

ABORIGINAL LINGUISTICS

# *Aboriginal Linguistics*

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edited by

**Nicholas Evans & Steve Johnson**

**1988**

## Formalizing Yir-Yoront Lenition

Barry Alpher

University of Sydney

Yir-Yoront (spoken in the Mitchell River estuary area, Cape York) attests a stress-conditioned alternation of stops with glides: *p* with *w*, *th* and *ch* with *y*, and *rt* with *R*. Under the same conditions, *q* (glottal catch) alternates with zero. These alternations may be the manifestation of a single phonological process, or they may be the manifestation of two (or more) processes. Either way, a parsimonious formal account of these phenomena represents them as a sequence of steps. The result of one of these steps is the generation of 'imaginary' intermediate products<sup>1</sup>: sound-types which are not attested phonetically in this language and which there is no reason to suppose occur in underlying forms. The formalism uses distinctive feature theory, but some sound-types must be seen as having specifications for certain features other than the ones commonly given in the literature. Only with imaginary intermediate products and re-evaluated feature specifications does the formalism yield a simple statement.

Yir-Yoront has the following inventory of sound-types: bilabials *p*, *m*, *w*, lamino-dentals *th*, *nh*, *lh*, apico-alveolars *t*, *n*, *l*, apico-postalveolars (retroflexes) *rt*, *rn*, *rl*, *R*, lamino-alveolars *ch*, *ny*, *y*, dorso-velars *k*, *ng* (and *w*), glottal catch *q*, high vowels *i*, *u*, mid vowels *e*, *o*, the low vowel *a*, and the mid-central vowel *v* (shwa). The glottal catch<sup>2</sup> *q* continues an earlier non-word-initial *k*, but now contrasts with *k* in a few instances (*thoquwrr* 'windbreak' vs. *thokowl* 'one's own', *kalkarrl* 'sees' (*karr* reduplicated) vs. *kalqarrl* 'only spears' (with *kalq* 'spear'). Although there is no morphophonemic alternation *k* ~ *q* in the language, and there are only a couple of forms of the type *kokirr* ~ *koqirr* 'younger brother' that fluctuate according to individual speakers, considerations involving morpheme boundaries and allowing for a few exceptions permit the postulation of underlying forms in *k* for forms containing a surface *q*. And it facilitates the statement of the phonotactics of *q* to assume that it, as underlying *k*, shares position-of-articulation features with *ng*, *p* and *m*. As will be seen below, the identification of *q* with *k* is useful, if not crucial, in the characterization of processes involving *w*, *R*, *y*. Apico-alveolar *t* occurs only after *l* (*palt* 'shoulder': *lt* continues an original \*Rt) and in English borrowings (*chat* 'shirt'), and it does not figure in the processes discussed below.

The phonological alternations of relevance are of *p* with *w*, *th* with *y*, *ch* with *y*, *rt* with *R*, and *q* with  $\emptyset$  (zero). It will be convenient (pre-formally) to refer to *p*, *th*, *ch*, *rt*, *q* as STOPS and *w*, *R*, *y* as GLIDES. The alternation is of the stop noninitially in a form occurring in a context where it is normally stressed, with the corresponding glide in the form occurring in a position where it is normally unstressed. In the following examples, the boundary symbols '-', '+', and '=' are used diacritically for stress: X+Y has primary stress on X and lesser stress on Y, X-Y represents an unstressed X followed by a primary-stressed Y, and X=Y represents a sequence of two more-or-less equally stressed items (typically a compound verb). Verbs are generally unstressed relative to what immediately precedes them in the utterance.

