Topicalization and prosodic phrasing in Akan

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1 Introduction

Information structure categories such 'topic' or 'focus' are conceived of as cognitive categories and they interact with linguistic structure and linguistic categories in such a way that natural languages express these cognitive categories using language-specific linguistic means (e.g., Zimmermann and Onea 2011, Zimmermann and Féry 2010).[1] Syntactic, morphological and phonological means may be used exclusively, or, as in many languages, a combination thereof expresses a particular information structure. This paper deals with the prosody of topicalization in Akan, a two-tone Kwa language spoken in Ghana.

According to the literature, Akan makes use of a rich inventory of morphological markers to indicate information structure (Amfo 2010). This morphological marking is accompanied by certain syntactic topic constructions which descriptively can be labelled as left-dislocated. This paper discusses the role of prosody in the expression of topics in Akan, and how prosody adds to the morpho-syntactic expression of topics. The conclusion of this study is that topics are phrased within a separate prosodic phrase. This phrasing is marked by an obligatory pause after the topic constituent and the interruption of the downstep pattern within an utterance.

The data in this paper come from the SFB 632 "Information Structure" in Potsdam/Berlin, where Katharina and I each led projects on the linguistic expression of information structure. The occasion of this *Festschrift* is a wonderful opportunity to reminisce about the common time in Potsdam/Berlin and

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to add another piece of the puzzle to our understanding of the linguistic expression of information structure and in particular the role of prosody with this small, previously unpublished data set. It adds to Katharina's work on the expression of focus in West-African languages (e.g., Hartmann and Zimmermann 2007a,b, 2009), now focusing on topics.

2 Background

2.1 Akan

Akan is a Kwa language belonging to the Niger-Congo phylum spoken in the central and southern regions of Ghana by about 8.3 million speakers (Lewis 2009). The data for this paper come from native speakers of Asante Twi, which is one of the major dialects of Akan spoken in Ghana. The many dialects of Akan are more or less mutually intelligible, but differ at the level of segments as well as tones (Dolphyne 1988, Dolphyne and Kropp Dakubu 1988, Abakah 2000, 2005a, Schachter and Fromkin 1968). Akan is used as a cover term throughout the paper.

The tone system of Akan is relatively well-studied (Stewart 1965, Schachter and Fromkin 1968, Clements 1983, Dolphyne 1988, Abakah 2005b, 2010a,b, Paster 2010, Kügler 2016b), and a number of studies on the interaction of tone and information structure provide the basis for the current study (Marfo 2005, Genzel and Kügler 2010, Kügler and Genzel 2012, Genzel 2013).

Akan is an SVO language (Saah 1994), illustrated in (1). In the example, it can also be seen that NPs are right-branching with a strict order of post-nominal modifiers Boadi (2005).

(1) kòfí dí kɔ̀tɔ̀ kɔ̀kɔ́ː bèbréː
Kofi eat.PRS crab red many
'Kofi eats many red crabs.' (example from Kügler 2015: 194)

Left-dislocated structures represent deviations from simple SVO word order. For instance, a topic or focus constituent in Akan is fronted to the sentence-initial position, thus dislocated from its base position (e.g., Boadi 1974, Marfo 2005, Ermisch 2006). The example in (2) shows a topicalized subject followed by the topic marker *de*. If a constituent is topicalized, an obligatory resumptive pronoun appears in the matrix clause.

(2) Ama de ɔ baa ha
Ama TOP 3SG.SUBJ came here
'As for Ama, she came here.'
(example in orthography, from Saah 1992: 237)

2.2 Tone and prosody in Akan

The two lexical tones of Akan contrast between High (H) and Low (L) tones. From a sentence perspective, the regular tonal pattern of an utterance is descending with local tones interacting resulting in a regular downstep pattern (Christaller 1875, Dolphyne 1988, Kügler 2016b). Sentence length has been shown to affect the local tonal scaling and the overall realization of the intonation of an utterance (Genzel 2013). The longer an utterance, the higher speakers start in their pitch range. The descending pattern of many West-African languages has led to a classification as a 'terrace-level' tone language (Welmers 1959).

