An experimental investigation of focus prosody in Akan and Ghanaian English

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Abstract

This thesis investigates the prosodic means of marking focus in Akan, a Niger Congo language spoken in Ghana. Existing literature on Akan presents conflicting views regarding whether the language exhibits prosodic focus. To provide a better understanding of prosodic focus in Akan, this study introduces a novel dimension by examining the phenomenon in Ghanaian English, a variety of English spoken in Ghana. Unlike European and North American Englishes, West African varieties such as Nigerian English do not mark focus prosodically. Thus, investigating Ghanaian English becomes critical for evaluating any effects of prosodic focus in Akan. This study compares broad focus to narrow focus on the subject and object in syntactically marked and unmarked sentences. Focus was elicited through preceding context questions, and both relative and absolute measures of f0, intensity, and duration were analysed. Data from 27 bilingual speakers (24 males, 3 females) of Akan and Ghanaian English were considered. The evidence indicates that Akan employs prosody to express information structure, and this phenomenon is more pronounced in Akan compared to Ghanaian English. In both Akan and Ghanaian English, intensity served as a significant cue for marking focus in syntactically unmarked sentences, whereas duration was significant only in Akan. However, neither Akan nor Ghanaian English employed pitch as a significant cue for marking focus. The results further suggest the presence of post-focal compression in both languages. Contrary to the common assumption of a trade-off between prosodic and syntactic focus marking, the findings in Akan do not support this relationship. Rather, they suggest that prosody may be used simultaneously with morpho-syntactic means to encode focus in Akan.

Résumé

Cette thèse étudie les stratégies prosodiques pour marquer la focalisation en akan, une langue nigéro-congolaise parlée au Ghana. La littérature précédente présente des points de vue contradictoires sur la question de l'existence de focalisation prosodique en akan. Afin de mieux comprendre la focalisation prosodique en akan, cette étude introduit une nouvelle dimension en examinant le phénomène en anglais ghanéen. Distinctes des variétés d'anglais européenne et nord-américainne, les variétés ouest-africaines (telles que l'anglais nigérian) ne marquent pas l'accent prosodique. Une étude comparative de l'anglais ghanéen et de l'akan devient donc essentielle afin de bien évaluer les effets de la focalisation prosodique. De manière plus spécifique, cette étude compare la focalisation large à la focalisation étroite sur le sujet et l'objet dans des phrases syntaxiquement marquées et non marquées. La production de la focalisation a été élicitée à l'aide de questions contextuelles préalables, et les mesures relatives et absolues de f0, d'intensité et de durée ont été analysées. Les données proviennent de 27 locuteurs bilingues (24 hommes, 3 femmes) de l'anglais ghanéen et de l'akan. Les résultats indiquent que l'akan utilise la prosodie pour exprimer la structure de l'information, et que ce phénomène est plus prononcé en akan qu'en anglais ghanéen. En anglais ghanéen et en akan, l'intensité a servi d'indice significatif pour marquer le focus dans les phrases syntaxiquement non marquées, tandis que la durée n'a été significative qu'en akan. Cependant, ni l'akan ni l'anglais ghanéen n'ont utilisé la hauteur mélodique comme marqueur de focus. Les résultats suggèrent en outre la présence d'une compression post-focale dans les deux langues. Contrairement à l'hypothèse courante d'un compromis entre le marquage prosodique et syntaxique du focus, les résultats en akan ne confirment pas cette relation. Ils suggèrent plutôt que la prosodie peut être utilisée simultanément avec des moyens morpho-syntaxiques pour encoder le focus en akan.

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List of Abbreviations

ACC	Accusative
DEF	definite
f0	fundamental frequency
FOC	focus
FM	focus marker
HAB	habitual
PERF	perfective
PFC	post-focal compression
PL	plural
PROG	progressive
PRT	particle
REL	relative
RPro	resumptive pronoun
SG	singular
STAT	stative

1 Introduction

This thesis examines the prosodic marking of focus in the Asante Twi dialect of Akan (Kwa, Niger-Congo) and Ghanaian English, a variety of English spoken in Ghana. *Focus*, an important aspect of information structure, entails highlighting specific elements within a sentence to draw the listener's attention. To encode focus, languages can use different strategies, including prosody, morphology, syntax, or a mix of these strategies. A general finding about prosodic focus is that a focused word is characterized by a higher pitch, longer duration, and greater intensity (Cooper et al. 1985; Féry and Kugler 2008). Evidence from various languages, such as Korean and French has also shown that not only can speakers enhance the words under focus, but they can also reduce the pitch range and intensity of the words after the focused word (e.g., Xu 2011). This phenomenon is referred to as *post-focus compression (PFC)*. Although PFC has been found in many languages, Xu points out that the phenomenon is not universal.

The literature on African tone languages shows that many of these languages use morphological and/or syntactic, rather than prosodic means to encode focus. This tendency is likely influenced by the fact that both tone and prosodic focus involve variations in pitch. Focus can be marked morphologically by special focus markers in the Bantu tone language Kikuyu, the Gur tone languages Kɔnni and Dagbani, and the Kwa tone languages Lelemi, Akan, and Ewe (e.g., Aboh et al. 2007; Zerbian et al. 2010). Zerbian et al. (2010) note that, in some cases, the morphological and/or syntactic means may also be accompanied with changes in prosody.

Out of the twelve African languages discussed in Downing and Rialland (2017), only four languages (Akan, Bemba, Chimiini, Shingazidja) were found to mark focus prosodically. Of those that exhibited the phenomenon, none of the languages marked focus by making the focused word prominent. In contrast, the pitch of focused words was lowered in Akan and Bemba. In the other languages like Chimiini, post-focused words were realized through unusual means like the assignment of an accent to the penultimate syllable of the post-focused word.

The prosodic expression of focus may not be straightforward in a tone language like Akan, where different pitch levels distinguish between word meanings. This complexity is evident in the literature on Akan, where there is little agreement on how focus is marked in the language. Boadi's (1974) earlier work shows that *ex-situ* informational and contrastive focused words are characterized by the raising of lexical high and low tones. *Ex-situ* focus involves the overt displacement of the focused constituent from its canonical position, while *in-situ* focus does not involve such movement. Sanusi and Abrefa (2021) also report that *in-situ* informational

focused words are prosodically marked by tonal raising. However, it should be noted that these are impressionistic studies, which do not employ experimental methodologies.

For experimental studies, Kügler and Genzel (2011) observe that the prosodic marking of corrective focus in Akan is expressed by the pitch lowering of the focused *in-situ* and *ex-situ* target word. The amount of lowering in the *ex-situ* construction was about 3 semitones greater than in the *in-situ* construction. Additionally, they observe the pitch lowering of high and low tones in the post-focal domain. Their study, however, reveals no consistent pattern of the durational reduction of the target word. Contrary to Kügler and Genzel (2011), Genzel et al. (2018) find no specific prosodic device for marking *in-situ* corrective focus. The tonal structure of subject and object focus constituents was not affected while glottal stops and/or creaky voice that occurred after the object were also consistent across all conditions. On the other hand, their results show that Akan exhibits a tendency to lower the intensity of the words in the post-focal domain. Thus, in contrast to wide focus, the absolute intensity of vowels in the post-focal domain was lower relative to the maximum absolute intensity of the entire utterance. It is worth noting that Genzel et al.'s (2018) study considered data from only six speakers. The contradictory nature of all the above findings prompts questions about whether methodological differences among the studies could explain the discrepancies and how future research can reconcile these contradictions to offer a clearer understanding of the prosodic realization of focus in Akan.

The present study is an experimental investigation of focus prosody in Akan. The main objective of the study is to provide a better understanding of whether *in-situ* and *ex-situ* focus sentences in Akan are marked prosodically. As a crucial step, this research also delves into focus prosody in Ghanaian English, a variety of English spoken in Ghana. English has been found to mark focus prosodically (Eady and Cooper 1986, Ladd 1996; 2008). However, this has been observed for North American and European varieties, whereas West African varieties like Nigerian English have been noted to lack prosodic focus. According to Gussenhoven and Udofot (2010) and Gussenhoven (2013), Nigerian English speakers cannot mark focus prosodically because every syllable is specified for tone in the language, coupled with a lack of tone deletion rule equivalent to deaccentuation in European and North American Englishes. Hence, a comparative study of Akan and Ghanaian English will help assess and quantify any potential effects of the marking of prosodic focus in Akan. This study is also the first to investigate focus prosody through bilingualism in Akan, which will enrich our understanding of the phenomenon in the language and African tone languages more broadly. Moreover, a

study on Ghanaian English is worth conducting because it could shed light on the prosodic properties of English varieties spoken in tonal environments.

2 Defining focus

Focus has been defined in various ways in the literature, encompassing a range of aspects including phonology, syntax, semantics, and pragmatics. Rooth (1992) introduced a theory of focus alternatives, in which the central claim is that focus indicates a range of alternatives from which the speaker selects one. This underscores the significance of the chosen element within the context of the discourse. Similarly, Krifka (2008) points out that focus signals the presence of relevant alternatives that are crucial for interpreting linguistic expressions. Moreover, focus has been described as new information rather than presupposed (see Jackendoff 1972; Lambrecht 1994). Thus, presupposition is the information in the utterance that is assumed to be shared by the speaker and listener, whereas focus is the information that the speaker considers new to the listener. Halliday (1967) characterizes focus as the prominent information within a speaker's message, which the speaker intends to be perceived as informative. He argues that this information may not necessarily be new because the speaker presents it as not retrievable from the preceding context.

When constructing sentences, speakers have the flexibility to either bring the entire sentence into focus (broad/wide focus) or accentuate a smaller constituent (narrow focus). Broad focus is commonly prompted by wh-questions such as "What happened?" A specific type of narrow focus is corrective focus (also called contrastive focus in Chafe 1974), where the speaker rectifies information provided by another speaker in a preceding context. An instance of corrective focus is exemplified in the response in (1b) to the question in (1a), where 'MARY' is the focused word.

(1) a. Did John read the book?
b. No, MARY read the book

Languages worldwide exhibit a wide variety of devices to express focus, ranging from morphological, syntactic, prosodic, or combinations of these devices. For example, West Chadic languages such as Gùrùntùm spoken in Nigeria mark focus using morphological focus markers (Hartman and Zimmermann 2009). The data in (2) from Hartman and Zimmermann (2009) illustrates object focus in Gùrùntùm, indicated by the focus particle *a*, which attaches to the verb preceding the focused constituent. In contrast, other languages mark focus through *ex-situ* means. As mentioned above, the focused constituent is moved from its base position in

ex-situ focus. For example, in Hausa (Chadic; Nigeria), focus is marked by moving the focused constituent to sentence-initial position (Hartman and Zimmermann 2007). Additionally, the fronted constituent can be followed by the particle *cee* or its feminine form *nee*. The example in (3) illustrates *ex-situ* focus in Hausa, as discussed by Hartman and Zimmermann. The focused constituent is printed in bold. Although it is not clear whether focus fronting encodes similar information semantically and/or pragmatically as prosodic focus, it has been argued that focus fronting encodes exhaustivity like clefts, whereas prosodic focus does not. In *in-situ* focus, on the other hand, the focused constituent remains in its base position. Additionally, some languages adopt a mixed approach to marking focus. Hungarian, for instance, employs syntactic reordering, moving the focused constituent to sentence initial position, but only when accompanied by pitch accent on the focused constituent (Szendröi 2003). An example of subject contrastive focus in Hungarian is provided in (4), with the focused constituent highlighted in bold.

(2) a. **Á** kǎ̃ã mài tí bà pánì?
FOC what REL 3SG PROG carry
'WHAT is he carrying?'

b. Tí bà pán-**á** máa
3SG PROG carry-FOC water
'He is carrying water.'

(3) a. Mèe sukà kaamàa?
what 3PL.REL.PERF catch
'What did they catch?'

b. **Kiifii** *(nèe)* sukà kaamàa
fish PRT 3PL.REL.PERF catch
'They caught fish.'

(4) **A RÁDIÓT** fogom akarni kezdeni szétszedni t_{DP}
the radio-ACC will-I want-to begin-to PRT-take-to
'It is the radio that I will want to begin to take apart.'

Prosodic marking of focus involves some form of pitch (f0) range expansion, boost in intensity, and longer duration. In intonation languages like English and German, for example, speakers mark focus prosodically through the placement of a pitch accent on the focused constituent (Féry 1993; Selkirk 1995; Büring 2001). Additionally, the prominence of the

focused word can be enhanced through deaccentuation of elements in the post-focal domain, achieved phonetically by compressing the pitch range and intensity, a phenomenon known as post-focus compression (PFC). PFC is present in many languages such as French (Dohen and Loevenbruck 2004), Korean (Lee and Xu 2010), Greek (Botinis et al. 1999), and German (Féry and Kügler 2008). On the other hand, many other languages including Yucatec Maya (Kugler 2007) and African languages Chitumbuka, Wolof (Zerbian et al. 2010), and Northern Sotho (Rialland 2001) have been shown to exhibit no PFC.

Aside from modifications in pitch and intensity, various languages worldwide employ different prosodic methods to mark focus. For example, in African tone languages like Chichewa (Bantu; Kanerva 1990), Pero (Chadic; Frajzyngier 1989), Tangale (Chadic; Kidda 1993), as well as accentual languages like Bengali (Selkirk 2007) and Japanese (Beckman and Pierrehumbert 1986), focus is realised through the insertion of a phrase boundary before or after the focused constituent. This phrase boundary is associated with phonetic cues such as final lengthening, pause, pitch reset, or a combination thereof. In Japanese, in addition to prosodic phrasing, a focused constituent is marked by a rise in pitch, even when it does not bear a lexical accent.

3 Akan and Ghanaian English

Akan is a Niger-Congo language widely spoken in Ghana among over 70 indigenous languages spoken in the country. It is the mother tongue of a large percentage of the Ghanaian population, and it is often used as a second language by non-Akans throughout the country. Due to the multilingual setting of Ghana, most Akans may also be bi/multilingual. Akan has about 9.1 million speakers, and it is the mother tongue of about 8.1 million people in Ghana (Eberhard et al. 2024). Akan is a cluster of several mutually intelligible dialects with two main dialects, Fante and Twi. Although these dialects are mutually intelligible, there are some lexical and phonological differences between these dialects. The Fante dialect has sub-varieties, including Agona, Ekumfi, Iguae, Breman, Nkusukum, and Gomoa. The sub-ethnic varieties in Twi include Akyem, Akuapem, Asante, Wassa, Bono, and Kwahu. The current study focuses on the Asante Twi variety, although Akan will be used as a cover term throughout this paper.

Akan has fourteen consonantal phonemes /p, b, t, d, k, g, m, n, f, s, h, r, j, w/ and nine phonemic vowels /i, ɪ, e, ɛ, a, u, ʊ, o, ɔ/ (e.g. Dolphyne 1988; Abakah 2003). There exists a tenth vowel [æ] which is traditionally described in Akan phonology as an allophone of /a/ derived through vowel harmony. Syntactically, Akan is an SVO language, showing head-initial properties. Nouns precede numerals, determiners, and adjectives.

