii, then the language should be presumed to contain monomoraic short vowels and diphthongs, dimoraic long vowels, and variably moraic final consonants. Also, it seems that coda consonants in Anii verbs are not moraic for tone attachment, though word-final consonants can bear tone in certain conditions.

In conclusion, I will look more closely at the options for analyzing the data in (8) and (15), reprinted here:

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\(^6\) Acoustic analysis has not yet been done, but this type of long vowel does seem impressionistically to be shorter than clearly dimoraic long vowels and longer than unambiguously short vowels. This is an area of ongoing investigation.
In (8), there is only a lexical H tone, which cannot attach to the final consonant, presumably because at the time of attachment, the final consonant is not moraic. Therefore, H Attachment cannot apply, but Unattached H Docking results in the lexical H being attached to the vowel mora.

To claim that the mora is the TBU, I need to explain why the Lexical H Spreading Rule (6) can then spread the H tone onto the final consonant. For this, I posit a Mora Docking Rule, given in (20), and assumed to apply after both attachment rules:

(20)  **Mora Docking**
\[
\begin{array}{ccc}
C & V & C^7 \\
\mu & \mu & H
\end{array}
\]

If Mora Docking applies before Lexical H Spreading, then the desired result is obtained, and the same analysis would apply to the example in (15), except that in that case, Lexical H Spreading must be assumed to be blocked by the floating grammatical H tone that is present in that form.

The same type of analysis must apply also to forms such as those in (18) and (19), repeated here:

(18)  ŋ bōnā jēē
\[1.\text{SG.SBJ PST} \text{ search}\]
I searched (long ago)

(19)  a.  ŋ ʧū
\[1.\text{SG.SBJ run}\]
I ran

b.  ŋ  lī
\[1.\text{SG.SBJ PST} \text{ draw.water}\]
I ran (long ago)

Interestingly, with these forms, we must either posit a monomoraic long vowel, or assume that tone attaches to something other than a mora, which seems theoretically unwarranted. Another option is that the final vowels in these forms are underlyingly ‘empty’ consonants which act like all other consonants for purposes of syllable weight, but take their surface segmental features from the preceding segment, and thus sound like vowels.

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7 C and V here represent segments, not timing slots. The fact that this rule applies only to final consonants (or consonant-like forms) and not final vowels is already included in the assumed moraic difference between these segment types. The crucial point is that a final non-moraic segment becomes moraic here.
5. Conclusions
The Gsida Anii data given in this talk have illustrated that the relationship between syllable weight, moras and tone attachment can be quite complicated, and that forms that appear to be long vowels on the surface may have consonantal properties.

Additionally, in a framework where rule-ordering is not possible, the analysis of this data becomes quite complex. For example, it would either be necessary to claim that tone can attach to something other than moras to explain the data in (12), or some concept of extrametricality in certain domains might be needed, complicating the theory. What is clear is that any theory of tone attachment and syllable weight will need to be able to account for the data presented here.

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References