
ESSAY ON THE INTRASEGMENTAL PHONETIC PROCESSES IN THE KAINGANG LANGUAGE

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ABSTRACT

This article shows us the necessity to develop a non-standard phonological treatment to deal adequately with the complex segments of the Kaingang language – intrasegmental phonological rules.

We intend to point out through this article that some phonological facts in the Kaingang language have shown us the necessity to develop a non-standard treatment to deal adequately with the complex segments of that language.

The Kaingang language presents phonological segments which are phonetically complex, that is, phonological units which are not formed by merely a bundle of simultaneous articulations (as the most common case is), but are formed instead by sequences of articulations. In general, only a single articulatory element (which is responsible for a feature) is modified during the production of the phonological segment, like the lowering of the velum or the vibration of the vocal cords. The most familiar case in the languages of the world are the so called affricate segments, which have been normally considered phonologic units, despite being formed by a sequence of phonetic articulations (stop -> fricative or momentary -> continuous). This case is so common that the standard generative phonology decided to treat it also as a phonetic unit, but had to create an *ad hoc* phonological feature "delayed release" (Chomsky and Halle, 1968:318). Other phonologists realized the artificialism of such a treatment (see, for instance, Krohn, 1972: 217 and following). The Kaingang language, as we will see ahead, presents other cases of complex phonological segments, to which we cannot apply a feature such as "delayed release". The most noticeable case is that of the segments during whose production there alternate the positive and negative values of the feature [nasal] or, in other words, in which the velum articulates between the positions of closure and opening of the nasal cavity. This case includes the segments improperly called prenasalized and postnasalized. The problem raised by such segments towards standard generative phonology was discussed, for instance, by Anderson (1974: 272).

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We will consider below the various complex segments of the Kaingang language of the State of São Paulo, Brazil.

In that dialect, like in the one of the State of Paraná (See Wiesemann, 1972, and Kindell, 1972), there are sequences of closure-opening-closure of the naso-pharyngeal passage during the production of the same phoneme, as the following examples show (we will take the realizations of the phoneme /ŋ/ to represent all other nasal segments:

(a) [ŋ] preceded by nasal vowel or word boundary and followed by word boundary or nasal vowel:

- (1) / ɛŋ# / -> ɛŋ "we"
- (2) / 'tɛ ŋ# / -> ['tɛ ŋ] "fat"
- (3) / #'ŋɛ r / -> 'ŋār "corn"
- (4) / nī'ŋrɛ / -> nī'ŋrɛ "ear"

(b) [ŋg] preceded by nasal vowel and followed by oral vowel:

- (5) / kɛ 'ŋgə w / -> kɛ 'ŋgə w "they went away"

(c) [ŋg] ~ [ŋŋ] ~ [ŋ] preceded by word boundary and followed by oral vowel:

- (6) / #ŋa / -> [ŋgə] ~ [ŋŋə] ~ [ŋə] "earth "

(d) [gŋ] preceded by oral vowel and followed by nasal vowel or word boundary:

- (7) / ya'ŋrɛ / -> ya'gŋrɛ "beautiful"
- (8) / aŋ # wə / -> agŋwə "they + subject marker"

(e) [gŋ] ~ [g] preceded by oral vowel and followed by sentence boundary:

- (9) / 'məŋ## / -> ['məgŋ] ~ ['məg] "big"

(f) [gŋg] preceded by oral vowel and followed by oral vowel:

(10) /ka'ŋa/ -> ka'gŋga "ache"

(g) [ŋg] preceded by nasal vowel and followed by voiceless consonant:

(11) /ɛ̃ŋ # 'Φe/ -> ɛ̃ŋg'Φe "our heart"

(h) [g] preceded by oral vowel and followed by nasal consonant:

(12) /krəŋ#mi / -> ['krəgmɨ] "pig"

(i) [g̊] preceded by oral vowel and followed by voiceless consonant:

(13) /Φɔŋ#pi/ -> Φɔg̊pi "radio battery"

(14) /'məg#hə/ -> ['məghə] "huge"