Akan is a level tone language, with two contrasting tones: high and low. The high tone is indicated with an acute accent [´] and low tone by a grave accent [`]. The tone-bearing unit (TBU) in Akan is the syllable. Every vowel in the language is a syllable, and in cases of two adjacent vowels, each vowel constitutes its own syllable (Dolphyne 1988). Dolphyne (1988) categorizes three types of syllables in the language: open syllables V, CV, and single nasal consonants C acting as syllabic units. For the C syllable type, any consonant that is not an onset of a CV syllable forms a syllable (Abakah 2003). For example, a preconsonantal nasal consonant occurring at the beginning or middle of a word constitutes a syllable with its own tone, as shown in (5). The functional load carried by tone in grammar is more significant than in the lexicon (Dolphyne 1988), and the grammatical function is associated with the expression of verb aspect, tense, and indicates the argument structure of the verb. For example, in (6a), the stative form of the verb is marked by a low tone while the habitual form is marked by a high tone in (6b).

(5) a. ǹtòmá ‘cloth’
b. téńtéń ‘tall/long’

(6) a. Ɔ̀-hyɛ̀ ɛ̀kyɛ́
He/she-wear.STAT hat
‘He/she is wearing a hat.’

b. Ɔ̀-hyɛ́ ɛ̀kyɛ́
He/she-wear.HAB hat
‘He/she wears a hat.’

Akan has been found to exhibit downstep, where the presence (downdrift/automatic downstep) or absence (non-automatic downstep) of a low tone may cause the downward movement of successive high tones. The lowering of tones may also occur in sentences, which contain low tones only or high tones only (Genzel 2013). Akan researchers have also debated whether automatic and non-automatic downsteps are the same or two different phonetic processes in the language. While Stewart (1965) and Genzel and Kügler (2011) equate automatic downstep with non-automatic downstep, Dolphyne (1988) describes automatic and non-automatic downstep as two different phonetic processes in Akan.

Ghanaian English (GhE) is a variety of English spoken in Ghana. According to Huber (2004), Ghanaian English leans towards British English (BrE) rather than American English because of the colonial past of the country. The phonological features of GhE also mirror its

interaction with Ghanaian languages, indicating influences and adaptations from these local languages. There are seven vowels /i, e, o, a, u, ɛ, ɔ/ in GhE, resulting from the simplifications of the BrE monophthong system, neutralisation of length distinctions in BrE, and the monophthongisation of the BrE diphthongs /eɪ/ and /ou/ to /e/ and /o/.

Similar to other West African English varieties such as Nigerian English, GhE has been noted for its tonal specifications for every syllable, resulting in pitch fluctuations; this sets it apart from European and North American varieties of English, where only accented syllables are marked for tone through pitch accents (Gussenhoven and Udofot 2010; Gussenhoven 2013). In unstressed syllables, GhE does not undergo vowel reduction. Consequently, vowels in unaccented syllables typically maintain their complete quality, with the schwa sound rarely occurring. Additionally, the speech of some GhE speakers may exhibit downstep and pitch reset effects carried over from indigenous tone languages spoken by many Ghanaians.

3.1 Focus in Akan

What constitutes a focus construction in Akan has received considerable attention in the literature (e.g. Boadi 1974; Marfo and Bodomo 2005; Kobele and Torrence 2006; Amfo 2010). Generally, two types of focus marking strategies have been identified in Akan: *ex-situ* and *in-situ* focus. *Ex-situ* focus involves the fronting of the focused constituent followed by the focus marker *nà*. Although it is agreed that Akan marks *ex-situ* focus by means of the particle *nà*, other particles have been identified to signal focus in the language including *dèè, né, ńsó,* and *á* (e.g. Amfo 2010; Abrefa 2021). Boadi (1974) particularly characterizes *nà* as the exclusive focus marker, suggesting that it effectively narrows the referential scope of the attached constituent, isolating it within its own distinct category and highlighting its contrast with other members of its paradigm. The example in (7b) illustrates *ex-situ* focus marking, which represents a possible response to the question shown in (7a). The focused element is highlighted in bold. Optionally, the word *ɛyɛ* 'it is' may precede the focused word. In Asante Twi, when an animate subject or object is fronted, an optional resumptive pronoun may appear in its place, which is coreferent with the focused word, as demonstrated in the response in (8b) to the question in (8a). Kobele and Terence (2006) indicate that the presence of this element adds emphasis to the focused word. In *in-situ* focus, the basic SVO structure of the sentence is maintained regardless of the constituent in focus, as shown in (9b).

(7) a. Àmá dìì déɛ́ń Fíàdà nó?
Ama ate what Friday DEF

‘What did Ama eat on Friday?’

b. (èyɛ́) **èmóó** nà Àmá dìì Fíàdà nó
(it is) rice FM Ama ate Friday DEF
‘It is rice that Ama ate on Friday.

(8) a. Àmá frɛ̀ɛ̀ hwáń ánɔ̀pá nó?
Ama called whom morning DEF
‘Whom did Ama call in the morning?’

b. **Máńsá$_i$** nà Àmá frɛ̀ɛ̀ nó$_i$ ánɔ̀pá nó
Mansa FM Ama called RPro morning DEF
‘It is Mansa that Ama called in the morning.’

(9) a. Àmá dìì déɛ́ń Fíàdà nó?
Ama ate what Friday DEF
‘What did Ama eat on Friday?’

b. Àmá dìì **èmóó** Fíàdà nó
Ama ate rice Friday DEF
‘Ama ate rice on Friday.’

While there is a consensus in the literature about the *ex-situ* and *in-situ* focus marking strategies, Marfo and Bodomo (2005) argue that only contrastive focus is expressed through focus fronting and that it is not possible to express a constituent contrastively *in-situ*. According to Marfo and Bodomo, a constituent is considered contrastively focused in Akan when it is fronted in its extra-sentential projection of focus phrase. They argue that the focus particle cannot appear *in-situ* because it is introduced at the head position of the projected focus phrase. Hence, the ungrammaticality of the response in (10). On the other hand, in a situation description experiment testing the interaction between syntactic structure and information structure, Genzel and Kügler (2010) find that the *in-situ* strategy is the preferred method for marking object corrective focus among Akan speakers.

(10) *Àmá dìì **èmóó** nà Fíàdà nó
Ama ate rice FM Friday DEF
‘Ama ate rice on Friday.’

In previous studies, conflicting views have emerged regarding the notion of subject-object asymmetry in Akan focus marking. Thus, Marfo and Bodomo (2005) and Fiedler et al.

(2010) argue that only focused objects can appear *in-situ*, with focused subjects requiring *ex-situ* realization. In contrast, Genzel (2013) contends that both subjects and objects can be marked *in-situ* and *ex-situ*, claiming no subject-object asymmetry in the marking of focus in the language. Pfeil et al. (2015) conducts a questionnaire study and production experiment, revealing that speakers employ both *in-situ* and *ex-situ* strategies to mark subject focus, also challenging the proponents of the subject-object asymmetry. Furthermore, they highlight the role of exhaustivity, indicating that speakers prefer morpho-syntactic focus marking for focused subjects in contexts with exhaustive interpretations, while such marking is less common in non-exhaustive contexts.

In previous experimental studies on prosodic focus in *in-situ* and *ex-situ* focus in Akan, Kügler and Genzel (2011) observed a gradual decrease in f0 height as prosodic prominence increased (wide focus < informational focus < corrective focus). They found no significant difference in the absolute f0 height of target objects under informational focus compared to wide focus. However, in corrective focus, the absolute f0 on target objects was significantly lower compared to its broad focus counterpart. For duration, they observed no consistent pattern or significant effect. Kügler and Genzel then concluded that prosodic focus in Akan is marked by pitch register lowering in the case of corrective focus. They also found that this lowering extended to the post-focal domain. Genzel (2013) revealed that the lowering effect observed for contrastive focus in Kügler and Genzel (2011) is due to a global register lowering triggered by the negation marker *dààbí* 'no' appearing in the beginning of such sentences. On the other hand, in Genzel et al. (2018), no specific prosodic device for marking *in-situ* focus was observed in Akan. There was no significant difference between the tonal structure of subjects and objects under corrective focus compared to broad focus. However, Genzel et al. observed a tendency for post-focal compression in Akan.

Overall, the diverse results from the above studies all emphasize the need for a comprehensive understanding of focus marking in Akan, particularly regarding the limited quantitative investigations on focus realization in Akan. The current study addresses this gap by adding to the few studies.

4 Methodology

The current study aims to address the following research questions: Which syntactic strategies do Akan speakers use to express focus? Is focus prosodically marked in both *in-situ* and *ex-situ* Akan focus constructions? Does Ghanaian English exhibit prosodic focus, and do bilingual speakers of Akan and Ghanaian English demonstrate similar patterns in how they mark

prosodic focus in each language? On the basis of Gussenhoven and Udofot (2010) and Gussenhoven (2013), it is expected that Ghanaian English may not exhibit focus prosody but instead reflect the properties of the tone languages spoken by most of its speakers. The methodology involved question-answer pairs to elicit focus at different sentence positions, allowing for a direct comparison between broad and narrow focus conditions, and statistical comparisons of acoustic measurements on target items.

4.1 Design and materials

For Akan, the experiment had five conditions: subject focus, subject corrective focus, object focus, object corrective focus, and broad focus as baseline. Subject/object focus and corrective focus conditions were tested to ascertain any differences in the degree of prominence, as a greater decrease in f0 has been found in corrective focus than subject/object focus (Kügler and Genzel 2011). To elicit the desired focus condition, speakers were asked to respond to questions about pictures which illustrated specific situations. Ten different pictures were used, and all questions were pre-recorded by the researcher, a native speaker of the Asante Twi variety of Akan. Pictures were used to elicit more spontaneous reactions and to allow participants the freedom to choose their preferred syntactic strategies. This approach was intended to capture more natural language use, as participants were less constrained by the structured nature of the classic question-answer paradigm method, which can lead to more controlled or formulaic responses. The situation in each picture involved a transitive verb with one agent and one patient; the agent was animate and the patient inanimate or both were animate. Excluding the verbs, all subject/object target words were displayed in Akan orthography, which does not mark tones, on the pictures. Figure 1 shows an example of the pictures used to elicit the desired information structure.[1] Animacy was controlled as it is assumed to impact word order, with animates often occupying sentence initial positions regardless of their grammatical function (Prat-Sala and Branigan 2000; Nice and Dietrich 2003). The target subjects had between two to five syllables, whereas objects had between two to four syllables, allowing for the balancing of the possible tone combinations present in Akan (see table 1).

[1] This picture was adapted from www.vectorstock.com and subsequently edited to include the names.

Figure 1 A sample of the pictures used for the elicitation in Akan

Table 1 *Verbs and target words used in the stimuli*

Verb	**Subject Target Word**	**Object Target Word**
dí 'eat'	Òwúsù 'name of a person'	àǹkàá 'orange'
ká 'bite'	ɔ̀krámáǹ 'dog'	Máǹsá 'name of a person'
kúḿ 'kill'	Kwámè 'name of a person'	àkókɔ́ 'chicken'
twá 'cut'	Àfíà 'name of a person'	páànòó 'bread'
tú 'harvest'	Méǹsà 'name of a person'	bàǹkyé 'cassava'
bó 'beat'	Àmàǹkwàá 'name of a person'	ɔ̀krá 'cat'
wɔ́ 'pound'	Tíwàà 'name of a person'	fùfúó 'fufu'
yɛ́ 'make'	Àtàá 'name of a person'	ǹkwáǹ 'soup'
pìá 'push'	Kwàkú 'name of a person'	àdákà 'box'
sòá 'carry'	Àkúà 'name of a person'	kwàdú 'banana'

In total, 50 Akan questions were designed to elicit broad focus or narrow focus on the subject or the object (5 focus conditions × 10 pictures). A sample of the questions is shown in (11). The question in (11a) seeks to elicit broad focus. The question in (11b) elicits narrow focus on the subject while (11c) elicits narrow corrective focus on the subject. The question in (11d) elicits narrow focus on the object and the last question (11e) elicits narrow corrective focus on the object.

(11) a. ɛ̀déɛ́ǹ nà sì-ì ɛ̀nórà ánàdwó?
what FM happen-PST yesterday night
'What happened last night?'

b. Hwáń nà dì-ì àǹkàá ɛ̀nórà ánàdwó?
who FM eat-PST orange yesterday night
'Who ate an orange last night?'

c. Ámà dì-ì àǹkàá ɛ̀nórà ánàdwó?
Ama eat-PST orange yesterday night
'Did Ama eat an orange last night?'

d. Òwúsù dì-ì déɛ́ń ɛ̀nórà ánàdwó?
Owusu eat-PST what yesterday night
'What did Owusu eat last night?'

e. Òwúsù dì-ì fùfúó ɛ̀nórà ánàdwó?
Owusu eat-PST fufu yesterday night
'Did Owusu eat fufu last night?'

An English version of the Akan stimuli was used for the Ghanaian English experiment. The experiment concentrated on broad focus, subject focus, subject corrective focus, object focus, and object corrective focus. The same pictures were used and were complemented with questions pre-recorded by the researcher, a native speaker of Ghanaian English. The text on the pictures was translated to English. The experimental stimuli for Ghanaian English consisted of 50 questions (5 focus conditions × 10 pictures).

4.2 Participants

Thirty-two bilingual speakers of Asante Twi and Ghanaian English (28 males, 4 females) participated in the study. However, data from five speakers were discarded due to issues such as using non-target words, incomplete recordings, or poor recording quality. This left a total of twenty-seven participants (24 males, 3 females), with an average age of 30 years. Many participants resided in the Ashanti region of Ghana, with sixteen speakers taking part in the research from this region. The remaining eleven participants lived in diverse regions, including Quebec, Berlin, and Helsinki with two participants each. Additionally, there was one participant each from Bayern, England, Ontario, Ad Dawhah, and Massachusetts. All participants filled out a background questionnaire to determine their eligibility before commencing the study. They also rated their proficiency levels in speaking, understanding, and reading Akan and Ghanaian English on a 6-point scale (1 = basic proficiency, 6 = full fluency). About 74.1% and 77.8% of participants reported full fluency in terms of understanding and engaging in conversations in Akan, respectively. Additionally, 48.1% indicated they could read

any text in Akan. For Ghanaian English, 74.1% of participants reported full proficiency in speaking, understanding, and reading.

