1. Introduction and Research Question

Anii is a severely underdocumented Niger-Congo (probably Kwa) language spoken by approximately 45,900 people on the border between Togo and Benin in West Africa (Lewis 2009). The data analyzed below is from the Bassila dialect of Anii, gathered during fieldwork in Bassila, Benin in Autumn 2009.

1.1 [ATR] Harmony

Vowel harmony based on the feature Advanced Tongue Root (hereafter [ATR]) has been documented for many African languages (cf. Starwalt 2008, Casali 2003, 2008, Clements 2000). An example from Anii is in (1) below, where the same noun-class marker (bolded) contains a different vowel depending on the [ATR] quality of the root to which it is attached. In (1a), the marker is attached to a root with a [+ATR] vowel, in (1b) a root with a [-ATR] vowel:

(1)  a. [gu-jo] ‘tree’
    b. [gʊ-jà] ‘market’

Languages with [ATR]-based vowel harmony have the following general properties:

* There is a set of vowels pronounced with the root of the tongue advanced (i.e. with expanded pharynx), i.e. [+ATR], and a second set of vowels without this feature, i.e. [-ATR]
* There are certain contexts, usually in affixes, where the contrast between pairs of [+ATR] and [-ATR] vowels of roughly the same height and backness (harmonic pairs) is neutralized, with the vowel of the affix taking on the [ATR] quality of the vowel(s) in the root to which the affix is attached (as in (1) above).

1.2 Typological generalizations about [ATR]-harmony languages

The following pertinent generalizations about languages with [ATR] harmony have been made:

* The majority of languages with [ATR] harmony that have been described thus far have either seven or nine vowel phonemes (Casali 2003, 2008, Starwalt 2008)
* Ten-vowel languages are known as well, but are rarer (Clements 2000, Casali 2008).
* There are very few African languages with [ATR] harmony (less than 3% of the languages in Casali’s (2008) survey of over 300 African languages with [ATR] harmony) that are known to have more than ten vowels.

In languages with [ATR] harmony, not all vowels exhibit harmony:

* In 10-vowel languages such as Diola (Sapir 1965), all the vowels of the language participate in the harmony system, so there are five harmonic pairs.
* In 7- and 9-vowel languages, there are one or more vowels that are not part of the harmony system (not part of a harmonic pair), these are called non-participatory vowels.
* The most common non-participatory vowel is /a/, and it has been claimed that the reason /a/ does not have a [+ATR] counterpart in many languages is that vowel quality differences in the mid-central region of the vowel space (where the [+ATR] counterpart of /a/ is in 10-vowel languages) are difficult to pronounce and/or perceive (cf. Stewart 1971, Hall and Creider 1998).

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1 Note that when categorizing the language here, we focus only on phonemes, not counting allophonic variation, though it is common for /a/ (for example) to have an allophonic [+ATR] variant in many languages.
1.3 Why Anii is interesting
Anii has an unusual eleven-vowel system:

*There are five harmonizing pairs including /a/ and /ɨ/, where /a/ is a [-ATR] vowel whose [+ATR] counterpart is a high central vowel, /ɨ/. There is also an eleventh vowel, the mid-central vowel, /ə/.*

*/ə/* is [-ATR], and only appears in words where the surrounding vowels are [-ATR], but it does not have a [+ATR] counterpart.

This talk will describe the phonology of the Anii system of [ATR]-based vowel harmony, including the possible origins of the mid-central /ə/, illustrating how this vowel is different from /ə/ (and from non-participatory vowels like /a/) in other African languages with [ATR]-based vowel harmony. In addition, I will discuss the implications of the Anii vowel system for the typology of [ATR]-harmony languages.