(1)	<i>nhaprr</i>	'name'
(2)	<i>nhawrr-warrqa</i>	'name belong grass ( <i>warrq</i> ), grass-clan'
(3)	<i>keperr</i>	'female'
(4)	<i>kewrr-mart</i>	'man's daughter' ( <i>mart</i> 'small')
(5)	<i>kopl</i>	'down'
(6)	<i>kopl+kowl</i>	'low (Adv)'
(7)	<i>ngop+ngow+rr</i>	'wide' <sup>3</sup>
(8)	<i>puth</i>	'arm'
(9)	<i>puy-mal</i>	'right-hand'
(10)	<i>puy-kunhthn</i>	'pandanus ( <i>kunhthn</i> ) arm-band'
(11)	<i>pitharr</i>	'dream (N)'
(12)	<i>piyrr=wornt</i>	'to dream' ( <i>wornt</i> 'to sound out')
(13)	<i>kach</i>	'neck, stalk'
(14)	<i>kay-pall</i>	'lily pad'
(15)	<i>ngart</i>	'fish'
(16)	<i>ngaR-thip</i>	'stingray' ( <i>thip</i> 'liver')
(17)	<i>kurta</i>	'dog'
(18)	<i>kuR-marrvm</i>	'dingo' ( <i>marrvm</i> 'wild')
(19)	<i>thert+theR+lh</i>	'rough' <sup>3</sup>
(20)	<i>mart+maR+w</i>	'young of possum' ( <i>mart</i> 'small')
(21)	<i>kalq</i>	'spear'
(22)	<i>kal-puth</i>	'bullet spear' ( <i>puth</i> 'arm')
(23)	<i>yoq</i>	'tree'
(24)	<i>yo-thethw</i>	'banyan tree'
(25)	<i>yo-kumn</i>	'root' ( <i>kumn</i> 'thigh')
(26)	<i>moqR</i>	'mother's older brother'
(27)	<i>moR-warrch</i>	'mother's older brother'
(28)	<i>waqarr</i>	'tea-tree bark'
(29)	<i>yo-waqarr</i>	'tea-tree'

(30)	<i>warr-thaw</i>	'tea-tree blossom' ( <i>thaw</i> 'mouth')
(31)	<i>peqerr</i>	'little'
(32)	<i>peq+pe+lh</i>	'nearby'
(33)	<i>moq</i>	'all'
(34)	<i>moq+mo+rr</i>	'quite a few'
(35)	<i>may</i>	'vegetable food'
(36)	<i>may-melh</i>	'lily seed'
(37)	<i>yoR</i>	'hand, finger'
(38)	<i>yoR-mart</i>	'finger' ( <i>mart</i> 'small')
(39)	<i>paR</i>	'head'
(40)	<i>paR-poq</i>	'head' ( <i>poq</i> 'knee')
(41)	<i>kow</i>	'nose'
(42)	<i>kow-kewrr</i>	'nasal mucus'

The alternations illustrated in (1-34) are quite regularly conditioned according to the normal stress pattern (but not automatically conditioned: note that sequences like *ngart-thip* 'stingray' are pronounceable — cf. 16). The accentual pattern in tripartite sequences like *yoq-kun-maq* 'bottom of a tree' destresses the middle element and assigns primary stress to the last element and secondary to the first, which never lenites (to *yo*; cf. 24-5) in a context of this kind. Forms which occur stressed as full disyllables (3, 11, 28, 31) are matched by unstressed forms which lack the second vowel (4, 12, 30, 32, respectively; occasionally also minus the last consonant, as in 32). These alternations are paralleled by regular historical developments in verbs (which are unstressed in context): *pay* 'bite' < \**pacha*. Consideration of examples (35-42), which contain glides in all contexts, suggests that the directionality of the synchronic process is stop-to-glide lenition, recapitulating the diachronic change.

The intuitively appealing generalization is: postvocalic stops become glides (at the corresponding points of articulation) when in unstressed context. A formalization of this process is however not without its wrinkles:

- (a) Zero (22, 24, 25, 27, 30, 32, 34) is not a glide.
- (b) The glottal catch *q* (21, 23, 26, 28, 29, 31, 33) is (irremediably, I think) on very shaky grounds as a stop (underlying /k/).
- (c) The stops *th* and *ch* both alternate with the glide *y* (8-14), which corresponds in point of articulation only with *ch*.