4.3 Procedure

The experiment was JavaScript-based and hosted on a McGill server (https://github.com/prosodylab/prosodylabExperimenter). At the beginning of the experiment, participants indicated their consent to participate and provided background information, including year of birth, gender, and languages they speak before engaging in the study. Participants were asked to use a headset with microphone for the study. The participants were first presented with the Akan session, prepared in Akan orthography, followed by the English session. Each session had orthographic and oral instructions regarding the task. Participants were instructed that they will be shown some pictures, and their task was to answer questions about these pictures in a natural way. Additionally, they were instructed to end their responses with the adverbs indicated in the questions. This was crucial for testing any effect of post-focus compression in *in-situ* object focus. Otherwise, it was likely that participants would omit or front the adverbs in their responses and the focused word would appear at the end of the sentence. At the end of each trial, participants were also asked to rate their responses. The question was 'How good did your response seem given the question? (1 = very bad, 6 = very good).[2]

The participants were given three practice trials in each experiment session to familiarize themselves with the task. The practice trials involved both orthographic and oral presentations of the questions. Participants saw the picture and question simultaneously on the screen; they then clicked a button to listen to the question again before responding. The practice trials involved broad focus conditions, and the names of the subjects and objects were written on the pictures. Participants were instructed to end their responses with the adverb specified in the question and rated their responses at the end. Participants proceeded directly to the experimental test after the practice session, and the trials were then randomly presented to each participant in a Latin square design. Overall, each participant produced 20 responses, comprising 10 responses each for Akan and Ghanaian English. On average, it took about 25 minutes to complete the task.

[2] These data were not analysed.

4.4 Quantitative measures and statistical analysis

The data was automatically annotated using the Montreal Forced Aligner (McAuliffe et al. 2017) to obtain measurements for the target items. Pretrained North American acoustic models were used for the alignment because they provided the best results compared to training new acoustic models on the Akan data. Praat scripts (Boersma and Weenink 2024) were used to extract pitch, duration, and intensity measurements of pre-focus, focused, and post-focus constituents. Relative measures of the target items were then computed by comparing each measure on the subject constituent with those on the object.[3] This was done because words found earlier in a sentence may exhibit higher pitch and intensity than those found later, and this may be attributed to the downward movement of the pitch pattern towards the end of sentences. Relative measures were calculated using a logarithmic scale, representing differences in semitones for maximum pitch, log differences of duration, and intensity differences in db, inherently a logistic measure. This was justified from the fact that perceptual distinctions in pitch, loudness, and duration are more accurately represented as ratios rather than differences in absolute values (see e.g. Breen et al. 2010). To normalize for individual differences, the pitch of each participant was centred by subtracting the mean pitch for that participant and then dividing by the standard deviation.

The response variables, relative pitch, relative intensity, and relative duration were modelled separately as a function of condition using linear mixed-effects models (using the lme4 package in R; Bates et al. 2015). Participant and item were included as random effects in the models.[4] Corresponding *p*-values were calculated using Satterthwaite's approximation via the lmerTest package in R (Kuznetsova et al. 2017). To enhance interpretability and minimize unnecessary collinearity, the levels of the predictor condition were coded using custom contrasts. The levels were ordered as follows:

Contrast 1: Broad focus vs. Other focus

Contrast 2: Subject (including corrective) vs. Object (including corrective)

Contrast 3: Non-corrective focus vs. Corrective focus

[3] For example: rPitch = $12 \times \log_2 (\text{maxPitch}_{\text{subject}} / \text{maxPitch}_{\text{object}})$

[4] Below is an example model:
model = lmerTest::lmer(rPitch ~ Wide vs. Other + Subject vs. Object + NonCorrective vs. Corrective + (1| participant) + (1| item), data = Akan)

Additionally, centred contrasts were defined for the variable language (Akan vs. Ghanaian English) to reduce collinearity. No by-participant and by-item random slopes of condition were included in the models, as it resulted in singularity issues.

5 Results

The results of the study are presented in three different parts. The first provides the results of the annotations of participants' responses performed by the researcher. It examines the frequency at which participants used a morpho-syntactically marked or unmarked focus marking strategy in Akan and Ghanaian English. Additionally, it examines the rate at which the target constituents were perceived to be prosodically marked. The second part details the findings of f0, intensity, and duration measurements of target items across the five focus conditions in Akan and Ghanaian English. It also discusses the findings on the interaction between prosody and tone in Akan. Notably, the second part excludes syntactically marked sentences due to the differences in the syntax of focused constituents with marked syntax compared to those with unmarked syntax. Finally, the findings on the interaction between prosody and syntactically marked sentences are discussed for Akan.

5.1 Distribution of focus marking strategies

5.1.1 Akan

Three different focus marking strategies were coded in Akan: fronting of the focused constituent followed by the particle *nà*, no focus fronting, and the use of cleft sentences. Aside from *nà*, only one instance of a different lexical item *móm* was observed. This word, however, is not a focus particle in Akan. The data was also coded for whether there was audible focus on the subject, object, and whether no focus prosody was heard.

Figure 2 shows the proportions of each strategy produced by the participants in Akan. Out of 320 tokens collected from 32 speakers, 240 tokens from 27 speakers were analysed. The remaining 80 tokens were excluded due to poor sound quality, the use of non-target words, or incomplete recordings. Of the 240 analysed tokens, speakers used focus fronting about 24.2% of the time and employed no focus fronting 74.1% of the time. Among the responses involving focus fronting, speakers used this strategy almost exclusively in the subject conditions, rather than the object conditions. Only 1.7% of the responses involved cleft sentences, and these were produced in the subject conditions.

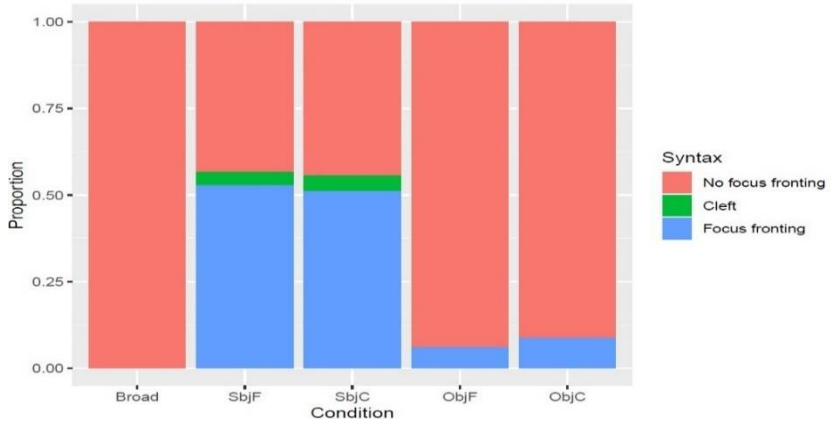

Figure 2 *Proportion of marked versus unmarked syntactic focus marking by condition in Akan*

Figure 3 plots the proportion of cases where focus was perceived to be prosodically marked. About 88.3% of the tokens were perceived not to have focus prosody, with only 11.7% perceived to have focus prosody. Of these, audible focus was heard more on the items in the subject conditions (7.9%) than the object conditions (3.75%). Additionally, in the object conditions audible focus was heard on the object while audible focus was also heard on the object in the broad focus condition.

Figures 4 illustrates the relationship between the focus condition, perceived prosody and syntax in Akan. Focused constituents in the subject and object focus conditions of syntactically marked sentences were also perceived to be marked prosodically. Moreover, more of the focused constituents perceived to be prosodically marked were found in sentences with marked syntax than unmarked syntax. A notable observation is that subject constituents in the object conditions of both syntactically marked and unmarked sentences were also perceived to be prosodically marked.

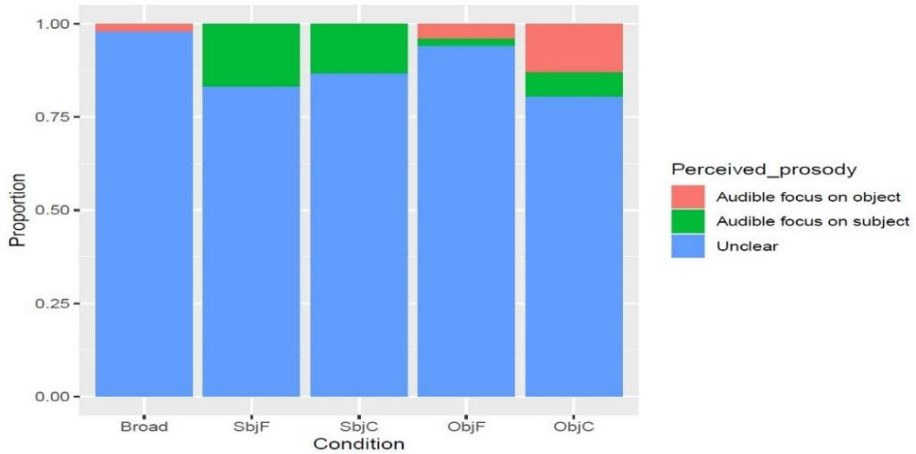

Figure 3 *Proportion of perceived prosody by condition in Akan*

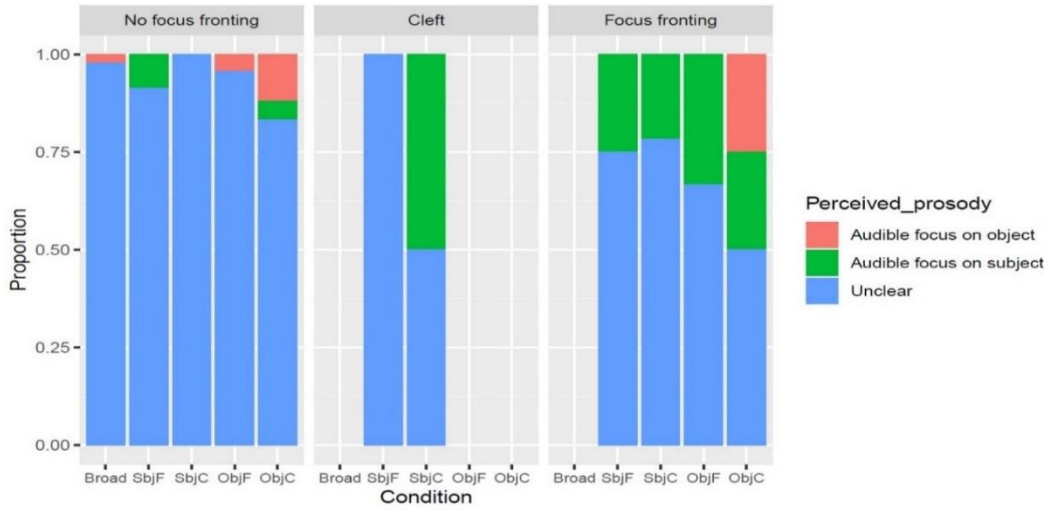

Figure 4 *Proportion of perceived prosody by condition and syntax in Akan*

5.1.2 Ghanaian English

In Ghanaian English, none of the focused constituents were fronted. However, speakers also used cleft sentences to mark focus. The data was coded for whether there was audible focus on the subject, object, elsewhere in the sentence, and whether no focus prosody was heard.

For the 320 tokens collected from 32 participants in Ghanaian English, 225 tokens were analysed from 27 speakers. 95 tokens were eliminated also due to issues like poor sound quality, the use of non-target words, or incomplete recordings. Out of the 225 tokens, clefting was used about 2.2% of the time (figure 5), occurring in the subject corrective and object focus conditions. 93.8% of the data was perceived to not have focus prosody, with focus on the subject and object heard about 1.3% and 2.2% of the time, respectively (see figure 6). In the subject focus condition, focus was also heard on the object. Additionally, other elements of some responses were perceived to be prosodically marked, and this mostly was heard on the verb. Figure 7 plots the interaction between condition, perceived prosody, and syntax in Ghanaian English. No prosody was heard on focused constituents in clefts.

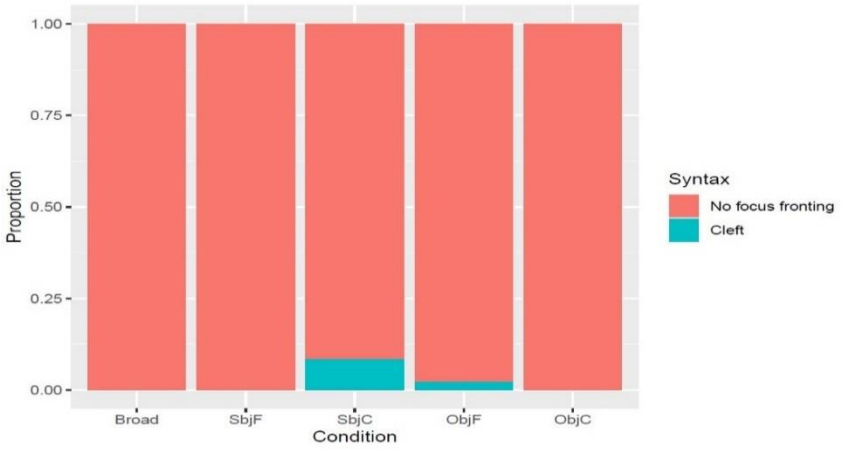

Figure 5 *Proportion of marked versus unmarked syntactic focus marking by condition in Ghanaian English*

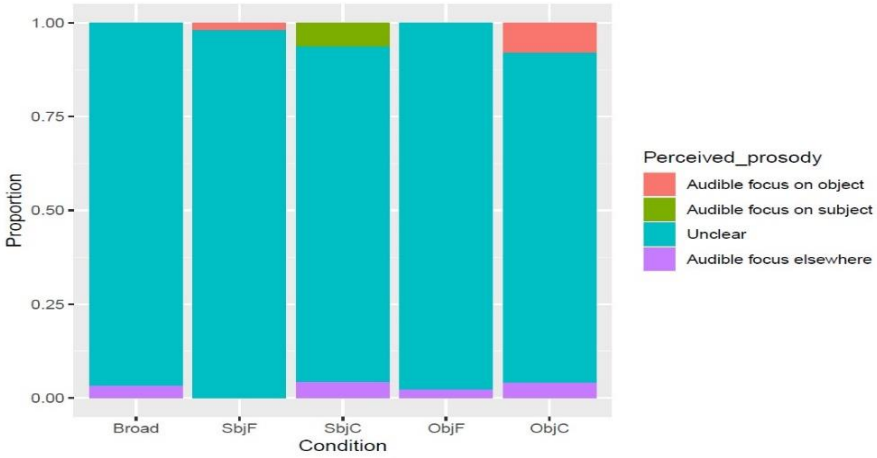

Figure 6 *Proportion of perceived prosody by condition in Ghanaian English*

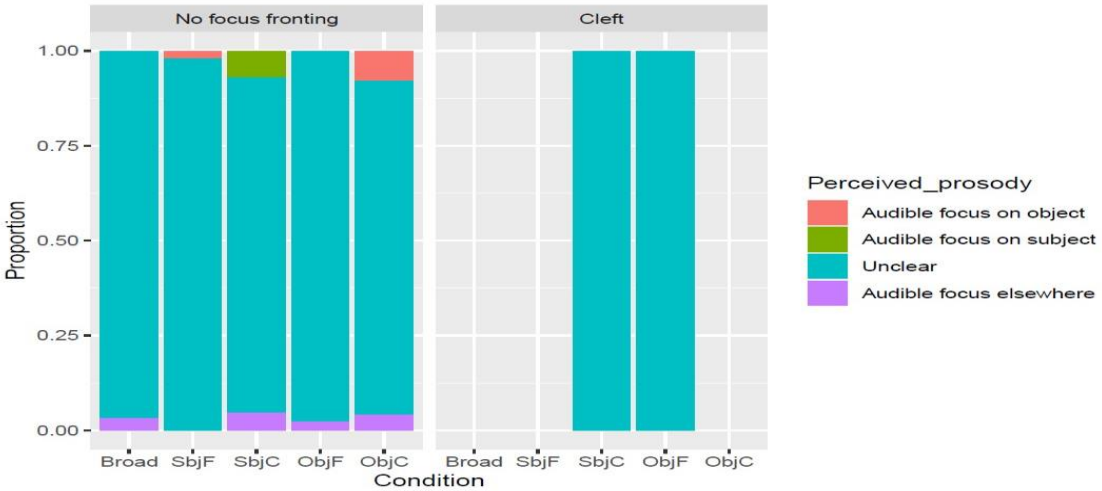

Figure 7 *Proportion of perceived prosody by condition and syntax in Ghanaian English*

5. 2 Acoustic analysis in Akan

5.2.1 Relative f0

Figure 8 shows the relative f0 of focused constituents across all focus conditions in Akan. Compared to the broad focus condition, the subject focus condition exhibited a higher f0, with a marginal increase observed in the object focus condition. In contrast, the f0 of constituents in the subject corrective and object corrective conditions was lower compared to the broad focus. A potential explanation for the lower f0 realisation in the corrective conditions in Akan could be a global lowering effect caused by the use of the negation *dààbí* at the sentence initial position in these contexts, as also revealed in Genzel (2013). However, an examination of the plots for constituents with and without negation revealed no differences.[5]

Tables 2 summarizes the statistical results for relative f0. There was no significant difference between broad focus and the other focus conditions. This suggests that there is no f0 difference that encodes focus in these contexts. Additionally, neither the difference between subject and object focus nor non-corrective and corrective focus reached statistical significance in Akan.

