Title
Phonetics and Phonology of Urhobo

Permalink
https://escholarship.org/uc/item/2q6685k5

Journal
UC Berkeley PhonLab Annual Report, 9(9)

Author
Rolle, Nicholas

Publication Date
2013
This paper describes the 14 vowel phonemes, 26 consonant phonemes, and 3 contrastive tone units in Urhobo. Accompanying .wav files mentioned in this paper are available upon request to the email provided above.

Table of Contents
1. Section 1 – The language and the language consultant.................................................................................. 2
2. Section 2 – Vowels ............................................................................................................................................. 2
3. Section 3 – Consonants ................................................................................................................................ 10
   3.1. Plosives ..................................................................................................................................................... 10
   3.2. Affricate /dz/ .......................................................................................................................................... 15
   3.3. Nasals ..................................................................................................................................................... 17
   3.4. Fricatives ............................................................................................................................................... 19
   3.5. Approximants ........................................................................................................................................ 24
   3.6. Liquids ................................................................................................................................................... 25
       3.6.1. Alveolar lateral /l/ ..................................................................................................................... 25
       3.6.2. Rhotics /r/ and /r̥/ ...................................................................................................................... 25
4. Section 4 - Prosody ......................................................................................................................................... 32
   4.1. Tone ....................................................................................................................................................... 32
       4.1.1. Lexical tone ....................................................................................................................................... 32
       4.1.2. Grammatical Tone ............................................................................................................................ 39
       4.1.2.1. Associative construction – H floating tone ............................................................................... 39
       4.1.2.2. Temporal/aspectual distinctions ................................................................................................. 39
   4.2. Intonation and Tone ................................................................................................................................ 40
5. Section 5 - Phonological process – Nasal spread .............................................................................................. 41
References............................................................................................................................................................. 43
Appendices......................................................................................................................................................... 44
Appendix 1 .......................................................................................................................................................... 45
Appendix 2 .......................................................................................................................................................... 46

1 Many thanks go to Enojare Uadiale first and foremost for her patience and knowledge, and further to Herman Leung, Katie Sardinha, and Keith Johnson.
1. **Section 1 – The language and the language consultant**

Urhobo (ISO code: urh) is a South West Edoid language [Benue-Congo, Niger-Congo] spoken in Delta State, Nigeria, in the south-south geopolitical zone (see the genetic tree in Appendix 1, adopted from Elugbe 1989a,b). Population estimates range from approximately 500,000 (Lewis 2009) to 1.5 million (Mowarin 2004), with a significant population abroad (e.g. the Urhobo Progressive Union of Northern California, and Urhobo Congress USA Inc., etc.). No figures are available distinguishing number of speakers from number of ethnic group members. Although the language is widely spoken, Ojaide (2007: 3) reports that many of those who live in the urban centers of Urhoboland such as Effurun, Sapele, Ughelli, and Warri do not use and/or speak the language. This is particularly apparent among those who are under 21, who use Nigerian Pidgin English and Nigerian Standard English as the primary medium for inter-ethnic communication. Therefore, one should consider the Urhobo language highly endangered, despite a fairly large speaker population. A map of the Edoid languages locating where Urhobo is spoken is provided in Appendix 2.

The consultant identified for this paper was born in 1967 in the village of Eko in Urhoboland, and grew up most of their life in the cosmopolitan city of Warri (consisting of Urhobo, Ijaw, and Itsekiri people speaking quite distinct languages). They grew up speaking Urhobo with their parents, who spoke different dialects. They still speak with their mother in Urhobo, who remains in Nigeria. At 20 years old, they moved to Lagos (the largest city in the country within the Yoruba area in SW Nigeria), away from Urhoboland, and came to America at age 32. The consultant speaks both Urhobo and English fluently, though does not often speak Urhobo in the US. They know vocabulary and phrases from many other Nigerian languages, as well.

The earliest documentation on Urhobo is an 1828 word list by Hannah Kilham, as spoken by a freed slave in Freetown, Sierra Leone (Kilham 1828). In general, however, little research has been conducted on Urhobo and few resources exist. Two small dictionaries have been produced (Ukere 1986 and Usobele 2001), though no reference grammar exists. A number of articles exist written mostly for journals with areal commitments to West Africa. Previous phonetics/phonology research on Urhobo include Ladefoged (1968), Welmers (1969), Dunstan (1969), Iweh (1983), and Aziza (1997, 2002, 2003, 2006, 2008), among others.

2. **Section 2 – Vowels**

Urhobo contrasts seven vowels qualities. Each vowel has oral and nasal counterparts. Vowel length is not contrastive, and no distinctive phonations types exist. Vowels may occur in word initial or word final position. Phonetic diphthongs exist, but are restricted. We can therefore understand Urhobo as contrasting 14 vowel phonemes. This is summarized in the chart below:
Some near-minimal pairs involving oral and nasal vowels are provided below.

1. Oral and Nasal pairs

<table>
<thead>
<tr>
<th>Urhobo English</th>
<th>Wav</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /ùdì/</td>
<td>“a drink” Rolle_Urhobo_drink.wav</td>
</tr>
<tr>
<td>/òdì/</td>
<td>“grass” Rolle_Urhobo_grass.wav</td>
</tr>
<tr>
<td>b. /úkpè/</td>
<td>“bed” Rolle_Urhobo_bed.wav</td>
</tr>
<tr>
<td>/ékpè/</td>
<td>“sand” Rolle_Urhobo_sand.wav</td>
</tr>
<tr>
<td>c. /bɛɛrɛɛ/</td>
<td>“to tear” Rolle_Urhobo_to tear - bere.wav</td>
</tr>
<tr>
<td>/àbɛɛrɛ̃̀/</td>
<td>“sword” Rolle_Urhobo_sword - aberen.wav</td>
</tr>
<tr>
<td>d. /ésàkpà/</td>
<td>“ant” Rolle_Urhobo_ant - esakpa2.wav</td>
</tr>
<tr>
<td>/ésà/</td>
<td>“six” Rolle_Urhobo_six - esan3.wav</td>
</tr>
<tr>
<td>e. /ɔ̃xɔ̃/</td>
<td>“chicken” Rolle_Urhobo_chicken - oho1.wav</td>
</tr>
<tr>
<td>/ér̥ɔ̃́/</td>
<td>“ears” Rolle_Urhobo_ears - erhon1.wav</td>
</tr>
<tr>
<td>f. /ùgbo/</td>
<td>“knee” Rolle_Urhobo_knee.wav</td>
</tr>
<tr>
<td>/àgbo/</td>
<td>“Agbon” (a clan of Urhobo) Rolle_Urhobo_Agbon clan.wav</td>
</tr>
<tr>
<td>g. /èwù/</td>
<td>“Ewu” (a village of Urhoboland) Rolle_Urhobo_Ewu village.wav</td>
</tr>
<tr>
<td>/èwù/</td>
<td>“clothes” Rolle_Urhobo_clothes ewun - said to be bad when oral.wav</td>
</tr>
</tbody>
</table>

The distinction between the nasal mid-open and mid-close vowels is difficult to determine in certain words/tokens. Many neighboring languages only consists of one oral vowel at the mid-position, typically the mid-open vowels /ɛ/ and /ɔ̃/ (e.g. in Edo, Esan, Yoruba, among others).