Be that as it may, a point of departure is to formalize the statement, using the Hallean features (as described in Halle and Clements 1983:6-8, 33), and see what happens. The stops are the natural class that is [-syllabic, +consonantal, -sonorant, -continuant], and the glides are [-syllabic, -consonantal, +sonorant, +continuant]. The status of Yir-Yoront [R] as a glide in these terms is, I would

argue, nonproblematic, despite the classing of sounds written with one or another variant of the letter 'r' as [+consonantal] in published tabular summaries (Halle and Clements 83:33, Hyman 242). The definition of CONSONANTAL/NONCONSONANTAL (Halle and Clements 83:6) reads: "Consonantal sounds are produced with a sustained vocal tract constriction at least equal to that required in the production of fricatives; nonconsonantal sounds are produced without such a constriction." Yir-Yoront [R] is clearly nonconsonantal under this criterion. Pertinent here, furthermore, is an observation of Ladefoged's (1975:262-3) with regard to his proposed feature [stop], which characterizes degrees of articulatory closure. The possible phonological values along this continuum are given as [stop], [fricative], and [approximant] — the last more-or-less equivalent to what I am here calling glides. Ladefoged remarks: "Trills, taps, and flaps are often classified as [stop], but in a particular language they might be [approximant] or [fricative]." In alluding to the phonological rather than the phonetic aspects of the distinction, Ladefoged is here sounding just the right note.

Yir-Yoront points of articulation under the Hallean formulation are [+anterior] (*p, th, t, m, nh, n, lh, l, rr, w*) vs. [-anterior] (*rt, ch, k, q, rn, ny, ng, rl, R, y*); [+labial] (*p, m, w*) vs. [-labial] (the rest); [+coronal] (*th, t, rt, ch, nh, n, rn, ny, lh, l, rl, rr, R, y*) vs. [-coronal] (*p, k, q, m, ng, w*); [+distributed] (*th, ch, nh, ny, lh, y* — the laminal sounds) vs. [-distributed] (*p, t, rt, k, m, rn, n, l, rl, w, R*). The glides *y* and *w* share the feature [+high] with *ch* and *k*, and *w* shares [+back] with *k*; these features of *y* and *w* will be treated here as redundant.

A mechanical application of the formulation

$$(43) \quad [-\text{sonorant}] \longrightarrow \begin{bmatrix} -\text{consonantal} \\ +\text{sonorant} \\ +\text{continuant} \end{bmatrix}$$

carries *p* to *w* (position of articulation [+anterior, -coronal, +labial]), *rt* to *R* (position of articulation [-anterior, +coronal, -distributed], and *ch* to *y* (position [-anterior, +coronal, +distributed]). What happens to *th*, whose position [+anterior, +coronal] (and [-labial]) is not represented among Yir-Yoront glides? There is in fact such a sound type, here symbolized *yh*, attested in other Aboriginal languages (of the Pilbara, e.g. Yinyjiparnti-Kurruma — see for example O'Grady 1966:86, Dench 1987) and elsewhere in the world (Danish). O'Grady designates this sound a "dental glide" (1966:86). The most economical statement of the Yir-Yoront phonological process of stop to glide in fact allows *yh* to be generated as an 'imaginary' intermediate product, which is then turned without residue to the [-anterior] *y* in a subsequent process.

What then of *q* alternating with zero? If set up as an underlying *k*, rule (43) as formulated carries it into a glide with the position [-anterior, -coronal, +high, +back] (and [-labial]), i.e. a velar glide. Such a sound, here symbolized [ɣ]

(gamma), occurs in a number of Australian languages, as for example the Arandic languages, and it typically patterns with the glides (originating historically, in Arandic, from the glide *w*). Sounds symbolized with gamma, like the 'r's', occur in the published tabulations with the feature [+consonantal], and Arandic [ɣ] is indeed articulated with slight friction. Note also of the back velar 'r's', often symbolized with one or another variety of upper case 'R', that Hyman (1975:242-4) holds them to differ from 'gamma' only in being negative for the feature [high], i.e. only in place of articulation and not in manner. And note that Arandic [ɣ] is apt to strike observers with a grounding in German or French as 'r-like' (see for example Strehlow 1971, Spencer and Gillen 1927). Let it be emphasized however that the Arandic [ɣ] is articulated well forward of the uvular region and that the friction that accompanies it is slight; it is phonetically quite unlike the '[ɣ]', with heavy friction, of a language like Lakhota (North America). And conversely, the sounds that count as /w/ in a number of Australian languages (for example Wik-Mungkan) are accompanied by slight bilabial friction. And the formulation of the historical phonology of the Arandic languages (at least) requires that [ɣ] share the same manner features as [w] and that it therefore be regarded as [-consonantal].

