



Focus and its prosody in Akan and Ga

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Abstract

The paper investigates the prosodic effects of focus in morpho-syntactically unmarked simple sentences in the tone languages Akan and Ga (Kwa). We compare broad focus realizations to either narrow contrastive focus (Akan) or narrow informational focus (Ga) on the subject and the object. The results show that in-situ focus in both languages is not marked by a specific categorical prosodic device. While Akan shows a tendency to lower the intensity of the post-focal part, Ga speakers have the option to slightly raise the F0 of a focused object. The findings are discussed with regards to focus-prominence, focus alignment as well as the Nostratic origin hypothesis of post-focal compression.

Index Terms: African tone language, focus, prosody

1. Introduction

1.1. Focus and focus types

Focus is an information structural notion that points out to the existence of the alternatives ([1], [2], [3]) that are important for the interpretation of the linguistic expression. There are different types of focus, from which information (IF) and corrective focus (CF) are relevant for this paper. Focused constituents may further be divided by their size ([3], [4]). In broad focus (BF), typically the whole sentence is in focus. In a narrow focus (NF), on the other hand, a smaller constituent is in focus, e.g. a single constituent. The most common method to elicit IF, narrow and broad, is the question-answer paradigm, see e.g. [4]. The *wh*-element evokes a set of alternatives to the focused constituent [5], from which a true answer is selected. The element which answers the question is in focus. BF is elicited by a question like *What happened*. A sentence under BF exhibits default prosody [6] and serves as baseline in empirical phonetic studies investigating prosodic effects of focus and its types. A focus is corrective when a speaker corrects information given by another speaker. Narrow corrective focus is elicited by a context and/or a question that contains an explicit alternative which evokes a correction of a certain element of the answer/reply.

1.2. Prosody of in-situ focus in tone languages

Various strategies of focus marking are attested cross-linguistically: morphologic, morpho-syntactic and prosodic (see e.g. [7], [8], [9], [10], [11], and [12]). Specifically, in tone languages, morpho-syntactically unmarked (in-situ) focus can be marked with the use of various prosodic means. The variation includes the modification of scaling relations such as higher pitch range on the focused constituent and compression of the F0 of the post-focal part (PFC), as in Mandarin Chinese [13], longer duration of the focused constituent, as in Ewe [14], boundary insertion or enhancement, as in Naxi [15], and even no prosodic marking is possible, as in Northern Sotho [16], Hausa [17], and Yucatec Maya ([18], [19]). To the best

of our knowledge, no categorical prosodic means marking different focus types for tone languages are reported. Research in intonation languages like German shows that gradient means in terms of increased phonetic prominence may accompany the corrective focus [20].

1.3. Prominence, Alignment and PFC

The prosodic realization of focus in terms of modified scaling relations lead to the formulation of proposals equating focus with (metrical) prominence (FP), see [21] and [8]. Proponents of FP consider phrasal means (alignment), such as boundary insertion or enhancement, as a way to achieve focal prominence. [12], on the other hand, argues that prosodic prominence is not a universal property of focus but that a focused constituent is preferably aligned with the edge of a prosodic domain (FA). Proponents of FA analyze the variation of focus marking as different strategies to fulfill alignment; these include syntactic movement, cleft constructions, insertion of a prosodic boundary, and enhancement of existing boundaries, among others. Under this view, PFC is analyzed as an indirect way to achieve alignment [11:687].

[11] presents an overview on the distribution of PFC across languages. According to [11], PFC is basically independent of the prosodic profile of a language, i.e. tone or intonation language, lexical stress or no lexical stress and the presence of morpho-syntactic focus strategies. [11] suggests that PFC has one genetic origin, since the distribution of PFC appears to be compatible with the hypothetical Nostratic superfamily. The Nostratic superfamily comprises the Afro-Asiatic language family next to the Indo-European, Uralic, Altaic, Dravidian, Kartvelian and Eskimo-Aleut language families but crucially not the Kwa languages [22].