2. Anii Data
Anii has a very robust system of vowel harmony which applies to almost all affixes in the language.

2.1 Vowel Phonemes in Anii
Most Anii vowels come in pairs, one [+ATR] and one [-ATR], except that there are two [-ATR] central vowels, mid and low. The inventory of vowel phonemes in Anii is given in (2):

(2) +ATR -ATR
/i/ /ɨ/ /u/ /v/ /ʊ/
/e/ /o/ /ɛ/ /ɔ/ /ə/

In (3), the vowels are given with their harmonic counterparts (/ə/ is not included in (3) because it has no [+ATR] counterpart):

(3) +ATR -ATR
High front: /i/ /v/
Mid front: /e/ /ɛ/
Central: /ɨ/ /a/
High back: /u/ /ʊ/
Mid back: /o/ /ɔ/

All eleven Anii vowels are phonemic, and there are minimal (or near-minimal) pairs between all the harmonizing vowel pairs, as shown in (4):

(4) [ʧi] 'to die'
[ʧɨ] 'to wash'
[ɲe] ‘to detest/hate strongly’
[wɛ] ‘to lend/pass’
[wɨ́] ‘to meet’
[dʊ́] ‘to put/place’
[fɔrɔ] ‘to mix/knead in’

Phonemic tone is not transcribed here because an analysis of Anii tone has not yet been carried out, but an effort has been made for the minimal pairs given here to have the same tone, though that was not always certain or possible.
Additionally, there are minimal pairs between the two non-low central vowels, as in (5a), and between /a/ and /ɛ/, as in (5b):

(5)  a. [pəl] ‘to cook’    [pɨl] ‘to pursue’
   b. [sələ] ‘to approach’ [sala] ‘to greet’

Thus, Anii can be seen to have eleven vowel phonemes, five [+ATR] and six [-ATR].

2.2 Anii Vowel Harmony

All non-compound words in Anii show a consistent [ATR] value in all of their vowels, including affixes. For example, noun-class markers have two forms, one that surfaces when attached to roots with [-ATR] vowels and one that surfaces when attached to roots with [+ATR] vowels. This is illustrated in (6). The noun-class markers are bolded:

(6)  
<table>
<thead>
<tr>
<th>Class</th>
<th>[-ATR]</th>
<th>[+ATR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[a-bɔɾɨ] ‘sheep/animal’</td>
<td>[i-kutu] ‘orange’</td>
</tr>
<tr>
<td>b.</td>
<td>[ga-ʃil] ‘fish (sg.)’</td>
<td>[gi-du] ‘place’</td>
</tr>
<tr>
<td>c.</td>
<td>[gi-bo] ‘very short shorts’</td>
<td>[gi-dʒe] ‘yam’</td>
</tr>
<tr>
<td>d.</td>
<td>[ɾi-dɔ] ‘neck’</td>
<td>[u-ʃine] ‘heart/courage’</td>
</tr>
<tr>
<td>e.</td>
<td>[ɡiɾ-tɔ] ‘ear’</td>
<td>[ɡu-jo] ‘tree’</td>
</tr>
<tr>
<td>f.</td>
<td>[bu-tɔŋa] ‘salt’</td>
<td>[bu-to] ‘water’</td>
</tr>
<tr>
<td>g.</td>
<td>[a-ɲɛ] ‘hands’</td>
<td>[i-ku] ‘rooms/huts’</td>
</tr>
<tr>
<td>h.</td>
<td>[i-tɔ] ‘strings/cords’</td>
<td>[i-dʒe] ‘yams’</td>
</tr>
<tr>
<td>i.</td>
<td>[i-tuŋa] ‘guinea fowl (pl)’</td>
<td>[i-bu] ‘snakes’</td>
</tr>
<tr>
<td>j.</td>
<td>[ba-ʃʊm] ‘farmers’</td>
<td>[bi-pi] ‘children’</td>
</tr>
</tbody>
</table>

Note that none of the noun-class markers contain mid vowels, but the /ɛ/ and /o/ only appear in words where other vowels (if any) are [+ATR], while /e/ and /a/ only appear in those words where other vowels (if any) are [-ATR]. Mid vowels also trigger appropriate harmony as the only vowel in a root (see e.g. (5e) for /ɔ/ and /o/, (5g) for /ɛ/, and (5h) for /e/).

