SYNCHRONIC/DIACHRONIC VARIATION OF THE TYPE
/CV1V1/ ~ /CV1V1/ IN THE GA LANGUAGE: AN INSTANCE
OF THE BACKWARD MASKING EFFECT OF A STRONG
SOUND STIMULUS ON A SHORT, WEAK,
PRECEDING STIMULUS?

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The importance of this particular type of variation in Ga has long been recognized
by linguists, while today it is emphasized by the need to set up an additional tone-
bearing unit (hence: 'thu.') for structures of the type /CV1V1/ so that post-consonantal
/l/ becomes one of the /ths/ of the language, while in all other positions it is not in-
volved with tone at all. If one succeeded in making plausible the derivation (both
synchronic and diachronic) of all structures of the type from underlying /CV1V1/
by a common mechanism, then they could conveniently be regarded as doubles
of /CV1V1/ (the favourite syllable structure of Gâ). The /l/ involved — though trans-
formed into a 'thu.' 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 /ths/ 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 argu-
ments, 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).1

1. We are here not concerned with speech intelligibility, nor indeed with the expla-
nations 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 [s] sounds in Table 7.4 are pronounced like those encountered in Gâ,
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 Gâ 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 Gâ word of /CV1V1/ 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 Gâ?

Spectrograms were made, which show that in /CV1V1-sequence in Gâ there is a short
(spectro-)segment between the C and the l, which cannot, however, be identified
auditorily as a separate vowel.2

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', 'chee'). A laterally released voiceless contoid in rapid speech easily
brings about partial or complete devoicing of the lateral (thus: [pz], [k]). Though
similar sequences are found in Gâ words (e.g., akkutia, 'pin'), one does not find
any devoicing (even of part) of the lateral. And even following such characteristicall "fortis" plosives as the voiceless labial-velar /s/ there is no devoicing of the l (cf.
Figure 1, the spectrogram of [ækko₃p] 'tortoise'). On the other hand contextual
devoicing of voiced sounds is not at all unknown in colloquial Gâ.3 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 then 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 opera-
tion, 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 Gâ case we have been discussing is just such an exceptional one. To quote
Kropp (1968:45): "there are no cases of contrast between /CV1V1/ and /CV1V1/.
Therefore nothing should stand in the way of this habit of forming reduced alternants of suitably
structured words. On the contrary, the Gâ language exhibits signs of a tendency in
favour of regressive conditioning: so there is regular assimilation of initial nasals

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1. 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, 0.0375 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.

2. So we have a spectrogram with zhup 'image' pronounced [dʒup].
Fig. 1.

* The starred spectrosegment is inaudible.
to the place of articulation of a following contoid within the word (cf. [sena], 'pair'; [gku], 'sheabutter'; [gihnpeal], '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 ~ m ~ n ~ m~ m~ i}).

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: isula 'servant', hewals 'strength', yeli 'eating'), and neither in words whose first consonant is /l/, like lolo 'still', lile 'boat' (otherwise these might have become indistinguishable from words like lo(o) 'or', le 'he/she').

An interesting confirmation of the interpretation of /ClV/ as /CV1V/ 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 Gäs 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 Gä 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 Gä reading public was not likely to be very favourable".

While all observations on the Gä 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.

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5 An apparent exception like the noun asa 'snuff' (an alternant asa is recorded by J. Zimmer-
mann in his vocabulary of 1858) turns out to be an Akam loan (cf. Fante asa), which has been treated as analogous to native Gä words permitting the vowel-reduction.
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