In complex sentences with embedded structures, the embedded clause is prosodically integrated in an overall descending intonation pattern showing pitch reset at the left edge of the second clause (Kügler 2016a). A similar pitch reset pattern can be expected after left-dislocated structures, as studied in this paper, assuming that a topic clause and a matrix clause form complex clause.

2.3 Topic constructions in Akan

A 'topic' is typically identified as the part of an utterance about which the remaining part conveys information (Krifka 2008). The expression of topics varies across languages and even within a language, i.e. speakers may have different ways of expressing a topic at their disposal. In Akan, three distinct types of topic constructions have been identified (Christaller 1875, Boadi 1974, Saah 1994, Ameka 1992, Ermisch 2006), all of which realize the topic constituent in sentence-initial position and with an obligatory resumptive pronoun appearing in the matrix clause. Two topic constructions involve a morphological marker, either *de* or *no*. The third construction has no additional morphological topic marker.

Example (2) above illustrates a topic construction with the topic marker *de*. The example in (3) illustrates a construction with the topic marker *no*, which on the surface is realized identical as example (2).

(3) Onipa no ɔ-m-mae
man TOP 3SG-NEG-come.PST
'That man, he has not yet come.'
(example in orthography, from Ermisch 2006: 59)

The topic construction without a topic marker is illustrated in (4). The sentence is about the object constituent *Ama*, which obligatorily appears as a pronoun in the matrix clause, indicated by subscript 'i'.

(4) *Ama*$_i$, me huu *no*$_i$
Ama I saw her
'Ama, I saw her.'
(example in orthography, from Ermisch 2006: 58)

Syntactically, it is claimed that the topic forms its own phrase, and the matrix clause starts with an embedded TP (Marfo 2005), as illustrated in (2). According to Marfo and Bodomo (2005: 192), any dislocated clause in Akan requires that the dislocated constituent has to be realized in the matrix clause. In case of a dislocated subject constituent, it appears as a resumptive pronoun cliticized to the verb.

There is some debate in the literature as to whether the distinct topic constructions mentioned above express different pragmatic functions. For instance, the topic marker *de* expresses a contrast with a referent from the context (e.g., Boadi 1974, Amfo 2010), while the construction without a topic marker is interpreted as a more neutral aboutness topic. Since this paper is concerned with the prosodic marking of topic constructions, the different meaning distinctions are left aside.

For this study, the collected data will compare simple SVO sentences with two types of topic constructions: (a) a topic construction with the topic marker *de* (see (2)), and (b) a topic construction without a topic marker (see (4)).

3 Production study

To collect the data for the present study, a reading study was developed, controlling sentence material for topic construction, sentence length, and lexical tone. Because topics in Akan can be expressed with or without topic markers, but at the same time, topics are dislocated from the matrix clause, the aim of this study is to investigate the prosodic realization of topic constructions. Possible prosodic cues that can signal a topic constituent include pauses, pitch reset, and downstep interruption.

3.1 Method

3.1.1 Speakers

Four native Asante Twi speakers (two female) participated in this study. They did not report any speech, language or hearing disorders. All were fluent in the regional variety of English. Participants were in their mid-twenties and were paid a small amount for participation.

3.1.2 Speech materials

Sentences were constructed to compare simple SVO sentences with sentences containing a subject in a topic constituent that is marked with and without an overt topic marker. The tone on the topic constituent was controlled, i.e. in an identical sentence frame, the subject ended either in a H tone or in a L tone testing for a possible pitch reset after the topic clause and before the matrix clause.

The first set of data contains sentences with eight syllables ((5) and (6)). In (5-a), the topic constituent *Kofi* is morphologically marked by a topic marker *de*, and the topic constituent appears as a resumptive pronoun clitized to the verb in the matrix clause. Note that the phonetic realization of the topic marker *de* in the dialect of Asante is [dèɛ̀] (Amfo 2010: 224, Note 23). Hence, the topicalized constituent consists of four syllables. In (5-b), the topic constituent has no morphological topic marker. To maintain an identical sentence length, the subject constituent contains two disyllabic words 'uncle Kofi'. The subject is realized as a topic since the resumptive pronoun appears as clitized to the verb of the matrix clause. In the data elicitation task, the topic constituent was separated from its matrix clause by a comma. The baseline is the SVO sentence in (5-c). With respect to lexical tones, the final tone in the topic constituent was H when no topic marker followed (5-b), but L in the case of the topic marker (5-a).