The vowel /a/ also never surfaces in any of the noun-class marker. However, when it does occur in a word, all other vowels in that word will be [-ATR]:

(7)  
[ɡu-paɾa] ‘arm’
[ɡi-dɔmpəla] ‘slavery/captivity’
[bu-kamə] ‘backs’
[i-fətəla] ‘lamps’

3 The twelve Anii noun classes are currently designated with letters from the Anii alphabet in the absence of an applicable convention for noun-class categorization in Kwa languages. Class Ǝ has no noun-class prefix and Class Ɛ has no vowel (the noun-class marker is simply a nasal consonant, so they are not mentioned further here.

4 These two classes have been kept apart in the past because Class F contains singular objects or mass nouns and Class Ʊ plural objects, but no linguistic reason is seen now to continue that separation. Originally, the ‘singular’ classes were given letters from the beginning of the alphabet and the ‘plural’ classes letters from the end of the alphabet (Zaske 2009).

5 Classes A and T, and U and W respectively have the same noun-class markers but they trigger different agreement patterns, and are so kept as separate classes.
Morton 4

/ə/ can also be the only vowel in a word, in which case it takes [-ATR] affixes, as seen in the forms of [gɪ]/[ɡɪ] (the personal pronoun meaning ‘we’) in the following phrases:

(8) a. [ɡɪ pəl] ‘we cooked’
   b. [ɡɪ pɨl] ‘we pursued’

[ATR] harmony in Anii also occurs in adjectives which agree in noun class with the noun they modify. The [ATR] specification of the vowel in the noun-class agreement on the adjective is influenced by the vowels in the adjective root. The vowels of the noun-class markers are bolded:

(10) a. [ɡi-dʒe gi-tolo] ‘uncooked yam’
    \hspace{1cm} \textit{yam} \hspace{1cm} \textit{uncooked}

   b. [ɡi-dʒe ɡi-fɔlɪ] ‘new yam’
    \hspace{1cm} \textit{yam} \hspace{1cm} \textit{new}

   c. [ɡi-dʒaŋkət gi-tolo] ‘uncooked pepper’
    \hspace{1cm} \textit{pepper} \hspace{1cm} \textit{uncooked}

   d. [ɡi-dʒaŋkət ɡi-fɔlɪ] ‘new pepper’
    \hspace{1cm} \textit{pepper} \hspace{1cm} \textit{new}

Grammatical particles in the verb phrase also exhibit [ATR] harmony. There is obligatory noun-class agreement between the subject and the verb, coming at the beginning of the verb phrase. Subject pronouns (as in (8) above), agreement markers, and the imperfective marker [ti]/[tɪ], show [ATR] harmony with the verb root. The verbal morphology exhibiting [ATR] harmony is bolded in (10) below. The verb roots are [pɛmpɛŋɛ], ‘to clean’ and [kide], ‘to look at’:

(11) a. bi-pi \textit{ba-fi-pɛmpɛŋɛ} \hspace{0.5cm} ŋ-ku
    \hspace{1cm} \textit{CL.Y.child} \hspace{1cm} \textit{AGR.CL.A.IMPF clean} \hspace{1cm} \textit{CL.E.room}’

    The children are cleaning the room

   b. bi-pi \textit{bi-ti-kide} \hspace{0.5cm} ŋ-ku
    \hspace{1cm} \textit{CL.Y.child} \hspace{1cm} \textit{AGR.CL.A.IMPF look.at} \hspace{1cm} \textit{CL.E.room}

    The children are looking at the room

Thus far, it has been shown that nominal, adjectival and verbal prefixes in Anii are affected by [ATR] harmony. In addition, at least one suffix, a relativizer, shows similar effects:

(12) a. [ɡi-du] ‘place’
   b. [a-re] ‘man’

| a. | [ɡi-du-i] ‘place where’ |
| b. | [a-re-i] ‘man who’ |

There are also nominalizing circumfixes that display [ATR] harmony, of which an example is given in (13):