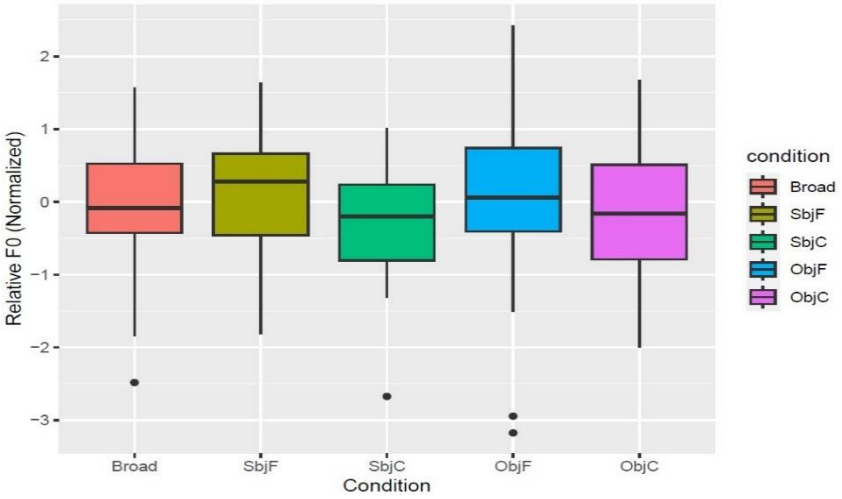

Figure 8 *Relative f0 values by condition in Akan*

[5] The plot with negation is not shown here. See figure 8 for the plot without negation.

Table 2 *Summary of fixed effects for the model of relative f0 in Akan*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	3.75	0.52	21.40	7.22	<0.001
Broad vs. Other	0.42	0.82	147.27	0.51	0.61
Subject vs. Object	-0.47	0.98	148.19	-0.48	0.63
NonCorrective vs. Corrective	-1.06	0.89	136.96	-1.19	0.24

5.2.2 Maximum f0

Figure 9 presents the means for maximum f0 of constituents across the focus conditions in Akan. A general observation of the plot shows a decreasing pattern of the constituents in all the conditions. Subject constituents in the subject focus and subject corrective focus conditions exhibit a lower f0 compared to the broad focus. There is also no apparent decrease in f0 for the post-focal verb in these subject conditions relative to the verb in the broad focus condition, suggesting the absence of post-focal compression. Note that the biggest pitch drop between the subject and verb is in the broad focus and object focus conditions. Additionally, f0 on the object constituent in the object focus and broad focus conditions overlaps, whereas the object in the object corrective context is slightly below the broad focus and object focus contexts. The post-focal adverb in the object focus context shows a lower f0 compared to the broad focus, which may be explained as PFC.

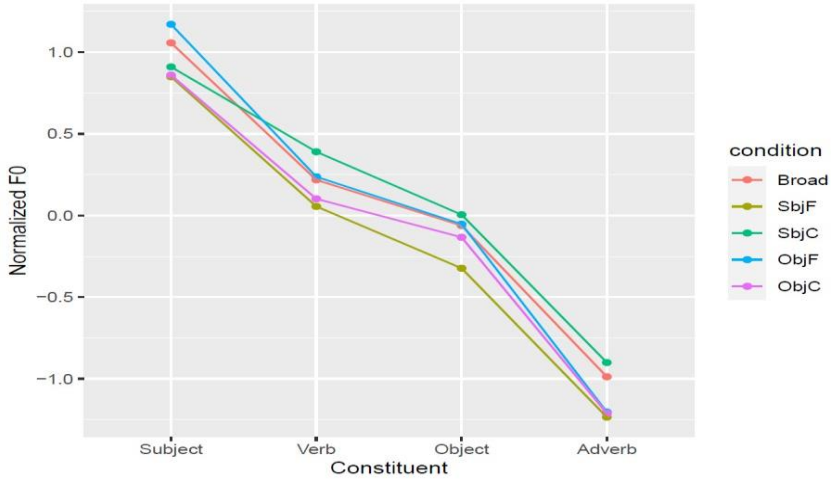

Figure 9 *Maximum f0 values by constituent and condition in Akan. Each point represents the average of the constituents across speakers*

5.2.3 Relative intensity

In figure 10, the relative intensity of Akan focused constituents in the subject focus and subject corrective conditions appear higher than in the broad focus condition. On the other hand,

constituents in the object focus and object corrective focus conditions demonstrate lower intensity than the broad context. The statistical results for relative intensity, summarized in table 3, show a significant effect for the difference between subject focus and object focus constituents (p = 0.005). However, there was no evidence indicating that broad focus significantly differed from the other focus conditions, or that non-corrective focus significantly differed from corrective focus.

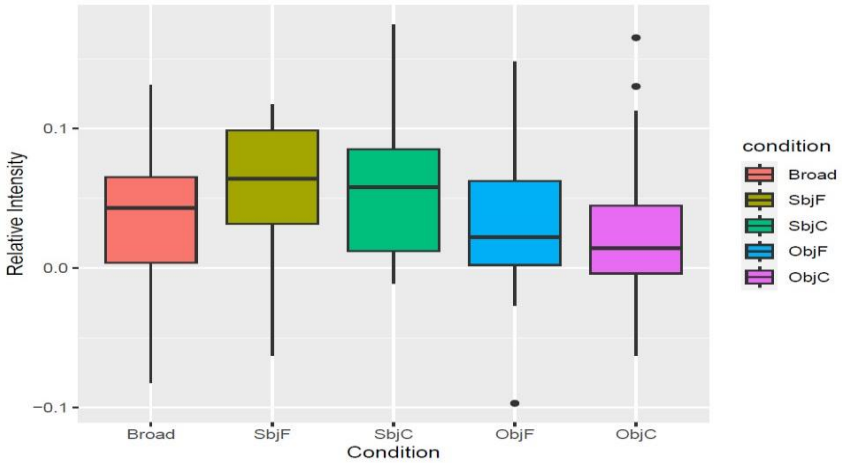

Figure 10 *Relative intensity values by condition in Akan*

Table 3 *Summary of fixed effects for the model of relative intensity in Akan*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	0.04	0.01	30.70	4.23	<0.001
Broad vs. Other	-0.005	0.01	142.34	-0.33	0.74
Subject vs. Object	-0.05	0.02	143.35	-2.82	0.005
NonCorrective vs. Corrective	-0.01	0.02	133.69	-0.34	0.73

5.2.4 Maximum intensity

The mean values for maximum intensity of constituents are shown in figure 11. Notably object constituents in object focus and object corrective exhibit higher intensity levels than those in broad focus. In contrast, subject constituents in the subject focus context demonstrate lower intensity compared to broad focus, whereas subject corrective focus constituents closely overlap with those in the broad focus condition. Examining the post-focal area, the verb in the subject corrective context exhibits lower intensity than in broad focus, which may also be interpreted as post-focal compression. However, in the broad focus context, the post-focal adverb exhibits lower intensity compared to the object focus and object corrective contexts.

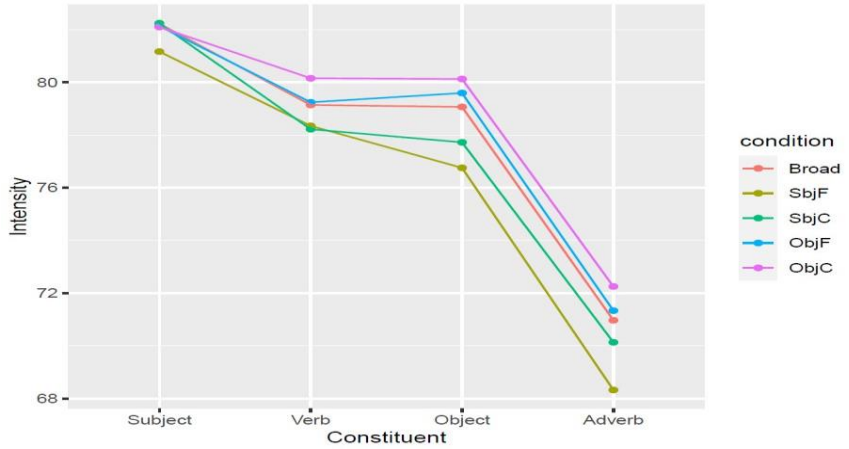

Figure 11 *Maximum intensity values by constituent and condition in Akan. Each point represents the average of the constituents across speakers*

5.2.5 Relative duration

In Akan, relative duration in the subject focus context was longer compared to the broad context (see figure 12). Constituents in the subject corrective context exhibited shorter durations than those in the subject focus context, with a slight increase for subject corrective compared to broad context focus. Durations in the object focus and object corrective focus contexts were shorter than the broad context. Additionally, the duration in object corrective focus was shorter than in the object focus context. Aside from subject versus object constituents which significantly differed in Akan, the model found no evidence that broad focus significantly differed from the other focus conditions, or that non-corrective focus significantly differed from corrective focus (see table 4).

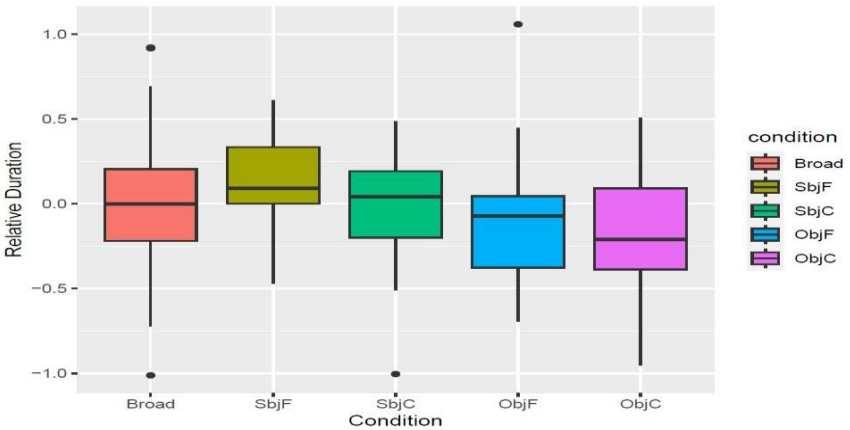

Figure 12 *Relative duration values by condition in Akan*

Table 4 *Summary of fixed effects for the model of relative duration in Akan*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	-0.04	0.08	16.93	-0.51	0.61
Broad vs. Other	-0.08	0.10	141.36	-0.77	0.44
Subject vs. Object	-0.43	0.12	142.42	-3.57	<0.001
NonCorrective vs. Corrective	-0.17	0.11	131.37	-1.56	0.12

5.2.6 Maximum duration

Figure 13 presents mean values for the maximum duration of constituents, grouped by the syllable count of subject constituents. The plot shows that trisyllabic subjects under subject focus, subject corrective, and broad focus exhibited similar durations. For disyllabic subjects and those with five syllables, only subject focus constituents exhibited durations similar to broad focus, whereas subject corrective focus constituents exhibited shorter durations. Compared to broad focus, the duration of the post-focal verb in the subject focus context was shorter for the disyllabic group. Considering object constituents, disyllabic and trisyllabic objects in the object conditions had longer durations compared to objects under broad focus (see figure 14). Further, adverbs following disyllabic object constituents showed shorter durations compared to the broad focus condition. For the quadrisyllabic objects, those under object focus had similar durations to those under broad focus while subject corrective objects exhibited shorter durations compared to both conditions.