1.4. Background on Akan and Ga

Both Akan (ca. 8.3 million speakers) and Ga (ca. 745.000 speakers) are Kwa languages of the larger Niger-Congo phylum spoken in Ghana. The basic word order is SVO, see (1a). Both languages contrast L(ow), marked with a grave accent, and H(igh) tone, marked with an acute accent, in their grammar. We assume that the syllable is the TBU [but see 23]. They are level-tone languages and exhibit downdrift: the stepwise lowering of H tones in a sequence of alternating L and H tones. Neither Akan nor Ga exhibit lexical stress. The prosody of Akan, unlike Ga, is relatively well studied experimentally, see e.g. [24], [25] and [26] for recent works and [27] for a summary on tonal processes. The prosodic structure is basically isomorph to the syntactic structure. The blocking of a process of regressive ATR vowel harmony between words serves as diagnostic of (maximal) phonological phrase boundaries [27]. (1) illustrates the prosodic structure of a simple SVOAdv sentence: (1a) displays the syntactic structure and (1b) shows the corresponding prosodic structure, where φ refers to phonological phrase and ι to intonation phrase. Time adverbials, unlike manner adverbials, form their

own maximal φ . We use time adverbials in our production experiment, see section 2.1.

- [CP [TP [DP Subject] [VP Verb [DP Object]
[ADV Adverb]]]]] (1a.)
((Subject) φ (Verb (Object) φ) φ (Adverb) φ) ι (1b.)

Akan marks neither φ nor ι phrases tonally and does not exhibit pre-boundary lengthening [25]. The comparison of the prosodic focus marking of Akan and Ga is interesting because both languages differ in the way they mark sentence mode prosodically, despite their genealogical relationship. Akan questions exhibit an L boundary tone at the right edge of the IP, which is accompanied by a longer duration, a higher intensity on the final vowel and a higher register, e.g. [24], [25] and [26]. Ga questions, on the other hand, exhibit a higher register/reduction of downdrift, reduction of final lowering and a polar or mid tone at the right edge of the IP [28]. The overarching question thus is whether this difference extends to the prosodic focus marking. Especially in light of [11] which suggests that language families constitute a homogeneous group with respect to focus marking, see section 1.3.

1.5. Focus realization in Akan and Ga

Both Akan and Ga exploit a morpho-syntactic strategy to mark focus, see [29] for an overview. (2c) illustrates the morpho-syntactic strategy of focus marking in Akan (compare it with (2b) which shows its in-situ counterpart). (2a) displays a possible context/question for both structures. The focused object in (2c) appears in a sentence initial position and is followed by the particle *nà* (square brackets indicate the focused constituent). A copula may optionally precede the fronted focused element, e.g. [30], [31]. If the fronted focused element is animate, a resumptive pronoun appears in its base position ([30], [31]). In the in-situ construction, as in (2b), the verb carries an L and an H tone underlyingly. In the ex-situ construction however, as in (2c), the verb carries only H tones ([30], [32]). The glosses HAB and PRT serve as abbreviations for habitual and particle, respectively.

- Akan:
ánàní bisá krátáá ènné
Anane ask.HAB book today
'Did Anane asks for a book today?' (2a.)

- ánàní bisá [siká] ènné
Anane ask.HAB money today
'Anane asks for money today.' (2b.)

- [siká] nà ánàní bisá ènné
money PRT Anane ask.HAB today
'It is money that Anane asks for today.' (2c.)

The morpho-syntactic strategy of focus marking in Ga resembles that of Akan, except that the focused constituent is marked morphologically by the particle *nì*, as demonstrated in (3c). (3b) displays the in-situ counterpart for comparison and (3a) constitutes a possible context/question for both structures.

- Ga:
námò màdzé kpaní jwàné
who send Kpani afternoon
'Who sent Kpani away in the afternoon?' (3a.)

- kpaní màdzé [dèdè] jwàné
Kpani send Dede afternoon
'Kpani sent Dede away in the afternoon.' (3b.)

- [dèdè] nì kpaní màdzé jwàné
Dede PRT Kpani send afternoon
'It was Dede who Kpani sent away in the afternoon.' (3c.)

In Ga however, unlike in Akan, the resumptive pronoun is generally not present with fronted focused objects; it is optional with fronted focused subjects but appears obligatory with fronted focused pronouns [33]. The ex-situ constructions in Akan and Ga are analyzed as clefts and trigger a marked interpretation, i.e. they are contrastive and trigger exhaustivity and existence presuppositions, see [34], [35] and [36] for data and discussion. Current, experimental studies show that focused elements in Akan and Ga may also remain morpho-syntactically unmarked. Akan usually realizes focused non-subjects in-situ, preferably also when the focus is corrective [37], as in (2b), but see [38]. Exhaustively interpreted focused objects appear obligatorily ex-situ [39]. Focused subjects may remain in-situ as well [25], [39] and [34], but see [40]. Like non-subjects, exhaustive focused subjects appear obligatorily ex-situ [34], [39]. As for Ga, while [33] and [29] claim that focused subjects are obligatorily morpho-syntactically marked, [33], [36] show empirical evidence that morpho-syntactically unmarked focus is equally acceptable for focused subjects and non-subjects.