The various realizations of the phoneme /ŋ/ (and, equally of the phonemes /m/, /n/ and /ñ/) show clearly that it is necessary to recognize the existence of segments which comprise a sequence of positive and negative values of the same feature, the feature [\pm nasal] in this case. Anderson, the first phonologist to discuss the problem imposed by such situation in the Kaingang language, had already recognized (1974:271-272) that it would be incorrect to use features such as [prenasalized] (thought of by Anderson himself) to describe the intermedially nasalized segments (or medionasalized, as he called them), but that we should rather admit more than one specification of the same feature in a single segment. According to Anderson, a natural description of the types of segments found in Kaingang "would represent oral stops as [-nasal] throughout, and nasal stops as [+nasal] throughout, but prenasalized stops as a sequence [+nasal][-nasal] realized on the same segment; postnasalized stops as [-nasal][+nasal] on the same segment and the Kaingang medionasal stops as [-nasal][+nasal][-nasal], all imposed on the same oral segmental articulation" (Anderson, 1974:272).

We (Rodrigues and Cavalcante, 1982) decided to represent the sequences of positive and negative specifications of the same feature in a single segment through the sequence of the adequate signs within a single pair of brackets: [ŋg] is [+nasal], [gŋ] is [-+nasal] and [gŋg] is [-++nasal]. Such a convention allows us to distinguish the intrasegmental sequences of specifications from the heterosegmental sequences which occur in other languages, as for instance, in English "dressing gown" ['dresɪŋgəʊn], in which [ŋg] represents a sequence of two different segments and is, for that matter, [+nasal][-nasal] rather than [+nasal]. From

a mere articulatory point of view there is no difference between [+nasal][-nasal] and [+nasal]; the difference is not phonetic, but phonological: the distinction between heterosegmental and tautosegmental sequences of values of the same phonetic feature is a question to resolve at the level of the segmental organization of a specific language, as should be the placement of syllable boundaries.

In the above illustrated segments from (a) to (i) we observe that their internal structure is motivated by the presence or the absence of nasality and voice in the surrounding segments. Supposing we start our analysis considering the most complex segment, which is [gŋg], we observe three different phases in it, according to the successive specifications of the feature [nasal]: the first phase is [-nasal], the second phase is [+nasal] and the third phase is [-nasal]. The first phase has the same specification of the immediately preceding segment and the third phase has the same specification of the immediately following segment, whereas the second phase has an independent specification from the context. This last one must be considered the real specification of the phoneme in question, whereas the specifications of the first and third phases must be considered resulting from the assimilation of such phases to the specification of the contiguous segments. Thus, the phoneme /ŋ/, which is [+nasal], is subspecified in Kaingang as [+++nasal]. The second phase is considered the nuclear phase of the phoneme, whereas the first and third phases are peripheral. The three phases are only completely realized when the nasal phoneme occurs between oral vowels as in /ka'ŋa/, phonetically [kagŋga], in which /ŋ/ is [-+nasal]. In other environments the first or the third phase, or both of them, may not surface, and such cases will be represented by the value 0 in the specifications as in /ŋa/, in a realization in which /ŋ/ is [0+nasal], that is, [ŋga]; or in /ya'ŋrɛ/, in which /ŋ/ is [-+0nasal], that is, [ya'gŋrɛ], or also in /ni'ŋrɛ/, in which /ŋ/ is [0+0nasal], that is, [ni'ŋrɛ]. The nuclear phase never fails to be realized, even though in some contexts, it may lose the feature [+nasal], as, for instance, in /ko'Φθrθ#mθŋ/, in which /m/ is [0-0nasal], that is, [ko'Φθrθ'βθg]. Thus, the substitution for 0 (Zero realization) of the non realized phase becomes useful in maintaining the representation of the three phases of the nasal phoneme in any one of its phonetic realizations.

Apart from the case of the nasal consonants between oral vowels, which constitutes the main argument in favour of the subspecification of a segment into three phases, there are other cases to which we can apply the differentiation of phases:

(a) the palatal segments: when preceded by a vowel, they require the automatic insertion of [y] between it and the preceding vowel, as in [kuy'čõ] "red", [čðy'čð] "black", [kay'jñiri] "to play", [t'ðyñ] "green". The [y] may, in such cases, be considered a vocalic phase of the palatal segment, representing a partial assimilation of the preceding vocalic segment;

(b) the approximant segment /r/: when it occurs at the beginning of a word, it requires the insertion of [ə] to its left, as in [ə'rorU] "round", [ə'rɛ] "sun"; [ə] may, in the same way as [y] above, be considered a vocalic phase of the segment /r/, becoming, however, in this case, a new phonetic syllable;