Formulation of the Yir-Yoront  $q \sim \emptyset$  alternation as the same process as the stop vs. glide alternation, then, requires [ɣ] as an imaginary intermediate product with the feature [-consonantal], a rule that carries [ɣ] to zero without residue, and a rule that carries  $k$  to  $q$  in most noninitial contexts. However 'natural' it feels to replace a stop by glottal catch, the formalization of the process using feature-systems as they appear in the literature is once again a complex one. In the Hallean system (Halle and Clements 1983:33), the process is a change of manner:

$$(44) \quad \left[ \begin{array}{c} \text{-sonorant} \\ \text{+consonantal} \\ \text{+back} \end{array} \right] \longrightarrow \left[ \begin{array}{c} \text{+sonorant} \\ \text{-consonantal} \\ \text{-lateral} \\ \text{-spread} \\ \text{+constricted} \end{array} \right]$$

This rule changes any stop into a glottal catch; points of articulation become irrelevant. In Hyman's (1975:244) reformulation of the feature composition of the glottal catch, however, the process must be seen as one of change of position of articulation, since glottal catch is designated [-sonorant, +consonantal] like the stops, and like the stops it carries a specification for the place features ([anterior, high, low] etc.). There is some reason to prefer the 'manner' formulation, as in (44), given consideration of Cape York as a linguistic area in which one or another language has undergone a change of \*p (Umpila), \*t (Wik-Mungkan), or \*k (Yir-Yoront) to glottal catch. These changes can be seen as instances of the 'same' change, given only a specification of the position of articulation in the

structural description part of the rule, so long as the rule is of the 'manner' type. The fact that the process is not attested with \*ch (or \*th) would appear to require some extra phonetic theory not present in these feature inventories, but it can be captured ad hoc by characterizing *ch* and *th* alone among the stops as positive for the feature [distributed] and restricting (44) to [-distributed] elements.

It is of course possible that these processes,  $k > \gamma$  and  $k > q$ , which there is little doubt took place historically, have no synchronic reality, and that  $q > \emptyset$  is a separate synchronic process. There is no possibility that lenition as formulated in (43) subsumes a part of this process, say as  $q > h$ , because under the Hallean formulation glottal catch is [+sonorant] and under Hyman's formulation [h] is [+consonantal]. So the deletion of glottal catch amounts to the addition of a rule. But its consequences do not include a loss of generality to the lenition process as stated in (43), which can stand as written. And the addition of the rule  $q > \emptyset$  is balanced by the loss of the rule  $\gamma > \emptyset$ ; the only loss of simplicity is that the new rule, but not the old one it replaces, contains a context specification.

The featural system described in Halle and Clements (1983:6-8, 33) and the slightly earlier version outlined in Hyman (1975:241-3) are in the theoretical tradition of proposed language-universal inventories of some twenty or so features. Other formulations differ radically in their fundamental assumptions; at the opposite end of the scale to the Hallean system is the in-principle unbounded list based on the premise that the sound inventory of a given language is *sui generis* along at least some of the possible phonetic parameters (e.g. Hockett 1955). Sharing some characteristics of both these positions are systems which eschew any claim to universality and which admit features typical of or limited to certain geographical areas, but which contain the claim that for any given area a list of no more than twenty or so features is both adequate and revealing. Such a treatment is Dixon's (1980:192), with regard to Australian Aboriginal languages.