For Akan, previous studies on prosodic focus marking investigated in-situ objects. [10] show experimentally that narrow IF neither affects the scaling of tones nor the duration of their TBUs but that narrow contrastive focus lowers the F0 of the focused in-situ object without affecting the length of the TBU. [10] further show that the lowering extends to the tones of the post-focal domain. [25] suggests that the lowering is due to a global F0 lowering effect triggered by the negation preceding the sentences containing the narrow contrastive focus. Semi-spontaneous realizations of narrow IF and narrow contrastive focus exhibit pauses and/or glottal stops preceding and/or following the focused object [25]. [25] interprets the result as indication of enhancement of existing φ -boundaries enclosing the object, see (1b.), i.e. as a form of alignment [12]. However, [12:725] notes that controlled lab speech may differ from semi-spontaneous speech with regards to boundary marking/enhancement. To the best of our knowledge, there are no previous experimental studies on prosodic focus realization in Ga.

Our paper seeks to address two main research questions: first, whether morpho-syntactically unmarked focus is prosodically marked and second, whether the post-focal part exhibits PFC. Regarding the former, based on the previous controlled data/lab speech, we do not expect Akan to mark in-situ focus by a specific prosodic device, e.g. boundary enhancement, or by gradient prominence related means. As for the second question, since neither Ga nor Akan belong to the Nostratic superfamily, we do not expect PFC to be present in these languages.

2. Production experiment

2.1. Materials, procedure and participants

We used simple SVOAdv structures as test-sentences and questions to elicit either BF or NF on the subject or the object as explained in section 1.1. (2b) shows the Akan test sentence. It exhibits alternating HL tones. (2a) displays the question that elicits narrow corrective focus (CF) on the object and (4) displays the question that elicits CF on the subject. A negation was not present to avoid register lowering, see [25].

- àfià bisá siká ènné
Afua ask.HAB money today
'Did Afua asks for money today?' (4.)

We used comparable materials for Ga. (3b) presents one of the two test-sentences with alternating LH tones. (3a) displays the

wh-questions that elicits IF on the object and (5) displays the questions that elicits IF on the subject.

námò màdzé dèdè ʃʷàné
 who send.COMP Dede afternoon
 ‘Who sent Dede away in the afternoon?’ (5.)

All test sentences were prepared in Akan/Ga orthography with English translation below the target sentence, since the orthography lacks marking for tone. Fillers were interspersed. The experiments were carried out using presentation software. Question and answer were presented on one slide. The answer/test-sentence was presented below the question. The questions were recorded previously with an/a Akan/Ga speaker who did not participate in the production experiment and were auditorily presented to the participants. The participants wore a headset and were digitally recorded on a laptop in a quiet room. They were instructed to read the sentence displayed silently and utter it as a response after the question/context was played by the experimenter.

For Akan (Asante Twi), 72 test-sentences from 6 speakers (1♀ & 5♂, Ø 28 years) x 2 conditions x 2 positions x 3 repetitions were recorded. For Ga, 120 test-sentences from 5 speakers (4♀ & 1♂, Ø 22 years) x 2 items x 2 conditions x 2 positions x 3 repetitions were collected.

2.2. Acoustic and statistical analysis

We labelled each vocalic segment (V) in Praat [41] and extracted F0 (time-normalized) at 10 equally-spaced points over the interval in Hz, duration (D) in msec, the maximal intensity of the utterance and the maximal intensity in dB of each vocalic segment. The difference between the maximal intensity of V and the maximal intensity of the utterance is presented as relative intensity measure (Irel) [42]. Furthermore, we annotated indicators of phrase boundaries, such as pauses, creaky voice and /ʔ/ between the subject and the verb (edge 1), between the verb and the object (edge 2) and between the object and the adverb (edge 3).

The results of the phonetic analysis (5th F0 point, D and Irel) were evaluated against the fixed factor CONDITION with the two levels, BF and NF, for each V of the subject and object separately in R [43] using linear mixed models from the ‘lme4’ package [44]. BF served as reference level. To examine post-focus effects, another model was constructed with the fixed factor CONDITION, BF and NF on the subject. The phonetic measures of all Vs in the post-subject region served as dependent variables. We added random intercepts for speaker, item (only Ga) and repetition, and by-speaker, by-item (only Ga) and by-repetition random slopes for sentence mode into the models. To access p-values, we constructed an intercept-only model and tested it against the full model. Both models had an equal random factor structure. We used likelihood ratio tests to compare the models and chi-square tests to calculate the significance of frequencies of pause/glottal stops/creak between the conditions. A $p < 0.05$ is taken to indicate significance. We only report detailed figures on the significant results.