There are no apparent restrictions on the distribution of the oral vowels. All may appear in word initial, word medial, and word final position, as shown below:

2 Due to a lack of phonological process data, I do not make any claims as to the featural content of these vowels at this point; the labels “open”, “closed”, “back”, etc. therefore should not be understood as coextensive with features at this point.
Distribution of Vowels | Word Initial | Word Medial | Word Final |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>/i/</td>
<td>/ibi/</td>
<td>/dífigbò/</td>
<td>/èdì/</td>
</tr>
<tr>
<td></td>
<td>“seeds”</td>
<td>“oil”</td>
<td>“palm nut”</td>
</tr>
<tr>
<td>/ɛ/</td>
<td>/ébrì/</td>
<td>/ibêkpê/</td>
<td>/ɔbê/</td>
</tr>
<tr>
<td></td>
<td>“darkness”</td>
<td>“wings”</td>
<td>“leaf, book”</td>
</tr>
<tr>
<td>/ɛ/</td>
<td>/ɛ̃jɛ/</td>
<td>/âbɛrɛ/</td>
<td>/ɔ́rɛ/</td>
</tr>
<tr>
<td></td>
<td>“goat”</td>
<td>“sword”</td>
<td>“plantain”</td>
</tr>
<tr>
<td>/a/</td>
<td>/âmɛ/</td>
<td>/ı́faiɛ/</td>
<td>/ɛ́kà/</td>
</tr>
<tr>
<td></td>
<td>“water”</td>
<td>“man”</td>
<td>“corn”</td>
</tr>
<tr>
<td>/ɔ/</td>
<td>/ɔ́sɛ/</td>
<td>/gòrɔ́/</td>
<td>/ɔ́wɔ́/</td>
</tr>
<tr>
<td></td>
<td>“father”</td>
<td>“palm wine”</td>
<td>“leg”</td>
</tr>
<tr>
<td>/o/</td>
<td>/ɔgbɛ́/</td>
<td>/ʊkɔ́nĩ́/</td>
<td>/ɛ́yɔ́/</td>
</tr>
<tr>
<td></td>
<td>“tortoise”</td>
<td>“kitchen”</td>
<td>“darkness”</td>
</tr>
<tr>
<td>/u/</td>
<td>/ʊрjɛ́/</td>
<td>/ʊgbú*kɔ́/</td>
<td>/isṹ/</td>
</tr>
<tr>
<td></td>
<td>“river”</td>
<td>“back”</td>
<td>“stars”</td>
</tr>
</tbody>
</table>

Few examples occur with the mid-open vowels /ɛ/ and /ɔ/ in word medial position.

This 7-vowel quality system descended from a 10 vowel system which maintained an advanced tongue root [ATR]/retracted tongue root [RTR]\(^3\) distinction which has collapsed in Urhobo (Elugbe 1989b) [Only the Degema language maintains the conservative ATR proto-Edoid system, and exhibits full harmony (Kari 2004)]. Additional evidence that this system has collapsed is that vowels which would have formerly been classified as [–ATR] (/ɛ/ and /ɔ/) can appear freely with vowels which would have been classified as [+ATR] (/e/ and /o/). This is shown in the examples below.

2. **Free occurrence of mid vowels**
   a. /òwɔ́/ “leg”
   b. /ɔ́sɛ/ “father”
   c. /ɛ̃jɛ/ “goat”
   d. /ɔbê/ “leaf, book”
   e. among others

This is not so for other languages with a collapsed ATR system (e.g. Yoruba which forbids oCɔ type sequences ). There is currently not enough data available to determine if all vowels occur with all others vowels in a word, though I do not suspect this to not be the case.

The distribution of nasal vowels is more complicated. This complication arises due to a phonological process of rightward (anticipatory) nasal spread from either (A) a nasal consonant, or (b) a nasal vowel (see section 5. Section 5 - Phonological process – Nasal spread on 41). From the data, however, we can make the following two observationally adequate statements:

\(^3\) I will refer to this as [-ATR].
[1] When nasal spread does not occur, nasal vowels are found in word final position
   e.g. /èvũ/ [èvũ] “belly”

[2] When nasal spread does occur, nasal vowels occur in word initial, medial, and final position
   e.g. /íjòrı̃́/ [ı̃́ȷ̃õ̃́ɾ̃ı̃́] “five”
   /àŋ̊́mã́/ [ã̊mã] “cloth”

The only possible exceptions are /èkã́ì̃́kã́ì̃́/ “local gin” (which has clear reduplication), and /íjã́wɔ̀/ “soldier ant”, which is only variably nasalized, and may be a synchronic of diachronic compound. That nasals do not occur phonologically other than in the final position makes sense for two reasons. One is that these nasal vowels likely come from coda nasal stops which have been lost (research would need to be conducted looking at the diachrony). Secondly, the initial vowel on the nouns throughout are a remnant noun class marker which has been (arguably) incorporated into the stem (i.e. no longer combinatorial). Elugbe (1989b) reconstructs these noun class markers, and shows that they are all oral vowels with V (and a few CV) shapes. Nasal vowels or nasal consonants are not reconstructed for these noun class markers.

In certain tokens, nasal vowels are often difficult to hear, and can alternate with an oral counterpart in non-careful speech. This alternation has been noted by other researchers studying Urhobo as well (e.g. Welmers 1969:85). Variation in nasality is shown in the examples below:

3. /àbɛ́rɛ́/ “sword”
   [àbɛ́rɛ́] Rolle_Urhobo_sword - aberen.wav
   [àbɛ́rɛ́] Rolle_Urhobo_sword - abere - oral.wav

This variation in nasality is not noted for the nearby Edoid languages Edo and Esan.

No true diphthongs are attested in the language, that is, dynamic vowel sequences which consistently patterns as a single phoneme. There are instances of vowel-vowel sequences, however, though these are much more rare than single vowel occurrences, and depend on a particular analysis. The following chart displays vowel-vowel sequences attested in the language within words.
One can see from this chart that if one assumes that sequences [C{j/w}V] are underlinglly /C{i/u}V/, then there are many vowel-vowel sequences. If, however, one assumes that these are underlinglly /C{j/w}V/, then the only vowel-vowel sequences are /ei/ and /ai/4. The reason why I posit /C{i/u}V/ sequences as vowel-vowel sequences is because in some tokens, two vowels can clearly be heard. This is shown below:

4. Vowel-vowel sequences
   a. /òsìò/ “rain”
      [òsìøjò]~/òsìjò] Rolle_Urhobo_rain - osio - diphthong.wav
   b. /òviè/ “king”
      [òviè]~/òvìjè] Rolle_Urhobo_King.wav

A spectrogram for /òsìò/ “rain” is provided below. Here, one can clearly see the two vowels /i/ and /o/, associated with distinct F2 values. The duration of /i/ lasts for a significantly long portion (roughly 123 ms, or about 1/3 the total vowel-vowel sequence duration).

4 These should not be analyzed as /ej/ and /aj/ as there is no evidence for codas anywhere in the language.
[It should be noted, however, that the [wV] sequences sound more like a glide+vowel than a vowel+vowel sequence, perhaps suggesting that these are underlyingly /wV/ sequences. More research is required for vowel-vowel sequences in general, and more instrumental readings.]

That vowel-vowel sequences are rare in Urhobo is interesting if we note how often they occur in more northerly Edoid languages, e.g. Emai (Data from Schaefer & Egbokahre 2007):

5. Emai:
   a. ótòí /òtɔí/ “origin, source”
   b. éókhɔ /éɔxɔ/ “fowls”
   c. éèà /ê:à/ “person”
   d. háùn /hâù/ “great distance”

Urhobo, therefore, patterns much closer to the Delta Edoid language Degema, which has been claimed to have no non-identical vowel-vowel sequences (Kari 2004:383) [Refer to Appendix 1, the Edoid tree on page 45 for the relationship of Urhobo to Degema. These two languages are not geographically close, relatively.] Further research is required to determine if this is an areal feature, a genetic feature, or coincidence.