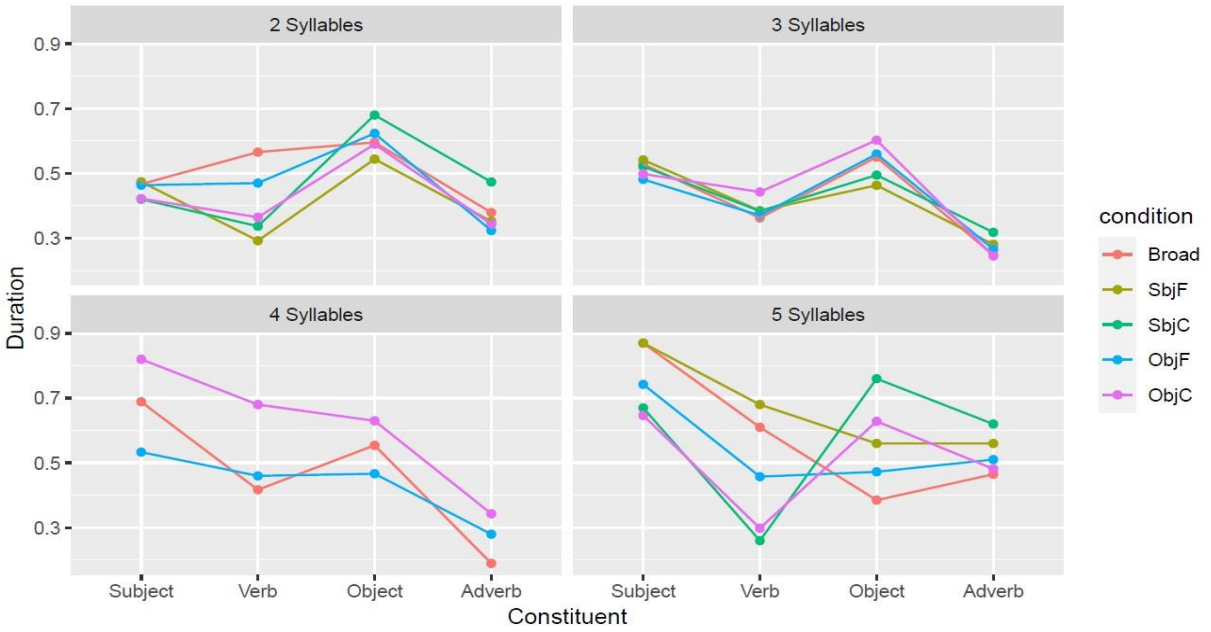

Figure 13 *Maximum duration values for constituents in Akan, categorized by the syllable count of subject constituents. Each point represents the average of the constituents across speakers*

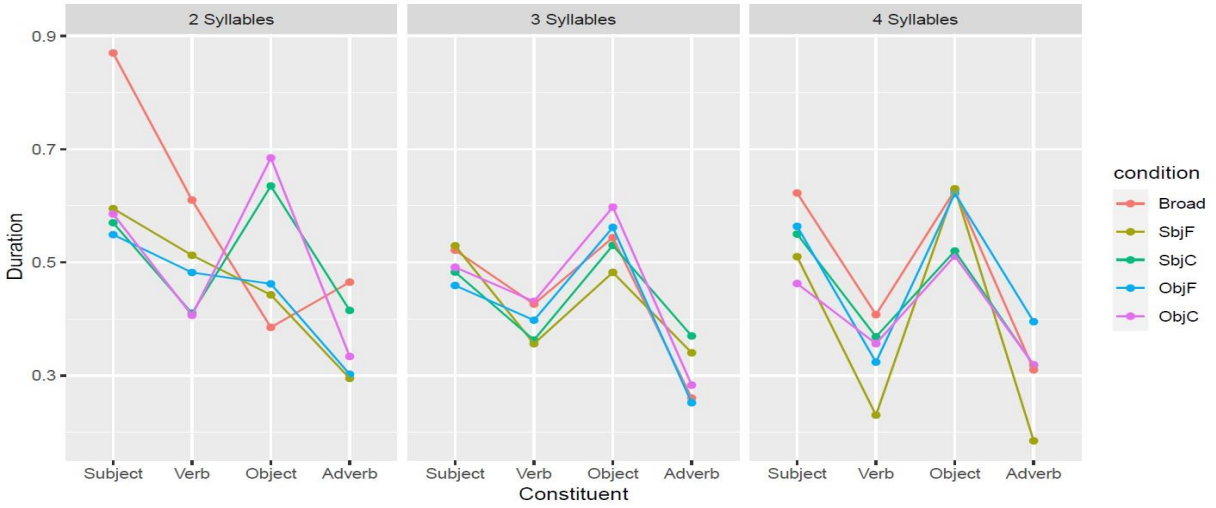

Figure 14 *Maximum duration values for constituents in Akan, categorized by the syllable count of object constituents. Each point represents the average of the constituents across speakers*

5.3 Acoustic analysis in Ghanaian English

5.3.1 Relative f0

Figure 15 illustrates the relative f0 values in Ghanaian English. In contrast to Akan, the broad focus condition exhibits higher f0 compared to all other conditions. Constituents in the subject conditions show similar patterns to those in the object conditions. The statistical results revealed no significant difference between broad focus and the other focus conditions (see table 5), suggesting no prominence difference that marks focus across the various contexts. Similarly, the differences between subject and object focus, as well as between non-corrective and corrective focus, did not reach statistical significance.

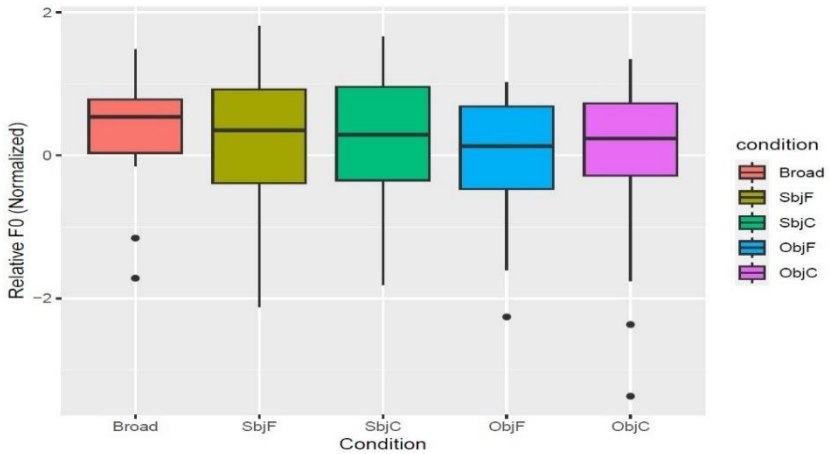

Figure 15 *Relative f0 values by condition in Ghanaian English*

Table 5 *Summary of fixed effects for the model of relative f0 in Ghanaian English*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	3.84	0.56	22.73	6.82	<0.001
Broad vs. Other	-0.86	1.09	153.40	-0.79	0.43
Subject vs. Object	-1.31	0.83	146.98	-1.57	0.12
NonCorrective vs. Corrective	0.03	0.79	139.52	0.04	0.97

5.3.2 Maximum f0

Figure 16 plots the means for maximum f0 in Ghanaian English. The plot indicates no clear differences between subject constituents in the broad focus versus subject focus contexts. However, subject constituents in subject corrective focus appear marginally lower compared to those in broad focus and subject focus. For constituents in subject focus, the post-focal verb is realised lower compared to constituents in broad focus, suggesting post-focal compression. In comparison to broad focus, f0 on the object is higher in both the object focus and object corrective conditions. On the other hand, the post-focal adverb under these conditions is not realized lower than in the broad focus condition, suggesting no PFC.

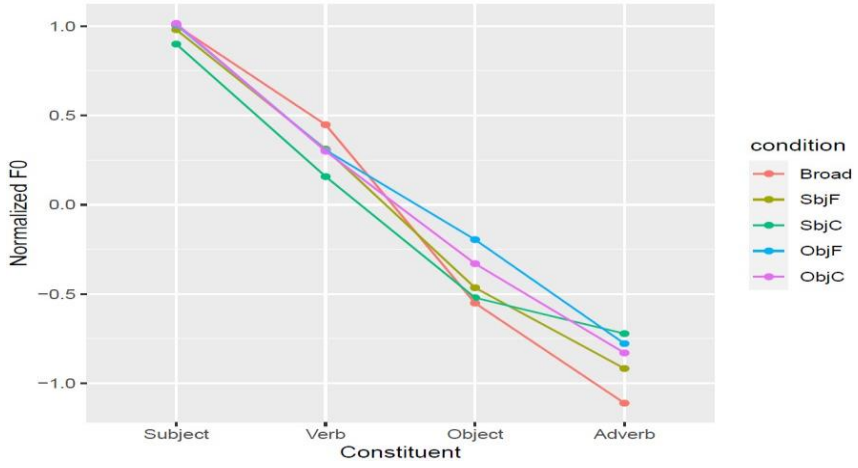

Figure 16 *Maximum f0 values by constituent and condition in Ghanaian English. Each point represents the average of the constituents across speakers*

5.3.3 Relative intensity

The relative intensity for focused constituents in the subject conditions is higher than in broad focus, with subject focus constituents displaying much higher intensity compared to subject corrective focus (see figure 17). However, there is no noticeable difference between object focus and object corrective constituents compared to broad focus. The statistical results for relative intensity, shows a significant effect for the difference between subject and object focus

(see table 6). This effect in Ghanaian English is even stronger (p = <0.001) than that observed in Akan. Similar to Akan, there was no evidence indicating that broad focus significantly differed from the other focus conditions, or that non-corrective focus significantly differed from corrective focus.

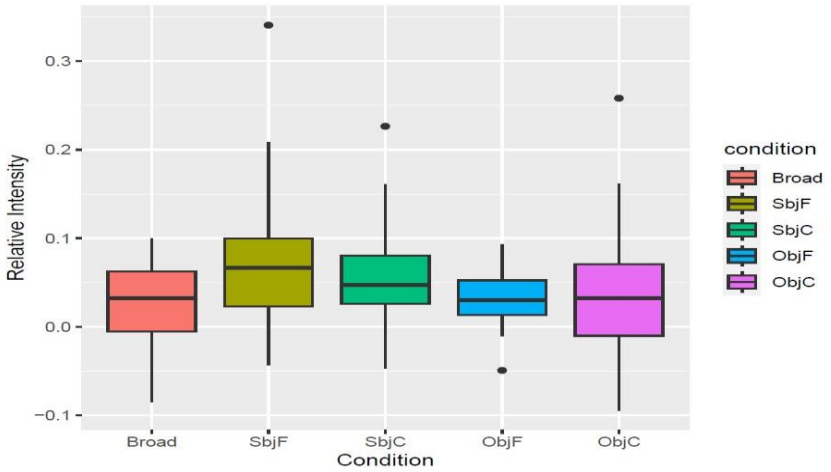

Figure 17 *Relative intensity values by condition in Ghanaian English*

Table 6 *Summary of fixed effects for the model of relative intensity in Ghanaian English*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	0.06	0.01	17.45	4.52	<0.001
Broad vs. Other	0.03	0.02	153.63	1.14	0.26
Subject vs. Object	-0.06	0.02	146.70	-3.55	<0.001
NonCorrective vs. Corrective	-0.02	0.02	139.33	-1.45	0.15

5.3.4 Maximum intensity

The mean values for maximum intensity measures in Ghanaian English are shown in figure 18. Subject constituents in the subject focus and subject corrective contexts display higher intensity levels than those in broad focus. Additionally, the post-focal verb in the subject corrective context exhibits a lower intensity compared to broad focus, while the verb is marginally lower in the subject focus context, potentially indicating PFC. There is no observable decrease in the intensity of the post-focal adverb in the object focus context compared to broad focus, with the adverb in the object corrective context only slightly below the intensity observed in the broad focus context.

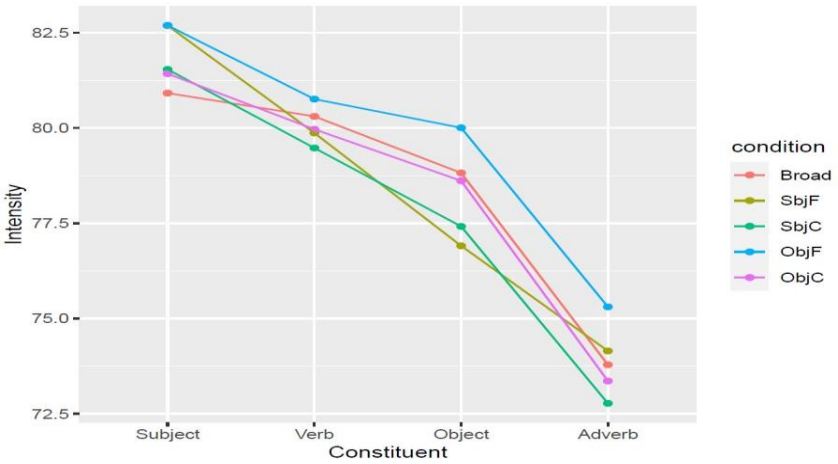

Figure 18 *Maximum intensity values by constituent and condition in Ghanaian English. Each point represents the average of the constituents across speakers*

5.3.5 Relative duration

In Ghanaian English, focused constituents in the subject contexts had longer durations compared to those in the broad focus context (see figure 19). On the other hand, the object conditions had shorter durations than broad focus. Constituents in the object focus condition had even shorter durations than those in the object corrective focus condition. Unlike in Akan, the duration difference between subject and object focus did not reach statistical significance in Ghanaian English (see table 7). Additionally, none of the differences between broad focus versus other focus conditions, or non-corrective versus corrective came out significant.

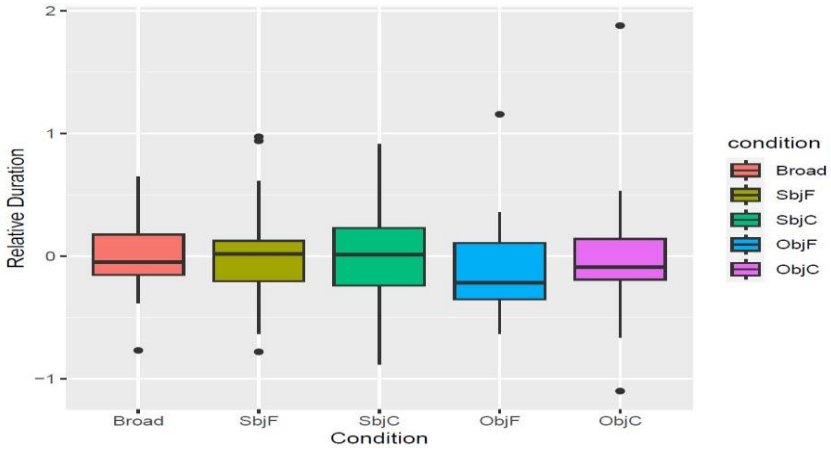

Figure 19 *Relative duration values by condition in Ghanaian English*

Table 7 *Summary of fixed effects for the model of relative duration in Ghanaian English*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	-0.02	0.09	12.77	-0.26	0.80
Broad vs. Other	-0.05	0.13	157.75	-0.40	0.69
Subject vs. Object	-0.11	0.09	149.77	-1.10	0.27
NonCorrective vs. Corrective	-0.02	0.09	142.37	-0.25	0.80

5.4 Comparison of Akan and Ghanaian English

The observed patterns suggest that Akan and Ghanaian English share some similarities in their focus prosody, although they vary in the magnitude of the prosodic features utilized. Tables 8 to 10 summarize the statistical results for the models of relative f0, intensity, and duration in both languages. There was no significant difference between Akan and Ghanaian English in terms of f0. In other words, there was no evidence that the two languages significantly differ in how they use f0 to mark focus. Additionally, neither the interaction between language and the difference between broad focus versus other focus conditions nor the interaction between language and the difference between subject and object focus yielded significant results. Similarly, no significant effect was found for the interaction between language and non-corrective versus corrective focus.

For relative intensity, a significant effect of language was observed (p = 0.01), indicating that the two languages differ in the extent to which they employ intensity. However, like relative f0, none of the interactions between intensity and language reached significance. Considering duration, there was no significant effect of language. Moreover, interactions between language and differences between broad focus versus other focus conditions, subject versus object, and non-corrective versus corrective were also insignificant.