How is the stop/glide alternation, in which it should be recalled that [R] functions parallel to [w] and [y], to be formulated in this system? The relevant manners of articulation are as follows: stops, nasals, liquids, and *R* are [+obstruction] and *w*, *y* are not; the liquids and *R* are [+partial passage] and the other consonants are not. *R* is characterized as positive for both these features on the grounds that it is produced with the sides of the tongue touching. A further property of this system is the postulation of a feature [rhotic]. This is the feature shared by sounds articulated with closure of the oral passage along the sides of the tongue and passage of air along its centre. These are, it is claimed, the 'r-like' sounds, of which Yir-Yoront, like many Australian Aboriginal languages, contains two: an apico-alveolar flap (here symbolized [rr]) and a retroflex continuant (here symbolized [R]). The feature [rhotic] is postulated to capture the fact that distinct sounds of these two types behave as a natural class in several



Aboriginal languages and to account for the perceptual confusion that English-speaking (in particular) linguists are apt to experience when first trying to differentiate sounds of these types.

Differences from the Hallean system in the characterization of points of articulation have no bearing on the issue at hand. As given, this system permits the formulation

$$(45) \left[ \begin{array}{c} \text{oral} \\ +\text{obstruction} \\ -\text{partial passage} \end{array} \right] \longrightarrow [-\text{obstruction}]$$

which carries *p*, *ch* into *w*, *y* and (supposing imaginary intermediate products along the lines sketched above) *th* > *y* and *k* >  $\emptyset$ . The system as given requires the change *rt* > *R*, however, to receive a completely different formulation:

$$(46) \left[ \begin{array}{c} \text{oral} \\ +\text{obstruction} \\ -\text{partial passage} \\ -\text{rhotic} \\ -\text{peripheral} \\ -\text{laminar} \end{array} \right] \longrightarrow \left[ \begin{array}{c} +\text{partial passage} \\ +\text{rhotic} \end{array} \right]$$

The fact that [R] is characterized as [+obstruction] makes it impossible to conflate rule (46) with rule (45). A reasonable solution would appear to be reinterpreting [+obstruction] so as to exclude *R*, along parallel considerations to those involving [+consonantal] in the Hallean system. Note that there appears to be no necessity to redefine either Halle's [consonantal] or Dixon's [obstruction]; their definitions are simply being applied rigorously to certain sound-types whose common alphabetic symbols are also used with the opposite value to what is useful here. The feature [obstruction] is defined as follows (Dixon 1980:190): [+obstruction] "involves some type of obstruction to the free passage of air in the mouth" and includes all consonants except semivowels; sounds characterized as [-obstruction] "permit unimpeded passage". All that is missing from this formulation that is present in the Hallean [consonantal] is the 'sufficient to produce friction' part. Yir-Yoront [R], I think, involves as little obstruction and friction as [y]. When Yir-Yoront lenition is formulated with a reinterpreted [obstruction] equivalent to the Hallean [consonant], the features [+rhotic, +partial passage] can then be regarded as predictable and need not appear in the statement of the rule.

There is however another problem with the three features [obstruction], [partial passage], and [rhotic], if defined as given. It is that the high front glide [y] and front velar fricatives also appear to be produced with the sides of the tongue touching, and thus to be positive for all these features. Although it is true (see above) that voiced velar fricatives are apt to sound 'r-like', the same cannot be

said for [y]. (Rather, in at least some Aboriginal languages, as for example the Arandic ones, [R] is apt to sound 'y-like'.)

Does the feature [rhotic] have a place in the Yir-Yoront system that justifies an effort to redefine it more rigorously? I would argue that it does not. No process in the language involves just *R* and *rr*. But if there were such a process, these two sounds can be characterized as a natural class under the Hallean system: [+sonorant, -nasal, +coronal, -laminar, -lateral]. Phonotactically, Yir-Yoront *R* patterns for the most part with *w* and *y*. Unlike *rr*, it can begin a word (there is just one example, *Richirr* 'toffee tree', and this only for individuals who do not perform the process described by rule (47) below). Unlike *R* and like the laterals and coronal nasals, *rr* occurs before word-final laminals: *warrch* 'bad', *ngalhth* 'taboo', *wanhth* 'sickness'. Like *rr* and unlike the laterals, *R* (because of the sound change \**Rt* > *lt*) fails to occur before *t* — but it shares this property with *w* and *y*.<sup>4</sup> There is no [rhotic] affinity.