A vowel plot showing the F1 and F2 values of these 14 vowels (7 oral and 7 nasal) are provided below. Oral and nasal vowels are provided in separate charts. 10 tokens of each vowel were used. Raw data is provided upon request, in an excel file. The average is provided in the black box.
6. Oral vowels
7. Nasal vowels

The vowels are fairly cleanly distributed for the oral vowels, with very minimal overlap. The nasal vowels are not as cleanly distributed (especially with respect to the non-low, back vowels). The average of the vowels is similar for both sets, though two points should be made. First, the nasal /ã/ has a lower F1 than the oral /a/ counterpart, suggesting it may be characterized as [ɐ̃] (comparison to Portuguese low nasal vowel might be interesting here). Secondly, the oral vowel /o/ has a lower F2 than the nasal counterpart /õ/, therefore suggesting /o/ is pronounced further back (this should be looked at both with respect to tongue shape, but also tongue root position, a possible remnant of the former ATR system). Tokens of /õ/ were rare in this corpus.
3. Section 3 – Consonants

A list of the 26 (possibly 28) consonantal phonemes found in Urhobo is provided in the table below.

<table>
<thead>
<tr>
<th>Consonants (Phonemic)</th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Alveolar</th>
<th>Post-alveolar</th>
<th>Palatal</th>
<th>Velar</th>
<th>Labial-Velar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plosive</strong></td>
<td>p</td>
<td>b</td>
<td>t</td>
<td>d</td>
<td>k l</td>
<td>g</td>
<td>kp</td>
</tr>
<tr>
<td><strong>Nasal</strong></td>
<td>m</td>
<td>(n)</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fricative</strong></td>
<td>φ</td>
<td>f</td>
<td>v</td>
<td>s</td>
<td>j</td>
<td>x</td>
<td>y</td>
</tr>
<tr>
<td><strong>Affricate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approximant</strong></td>
<td>β</td>
<td></td>
<td></td>
<td></td>
<td>j</td>
<td>w</td>
<td></td>
</tr>
<tr>
<td><strong>Lateral approximant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Trill/Tap/Flap</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>r</td>
<td>r</td>
<td></td>
</tr>
</tbody>
</table>

A list of phonetic variants of these phonemes are below. These variants are explained in this section.

<table>
<thead>
<tr>
<th>Consonants (Phonetic)</th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Alveolar</th>
<th>Post-alveolar</th>
<th>Retroflex</th>
<th>Palatal</th>
<th>Velar</th>
<th>Labial-Velar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plosive</strong></td>
<td>p’</td>
<td>b</td>
<td>tʰ</td>
<td>d</td>
<td>kʰ, cʰ</td>
<td>g</td>
<td>kʰ</td>
<td>g</td>
</tr>
<tr>
<td><strong>Nasal</strong></td>
<td>m</td>
<td>(n)</td>
<td>n</td>
<td></td>
<td>n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fricative</strong></td>
<td>φ</td>
<td>f</td>
<td>v</td>
<td>s</td>
<td>j</td>
<td>ç</td>
<td>j</td>
<td>x</td>
</tr>
<tr>
<td><strong>Affricate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tʰ, tʰs</td>
<td>d̃</td>
<td>d̃</td>
<td></td>
</tr>
<tr>
<td><strong>Approximant</strong></td>
<td>β</td>
<td></td>
<td>j</td>
<td>ɾ</td>
<td>ɾ</td>
<td>j</td>
<td>ɾ</td>
<td>j</td>
</tr>
<tr>
<td><strong>Nasal Approximant</strong></td>
<td>β̃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lateral approximant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trill/Tap/Flap</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ɾ, r</td>
<td>ɾ, r</td>
<td>ɾ̃</td>
<td>ɾ̃</td>
</tr>
</tbody>
</table>

3.1. Plosives

Urhobo contrasts stops at 5 places of articulation: bilabial, alveolar, palatal, velar, and labial-velar. Each of these has a voiceless/voiced pair (although the distribution of the voiced palatal is more complicated; see below). Voiceless stops /t k l/ are aspirated (i.e. there is a period of
voicelessness after the release of the burst); /p/ is found only in loanwords and is lightly aspirated; /kp/ is not aspirated. Plosive contrasts are shown in the pairs below:

8. Plosives
   a. Bilabial
      /iːpˈtu/ [ipˈɔtʰu] “pot”
      /aːbɔ/ [abɔ] “hands”
   b. Alveolar
      /tʰoːdɛ/ [tʰɔdɛ] “till tomorrow, good bye”
      /ɔdɔdɔ/ [ɔdɔdɔ] “flower”
   c. Palatal
      /kʲɛ/ [kʰɛ] [kʰɛ] “will” (future marker)
      (/eɡʲeɾɛ/ [eɡʲeɾɛ] “crocodile”)
   d. Velar
      /ɔkʰa/ [ɔkʰa] “corn”
      /uɡav̩a/ [uɡav̩a] “stomach”
   e. Labial-velar
      /ɛkpɔ/ [ɛkpɔ] “fool”
      /aɡbàkɔɾa/ [aɡbàkɔɾa] “local gin”

We present a spectrogram comparison of a three-way minimal pair for the stops /kʲ/, /k/, and /kp/ below (ignoring tone):

9. Spectrogram comparison
   a. /ɔkʲɛ/ “large calabash”
   b. /ɔkɛ/ “natural gift, talent”
   c. /ɔkpɛ/ “Okpe ethnic group”
/òkê/ “large calabash”

/òkê/ “natural gift, talent”

/ókpê/ “Okpe ethnic group”
We can see from these spectrograms (at least) the following, which we can interpret as the acoustic cues in the signal to distinguish these phonemes (besides aspiration distinctions):

[1] The velar pinch for /kʲ/ is strong
[2] There is a rising of F1 and F2 for /kp/, which is typically associated with labial sounds (Ladefoged & Johnson 2011)
[3] There is a palatal period after the release burst of /kʲ/ in which F1 is lower and F2 is higher.

Further, with respect to aspiration, the following VOT measurements have been made on a few select tokens.

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Word (phonetic)</th>
<th>Meaning</th>
<th>VOT</th>
<th>.wav</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>ŋisip’i tôho</td>
<td>hospital</td>
<td>36</td>
<td>Rolle_Urhobo_hospital - osipito.wav</td>
</tr>
<tr>
<td>p</td>
<td>ŋisip’itôho</td>
<td>hospital</td>
<td>31</td>
<td>Rolle_Urhobo_hospital1.wav</td>
</tr>
<tr>
<td>p</td>
<td>ipôtũ</td>
<td>hospital</td>
<td>13</td>
<td>Rolle_Urhobo_pot</td>
</tr>
<tr>
<td>t</td>
<td>âfjôtôv̩</td>
<td>rabbit</td>
<td>60</td>
<td>Rolle_Urhobo_rabbit</td>
</tr>
<tr>
<td>t</td>
<td>ñkôtũ</td>
<td>needle</td>
<td>100</td>
<td>Rolle_Urhobo_needle1</td>
</tr>
<tr>
<td>t</td>
<td>itũába</td>
<td>tobacco</td>
<td>83</td>
<td>Rolle_Urhobo_tobacco</td>
</tr>
<tr>
<td>kʲ</td>
<td>kʰùdźi</td>
<td>to steal</td>
<td>93</td>
<td>Rolle_Urhobo_to_steal - kyuji</td>
</tr>
<tr>
<td>kʲ</td>
<td>ōkʰë́</td>
<td>calabash</td>
<td>111</td>
<td>Rolle_Urhobo_calabash_large1</td>
</tr>
<tr>
<td>kʲ</td>
<td>ēkʰë́</td>
<td>door</td>
<td>50</td>
<td>Rolle_Urhobo_door</td>
</tr>
<tr>
<td>k</td>
<td>kʰɛ̀rovò</td>
<td>count one...</td>
<td>45</td>
<td>Rolle_Urhobo_count_one - kerovo</td>
</tr>
<tr>
<td>k</td>
<td>ñkʰè</td>
<td>time</td>
<td>76</td>
<td>Rolle_Urhobo_time1</td>
</tr>
<tr>
<td>k</td>
<td>ēkʰú</td>
<td>Eku town</td>
<td>66</td>
<td>Rolle_Urhobo_Eku_Town</td>
</tr>
<tr>
<td>kp</td>
<td>ókpê</td>
<td>Okpe group</td>
<td>-18</td>
<td>Rolle_Urhobo_Okpe_tribe</td>
</tr>
<tr>
<td>kp</td>
<td>ikpükpujêkʰê</td>
<td>duck</td>
<td>-25</td>
<td>Rolle_Urhobo_duck - ikpukpuyeke2</td>
</tr>
<tr>
<td>kp</td>
<td>mì kʰè *kpô</td>
<td>I want to go home</td>
<td>-109</td>
<td>Rolle_Urhobo_i_want_to_go_home</td>
</tr>
</tbody>
</table>