Table 8 *Summary of fixed effects for the model of relative f0 in Akan and Ghanaian English*

Coefficient	*β*	*SE (β)*	*df*	*T*	*P*
Intercept	3.82	0.41	13.96	9.36	<0.001
Akan vs. GhE	0.49	0.46	303.83	1.08	0.28
Akan vs. GhE:Broad vs. Other	-0.49	1.19	305.44	-0.40	0.69
Akan vs. GhE:Subject vs. Object	-1.29	1.26	305.95	-1.02	0.31
Akan vs. GhE:NonCorrective vs. Corrective	1.23	1.19	298.57	1.04	0.30

Table 9 *Summary of fixed effects for the model of relative intensity in Akan and Ghanaian English*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	0.04	0.01	16.09	5.80	<0.001
Akan vs. GhE	0.02	0.01	302.93	2.50	0.01
Akan vs. GhE:Broad vs. Other	0.02	0.02	304.64	0.90	0.37
Akan vs. GhE:Subject vs. Object	-0.02	0.03	304.68	-0.69	0.49
Akan vs. GhE:NonCorrective vs. Corrective	-0.02	0.02	297.39	-1.02	0.31

Table 10 *Summary of fixed effects for the model of relative duration in Akan and Ghanaian English*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	-0.03	0.06	9.70	-0.42	0.68
Akan vs. GhE	0.09	0.06	307.73	1.43	0.16
Akan vs. GhE:Broad vs. Other	0.17	0.16	310.48	1.10	0.27
Akan vs. GhE:Subject vs. Object	0.23	0.16	312.94	1.37	0.17
Akan vs. GhE:NonCorrective vs. Corrective	0.18	0.16	299.79	1.13	0.26

5.5 Focus and tone in Akan

Figure 20 shows the average measures of relative f0 for subject target items in Akan, categorized by tone structure and number of syllables. The plot suggests that the only comparison hinting at a difference for subject constituents is the case of disyllabic versus trisyllabic items with initial low tones. That is, the disyllabic constituents with a L.H tonal structure in the subject focus condition exhibit a higher f0 compared to the broad focus condition, while the trisyllabic constituents with a L.H.L tonal structure in the subject focus condition show a lower f0 than in the broad focus condition.

Turning to object target items (see figure 21), quadrisyllabic constituents with H.L.L.H and L.L.L.H tonal patterns under broad focus exhibit a lower f0 compared to those in object focus and object corrective focus. Apart from this observation, the plot does not indicate any clear differences based on the tonal structure or number of syllables of constituents in the object focus and object corrective conditions compared to broad focus.

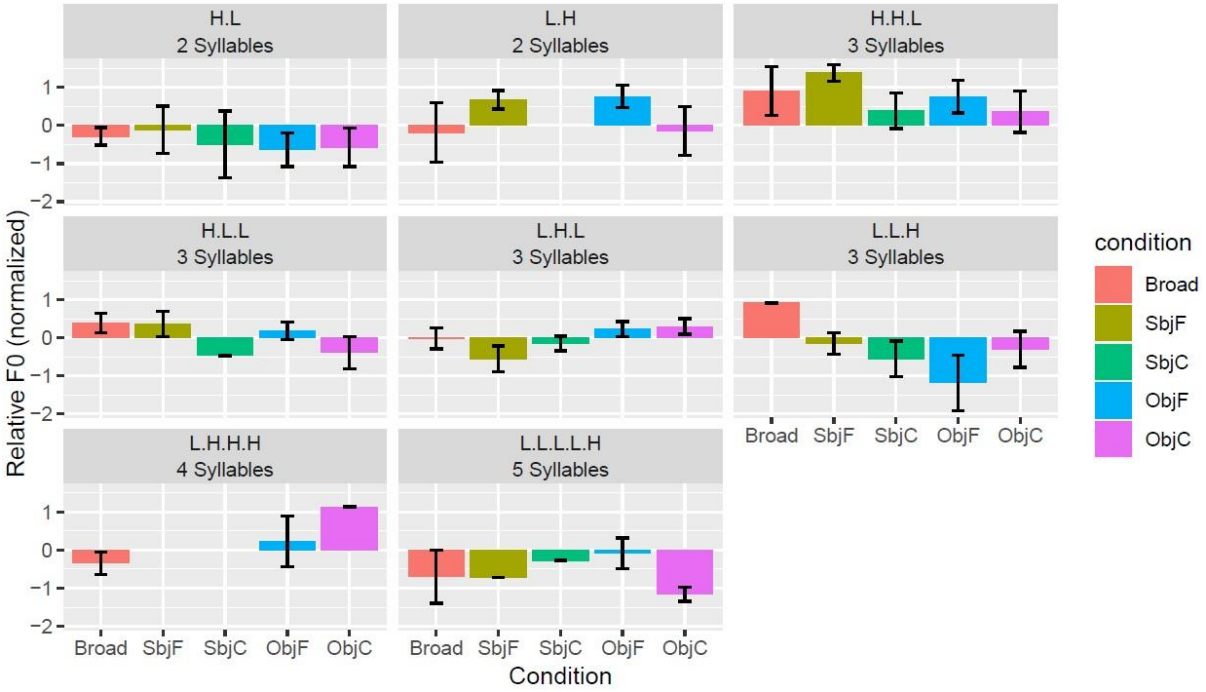

Figure 20 *Mean relative pitch values and standard errors of subject constituents by tonal and syllable structure in Akan across speakers*

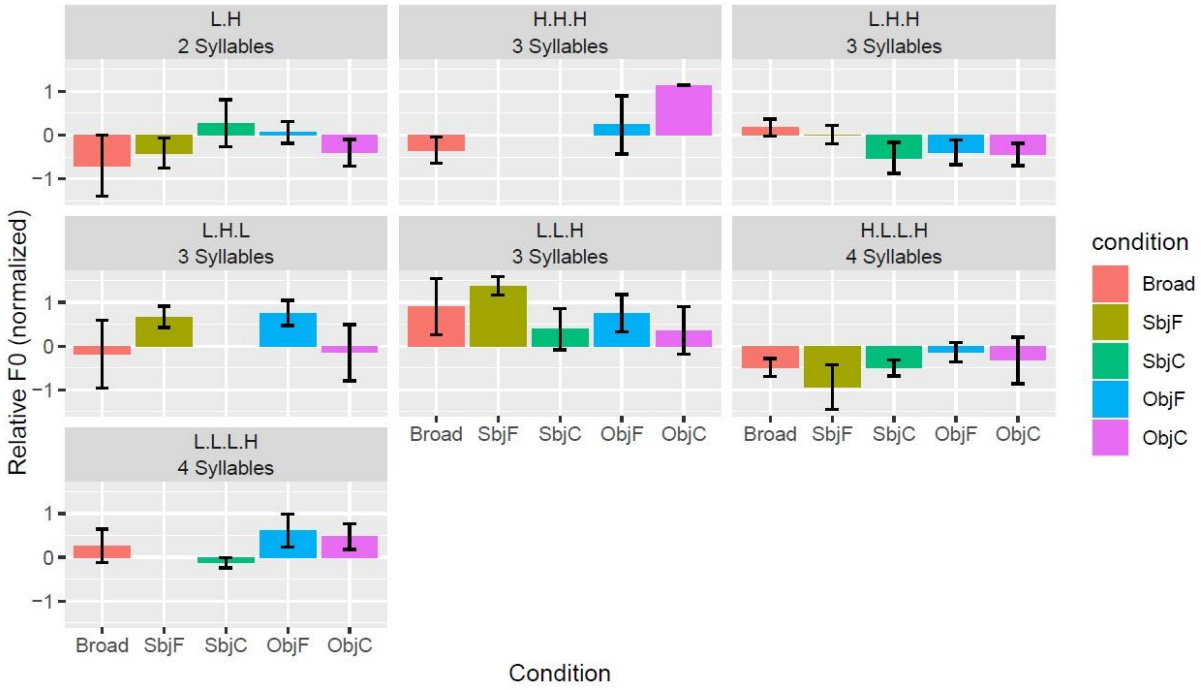

Figure 21 *Mean relative pitch values and standard errors of object constituents by tonal and syllable structure in Akan across speakers*

5.6 Focus fronting and prosody in Akan

Figure 22 compares the average maximum pitch values for fronted subjects and syntactically unmarked subjects in the subject focus and subject corrective focus conditions. The plot

illustrates that subjects generally exhibit higher f0 compared to verbs. Fronted subjects in the subject conditions show much higher f0 than subjects with unmarked syntax. Moreover, verbs in sentences with marked syntax demonstrate higher f0, particularly under subject focus, where they even surpass the preceding focus marker. By contrast, verbs in sentences with marked syntax under subject corrective focus exhibit lower f0 compared to those with unmarked syntax.

Linear-mixed effect models were fit to the absolute values of target subjects in syntactically marked and unmarked sentences. Both subject and item were treated as random effects. The predictors condition (subject focus vs. subject corrective focus) and syntax (fronting vs. no fronting), as well as their interactions, were tested.

Table 11 presents the statistical results comparing the pitch of fronted subjects and subjects with unmarked syntax. No significant difference was found between subjects in the subject focus and subject corrective contexts. Additionally, fronted subjects did not differ significantly from syntactically unmarked subjects. The interaction between condition and syntax was also not significant, indicating similar pitch realization of subjects in both syntactically marked and unmarked focus sentences.

For intensity, fronted subjects under subject focus and subject corrective focus were higher than their counterparts with unmarked syntax (see figure 23). Similarly, the intensity of verbs in sentences with marked syntax were higher compared to verbs in sentences with unmarked syntax. Neither the main effects of syntax and condition nor their interaction reached significance (see table 12).

Considering duration, fronted subjects under subject focus do not seem to differ from subjects with unmarked syntax under subject focus, whereas fronted subjects in the subject corrective context appear longer compared to their non-fronted counterparts in subject corrective focus (see figure 24). The plot does not suggest durational differences between verbs in sentences with marked syntax versus those with unmarked syntax. Similar to pitch and duration, there was no evidence indicating a significant durational difference between fronted and non-fronted subjects (see table 13). The interaction between condition and syntax was also not significant.

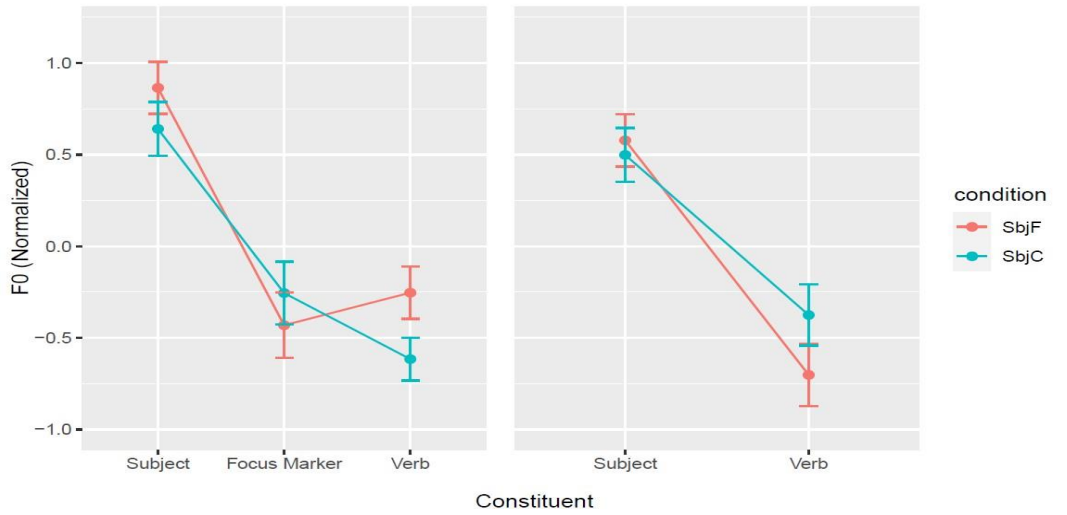

Figure 22 *Maximum pitch values and standard errors for constituents in syntactically marked sentences (left) and constituents in syntactically unmarked sentences (right) in Akan. Each point represents the average of the constituents across speakers*

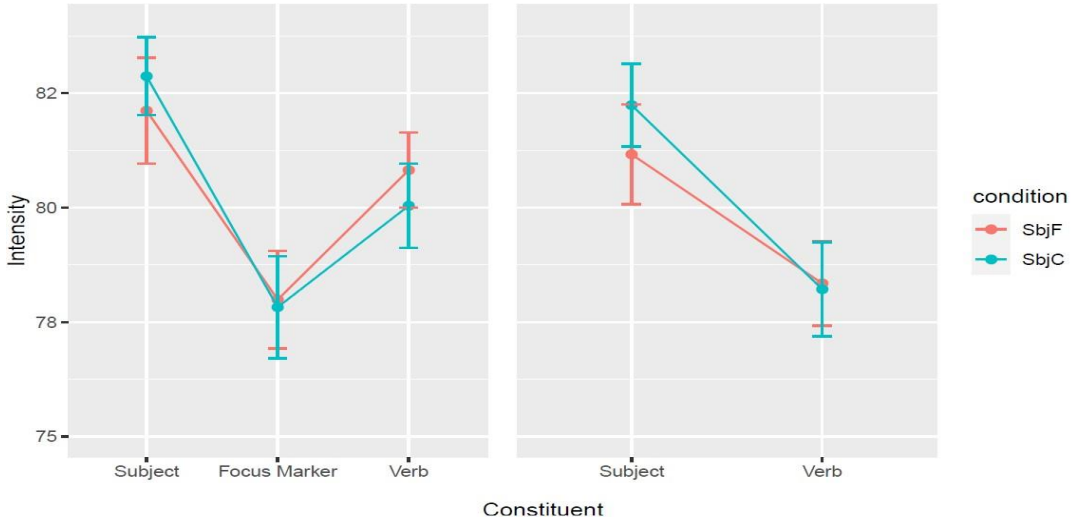

Figure 23 *Maximum intensity values and standard errors for constituents in syntactically marked sentences (left) and constituents in syntactically unmarked sentences (right) in Akan. Each point represents the average of the constituents across speakers*

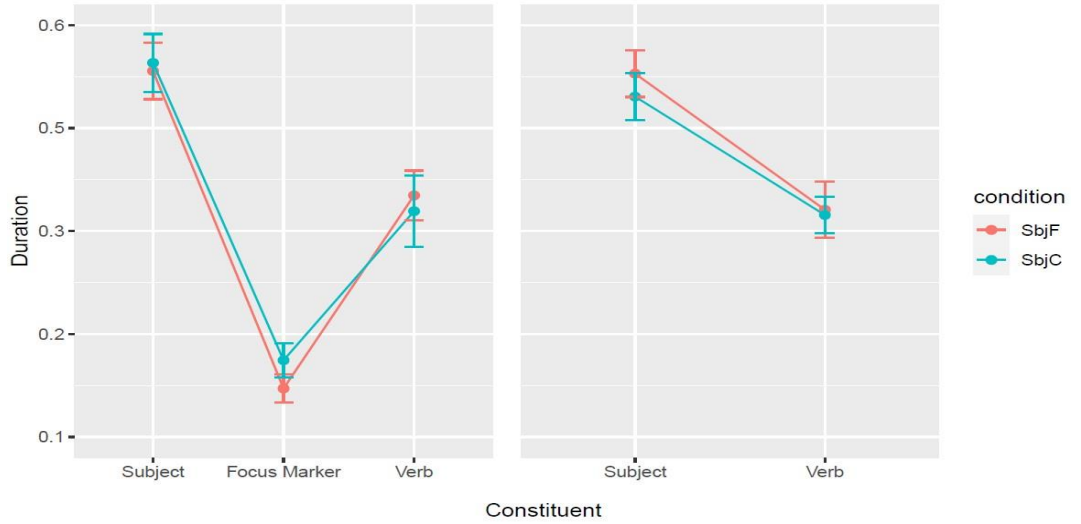

Figure 24 *Duration values and standard errors for constituents in syntactically marked sentences (left) and constituents in syntactically unmarked sentences (right) in Akan. Each point represents the average of the constituents across speakers*

