

SYNCHRONIC/DIACHRONIC VARIATION OF THE TYPE
/CV₁IV₁/ ~ /CIV₁/ IN THE GĀ LANGUAGE: AN INSTANCE
OF THE BACKWARD MASKING EFFECT OF A STRONG
SOUND STIMULUS ON A SHORT, WEAK,
PRECEDING STIMULUS?

H.M.J. TRUTENAU

The importance of this particular type of variation in Gā has long been recognized by linguists,¹ while today it is emphasized by the need to set up an additional tone-bearing unit (hence: 'tbu.') for structures of the type /CIV/, so that post-consonantal /l/ becomes one of the *tbu.s* of the language, while in all other positions it is not involved with tone at all. If one succeeded in making plausible the derivation (both synchronic and diachronic) of all structures of the type from underlying /CVIV/ by a common mechanism, then they could conveniently be regarded as doubles of /CV/ (the favourite syllable structure of Gā). The /l/ involved — though transformed into a *tbu.* by rules near the surface (coupled with the elision of the preceding vowel) supplying it with the feature [+syllabic] in such cases — need no longer be regarded as one of the *PER SE tbu.s* and only vowels and non-intervocalic nasals need be specified for tone in the language. Such a solution is clearly to be preferred, and this paper intends to support it (for the first time) by relevant phonetic data and arguments, thus going one step further than M.E. Kropp (1968:44ff.).

The phenomenon we shall be referring to was observed by I.K. Samoylova in 1955 "in analyzing the character of errors perpetrated by articulation crew members in the reception of syllables at increased intensity levels" (Pokrovsky 1963: 185) It was referred to as "retroactive masking" (also known as "backward masking"); further research followed, resulting in her paper of 1959, which also contained an attempt at explaining the phenomenon (though to my mind not very convincingly).²

1. We are here not concerned with speech intelligibility, nor indeed with the explanations suggested in 1959, but rather with the question whether the phenomenon described may have something to contribute to a phonetically plausible ('natural') explanation of the alternation outlined above.

Intensity ratio figures for English sounds are given in Fletcher (1953). It is fortunate that the [l] and [ɹ] sounds in *Table 7A* are pronounced like those encountered in Gā,

¹ Cf. Christaller's monograph on tones (1893:4): "it is frequently the case that the tone of a suppressed short vowel attaches itself to the following *l* or *r*". So [kāla] ~ [k|a] 'to nail'.

² Cf. for this, and also for how controls discussed below might operate, Don George's paper delivered at this congress.

so that Fletcher's relative intensity figures may safely be used here. What emerges from them is that the vowels have the relatively greatest intensity; next come *r* and *l*, and then the other consonants. This ranking sequence is crucial to our argument, as in Gā it is a reduced (shortened, weakened) vowel that is followed by the /l/, and is masked out by it (Cf. for the /l/ phoneme, Trutenau 1971).

2. Let us perform a thought-experiment: take a Gā word of /CV₁IV₁/ structure and progressively reduce the power and duration of the first vowel. There should come a point where it is masked out by the following /l/. May we assume that this is what indeed happens in Gā?

Spectrograms were made, which show that in *CIV*-sequences in Gā there is a short (spectro-)segment between the *C* and the *l*, which cannot, however, be identified auditorily as a separate vowel.³

There is other (and less direct) evidence to support our hypothesis. With a voiceless plosive followed by *l*, it is most usual to observe a 'lateral release' of the plosive (e.g., English 'play', 'clue'). A laterally released voiceless contoid in rapid speech easily brings about partial or complete devoicing of the lateral (thus: [p|eɪ], [k|u]). Though similar sequences are found in Gā words (e.g., *aklotia*, 'pin'), one does not find any devoicing (even of part) of the lateral. And even following such characteristically 'fortis' plosives as the voiceless labial-velar [k̠] there is no devoicing of the *l* (cf. Figure 1, the spectrogram of [ak̠p̠o|oŋto], 'tortoise'). On the other hand contextual devoicing of voiced sounds is not at all unknown in colloquial Gā.⁴ This may mean that the reduced vowel still articulated between initial consonant and following /l/ effectively protects the lateral from progressive devoicing, even where it is no longer perceived by the ear.

One may want to ask critically why this masking phenomenon does not assert itself more often in similar circumstances in other languages. This is because the structural requirements of a given language may not permit its indiscriminate operation, so that this is prevented by the control a speaker exercises over his speech via the feedback mechanisms. The rare case in which there is no need for these to be brought into play occurs when communication is in no way interfered with by the disappearance of the vowel.

The Gā case we have been discussing is just such an exceptional one. To quote Kropp (1968:45): "there are no cases of contrast between *CIV* and *CVIV**". Therefore nothing should stand in the way of this habit of forming reduced alternants of suitably structured words. On the contrary, the Gā language exhibits signs of a tendency in favour of regressive conditioning: so there is regular assimilation of initial nasals

³ Where the first contoid was a plosive, duration from its release to the achievement of the steady state of the *l* was measured. The shortest was 0.008 sec.; and the longest, of which we reproduce the spectrogram, 0.0275 seconds. Cf. generally Duifhuis (1970). Compare also research findings which indicate that to allow vowel quality to be recognized, durations of the order of at least 0.02 seconds are required.

⁴ So we have a spectrogram with *subaŋ* 'image' pronounced [s̠u|baŋ].