From this chart, we can see two things. First, the VOT is significantly shorter for /p/ than it is for the other voiceless stops. Secondly, the /kp/ sequence has a negative VOT, in some cases, quite dramatically, e.g. for the last token [kpô] from [mì kʰè *kpô] “I want to go home”. The phoneme /kp/ is distinguished from the phoneme /gb/ by the amount of negative –VOT. A spectrogram comparison is below. This is the [kpô] from the token above, compared with [gb] in /ùgbò/ “knee” (Rolle_Urhobo_knee.wav).
When we compare these, we see that the voicing lasts throughout the duration of /gb/, whereas it only starts past the second half with /kp/. 
There appears to be complementary distribution between [gʲ] and [g] in this data set, unlike with [kʲʰ] and [kʰ] (see minimal pair on page 11). [gʲ] appears before front vowels /i e ɛ/, while [g] appears before non-front vowels /a ɔ o u/:

<table>
<thead>
<tr>
<th></th>
<th>gʲ</th>
<th>g</th>
<th>kʲʰ</th>
<th>kʰ</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>ɪɡɪˈjɛrɛ</td>
<td>ɣɛ̀ɾ</td>
<td>ɛkʲʰɪʊsɪɭ</td>
<td>ɪkʰɪʃɛnɪ</td>
</tr>
<tr>
<td></td>
<td>“bicycle”</td>
<td></td>
<td>“rainy season”</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>ɛɡɛrɛ</td>
<td>-</td>
<td>-</td>
<td>ʊkʰɛɭɛ</td>
</tr>
<tr>
<td></td>
<td>“crocodile”</td>
<td></td>
<td></td>
<td>“numeral”</td>
</tr>
<tr>
<td>ε</td>
<td>ɪɡɛrɛ</td>
<td>ɛkʰɛ</td>
<td>-</td>
<td>ɔkʰɛ</td>
</tr>
<tr>
<td></td>
<td>“Idjere village”</td>
<td>“door”</td>
<td></td>
<td>“natural gift”</td>
</tr>
<tr>
<td>a</td>
<td>-</td>
<td>ʊɡává</td>
<td>ɛbáɭ “will”</td>
<td>ɭɡbákʰâɭ “local gin”</td>
</tr>
<tr>
<td>ɔ</td>
<td>-</td>
<td>ɔɡɔɭ “palm wine”</td>
<td>-</td>
<td>ɔkʰ “boat”</td>
</tr>
<tr>
<td>o</td>
<td>-</td>
<td>ɔɡode “sheep”</td>
<td>-</td>
<td>ʊkʰ “needle”</td>
</tr>
<tr>
<td>u</td>
<td>-</td>
<td>ɛɡusí “melon (dish)”</td>
<td>ɛbád “to steal”</td>
<td>ʊkʰ “grinding stone”</td>
</tr>
</tbody>
</table>

I assume that the gaps with /k/ are accidental gaps. More data will reveal whether there is a true contrast between [gʲ] and [g], though for now I classify them as variants of the same phoneme /g/.

3.2. Affricate /dʒ/

Urhobo has one phonemic affricate /dʒ/; no voiceless counterpart /tʃ/ exists. This phoneme appears to have two allophones. An allophone [dʒ] occurs before front vowels; an allophone [ɭʃ] appears before non-front vowels.

---

5 The reason why I am hesitant to fully adopt this analysis that [gʲ] and [g] are allophones of /g/ is because, according to my consultant and verified with an Urhobo dictionary, [gʲ] is spelled with <dj>, while [g] is spelled with <g>. Much more work is needed here to tease apart this issue, especially with respect to the voiced post-alveolar affricated /dʒ/, discussed below.
10. /dʒ/ Examples

a. [dʒ] before front vowels
   i. [kʰudʒi] “to steal”
   ii. [ódʒi] “thief”
   iii. [údʒi] “theft”
   iv. [dʒérwù] “what’s wrong with him?”

b. [ɟ̃] before non-front vowels
   i. [ájjá] “bat”
   ii. [ọjjù] “wind”
   iii. [ɛ̀jjó] “no”

The clearest distinction between [dʒ] and [ɟ̃] is in [ódʒi] “thief” (Rolle_Urhobo_thief_...oji1.wav) vs. [ọjjù] “wind” (Rolle_Urhobo_wind.wav). Spectrograms are provided below:

[ódʒi] “thief”
“wind”

Here, we can see that the formant transitions into these two sounds are distinct, and that there is more of a pinch of F2 and F3 associated with back consonants with [ọịjụ]. In pronouncing these sounds back to my consultant, and making her aware of the differences, the consultant notes that different clans of Urhobo will pronounce this phoneme /dʒ/ differently. In my consultant’s own speech, the consultant sometimes goes between [dʒ] and [j] despite the conditioning environment. Therefore, I only tentatively claim that these sounds are in complementary distribution until more data can be obtained. What suffices at this point is that there exist no examples of these sounds in contrast with one another.

We can compare this phoneme /dʒ/ to both /d/ and /ɡ/ [ɡʲ] before a front vowel to see a true phonological contrast.

11. Contrast between /dʒ/ and /ɡ/ [ɡʲ] before front vowels
   a. [ọdʒì] “thief”
   b. [iɡ'/iʃɛ̀ɾɛ] “bicycle”
   c. [èdị]–[èdʲi] “palm nut, palm fruit, a collection of them”

3.3. Nasals

Urhobo has four nasal stops: bilabial /m/, alveolar /n/, palatal /ɲ/, and labial-velar /ŋm/; no velar nasal /ŋ/ exists. The alveolar nasal /n/ is problematic, discussed below. These nasals are shown in the words below:

---

6 Alveolar stops /d/ and /t/ are slightly spirantized before /i/. This spirantization is not as much as other languages with a similar phonetic implementation, e.g. Quebec French.
12. Nasals
   a. Bilabial
      i. /màlú/ “cow”
         1. Further examples
            a. /àmè/ “water”
            b. /àmùnà/ “who”
            c. /òmà/ “child”
            d. /mí/ “I” (subject)
   b. Alveolar
      i. /nà/ “the”
         1. Further examples
            a. /ènè/ “four”
            b. /ì*nà/ “dirt”
            c. /ènè/ “yams”
            d. /ùkònì/ “kitchen”
   c. Palatal
      i. /èɲà/ “spittle”
         1. Further examples
            a. /ɔ̃́ɲɔ̃́/ “bee”
            b. /dìèɲɔ̃́rì/ “what’s the matter?”
   d. Labial-velar
      i. /àŋmà/ “cloth”

The labial stop /m/ occurs frequently in this corpus. The other nasal stops do not occur frequently. The alveolar nasal stop /n/ appears in only 12 lexical items, and appears to be in complementary distribution with /l/. The palatal stop /ɲ/ appears in only three lexical items, and before /a/ and /ɔ/; further research is required. The labial-velar /ŋ̥m/ appears only in one word, and is very difficult to hear. In one token, it sounds like a long [mː] sound, with heavy nasalization on the neighboring vowels. All of these stops are distinct phonologically and phonetically from nasalized approximants/taps at the same place of articulation, i.e. there is a distinction between [m] vs. [β̞̃], [n] vs. [ɹ̃], [ɾ̃], [ɲ] vs. [ȷ̃], and [ŋ̥m] vs. [w̃].