Table 11 *Summary of fixed effects for the model comparing maximum f0 between syntactically marked and unmarked subjects in Akan*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	197.71	10.01	26.03	19.76	<0.001
SubjectFoc vs. SubjectCorrective	2.83	4.08	59.74	0.69	0.49
Fronting vs. NoFronting	-0.37	5.58	63.69	-0.07	0.95
SubjectFoc vs. SubjectCorrective: Fronting vs. NoFronting	7.71	9.34	61.67	0.83	0.41

Table 12 *Summary of fixed effects for the model comparing maximum intensity between syntactically marked and unmarked subjects in Akan*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	82.09	0.77	13.31	106.41	<0.001
SubjectFoc vs. SubjectCorrective	-0.94	0.87	57.79	-1.08	0.28
Fronting vs. NoFronting	-0.39	1.06	83.78	-0.38	0.71
SubjectFoc vs. SubjectCorrective: Fronting vs. NoFronting	0.58	1.89	71.84	0.31	0.76

Table 13 *Summary of fixed effects for the model comparing duration between syntactically marked and unmarked subjects in Akan*

Coefficient	*β*	*SE (β)*	*df*	*t*	*p*
Intercept	0.56	0.04	9.26	15.02	<0.001
SubjectFoc vs. SubjectCorrective	0.01	0.03	55.65	0.58	0.57
Fronting vs. NoFronting	-0.01	0.03	77.05	-0.44	0.66
SubjectFoc vs. SubjectCorrective: Fronting vs. NoFronting	-0.04	0.06	68.49	-0.74	0.46

6 Discussion

The present study had three main research questions. First, it sought to determine the syntactic strategies used by Akan speakers to mark focus. Second, it examined whether morpho-syntactically marked and unmarked focus sentences in Akan are marked prosodically. To provide a better understanding of how focus prosody operates in Akan, the study also aimed to compare the prosodic marking of focus between Akan and Ghanaian English.

The results revealed that the preferred means for marking focus in Akan is the use of the *in-situ* strategy, with approximately 74.1% of responses involving this strategy, while only 24.2% of responses involved the *ex-situ* focus strategy. In Ghanaian English, a similar pattern was observed, where speakers employed a syntactically marked strategy only 2.2% of the time. While the results indicate a clear preference for the *in-situ* strategy in Akan, it is important to acknowledge the possibility of a task effect influencing participants' responses. Participants were instructed to end their responses with specific adverbs indicated in the questions. This may have prompted them to structure their sentences in a particular way, which may not reflect their natural or spontaneous speech.

The similar frequency at which Akan speakers employed the *in-situ* strategy in subject focus and object corrective focus contradicts Marfo and Bodomo's (2005) claim that corrective focus is solely expressed *ex-situ*. The current finding aligns with Genzel and Kügler's (2010) study, which noted a higher usage of the *in-situ* strategy among Akan speakers, even in corrective contexts. Additionally, the higher utilization of *ex-situ* focus in subject focus and subject corrective focus compared to object focus and object corrective conditions is consistent with previous research demonstrating a subject-object asymmetry in focus marking in Akan (Marfo and Bodomo 2005; Fiedler et al. 2010).

The findings suggest that Akan speakers do not use pitch to mark *in-situ* focus. Although the empirical patterns showed a tendency for Akan speakers to raise the *in-situ* target word in subject focus and object focus rather than subject corrective and object corrective focus, no significant effects were found for the differences between non-corrective versus corrective focus, subject versus object focus, or broad focus versus other focus conditions. Similarly, none of these differences reached significance in Ghanaian English. Additionally, the results indicated no significant effect regarding whether speakers employed pitch differently in Akan versus Ghanaian English across the focus conditions. Therefore, the results suggest that neither Akan nor Ghanaian English speakers encode focus through pitch.

In terms of pitch, the empirical plots suggested post-focal compression in the object focus condition in Akan, whereas no post-focal compression was observed in any of the contexts in Ghanaian English. Regarding tone in Akan, little pitch differences based on tonal structure were observed, indicating that focus may not be encoded differently depending on the tonal patterns of focused constituents.

One potential explanation for the insignificant pitch results in Akan could be attributed to the tonal nature of the language. Given that pitch is primarily used for distinguishing between lexical and grammatical meanings, it may not serve as a prominent marker for encoding focus. As mentioned earlier, West African varieties of English such as Nigerian English have been described to exhibit properties typological of a tone language. These varieties have syllabic tone unlike European and American varieties, where pitch accents on words are influenced by grammatical and pragmatic factors (Gussenhoven and Udofot 2010; Gussenhoven 2013). Although the plots revealed that participants employ pitch more when speaking Akan than when speaking Ghanaian English, the absence of significant pitch effects also in Ghanaian English could be influenced by Akan or other indigenous languages. However, further investigation involving monolingual Akan speakers is needed to confirm this assumption. The study's methodology could also be replicated with English speakers who have not been exposed to tone languages to further understand the influence of tonal characteristics.

Unlike Nigerian English, Ghanaian English exhibits prosodic focus, contradicting the earlier prediction that Akan may lack prosodic focus due to its tonal environment. In both Akan and Ghanaian English, there was a significant difference between subject versus object focus in terms of intensity, with a stronger effect observed in Ghanaian English. Thus, the results suggest that speakers realize focused constituents in subject focus and subject corrective focus contexts with greater intensity. This finding is noteworthy as it implies that both Akan and Ghanaian English employ the same acoustic cue when marking focus. Additionally, there was

a significant effect of language, indicating that speakers differed in the magnitude of intensity they employed in Akan versus Ghanaian English. The absence of significant pitch effects in both Akan and Ghanaian English, coupled with the significant emphasis on intensity also underscores the varied roles of prosodic features in linguistic expression. The effect of intensity in Akan is particularly interesting, as intensity effects have previously only been observed in terms of post-focus compression (Genzel et al. 2018).

In the present study, however, no significant intensity effect was observed for the difference between broad focus versus other focus conditions, or non-corrective versus corrective focus in either Akan or Ghanaian English. Moreover, there were no significant effects of the interaction between language and these aspects, nor of the language interaction with the contrast between subject versus object focus. In terms of intensity in the post-focal area, the empirical patterns indicated post-focal compression in subject corrective focus in Akan and post-focal compression in subject focus and subject corrective focus in Ghanaian English. This indication of post-focal compression in Akan is consistent with the findings of Genzel and Kügler (2018), who observed the phenomenon in the subject focus context in Akan.

There was a significant duration effect for the subject versus object focus difference in Akan. However, no significant differences were observed in broad focus versus other focus conditions or non-corrective focus versus corrective focus. The empirical plots showed that syllable count does not affect the duration of focused subjects. This is evidenced by the fact that these constituents exhibited durations comparable to or shorter than those in broad focus, regardless of syllable count. However, there was a shortening of the post-focal verb of disyllabic subject constituents in the subject focus context. In contrast, syllable count did influence the duration of focused objects to some extent. Disyllabic and trisyllabic object constituents in the object conditions had longer durations compared to broad focus. The post-focal adverb of disyllabic object constituents in the object conditions also showed shorter durations compared to broad focus.

The significant durational difference between subject and object focus in Akan is worth noting, as it suggests that duration serves as a significant cue for identifying subject focused constituents in the language. This finding contrasts with the results of Kügler and Genzel (2011), who did not find a consistent pattern or significant effect in the expression of *in-situ* focus through durational cues. The finding of prosodic focus in terms of intensity and duration in Akan may be relevant for research surrounding whether African tone languages make use of prosodic means to encode focus, as these languages use syntactic and/or morphological means for the same purpose.

In Ghanaian English, the empirical trends revealed tendencies for longer durations in subject focus and subject corrective focus. However, none of the differences among the focus conditions reached statistical significance, which suggests that duration is not a significant cue for marking focus in Ghanaian English. There was no significant effect of language, also indicating that the duration on focused constituents in Akan is not realized differently compared to Ghanaian English. None of the interactions between language and the other differences exhibited significant effects, suggesting no distinctions in how focus is expressed across the various focus contexts in both languages. These findings thus indicate that the interaction between language-specific phonetic features and prosodic marking strategies is complex and nuanced.

There is a common assumption that syntactic means of encoding focus, such as focus fronting and clefting, show a trade-off with prosodic means. This hypothesis suggests that when focus is marked syntactically, prosody is used less for expressing focus, whereas when focus is not marked syntactically, prosody plays a more prominent role. However, the current results do not support this trade-off relationship in Akan. The findings revealed no significant interaction between prosody and syntax. This suggests that prosody and syntax are two independent means for marking focus in Akan. Specifically, subject focus in sentences with unmarked syntax did not result in a higher realisation of f0, greater intensity, or longer duration compared to cases where subject focus was marked morpho-syntactically. In fact, the empirical evidence in Akan suggests that f0, intensity, and duration may be used more when the focused constituent is fronted. Therefore, the results indicate that prosody may be used simultaneously when focus is marked morpho-syntactically in Akan, rather than being in a trade-off relationship.

A similar pattern, indicating the absence of a trade-off relationship, was observed in English in Arnhold (2021). She found that the prosodic marking of subject focus did not differ in syntactically unmarked sentences compared to cleft sentences. Additionally, in a perception experiment, sentences with prosodic focus on subjects received higher ratings compared to broad focus, regardless of whether they were cleft sentences or not. Arnhold indicated that prosody and clefting do not exhibit a trade-off relationship in English, but they are used in an additive way to mark subject focus in the language.

7 Summary and conclusion

Prior studies on Akan have given contradicting evidence as to whether speakers make use of prosodic means to mark *ex-situ* and *in-situ* focus. The present study sought to address these

inconsistencies through a comparative investigation of prosodic focus among bilingual speakers of Akan and Ghanaian English. The study examined differences in the prosodic realisation of focus in both languages across various contexts, including subject focus, subject corrective, object focus, object corrective, and broad focus.

A key finding was that Akan speakers predominantly use the *in-situ* strategy to mark focus. Even in corrective contexts, this strategy is preferred contrasting earlier claims that corrective focus is only expressed *ex-situ* (Marfo and Bodomo 2005). Moreover, the findings align with the proposal of a subject-object asymmetry in the expression of focus in Akan, which suggests that only focused subjects can be realized *in-situ* while subjects are realized *ex-situ* (Marfo and Bodomo 2005; Fiedler et al. 2010). In Ghanaian English, speakers similarly rarely employed a syntactically marked strategy, indicating a consistent pattern across both languages.

Regarding prosodic focus marking, the study revealed that both Akan and Ghanaian exhibit this phenomenon, although pitch is not the primary focus marker in either language. The study found no significant use of pitch to encode focus in syntactically unmarked responses in Akan. This lack of pitch effect was attributed to its primary role in distinguishing between lexical and grammatical meanings in the language. Additionally, there was minimal evidence suggesting that the tone structure of focused constituents affects focus marking in Akan. However, the evidence does indicate that syllable structure may play a role in terms of duration. Similarly, pitch was not significantly used in Ghanaian English, possibly due to the influence of tone languages spoken by many Ghanaian English users.

Interestingly, intensity emerged as a significant cue for marking focus in syntactically unmarked sentences in both languages, particularly in subject focus and subject corrective contexts. This cue was more robust in Ghanaian English compared to Akan. Duration, on the other hand, served as a significant cue only in Akan, particularly in subject focus. Like Genzel et al. (2018), the results also suggest that post-focal compression exists in both languages, which is seen as an indirect way of highlighting the focused constituent. However, this phenomenon was not found across all contexts in either language. In Akan, post-focal compression was observed for pitch and intensity in subject focus, subject corrective, and object focus. In Ghanaian English, it was observed mainly in terms of intensity in subject focus and subject corrective focus. Moreover, Akan exhibited shorter durations for verbs following disyllabic subject constituents under subject focus, as well as for adverbs following disyllabic object constituents under object focus and object corrective focus.

The study further revealed that Akan uses prosody to mark *ex-situ* focus as well. Thus, the results do not support a trade-off relationship between prosody and syntax in focus marking

in Akan. Instead, they suggest that prosody and morpho-syntactic means may be used at the same time to encode information structure in Akan. However, the materials for the present study were not specifically designed to test this trade-off idea, hence further investigation may be needed to explore this aspect more thoroughly.

Overall, the results indicate that Akan speakers employ prosody to express information structure. Ghanaian English also marks focus prosodically, in contrast to Nigerian English. However, the use of prosody in Akan is more significant compared to Ghanaian English. In syntactically unmarked sentences, Akan speakers rely on intensity and duration rather than pitch, whereas Ghanaian English speakers rely only on intensity to mark focus. Contrary to Genzel et al. (2018), these findings show that prosodic means are used for marking contrastive focus in Akan.

References

Abakah, Emmanuel Nicholas. 2003. *The segmental and tone melodies of Akan*. PhD Dissertation. Norwegian University of Science and Technology, Trondheim.

Aboh, Enoch Oladé, Katharina Hartmann and Malte Zimmermann (eds.). 2007. Focus and grammar: the contribution of African languages. In *Focus strategies in African languages: the interaction of focus and grammar in Niger-Congo and Afro-Asiatic.* Berlin: Walter de Gruyter.

Arnhold, Anja. 2021. Prosodic focus marking in clefts and syntactically unmarked equivalents: prosody-syntax trade-off or additive effects? *The Journal of the Acoustical Society of America,* 149:3 1390-1399.

Amfo, Nana Aba A. 2010. Lexical signaling of information structure in Akan. *Linguistics* 48:1 195-225.

Bates, Douglas, Martin Mächler, Benjamin M. Bolker and Stephen C. Walker. 2015. Fitting linear mixed-effects models using lme4, *Journal of Statistical Software* 67, 1–48.

Beckman, Mary E. and Janet B. Pierrehumbert. 1986. Intonational structure in Japanese and English. *Phonology Yearbook 3*, 255–309.

Boadi, Lawrence A. 1974. Focus-marking in Akan. *Linguistics*, *140*, 5–57.

Boersma, Paul and David Weenink. 2022. Praat: doing phonetics by computer (Version 6.2.19) [Computer program]. Retrieved from https://www.praat.org

Botinis, Antonis, Marios Fourakis and Barbara Gawronska. 1999. Focus identification in English, Greek and Swedish. In *Proceedings of The 14th International Congress of Phonetic Sciences,*1557-1560, San Francisco.

Breen, Mara, Evelina Fedorenko, Michael Wagner and Edward Gibson. 2010. Acoustic correlates of information structure. *Language and Cognitive Processes,* 25:7-9, 1044-1098.