The feature [partial passage], however, has an obvious usefulness, because the sounds *R*, *rr*, *l*<sup>5</sup>, which are all and only the ones that are positive for this feature, are the context for a phonological process. This is the elision of the *R* of the irrealis suffix +*Rv* (as in *yamRv* 'would have carried', with stem *yam* 'carry') after any of these: *kal*+*Rv* > *kalv* 'would have speared', *karr*+*Rv* > *karrv* 'would have seen', *maR*+*Rv* > *maRv* 'would have hung'). But the feature [partial passage] carries with it the difficulties of definition mentioned above, and these sounds are also characterizable as a natural class using the Hallean features: [+sonorant, -nasal, +coronal, -laminar]. In fact, the specification [+sonorant] can be dropped, because stops (due to the general lenition of verbs) never occur in the relevant context. The sound class in question is the non-nasal apicals, which are [-nasal, +coronal, -laminar].

There is an interesting sidelight here in regard to one of the phonological processes of the system, a change of *R* to *rl* when the next consonant is *rr*. The process, which characterizes the usage of some speakers but not all, appears in an alternation involving *maR* 'mother's brother' in the compound forms *pam-maRiyr* (Nominative) vs. *paml-marlirrl* (Ergative). The same speakers who do this pronounce 'white gum tree' *porlorrl*, vs. others' *poRorrl*. The question is, is this process assimilative or dissimilative (or neither or both)? Formulation with [rhotic] characterizes the process as dissimilative (a process not without precedent: cf. Spanish *arbol* 'tree' < Latin *arbor*). Examples like *poRvR* 'thin', *kerrvR* 'fish-scale', and *maqrrarr* 'grass sp.', however, complicate the dissimilation analysis to the point where it becomes highly questionable. In the Hallean system, the process is clearly assimilative:

(47) [-consonantal] → [+consonantal] / \_\_\_ V  $\left[ \begin{array}{l} +\text{consonantal} \\ +\text{sonorant} \\ -\text{nasal} \end{array} \right]$

where *rl* is the only such sound-type in the system in the guise of which *R* can preserve its point of articulation.

This question of assimilation versus dissimilation in this area of the phonology does not in and of itself give a clear reason for preferring one feature theory over another. What does seem clear, however, is that the Hallean system, which is explicitly based on the quest for universals and which was not designed with Australian systems in mind, is quite adequate to characterize lenition and related processes in Yir-Yoront. A theory designed specifically to characterize Australian systems appears to add terms but no extra power. Within a theory of universal features like Halle's, traits of sound systems that are typical of a linguistic region (such as the Australian continent) become matters of the phonetic specification (in numerical terms, along various continua) of values of specific features for that region — such specification for particular languages being currently part of the theory. It will be these phonetically-specified features that figure in questions of markedness, propensity to certain types of sound change, and the like.

## NOTES

- \* I am indebted to Jason Johnston and to Diane Bell for comments on the ideas and presentation in this paper.
1. For examples of the discussion concerning imaginary segments in underlying representations, see Hyman 1970 and Kiparsky 1973. Hyman 1975:82-90 contains a summary and further references.
  2. Complete glottal closure. Since its status as a stop is very much at issue in what follows, we follow Hockett's (1955) terminology in calling it a glottal catch.
  3. The derivational suffixes *+rr* and *+lh* of the reduplications (7, 19, 20, 32, 34) recur in forms which do not exhibit the stop/glide alternation: *wolh+wolh+rr* 'funny', *porr+porr+lh* 'rotten'.
  4. A fuller discussion of Yir-Yoront phonotactics and morphophonemics can be found in Alpher (1973, 36-41 and 67-154).
  5. The lamino-dental lateral *lh* is in verbs followed by the stop *th* at the relevant stage of the derivation. Parallel considerations apply to the retroflex lateral *rl*.

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