The distribution of nasal vowels with respect to nasal stops is complicated. I will discuss here only the stops /m/ and /n/. There are not enough tokens of /ɲ/ and /ŋ̥m/ to make any generalizations at this point with respect to nasal vowels (however, they seem to occur with nasalized vowels). Both nasal and oral vowels can appear before and after /m/, shown below:

13. Vowels with /m/
   a. [VmV]
      i. [òmà gàtè] “how are you?”
         Rolle_Urhobo_how_are_you_-omagare.wav
   b. [VmV]
      i. [ɔ̃mà] “child, kid”
         Rolle_Urhobo_kid.wav
However, despite this, no clear minimal pairs have been established, and it is unclear if nasal and oral vowels before and after /m/ are in free variation or not. [E.g. the word /sмонфà/ “baby bird” does not sound like it contains nasal vowels (or at least less nasal) in the token “Rolle_Urhobo_baby_bird_-_omophra.wav”]. Attempts to introduce laboratory equipment into elicitation sessions to test for nasality have yet to be successful.

With respect to /n/, this almost always occurs followed by a nasal vowel (for example, the items listed in example (12.b) above). Because /n/ occurs with a nasal vowel and in the 4 instances involving /l/ (see 25 below), this phoneme appears with an oral vowel, we may make the following descriptive statement:

14. /l/ → [n] / __ [Ṽ]

This would make sense given that a nasalization process exists in the language which targets approximants.

The reason why I am hesitant to make this claim is that (1) there are very few tokens at this point of /l/ and /n/ (or [n]), (2) from my experience in studying West African languages, [l] and [n] often have a complicated relationship which does not lend itself to easy characterization, (3) from my knowledge of Edoid, there may be a fortis/lenis distinction in operation in this language which would justify two non-rhotic alveolar sonorant phonemes (though the SW branch is not known to have maintained this fortis/lenis Proto-Edoid feature more generally), and (4) in one token, the /n/ segment appears followed by a vowel which does not sound particularly nasal (“Rolle_Urhobo_yams.wav”).

3.4. Fricatives

Urhobo has 7 fricatives, shown below.
15. Fricatives:
   a. Bilabial
      i. Voiceless /\phi/
         1. /\phi\acute{a}/ “knife”
         2. /\phi\acute{o}\grave{o}/ “breeze”
         3. /\phi\acute{a}r\grave{a}/ “birds”
         4. /\phi\acute{a}r\grave{\i}/ “face”

   b. Labio-dental
      i. Voiceless /f/
         1. /\acute{o}\grave{\i}b\acute{\i}/ “oil”
         2. /\acute{o}f\acute{o}\acute{\i}/ “war”
         3. /\acute{u}\acute{f}/ “rope”
         4. /\acute{a}\acute{f}\acute{\i}\grave{\o}/ “rabbit”
      ii. Voiced /v/
         1. /\acute{e}v\acute{\i}/ “breast”
         2. /\acute{i}v\acute{\e}/ “two”
         3. /\acute{u}\grave{\i}v\acute{o}/ “Sun”
         4. /v\acute{\i}v\grave{\e}/ “to tell”

   c. Alveolar
      i. Voiceless /s/
         1. /\acute{s}\acute{o}/ “hawk”
         2. /\acute{s}\acute{\i}\acute{\i}/ “father”
         3. /\acute{e}\grave{\i}g\acute{\u}\grave{s}\grave{i}/ “melon (dish)”
         4. /sw\acute{\u}n\acute{\v}\acute{\e}/ “to sing a song”
         5. /\acute{u}\grave{\i}\acute{\s}\grave{\o}/ “rice”

   d. Post-alveolar
      i. Voiceless /\acute{\i}/
         1. /\acute{i}\acute{\j}\acute{\a}\acute{\b}\grave{o}/ “okra”
         2. /\acute{i}k\acute{\i}\grave{\e}\grave{n}\acute{i}/ “kitchen”
         3. /\acute{u}\acute{\u}\grave{\j}\acute{\u}\grave{r}\acute{\v}\acute{\e}/ “axe”
         4. /\acute{\j}\acute{\e}/ “to cut down, to fell”

   e. Velar
      i. Voiceless /x/
         1. /\acute{\i}x\grave{\o}/ “chicken”
         2. /\acute{\i}x\grave{\w}\grave{\e}/ “ten”
         3. /\acute{u}\grave{\o}\acute{\t}\acute{o}\acute{\r}\acute{\i}/ “pestle”
         4. /\acute{\u}\acute{x}\o\acute{x}\acute{i}/ “navel”
      ii. Voiced /\grave{\y}/
         1. /\acute{\y}\acute{\v}\grave{o}/ “darkness”
         2. /\acute{\i}g\acute{\i}y\acute{\e}\acute{\r}\acute{\e}/ “bicycle”
         3. /\acute{\i}y\acute{w}\acute{\r}\acute{\e}/ “seven”
         4. /\acute{\o}\acute{\j}\acute{\e}\grave{\e}\acute{s}\grave{i}/ “mouse”

   The voiceless bilabial fricative /\phi/ contrasts with the voiceless labiodental fricative /f/, rare cross-linguistically. A near-minimal pair is shown is provided below, with spectrograms.
There is almost no frication with /ɸ/; this is distinguished from a glottal fricative [h] only by the formant transitions into and out of this fricative. This can be compared with /f/, which has a high degree of noise which reaches into the lower hertz range. There does not appear to a single locus of energy.

Urhobo maintains a distinction between two voiceless fricatives /s/ and /ʃ/. No voiced fricative counterparts /z/ and /ʒ/ have been attested (although /dʒ/ does exist as a phoneme). An example comparing these fricatives before /e/ is below. One can see that with /s/, the energy is...
concentrated in the higher 8000 Hz region, whereas with /ʃ/, it is more distributed in the higher region.

\[ /s^{'e} i/ \text{ “father” Rolle_Urhobo_father - ose.wav} \]

This is also seen in the spectral slices midway between these fricatives, as well. Here, [s] is in the left and [ʃ] is on the right; one can see the concentration of energy in the higher frequencies for [s].
The final two fricatives are /x/ and /ɣ/. These can be realized as [ʃ] and [ɣ] (which can also be written as [tʃ] and [tʃ] respectively). Spectrograms are provided below.

A spectrogram showing the variable pronunciation of /ɣ/ as [ɣ] vs. [ɰ] is below. It is difficult to see clear differences on the spectrogram, though the word [ɛɣɔ] which sounds more like a fricative has darker energy bands.