2.3. Results of Akan

Neither the comparisons of the measured phonetic parameters on the three Vs of the subject nor on the two Vs of the object yielded significant results. In the post-focal area, CONDITION affected the Irel measure ($\chi^2(1) = 3.9531$, $p = 0.04678$), raising it by about $0.99 \text{ dB} \pm 0.47$ standard errors (SE); (Estimate: 10.05 dB). To assess the location of the effect, we ran post-hoc models for each post-subject V ($n = 6$) with Bonferroni-

corrected α -level of 0.008334. None of the comparisons yielded a significant result, see figure 1 for further details.

Concerning the phrasal indicators, we observed no silent pauses at the edges under BF and subject/object focus. Glottal stops and/or creaky voice occurred after the object in all conditions by approximately the same amount.

Figure 1 shows the mean F0 and standard deviation for the test sentence in (2b) uttered under the three focus conditions. It shows that the tonal structure and the downdrift relations are not affected by the experimental manipulation.

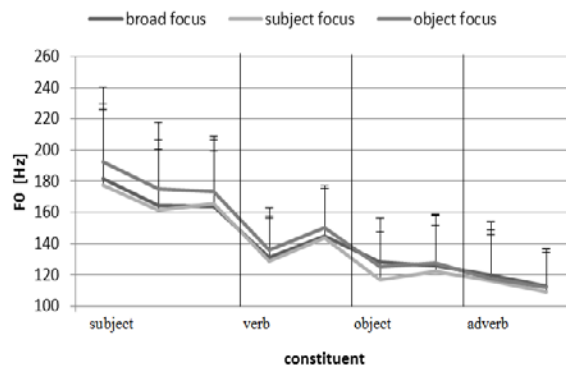


Figure 1: Mean F0 (5th point) in Hz and standard deviation for the Akan sentence in (2b) under the three focus conditions. Vertical lines indicate constituent boundaries.

2.4. Results of Ga

None of the comparisons between BF and IF on the subject yielded significant results. A marginally significant effect was obtained for the first and second V of the object, CONDITION affected the F0 (first V: $\chi^2(1) = 3.6585$, $p = 0.05578$, second V: $\chi^2(1) = 2.9847$, $p = 0.08405$), raising it by about $2.21 \text{ Hz} \pm 1.032 \text{ SE}$ (Estimate: 162.47 Hz) and by about $3.53 \text{ Hz} \pm 2.055 \text{ SE}$ (Estimate: 184.65 Hz), respectively. CONDITION did not cause any significant effects on the measured phonetic parameters in the post-focal area.

Pauses occurred frequently at each edge. No effect of CONDITION on the frequency of pauses could be detected.

Figure 2 represents the mean F0 and standard deviation for the test sentence in (3b) uttered under the three focus conditions. It shows that the tonal structure and the downdrift relations are not affected by the experimental manipulation.

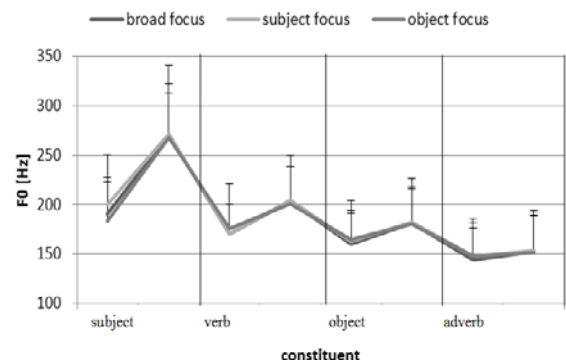


Figure 2: Mean F0 (5th point) in Hz and standard deviation for the Ga sentence in (3b) under the three focus conditions. Vertical lines indicate constituent boundaries.

3. Discussion

For morpho-syntactically unmarked narrow corrective focus in Akan, we could not detect any difference in the measured phonetic parameters on the focused elements (subject/object) in comparison to the same elements under BF. This is in line with current findings from controlled experimental data; see [10] and [25] who suggested that Akan does not exhibit a specific phonological device to mark focus. We did not observe ϕ -boundary enhancement as [25] for semi-spontaneous data. Differences between lab speech and semi-spontaneous speech have been predicted by [12]. Future research should test potential effect of boundary insertion using vowel harmony. For the post-focal area, a greater Irel measure was obtained in comparison to the BF which however did not turn out to be significant in the post-hoc tests. The absence of a significant effect in the post-hoc test is likely to be due to the small sample size ($n=36$). A greater Irel measure, see section 2.2 for details, means that absolute intensity on the post-subject vowels is lower in relation to the maximal absolute intensity of the utterance, post-focally than under BF. This effect may not be regarded as genuine PFC since it is usually only related to F0 [11]. However, it may serve the same function, i.e. an indirect way of making the focused element prominent by reducing the prominence of the post-focal part or an indirect way to signal alignment [12]. More data and perceptual evidence is needed to sustain this claim. However, intensity has been shown to play a role in the marking of sentence mode in Akan [25].