(c) the approximant segments /r/, /y/ and /w/: when followed by a word boundary, require the insertion to their right, of the vowel which precedes them, as in [ˈpiri] "one", [ˈΦeye] "flower", [təŋg'tɔwɔ] "to vomit", etc. Such vowels, copied to the right of those segments (r, y, w), may be considered a vocalic phase of such segments, becoming together with the preceding approximant, a new syllable at the phonetic level;

(d) the vocalic segments: when they occur at the beginning of a word, or are preceded by a vowel, require the automatic insertion of [ʔ] in front of them, as in [ʔɛŋ] "we" and [həʔə] "you're welcome"; [ʔ] may thus be considered an assyabic phase of the vocalic segment;

(e) the vocalic segments: when they occur at the end of a word, optionally present a voiceless prolongation, as in [ko 'Φaa̯] "old" and [nɪ'ŋruu̯] "nail".

We might also relate the three-phase treatment of a segment to the three phases identified by Saussure (1975:64) in the spoken language: the implosion or closure, the tension or sustained articulation and the explosion or opening, although he was considering groups of consonants as in the sequence *appa* and not intrasegmental phases as in our case.

It would be interesting to observe also that Mansur Guérios (1942:159 and following) represented some sounds of the Kaingang of Palmas by twin consonants, as in *ffan* "to cry", *niápaiiffá* "chimney", *ppā* "snake", *kékkêin-rum* "canoe", etc. We might easily relate such sequences to our intrasegmental sequences above and apply the phasic treatment to all other sounds of the Kaingang language.

As a conclusion from what we have discussed above, we may state that there are three intrasegmental phonetic processes affecting the complex segments of the Kaingang language: assimilation, zeration and syllabification of the phases of a segment.

To represent adequately such processes it is convenient to create rules which will operate on the phases of complex segments. Such rules may be conceived in a similar way to the standard generative segmental phonological rules of assimilation, deletion and insertion. But, differently from those ones, which operate on phonological segments, the rules we propose now, operate on subsegments - the phases of a complex phonological segment - and thus may be named intrasegmental or subsegmental rules.

The intrasegmental rules are the last ones to be applied during the derivation of forms. Consequently, they will be applied when there is left no other

segmental rule to be applied. This would be the first principle to govern the application of the intrasegmental rules.

To conclude and illustrate we will present below some intrasegmental rules:

(a) Denasalization of intrasegmental phases in front of obstruents:

$$[[+nas]] \rightarrow [[-nas]] / \text{-----} \left[\begin{array}{c} +cns \\ +nas \end{array} \right] \text{ (recursive)}$$

(a nasal intrasegmental phase becomes denasalized in front of non nasal consonants)

E.g.: /tɛŋ'tõ/ "three" tɛ [[ŋŋŋ]]tõ → tɛ [[ŋŋg]]tõ

N.B.: The process involved here is assimilation.

(b) Zero realization of the peripheral phases of segments:

$$\left\{ \begin{array}{c} [[\alpha \text{ feature}]] \\ < \left[\begin{array}{c} +cns \\ +nas \end{array} \right] > \end{array} \right\} \rightarrow \left\{ \begin{array}{c} \emptyset \\ <(\emptyset)> \end{array} \right\} / [[\alpha \text{ feature}]]$$

(an intrasegmental phase disappears obligatorily in front of another intrasegmental phase, and disappears optionally when the intrasegmental phase in question is a nasal one)

E.g.: tɛ [[ŋŋg]]tõ → tɛ [[ŋg]]tõ

N.B.: The process involved here is deletion.

(c) Assimilation of the peripheral phase of palatal segments:

$$\left[\begin{array}{c} -syl \\ +pal \end{array} \right] \rightarrow [[-cns]] / [-cns] \text{-----}$$

(an intrasegmental palatal phase becomes [-consonantal] after a vowel).

E.g.: /ku'čõ/ "red" -> ku[[yčč]]õ

N.B.: The process involved here is insertion.

RESUMO

Este artigo nos mostra a necessidade de desenvolvermos um tratamento fonológico não-padrão para dar conta dos segmentos complexos da língua Kaingang - as regras fonológicas intrassegmentais.

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