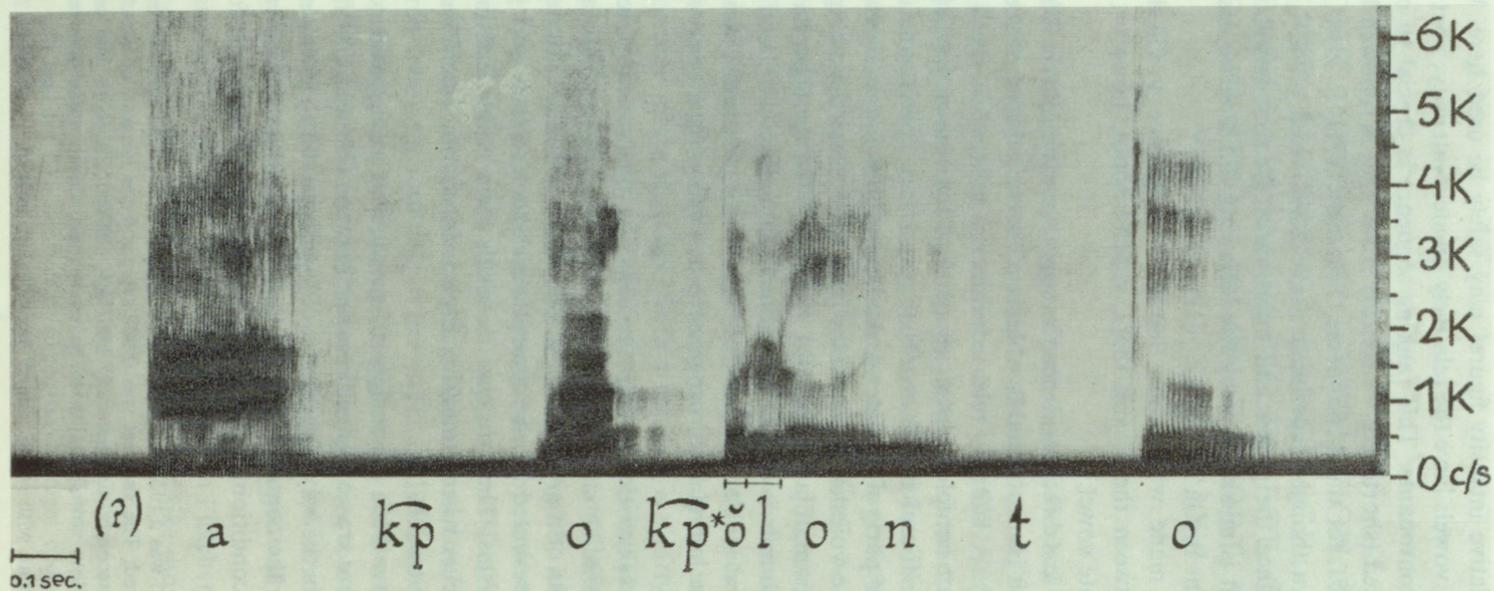


Fig. 1.

* The starred spectrosegment is inaudible.

to the place of articulation of a following contoid within the word (cf. [nta], 'pair'; [ŋku], 'sheabutter'; [ŋm̄k̄pai], 'libation'), which is in some dialects extended across word-boundaries, especially in the selection of the required allomorph of the first person singular pronoun subject, which is likewise conditioned by the first consonant of the immediately following verb-stem in the direction of homorganic articulation ({mi}, or {m ~ n ~ ɲ ~ ŋ ~ ŋm̄}).

While some such conditions were favourable to the process asserting itself, there were also restrictions preventing its institutionalization, wherever this was liable to prevent the discrimination of words. So, while freely operating on /CV₁V₁/ structures, it has practically never occurred where two different vowels were involved (thus always: *tsulo* 'servant', *hewale* 'strength', *yeli* 'eating'), and neither in words whose first consonant is /l/, like *lolo* 'still', *lele* 'boat' (otherwise these might have become indistinguishable from words like *lo(o)* 'or', *le* 'he/she').⁵

An interesting confirmation of the interpretation of /CIV/ as /CVIV/ has come to light in field-work. It emerged that illiterate villagers (the real custodians of the language) often preserve forms in which the vowel under discussion can still be heard. They constitute a social group with little economic power and prestige, however; and one can observe some prejudice among literate/educated Gās against adopting the unreduced forms. This became very clear when a proposal to represent the reduced vowel IN WRITING was brought before the "ad hoc Committee on Gā Orthography". Compare the Ghana Ministry of Education's minutes of the meeting of the 9th of June 1970, which stated tactfully that "if the recommendation was carried out, the reaction of the Gā reading public was not likely to be very favourable".

While all observations on the Gā language and its linguistic analysis used in this paper are well supported, the explanatory hypothesis must remain unverified, as facilities for testing it are not available to the author.

It may even emerge that recourse to this type of masking is too strong a hypothesis, and that reference to durational factors alone may be sufficient to explain the variation discussed here. It is expected that colleagues with well-equipped laboratories at their disposal will be stimulated to do more work on back masking. To date most investigations have focused on psychoacoustic masking by pure tones and clicks (see Duifhuis 1970 for a summary), and research on this kind of masking BY SPEECH SOUNDS (natural as well as synthetic) is urgently needed.

Department of Linguistics
University of Ghana
Legon, Ghana

⁵ An apparent exception like the noun *asla* 'snuff' (an alternant *asera* is recorded by J. Zimmermann in his vocabulary of 1858) turns out to be an Akan loan (cf. Fante *asera*), which has been treated as analogous to native Gā words permitting the vowel-reduction.

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