For morpho-syntactically unmarked narrow IF in Ga, we could not detect any difference in the measured phonetic parameters on the focused subject in comparison to the subject under BF. Post-subject Vs did not show a difference in the measured phonetic parameters post-focally than under BF. Pause frequency was not indicative for focus. Focus on the object did not affect the duration and relative intensity but there was a marginal F0 raising effect in comparison to the object under BF. The F0 differences are with 2 Hz for the L tone ($\bar{x}=160.26$ Hz, $SD=31$) and 3.5 Hz for the H tone (181.12 Hz, $SD=35$) too low to hinder the phonological contrast between L and H, the just-noticeable-differences (JND) for a tonal contrast is at around 9 Hz [45]. We would thus argue that the observed effect is phonetic and may serve to make the focused object prominent. Experiments on JNDs in the perception of pure tone have shown that a difference of 4 Hz in repetition frequency is perceivable at around 250 Hz [46]. At least the value for the H tone is approaching the critical value. Future experiments with more speakers and/or a stronger focus (corrective focus) may show whether this effect can be substantiated. What remains puzzling is the subject-object asymmetry of prosodic focus marking, but see [47] for comparable results in Bangla.

The finding that neither Akan nor Ga mark unmarked in-situ focus by a specific categorical prosodic device is in line with results of other tone languages like Northern Sotho [16], Hausa [17], and Yucatec Maya ([18], [19]). Our study adds evidence to the observation by [9] that the lack of prosodic focus marking is independent of the language family (Niger-Congo vs. Afro-Asiatic vs. Mayan) and geographical distribution. The absence of focus marking has been explained by the expectability of a focused element in a given discourse situation, i.e. a focus that is deducible from the context as in answers to questions or in corrections of preceding propositions does not need to be marked e.g. [48:147], [12:726]. Akan and Ga among others have a morpho-syntactic strategy which speakers may use to mark NF, e.g. in exhaustive contexts, see section 1.5. According to [12],

morpho-syntactic strategies can be interpreted as a form of alignment and hence as prosodic marking.

Both languages are terraced-level tone languages. At least for Akan [25] argues that declination, the gradual decrease of F0 over the course of an utterance, has been phonologized. Due to this rigid lowering pattern prosodic focus marking that involves F0 raising, like in Mandarin Chinese [13], may be dispreferred.

We raised the question whether the prosodic difference of the prosodic marking of sentence mode extends to the prosodic marking of morpho-syntactically unmarked focus in section 1.4. We may tentatively suggest that Akan and Ga also differ when it comes to fine-phonetic details of prosodic focus marking. However, as Kwa languages both Akan and Ga were not expected to allow for PFC since they do not belong to the Nostratic superfamily [11], [22]. Our findings are in line with this expectation.

4. Conclusions

The paper investigated the prosodic focus marking of the two Kwa languages Akan and Ga in morpho-syntactically unmarked simple SVOAdv sentences. We used the question-answer paradigm to elicit broad focus and narrow focus on the subject and the object. Results have shown that neither Ga nor Akan show PCF in the original, F0 related, sense. The finding thus adds evidence to the Nostratic superfamily origin hypotheses of PFC [11]. Our study has further shown that neither Akan nor Ga mark morpho-syntactically unmarked focus by a specific categorical prosodic device: underlying tones were preserved, the downdrift pattern was maintained and the duration of the tone bearing elements was not affected. Akan and Ga can thus be added to the list of languages that use morphological and/or syntactic means for focus marking and lack prosodic marking such as pitch range expansion or PFC.

However, we observed that Akan and Ga differ in fine phonetic details of prosodic focus marking which have been interpreted as phonetic prominence/alignment-related strategies. Akan shows a tendency to lower the intensity of the post-focal part, which has been interpreted as indirect way to make the focused element prominent or to align it. Ga, on the other hand, has the option to slightly raise the F0 of a focused object, which we interpreted as direct prosodic prominence. It remains to be examined whether the observed phonetic effects are of perceptual relevance.

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