This phoneme /x/ is not realized as [h], a glottal fricative. There are no spectrograms in which the formants of the fricative are identical with the following and preceding vowels (which would suggest a [h], phonetically a voiceless vowel).
/i\'ɨ\ñ\ý\ó/ [i\'ʊ\ŋ\ý\ó] “money” vs. /è\ý\ó/ [è\ý\ó] “darkness”

In certain cases, /x/ can be realized as [ç], a voiceless palatal fricative, e.g. before /i/ in /ùxòxì/[ùxòçìç] “navel” in Rolle_Urhobo_navel.wav.

3.5. Approximants

Urhobo has three non-liquid approximants phonemes (in addition to the approximant variants of fricatives discussed above), at three places of articulation: bilabial, palatal, and labial-velar; liquid approximants are discussed in the next section. A three way pair is shown below.

16. Non-liquid approximants
   a. /f\añ\ò/ “okra”
   b. /ŋ\j\è\ò/ “bitterness”
   c. /àw\ò/ “foot, feet”

These approximants appear before most vowels, though not all. I provide a table below showing the distribution of approximants with respect to vowels, glides, and the rhotic /r/. A checkmark indicates a word which has been attested; n/a stands for “not attested”.

---

8 In the speech of my consultant, visual confirmation supports the current analysis as [β], rather than the phonetically and articulatorily similar [v]. In her speech, it is observed that the bottom lip does not tuck behind nor approach the top teeth; rather the two lips approach each other (but not enough to produce frication). Visual recording is required.
This chart shows an interesting distribution of approximants and vowels. Most striking is that there appears to be a constraint against an approximant occurring with a high vowel of an “opposite” place, i.e. *wi, *ju. This is a matter of interpretation and analysis, however. Recall that these approximants [j] and [w] are found after consonants in [CGV] sequences, unlike other consonantal segments (besides rhotics and in loanwords). As discussed in 2. Section 2 – Vowels, these sequences can be understood as /CGV/ or /CVV/ underlying sequences, depending on analysis. Sequences of [ju] are found only in this context (e.g. /ísìù/ ‘stars”), and never at the beginning of a word, or after a vowel (i.e. there is no word found like *[eju] or *[jure]). If we understand that a constraint */ju/ applies only to [j] segments at the underlying level, then this gives evidence that such [CGV] sequences should be underlyingly analyzed as /CVV/. Further research is required.

These approximants are subject to nasalization when they occur next to a nasal vowel; they are realized as [\textipa{\textbetã}], [\textipa{\textj̃}], and [\textipa{\textw̃}]. These do not merge phonetically with [m], [n], and [\textipa{\textŋ̱}], respectfully. This is discussed on page 41 in 5. Section 5 - Phonological process – Nasal spread.

### 3.6. Liquids

Urhobo has three liquid phonemes: /l/, /r/, and /\textipa{\textr̥}/.

#### 3.6.1. Alveolar lateral /l/

The alveolar lateral /l/ is a rare phoneme, and occurs in only four lexical items:

<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>e</th>
<th>ε</th>
<th>a</th>
<th>ɔ</th>
<th>o</th>
<th>u</th>
<th>Cj</th>
<th>Cw</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>β</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>n/a</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>n/a</td>
<td>n/a</td>
<td>√</td>
</tr>
<tr>
<td>j</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>n/a</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>w</td>
<td>n/a</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>n/a</td>
<td>-</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

As discussed above, this appears to be in complementary distribution with /n/; further research is required.

#### 3.6.2. Rhotics /r/ and /\textipa{\textr̥}/

Urhobo contrasts two rhotics: /r/ and /\textipa{\textr̥}/. These have an inconsistent realization both with respect to manner and place of articulation. What is consistent is that the former is voiced and the latter is voiceless. A minimal pair is shown below:

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Lateral approximant /l/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>/ólôgbò/ “cat”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>/li/ “to eat”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>/màlú/ “cow”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>/ólálɔ̀/ “stone”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As discussed above, this appears to be in complementary distribution with /n/; further research is required.
This is shown in the spectrogram below. Here, the voiced /r/ has voicing throughout its production. One can see from the first /r/ token in this example (realized as [ɾ]~[ɻ]) the strong dip in F3 and F4. Compare this to the realization of /ɾ̥/. Here, there is random, non-voiced noise of a significant duration associated with this phoneme. As in /ɾ/, one can see a dip in F3 and F4, signaling rhoticity, but not as drastically.

/óré́ rè/  “village”  Rolle_Urhobo_village1.wav
Depending on the token, voiced /r/ may be realized as alveolar or retroflex, and an approximant, tap, flap, or trill. I do not have evidence that these sounds are contrastive, and the speaker will often say the same word with a different realization. Therefore, I surmise that the target of this phoneme is underspecified generally. Some examples of voiced /r/ variants are below in example 19. The voiced trilled [ɾ] occurs rarely, and only after consonants. The approximant is realized as alveolar or retroflex. Often, the sound file is ambiguous between these two. Only the alveolar approximant [ɹ] appears in word initial position.
19. Voiced /r/
   a. Trill \[r\]
      i. /ébrì/ [ébrj] “darkness”
         Rolle_Urhobo_darkness.wav
   b. Approximant \[r\] \[l\]
      i. /bri*ɣó/ [bui*ɣó] “how much money”
         Rolle_Urhobo_how_much_money_-_brigho.wav
      ii. /bɛtɛ/ [bɛtɛ] “to tear”
         Rolle_Urhobo_to_tear_-_bere.wav
      iii. /ògògòrò/ [ògògògò] “local gin”
         Rolle_Urhobo_gin_-_ogogoro.wav
      iv. /rǎ gbôdì wɛ̃́/ [ɹǎ gbôdì wɛ̃́] “go clear your grass”
         Rolle_Urhobo_go_clear_your_grass.wav
   c. Retroflex lateral flap \[l\]\9
      i. /ɔ̀gɔ̀rɔ̀/ [ɔ̀gɔ̀l-à] “palm wine”
         Rolle_Urhobo_palm_wine.wav
   d. Tap \[r\] \[ɾ\]
      i. /ɛɾùɛ/ [ɛɾwɛ] “cow”
         Rolle_Urhobo_cow_-_erhue3.wav
      ii. /dɪ*dürwó órùwɛ/ [dɪ*dürwó l órùwɛ] “what kind of job does he do?”
         Rolle_Urhobo_what_kind_of_job_does_he_do.wav
      iii. /óyɔ́yɔ́riɛ/ [óyɔ́yɔ́riɛ] “lizard”
         Rolle_Urhobo_lizard - oghoghorie.wav

A spectrogram of the retroflex lateral flap \[l\] is below, which is particularly interesting. Here, we see the F3 lower significantly, followed by the F3 immediately returning to its previous frequency range. This behavior of F3 suggests to me a flap; the contact of the tongue against the mouth can be clearly perceived in the wav file.

\[9\] This was the only token of this found.
Further, a nasal tap [ɾ̃] occurs as an allophone before a nasal vowel. Depending on the token, voiceless /r̥/ may be realized as alveolar or retroflex, and an approximant, tap, of trill.