(13) a. [fanə] ‘to teach’
   b. [boŋo] ‘to finish’

| a. | [tʃfanə] ‘the act of teaching’ |
| b. | [ubonə] ‘the end’ |

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6 Research is ongoing as to whether any other TAM markers also exhibit [ATR] harmony (some at least do not)
7 Abbreviations used in the glosses: \textit{CL} = noun-class (followed by the letter of the noun-class), \textit{AGR} = agreement, \textit{IMPF} = imperfective marker.
2.3 Summary of [ATR] harmony in Anii

* [ATR] harmony in Anii is found in both suffixes and prefixes, and on nouns, adjectives and verbs.
* High vowels and low vowels in Anii undergo [ATR] harmony.
* Mid vowels never appear in harmonizing environments, but each mid vowel has a consistent [ATR] quality, with /e/ and /o/ being consistently [+ATR] and /ɛ/, /ɔ/ and /ə/ consistently [-ATR].
* Among the Anii vowels, /ə/ alone is not part of a [+ATR]/[-ATR] pair.

3. The central vowels and /a/

Anii differs from other languages with [ATR] harmony mainly in the behavior of /a/ and the two central vowels /ə/ and /ɨ/. This is illustrated in this section.

3.1 /a/ in 7- and 9-vowel languages

The status of /a/ in the [ATR] harmony systems of seven- and nine-vowel African languages is quite varied. Claims that have been made about /a/ include:

*/a/ in most such languages is a [-ATR] vowel (triggering [-ATR] in harmonizing affixes) with no harmonic counterpart. Often, however, /a/ has a [+ATR] allophone in [+ATR] words (cf. Casali 2008).

* Possibilities for the [+ATR] allophone include [æ] (Gichode, Obenga 1995), some kind of mid-central vowel (e.g. [ʌ] in Maiak, Hall and Creider 1998, [ɜ] in Abe, Stewart 1971, or [ɨ] in Mabaan, Hall and Creider 1998). Also, [e] (in many languages, especially in West Africa, Casali 2008), [o] (many languages, especially in East Africa, Casali 2008), or even [ɔ] (e.g. Ateso, Hall and Creider 1998)).

*/a/ is either restricted to [-ATR] words, or can occur in words with either kind of vowel (is neutral)

3.2 /a/ and /ə/ in 10- and 11-vowel languages

Languages with ten vowel phonemes show /a/ with a [+ATR] counterpart which is a central vowel, sometimes transcribed as /ə/ (cf. Diola-Fogny, Sapir 1965), and sometimes as /ɨ/ (cf. Bongo, Kilpatrick 1985). Ten-vowel systems are generally straightforward, with every vowel having an harmonic counterpart (Casali 2008).

Eleven-vowel systems are much rarer and more varied, but some examples are given here:

In Baka (Parker 1985), a Nilo-Saharan language of Sudan, eleven vowels have been reported:

* The [+ATR] counterpart of /a/ is transcribed as /ə/
* The eleventh vowel in Baka, /ɨ/, is claimed to be neutral, appearing in both [+ATR] and [-ATR] words without restriction.
* /ɨ/ in Baka appears to be the result of a general process of vowel reduction, appearing in ‘unstressed’ syllables and never as the only vowel in a word.

Anii /ə/ is different from the non-participatory vowel in Baka on several counts. Firstly, /ə/ in Anii is consistently [-ATR], rather than neutral. Secondly, in Anii, /ə/ can be the only vowel in a word, as illustrated below in (13), so it is not a reduced vowel in the same way the /ɨ/ in Baka is:

(13) [fəl] ‘to pass/leave’
[kə] ‘to hit’
In Lama (Ourso 1989b), a Gur language which is spoken very close to the Anii area, there are also eleven phonemic vowels, but in Lama:

* /a/ is the non-participatory (and neutral) vowel, while /ə/ is the [+ATR] counterpart of another central vowel, /ɜ/.
* Ourso (1989a, b) also claims that the /a/ in Lama has a [+ATR] allophone, [ʌ], in the environment of [+ATR] vowels.