Büring, Daniel. 2001. Let's phrase it! – Focus, word order, and prosodic phrasing in German double object constructions. In Muller, G. and Sternefeld, W. (eds.), *Competition in Syntax,* 69-105. Berlin: de Gruyter.

Chafe, Wallace L. 1974. Language and consciousness. *Language*, 111-133.

Cooper, William, Stephen Eady and Pamela Mueller. 1985. Acoustical aspects of contrastive stress in question-answer contexts. *Journal of the Acoustical Society of America,* 77:6 2142–2155.

Dik, Simon C. 1997. *The theory of functional grammar: the structure of the clause.* Mouton:

Berlin.

Dohen, Marion and Hélène Loevenbruck. 2004. Pre-focal rephrasing, focal enhancement and post-focal deaccentuation in French. In *Proceedings of The 8th International Conference on Spoken Language Processing,* 1313-1316, Korea.

Dolphyne, Florence A. 1988. *The Akan (Twi-Fante) language: Its sound systems and tonal structure*. Ghana Universities Press.

Downing, Laura. J. and Annie Rialland. 2017. *Intonation in African tone languages*. Berlin: Mouton de Gruyter.

Eady, Stephen J. and William E. Cooper. 1986. Speech intonation and focus location in matched statements and questions. *Journal of the Acoustical Society of America,* 80402– 415.

Eberhard, David M., Simons Gary F. and Charles D. Fennig (eds.). 2024. *Ethnologue: Languages of the World*. Dallas, Texas: SIL International. Online version: https://www.ethnologue.com

Féry, Caroline. 1993. *German Intonational Patterns*. Niemeyer, Tübingen.

Féry, Caroline and Frank Kügler. 2008. Pitch accent scaling on given, new and focused constituents in German. *Journal of Phonetics,* 36 680 –703.

Fiedler, Ines, Kathrina Hartmann, Brigette Reineke, Anne Schwarz, and Malte Zimmermann. 2010. Subject focus in West African languages. In M. Zimmermann and C. Fery. (eds.) *Information Structure. Theoretical, Typological, and Experimental Perspectives*, 234–257. Oxford University Press.

Frajzyngier, Zygmunt. (1989). *A grammar of Pero*. Berlin: Dietrich Reimer Verlag.

Genzel, Susanne and Frank Kügler. 2010. How to elicit semi-spontaneous focus realizations with specific tonal patterns. *Interdisciplinary studies on information structure 13*, 77-102.

Genzel, Susanne, Agata Renans and Frank Kügler. 2018. Focus and its prosody in Akan and Ga. In *The 9th International Conference on Speech Prosody,* 724-728, Poland.

Genzel, Susanne. 2013. *Lexical and post-lexical tones in Akan*. PhD Dissertation. University of Postdam, Postdam.

Gussenhoven, Carlos and Inyang Udofot. 2010. Word melodies vs pitch accents: a perceptual evaluation of terracing contours in British and Nigerian English. *Speech Prosody* 015.

Gussenhoven, Carlos. 2013. On the intonation of tonal varieties of English. In Markku Filppula, Juhani Klemola and Devyani Sharma (eds.), *The Oxford handbook of World Englishes,* 569 – 598. Oxford: Oxford University.

Halliday, Michael Alexander Kirkwood. 1967. Notes on transitivity and theme in English Part

2. *Journal of Linguistics* 3,199-244.

Hartmann, Katharina and Malte Zimmermann. 2007. Exhaustivity marking in Hausa: a reanalysis of the particle *nee/cee.* In Enoch Oladé Aboh, Kathrina Hartman and Malte Zimmermann (eds.), *Focus strategies in African languages: the interaction of focus and grammar in Niger-Congo and Afro-Asiatic.* Berlin: Walter de Gruyter.

Hartmann, Katharina and Malte Zimmermann. 2009. Morphological focus marking in Gùrùntùm (West Chadic). *Lingua* 119:9 1340–1365.

Huber, Magnus and Kari Dako. 2004. Ghanaian English: Phonology. In B. Kortmann, E. W. Schneider, K. Burridge, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*, 1 854 – 878. Berlin: Mouton de Gruyter.

Issa O. Sanusi and Abrefa, Kofi Busia. 2021. On the focus strategies in Akan. *Journal of Linguistics and Foreign Languages,* 2:2 36-52.

Jackendoff, Ray. S. 1972. *Semantic interpretation in generative grammar.* Cambridge: MIT Press.

Kanerva, Jonni Miikka. 1990. *Focus and Phrasing in Chichewa Phonology*. New York: Garland Publishing.

Kidda, Mairo. 1993. *Tangale phonology*. Berlin: Dietrich Reimer Verlag.

Kobele, Gregory and Torrence Harold. 2006. Intervention and focus in Asante Twi. *ZAS Papers in Linguistics* 46, 161–184.

Krifka, Manfred. 2008. Basic notions of information structure. *Acta Linguistica Hungarica,* 55 (3-4) 243 – 276.

Kuznetsova, Alexandra, Per B. Brockhoff, Christensen, Rune H. B. 2017. lmerTest package: Tests in linear mixed effects models, *Journal of Statistical Software*, 82:13, 1–26.

Kügler, Frank and Stavros Skopeteas. 2007. On the universality of prosodic reflexes of contrast: the case of Yucatec Maya. In *Proceedings of the 16th International Congress of Phonetic Sciences*, 1188-1028, Saarbrücken.

Kügler, Frank and Susanne Genzel. 2011. On the prosodic expression of pragmatic prominence: the case of pitch register lowering in Akan. *Language and Speech,* 55:3 331-359.

Ladd, D. Robert. 1996. *Intonational phonology* (1st ed). Cambridge: Cambridge University.

Lambrecht, Knud. 1994. *Information structure and sentence form*. UK: Cambridge University Press.

Lee, Yong-cheol and Yi Xu. 2010. Phonetic realization of contrastive focus in Korean. In *Proceedings of Speech Prosody*, 100033 1-4, Chicago.

Marfo, Charles and Adams Bodomo. 2005. Information structuring in Akan question-word fronting and focus constructions. *Studies in African Linguistics*, *34*(2), 179–208.

McAuliffe, Michael, Michaela Socolof, Sarah Mihuc, Michael Wagner and Morgan Sonderegger. 2017. Montreal forced aligner: trainable text-speech alignment using Kaldi. In *Interspeech*, 498-502.

Newman, Paul. 2000. *The Hausa language: an encyclopedic reference grammar.* New Haven and London: Yale University Press.

Nice, Kathy van and Rainer Dietrich 2003. Task sensitivity of animacy effects: Evidence from German picture descriptions. *Linguistics, 5* 825-849.

Pfeil, Simone, Susanne Genzel and Frank Kügler. 2015. Empirical investigation of focus and exhaustivity in Akan. *Interdisciplinary studies on information structure: ISIS; working papers of the SFB,* 632:19 87-109.

Prat-Sala, Mercè and Holly P. Branigan. 2000. Discourse constraints on syntactic processing in language production: a cross-linguistic study in English and Spanish. *Journal of Memory and Language* 42(2), 168-182.

Rialland, Annie and Stéphanie Robert. 2001. The intonational system of Wolof. *Linguistics* 39: 893–939.

Rooth, Mats. 1992. A theory of focus interpretation. *Natural Language Semantics*, 1:1, 75–116.

Selkirk, Elisabeth. 1995. Sentence prosody: intonation, stress and phrasing. In Goldsmith, J. (ed.), *The Handbook of Phonological Theory*, 550-569. Oxford: Blackwell Publishing.

Selkirk, Elisabeth. 2007. Bengali intonation revisited: An optimality theoretic analysis in which FOCUS stress prominence drives FOCUS phrasing. In C. Lee, M. Gordon and D. Büring (eds.), *Topic and Focus: Cross-linguistic Perspectives on Meaning and Intonation,* 215–244. Netherlands: Springer.

Stewart, John Massie. 1965. The typology of the Twi tone system. Preprint from *The Bulletin of the Institute of African Studies 1*, 1-27.

Szendroi Kriszta. 2003. A stress-based approach to the syntax of Hungarian focus. *The Linguistic Review,* 20 (1) 37–78.

Xu, Yi. 2011. Post-focus compression: Cross-linguistic distribution and historical origin. In *Proceedings of the 17th International Congress of Phonetic Sciences*, 152-155, Hong Kong.

Zerbian, Sabine, Susanne Genzel and Frank Kügler. 2010. Experimental work on

prosodically-marked information structure in selected African languages (Afroasiatic and Niger-Congo). In *Speech prosody*, 1-4, Chicago.

Appendix: Questions used for focus elicitation

The following questions were used to elicit the desired information structure in Akan. Their English translations were used for elicitation in Ghanaian English.

1. *èdéɛ́ǹ nà sìì ènórà ánàdwó?*

'What happened last night?'

2. *Hwáǹ nà dìì àǹkàá ènórà ánàdwó?*

'Who ate an orange last night?'

3. *Ámà dìì àǹkàá ènórà ánàdwó?*

'Did Ama eat an orange last night?'

4. *Òwúsù dìì déɛ́ǹ ènórà ánàdwó?*

'What did Owusu eat last night?'

5. *Òwúsù dìì fùfúó ènórà ánàdwó?*

'Did Owusu eat fufu last night?'

6. *èdéɛ́ǹ nà sìì ánɔ̀pá nó?*

'What happened in the morning?'

7. *Àbóá bɛ́ǹ nà kàà Máǹsá ánɔ̀pá nó?*

'Which animal bit Mansa in the morning?'

8. *ɔ̀wɔ́ kàà Máǹsá ánɔ̀pá nó?*

'Did a snake bite Mansa in the morning?'

9. *Hwáǹ nà ɔ̀krámáǹ kàà nó ánɔ̀pá nó?*

'Whom did a dog bite in the morning?'

10. *Òwúsù nà ɔ̀krámáǹ kàà nó ánɔ̀pá nó?*

'Did a dog bite Owusu in the morning?'

11. *èdéɛ́ǹ nà sìì ènórà ánàdwó?*

'What happened last night?'

12. *Hwáǹ nà kúm̀ àkókɔ́ ènórà ánàdwó?*

'Who killed a chicken last night?'

13. *Mánsá kúm̀ àkókɔ́ ènórà ánàdwó?*

'Did Mansa kill a chicken last night?'

14. *Kwámè kúm̀ àbóá bɛ́ǹ ènórà ánàdwó?*

'What animal did Kwame kill last night?'

15. *Kwámè kúm̀ ɔ̀wɔ́ ènórà ánàdwó?*

'Did Kwame kill a snake last night?'

16. *èdéɛ́ń nà sìì Fíàdà nó?*

‘What happened on Friday?’

17. *Hwáń nà twàà páànòó Fíàdà nó?*

‘Who cut the bread on Friday?’

18. *Àtá twàà páànòó Fíàdà nó?*

‘Did Ata cut the bread on Friday?’

19. *èdéɛ́ń nà Àfíà twáà Fíàdà nó?*

‘What did Afia cut on Friday?’

20. *Àfíà twàà dùá Fíàdà nó?*

‘Did Afia cut a tree on Friday?’

21. *èdéɛ́ń nà sìì ánɔ̀pá nó?*

‘What happened in the morning?’

22. *Hwáń nà tùù bàǹkyé ánɔ̀pá nó?*

‘Who harvested cassava in the morning?’

23. *Àfíà tùù bàǹkyé ánɔ̀pá nó?*

‘Did Afia harvest cassava in the morning?’

24. *èdéɛ́ń nà Méńsà tùù ánɔ̀pá nó?*

‘What did Mensah harvest in the morning?’

25. *Méńsà tùù bàyéɾɛ́ ánɔ̀pá nó?*

‘Did Mensah harvest yam in the morning?’

26. *èdéɛ́ń nà sìì ènórà ánàdwó?*

‘What happened last night?’

27. *Hwáń nà bòò ɔ̀krá ènórà ánàdwó?*

‘Who beat a cat last night?’

28. *Yàá na bòò ɔ̀krá ènórà ánàdwó?*

‘Did Yaa beat a cat last night?’

29. *Àmàǹkwàá bòò hwáń ènórà ánàdwó?*

‘Whom did Amankwaa beat last night?’

30. *Àmàǹkwàá bòò ɔ̀krámáń ènórà ánàdwó?*

‘Did Amankwaa beat a dog last night?’

31. *èdéɛ́ń nà sìì Fíàdà nó?*

‘What happened on Friday?’

32. *Hwáń nà wɔ̀ɔ̀ fùfúó Fíàdà nó?*

‘Who pounded fufu on Friday?’

33. *Kwàkú nà wɔ̀ɔ̀ fùfúó Fíàdà nó?*

‘Did Kwaku pound fufu on Friday?’

34. *èdéɛ́ɲ́ nà Tíwàà wɔ̀ɔ̀ Fíàdà nó?*

‘What did Tiwaa pound on Friday?’

35. *Tíwàà wɔ̀ɔ̀ àbɛ́ Fíàdà nó?*

‘Did Tiwaa pound palm nut on Friday?’

36. *èdéɛ́ɲ́ nà sìì ènórà ánàdwó?*

‘What happened last night?’

37. *Hwáɲ́ nà yɛ̀ɛ̀ ǹkwáɲ́ ènórà ánàdwó?*

‘Who made soup last night?’

38. *Kwàkú yɛ̀ɛ̀ ǹkwáɲ́ ènórà ánàdwó?*

‘Did Kwaku make soup last night?’

39. *èdéɛ́ɲ́ nà Àtàá yɛ̀ɛ̀ ènórà ánàdwó?*

‘What did Ataa make last night?’

40. *Àtàá yɛ̀ɛ̀ èmóó ènórà ánàdwó?*

‘Did Ataa make rice last night?’

41. *èdéɛ́ɲ́ nà sìì ánɔ̀pá nó?*

‘What happened in the morning?’

42. *Hwáɲ́ nà píàà àdákà ánɔ̀pá nó?*

‘Who pushed a box in the morning?’

43. *Yàá nà píàà àdákà ánɔ̀pá nó?*

‘Did Yaa push a box in the morning?’

44. *èdéɛ́ɲ́ nà Kwàkú píàà ánɔ̀pá nó?*

‘What did Kwaku push in the morning?’

45. *Kwàkú píàà káà ánɔ̀pá nó?*

‘Did Kwaku push a car in the morning?’

46. *èdéɛ́ɲ́ nà sìì ánɔ̀pá nó?*

‘What happened in the morning?’

47. *Hwáɲ́ nà sóàà kwàdú ánɔ̀pá nó?*

‘Who carried bananas in the morning?’

48. *Kwámè nà sóàà kwàdú ánɔ̀pá nó?*

‘Did Kwame carry bananas in the morning?’

49. *èdéɛ́ɲ́ nà Àkúà sóàà ánɔ̀pá nó?*

‘What did Akua carry in the morning?’

50. *Àkúà sóàà bànkyé ánɔ́pá nó?*

‘Did Akua carry cassava in the morning?’