20. Voiceless /r̥/
   a. Trill [ɾ]
      i. /iɾ̥i/ [iɾ̥i] “nine”
         Rolle_Urhobo_nine – irhirin – trilled.wav
   b. Approximant [ɹ̥] [ɻ̊]
      i. /eɾ̥a/ [ɛɾ̥a] “three”
         Rolle_Urhobo_three_-_erha1.wav
   c. Tap [ɾ̥] [ɽ̊]
      i. /iwûr̥iɛ/ [iwûɾ̥iɛ] “ashes”
         Rolle_Urhobo_ashes.wav

The voiceless rhotic varies between a more approximant pronunciation and a trilled pronunciation. This is shown for the word /iɾ̥i/ “nine”. In the trilled version below, one can see on the spectrogram the vertical bands of low noise corresponding to the tongue striking the rough of the mouth.
In contrast, in the approximant realization, no such vertical bands occur:
3.7 Consonant clusters

Urhobo has very few consonant clusters. Only three consonants are allowed as the second consonant in a [CCV] sequence: /j/, /w/, and /r/. Some examples are below

21. Consonant clusters
   
   a. [Cj]
      i. [dǐːɔ́jóodêwê] “what’s your name?”
      ii. [iʃjû] “stars”
      iii. [aʃjóthɔ] “rabbit”
      iv. [útʃê] “orange”

   b. [Cw]
      i. [iːxwê] “ten”
      ii. [isâgwɛ] “groundnut”
      iii. [vwe] “to tell”
      iv. [swûnɛ] “sing a song”

   c. /Cr/
      i. [àgbáaá] “thunder”
      ii. [ɔbjo]/ “it’s bad”
      iii. [iʃjû] “fat”
      iv. [ûtòxɔ] “pestle”
At this point, not enough data is available to make any strong generalizations about the
distribution of the segments in consonant clusters (phonotactic restrictions). I present some brief
generalizations which require further verification and elaboration:

[1] The labial sounds /p b kp gb/ do not occur followed by /j/ or /w/
[2] /j/ and /r/ occur with more consonants than do /w/
[3] Alveolar and labiodental segments do not occur with /r/, though bilabial, velar, and labial-velar segments do

Other consonants clusters appear only in loanwords, e.g. [sk] below (cf. “hospital”, which is
broken up by epenthetic [i]). These consonants following [s] are either lightly aspirated or not
aspirated.

22. Loanword consonant clusters
   a. [ɪb́əskʼë́tʰɪ] “basket”
   b. [ɪskú] “school”
   c. [ɔ́sípítʰo] “hospital”

4. Section 4 - Prosody

This section presents on prosody in Urhobo. I mainly discuss tone here, at both the lexical and
grammatical level.

4.1. Tone

Tone patterns exist at both the lexical and grammatical level in Urhobo to distinguish linguistic
meaning. Tone is correlated with absolute pitch (f0) in Urhobo. Tests have not been taken to
determine the degree to which loudness, duration, or phonation play as secondary cues for
signaling particular tone categories.

4.1.1. Lexical tone

At the basic level, Urhobo distinguishes between three main tonemes: High, Low, and
Downstepped High. Some minimal pairs are found in this dataset showing the role of tone in
distinguishing meaning. From the limited number of data I have collected so far, tone is used to
distinguish nouns, though not verbs. The typical case for Edoid languages is for verbs to only
bare grammatical tone (Elugbe 1989a).

10 It will be unlikely if I get every tone right here, as this is my first exposure to this language (though not this
family). My experience with Edoid languages in general is that despite the fact that they only contrast two basic
tones (H vs. L), the phonetic and phonological implementation of this system is in fact complex and difficult to pin
down without substantial research. In particular, the most difficult aspect here is the distinction between a HL
sequence and a H'HI (a high followed by a downstepped high sequence) which in less careful speech can sound very
much alike. All of these tone transcriptions need to be checked against the speaker again (as well as another speaker)
before they can be confirmed.
23. Tone minimal (and near minimal) pairs
   a. LL  òdè  name
      HL  ódè  yesterday
   b. LH  ènè  yams
      HL  ènè  four
   c. HL  èwù  clothes
      LL  èwù  Ewu village
   d. H!H  èβ̞e  eczema
      LH  èβ̞e  goat
      HH  èβ̞è  kola nut
   e. LHL  ìgèrè  road
      LLH  ìgèrè  Idjere village
      LLL  ìgèrè  crocodile
   f. H!H  ú*dí  grasscutter
      LL  údí  a drink, wine
   g. LLL  úkpòkpó  big rock
      HH!H  úkpó*kpó  worrying, going through problems

A spectrogram is provided below which show the three way distinction between example (23.d) above involving the segments /ɛβ̞e/. [Note, the phonetic realization of these tones is not always consistent, or level]

Pitch tracks for the five tone patterns associated with disyllabic words (LL, LH, HL, HH, H!H) are provided below:
The sequence LL and HH are level tones which do not have distinct pitch targets. In isolation, it is often difficult to tell them apart, as there is no other target (L or H) which can be contrasted against. In non-level pitch sequences (HL, LH, H!H), however, it is much easier to determine the tone.  

Phonetically, the downstepped high tone [!H] could also be rendered [M]. The reason why I posit that this is a phonemic /!H/ toneme is that (1) it only occurs after high tones (typical of downstepped highs), and (2) when it occurs before a High tone, the following High tone is not realized with a higher pitch. That is, we might expect a /HMH/ sequence to be realized as ˥ ˧ ˥, where the mid tone does not lower the following High. However, the Urhobo data show that a !H “resets” the High tone target level, and consequently, a following high tone is realized (close to) that new target level, i.e. ˥ ˧ ˧.

I do not attempt to draw any conclusions as to the specific pitch associated with these tonal patterns, as this will change depending on numerous factors (speaker, place in utterance, rate of speech, emphasis, intonation, etc.).
I show this in an example below, involving the possessive pronoun /mɛ̃́/ “my”. This pronoun bears a high tone, and follows the noun which it modifies. This is shown below, occurring with the LL noun /èɲà/ “spittle”

24. /èɲà mɛ̃́/ “my spittle”

When a H!H sequence such as the noun /ɛ́β̞é/ “eczema” precedes /mɛ̃́/ “my”, the !H tone of the noun resets the H target of the phrase. Therefore, this phrase is realized as a H!HH sequence (and not a falling rising sequence). This is shown in the pitch track below.

25. /ɛ́β̞é mɛ̃́/ “my eczema”

As stated above, words which contain only level tones are difficult to determine their tone out of context. Depending on the level of carefulness (and other individual differences), an all Low sequence may sound like an all High sequence, and vice versa. For example, the word for “fish” (plural) is /ìjèrı̃̀/. In the token “Rolle_Urhobo_fishes - iyerin - sounds all H.wav”, the pitch
is concentrated between 222Hz and 242 Hz, typically a common range for High tones (e.g. example 25 just above). However, when this word /ijèr̥i̥/ “fishes” occurs in context with the post-nominal numeral word /ixùè/ “ten” with a HL pattern, the vowels of “fishes” are realized lower than the high-pitch target of “ten”. This is shown below:

Therefore, putting words into sentences with surrounding, different level tonemes is the only accurate way to determine the phonological tone specification of lexical items in Urhobo.

The following tone patterns involving L, H, and !H have been attested thus far.
Contour tones also exist (as apparent from some of the spectrograms and pitch traces already given). These have not been incorporated into the above chart. It is not known if these are (1) contrastive toneme units (e.g. [Raising]), (2) combinations of a tone sequence (e.g. [HL]) over a single tone-bearing unit, or (3) allophonic variations of a level tone. Much more research is required to resolve this issue. Some examples of contour tones are below, including pitch tracks.