Anii /ə/ and /a/ are different from those in Lama, since in Anii, /ə/ does not have a harmonic counterpart but /a/ does. Despite the lack of a counterpart, however, /a/ in Anii can not be considered neutral in the same sense that /a/ is in the majority of languages with [ATR] harmony (including Lama), since in Anii, /a/ only occurs in [-ATR] words, and does not have a [+ATR] allophone.

As far as I know, no other languages have been reported with a vowel system like that found in Anii.

3.2 Speculation on the historical origin of the Anii /ə/

Given the behavior of /ə/, /ɨ/ and /a/ in Anii, it is likely that the eleven-vowel system of Anii is the result of a phonemic split. This section presents the available evidence from within Anii supporting this hypothesis.

While /ə/ is clearly a phoneme in modern Bassila Anii, it’s distribution suggests it may have originated as an allophone of /ɨ/ before liquids and nasals:

*In multi-syllable words, /ə/ almost always appears in the pattern /əla/, /əNa/ or /əra/ (e.g. [gɪdəmpəla], ‘slavery’, [asəna], ‘dog’, [gakəma], ‘back’, [atsəra], ‘bushrat’)

*In CVC words, /ə/ (and all other vowels) appears but /ɨ/ does not (the only permitted final consonants are liquids and nasals). For example, [pəl], ‘to cook’, [tsəŋ], ‘to be good’, [ɲem], ‘to drink’, [boŋ], ‘to be finished’, [fũŋ], ‘to cultivate’, [kul], ‘to pound’, [fɛr], ‘to sweep’, [man], ‘to mix’, etc.)

*In other dialects of Anii, some of the words that contain /ə/ in Bassila Anii have /ɨ/ instead. For example, [asəna] was given as the word for ‘dog’ in at least seven Anii villages during a short dialect survey I conducted in 2006. The word in Bassila Anii is [asəna].

However, in modern Bassila Anii, there are near-minimal pairs between /ə/ and /ɨ/, as shown in (14):

(14) a. [tsə] to build [fɪ] to wash
b. [sə] to scar [fɪ] to buy

(14a) is of especial note here, since [ts] as an allophone of /ʧ/ for many speakers only occurs before /ə/ (and /ɨ/), meaning that /ə/ and /ɨ/ condition different allophones of this phoneme, which could provide further evidence that they are now different phonemes.

Thus, I posit that perhaps /ə/ in Anii originated as a reduction of /ɨ/ before nasals and liquids, which explains why /ə/ is [-ATR] (since /ɨ/ is [-ATR]).

A synchronic analysis, however, must still posit two phonemes since both sounds appear in monosyllabic words with similar phonetic environments and the same tone, they behave differently with

8 There is some evidence that [f] is a new, possibly marginal, phoneme in Bassila Anii, since it does not exist in most other dialects, and in Bassila is present mostly in borrowed words or before front vowels.
regard to conditioning allophones of the phoneme /ʧ/. Additionally, /ə/ is no longer completely limited to environments preceding liquids or nasals (cf. [fətəla], ‘lamp’, [səba], ‘to begin’, and [sə], ‘to sit’).

4. Conclusions and Typological Implications
As has been shown here, Bassila Anii has an unusual 11-vowel system of [ATR]-based harmony where the non-participatory vowel with respect to harmony is a mid-vowel, rather than a low vowel. This system appears to be the result of an historic phonemic split.

It has been argued (cf. Stewart 1971, Hall and Creider, 1998) that /a/ is so often non-participatory in vowel systems with [ATR] harmony because central [+ATR] vowels are hard to either hear or produce. In Bassila Anii, however, it appears a new mid-central vowel phoneme has been added where most scholars would predict only phoneme loss (cf. Polgárdi 1998 for a theoretical analysis that makes a prediction along these lines).

The facts of Anii can shed light on the origins of vowel systems with more than 10 vowels, given proposals that various proto-languages in Africa had ten-vowel systems of [ATR] harmony (cf. Stewart 1971 for Proto-Niger-Congo, Armstrong 1985 for Proto-Kwa).

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References