<table>
<thead>
<tr>
<th>Tone pattern</th>
<th>Example</th>
<th>Translation</th>
<th>Number of tokens collected with this pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>nà</td>
<td>the</td>
<td>2</td>
</tr>
<tr>
<td>H</td>
<td>k'á</td>
<td>will</td>
<td>7</td>
</tr>
<tr>
<td>LL</td>
<td>ọkè</td>
<td>time</td>
<td>48</td>
</tr>
<tr>
<td>LH</td>
<td>ẹmà</td>
<td>cloth</td>
<td>12</td>
</tr>
<tr>
<td>HL</td>
<td>ẹ́ọ̀</td>
<td>bee</td>
<td>18</td>
</tr>
<tr>
<td>HH</td>
<td>ọkpè</td>
<td>Okpe group</td>
<td>14</td>
</tr>
<tr>
<td>H!H</td>
<td>ọ́ré</td>
<td>native chalk</td>
<td>6</td>
</tr>
<tr>
<td>LLL</td>
<td>òfọ́jì</td>
<td>war</td>
<td>25</td>
</tr>
<tr>
<td>LLH</td>
<td>ọkùkú</td>
<td>darkness</td>
<td>5</td>
</tr>
<tr>
<td>LHL</td>
<td>ọfájọ</td>
<td>face</td>
<td>11</td>
</tr>
<tr>
<td>LHH</td>
<td>ẹ́káikái</td>
<td>local gin</td>
<td>2</td>
</tr>
<tr>
<td>LH!H</td>
<td>ùgbúkó</td>
<td>back</td>
<td>3</td>
</tr>
<tr>
<td>HLL</td>
<td>ijọ́rị</td>
<td>five</td>
<td>2</td>
</tr>
<tr>
<td>HLH</td>
<td>ọdibọ</td>
<td>banana</td>
<td>2</td>
</tr>
<tr>
<td>HHL</td>
<td>ọ́bà</td>
<td>rubber</td>
<td>9</td>
</tr>
<tr>
<td>HHH</td>
<td>ọdódó</td>
<td>flower</td>
<td>1</td>
</tr>
<tr>
<td>HH!H!H</td>
<td>ọ́ré́ré</td>
<td>village</td>
<td>3</td>
</tr>
<tr>
<td>H!HL</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>H!HH</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>H!H!H</td>
<td>ágbáọ́ọ́</td>
<td>Agbaro Town</td>
<td>1</td>
</tr>
</tbody>
</table>

12 The distinction between /HH!H/ and /HHL/ sequences at this point is merely impressionistic. Further research is required.
13 I am not confident with my transcription of the tone on this token. Therefore, this H!H!H sequence may be unattested as well.
26. Contour tones
   a. HFL /ísâgwɛ/ “groundnut”

   b. RFL /ĩʃβò/ “okra”

   c. LF /mãɔ̃/ “hi”
4.1.2. Grammatical Tone

Use of pitch to distinction non-lexical meaning is grammatical tone. I will discuss a few grammatical tone processes which I have found in the language.

4.1.2.1. Associative construction – H floating tone

In certain cases, grammatical tone occurs which alters the lexical tone of the individual words/morphemes. One such example is an associative marker used in noun noun compound/sequences. This is realized as a High tone which falls between these nouns, e.g.:

27. /ɔ̀kè/ “time” + /òsìò/ “rain” = [ɔ̀kʲʰíósìò] “rainy season” (LL LL(L) LHL)

4.1.2.2. Temporal/aspectual distinctions

Tone is used to express temporal/aspectual distinctions. The following minimal pair is provided below:
Present imperfective:
[mì ꜜ gbôdìnà]
mi gbe òdì nà
I clear grass the
“I am clearing the grass”

Past perfective:
[mì gbódìnà]
mi gbe òdì nà
I clear grass the
“I cleared the grass”

Here, the distinct tonal patterns on first part of the phrase signals a temporal/aspectual
distinction. Tentatively, we can understand a [R!F] pattern to be associated with present
imperfective, while a LH pattern is associated with a past perfective. Future research is required
to further expand on this statement.

4.2. Intonation and Tone

I collected very few suprasegmental features of the language besides tone. One pair which I was
able to capture was yes/no question intonation. In this case, the high tones become extra-high,
with the low tones not being affected. This is shown in the minimal pair below. In this token, the
consultant goes quite high in her pitch range, approaching 350 Herz.
29. Yes/no question intonation
   a. [wɔ̌ β̞ɛ̋ ɹ̥ ɛ̀] “are you sleeping?” vs. [wɔ̌ β̞êɹ̥ ɛ̀] “you are sleeping”

5. Section 5 - Phonological process – Nasal spread

Urhobo has a number of phonological processes. These include nasal spread, vowel elision/glide formation, affrication, and final vowel devoicing, among others. I will only discuss nasal spread below.

Before nasal vowels, the following phonemes become nasalized:

30. Nasal spread
   /β̞/ → [β̃]
   /j/ → [ȷ̃]
   /r/ → [ɾ̃] ~ [ɻ̃]
   /w/ → [w̃]
   (/l/ → [n]) : This is not yet confirmed as a real phonological process

Examples illustrating this process are below. We can see in the example in (31) that rightward nasal spread feeds further nasalization of vowels and consonants until it hits a consonant which cannot be nasalized (which are most). Thus, the sequence /ɛ̀rèβ̞ɛ̀/ “tongue” nasalizes all segments in this word, realized as [ɛ̃̀ɻ̃ɛ̀β̞̃ɛ̀].

31. Bilabial
   a. /òfò̃β̞ı́/ [òfõ̀β̞̃ı̃̀] “war”
   b. /ùjɔ̀β̞ı́/ [ùȷ̃ɔ̃̀β̞̃ı́] “head”
   c. /èr̥ ɛ̀r̥β̞ẽ̀/ [ɛ̃̀ɻ ̃ẽ̀β̞̃ẽ̀] “tongue”

32. Palatal
   a. /iý̃ɛ̀r̥ı̃̀/ [ı̃́ȷ̃ẽ̀ɾ̃ı̃̀] “fish”
   b. /iý̃jɔ̀r̥ı̃̀/ [ı̃́ȷ̃õ̀ɾ̃ı̃̀] “five”
   c. /èr̥ r̥ ɔ́j̃ı̃̀/ [èɹ̥ Źências] “his cap”

33. Labial-velar
   a. /ùwẽ̀β̞ı̃̀/ [ũ̀w̃ẽ̀β̞̃ı̃̀] “house;”
   b. /òd̃ı̃̀ wɛ̃́/ [òdı́ w̃ɛ̃́] “your grass”
   c. /ɔ̀r̥ ɛ̀ Źr̥ w̃ ẽ̀β̞̃ı̃̀/ [ɔ̀ɽ̊ ɛ̀ɻũ̀w̃ ẽ̀β̞̃ı̃̀] “gecko”

34. Rhotic
   a. /èr̥̃ı̃̀/ [ẽ́ːɾ̃ı̃̀] “fish”
   b. /ír̥ íf̃ı́/ [ír̥ ı́f̃ı́] “nine”

A spectrogram is presented which compares the nasalized approximant allophone [j] with the nasal stop /ɲ/. One can see from this example that the nasal stop on the left has faint bands of energy, especially a low band around 250 Hz. If we compare this to [j], this appears more like a approximant, with energy distributed at different frequency ranges. The same distinctions holds for the other pairs (i.e. [w] vs. /ŋm/; [r] vs. /ɾ/; [β̞] vs. /m/).

The distribution of nasal spread shows that the following segments act as a phonological class: /w j Ź r/ and possibly /l/. Not included in this class (at least with the current set of data), are the voiceless rhotic /r/, and the velar fricatives /x ɣ/. We can posit a rule as follows:

35. [+voice]
   [+sonorant] → [+nasal] / ___ [+ syllabic]
   [+ nasal]
Within this rule, we must posit that /β/ is [+sonorant], but /ɣ/ is [-sonorant] (or any other voiced fricative which we may encounter).

References


Iweh, Ode. 1983. La phonologie et le systeme nominal de l’urhobo. Université Stendhal (Grenoble 3) (Thèse de doctorat).
Appendices
Appendix 2

Urhobo Area circled. Map from Elugbe (1989a:294)