(5) a. Topic, topic marker
kòfí dèɛ̀ ɔ-à-bá hà
Kofi TOP 3SG.SBJ-PFT-come here
'As for Kofi, he has come here.'

b. Topic, no topic marker
wɔ̀fà kòfí ɔ-à-bá hà
uncle Kofi 3SG.SBJ-PFT-come here
'Uncle Kofi, he has come here.'

c. No topic, SVO
wɔ̀fà kòfí ì-bè-dídì
uncle Kofi PROG-FUT-eat
'Uncle Kofi is about to eat.'

A comparable set of sentences in (6) contains the name *Addo* instead of *Kofi*. Associated with a L tone pattern, the final tone of the topic constituent is thus L. Note however that speakers often realized the name in an anglicized pronunciation resulting in a HL tone pattern. Presumably, this tonal pattern results from transfer from a falling pitch accent (H*L) in English, often found in loan words in Akan.

(6) a. Topic, topic marker
àdò dèɛ̀ ɔ-à-bá hà
Addo TOP 3SG.SBJ-PFT-come here
'As for Addo, he has come here.'
b. Topic, no topic marker
wɔ̀fà àdò ɔ-à-bá hà
uncle Addo 3SG.SBJ-PFT-come here
'Uncle Addo, he has come here.'
c. No topic, SVO
wɔ̀fà àdò ì-bè-dídì
uncle Addo PROG-FUT-eat
'Uncle Addo is about to eat.'

The second set of data contains five syllables, again varying between the two names *Kofi* (7) and *Addo* (8). This data set does not contain a sentence with a topic marker since the subject or topic constituent only contains the disyllabic name. Note that in (7), the part of the sentence after the subject differs in lexical tone. In (7-a), the resumptive pronoun *ɔ-* carries a L tone, while in (7-b), the perfective marker *a-* carries a H tone. In (8), both the resumptive pronoun (8-a) the perfective marker (8-b) carry a L tone.

(7) H-tone target word
a. Topic, no topic marker
kòfí ɔ-bá hà
Kofi 3SG.SBJ-come here
'Kofi, he comes here.'
b. No topic, SVO
kòfí á-bá hà
Kofi PFT-come here
'Kofi has come here.'

(8) L-tone target word
a. Topic, no topic marker
àdò ɔ-bá hà
Addo 3SG.SBJ-come here
'Addo, he comes here.'
b. No topic, SVO
àdò à-bá hà
Addo PFT-come here
'Addo has come here.'

The third set of data contains sentences with nine syllables, again varying be-

tween the same two target words in subject or topic position. The matrix clause contains more words to test the effect of sentence length on a potential pitch reset after a topic constituent. In (9), again, the perfective marker carries a H tone due to the preceding H tone of the subject, while it is L in (10-b).

(9) H-tone target word

a. Topic, no topic marker
kòfí ɔ-dí á!má báyéré
Kofi 3SG.SBJ-eat Ama yam
'Kofi, he eats Ama's yam.'

b. No topic, SVO
kòfí á-dì á!má báyéré
Kofi PFT-eat Ama yam
'Kofi has eaten Ama's yam.'

(10) L-tone target word

a. Topic, no topic marker
àdò ɔ-dí á!má báyéré
Addo 3SG.SBJ-eat Ama yam
'Addo, he eats Ama's yam.'

b. No topic, SVO
àdò à-dí á!má báyéré
Addo PFT-eat Ama yam
'Addo has eaten Ama's yam.'

3.2 Recordings

The speakers were recorded in a quiet room at the University of Ghana, Legon, in 2014. All speakers were recorded at a sampling frequency of 44.1 kHz and 32 bit resolution, using Audacity and a headset (Logitech Internet Chat Headset) that was connected to an Edirol UA-25 sound card plugged in to a laptop (Levono R61). The material was presented in a pseudo-randomized order with the use of presentation software. Each sentence was presented on a separate slide. Items from other unrelated experiments were interspersed as fillers. All test sentences were prepared in Akan orthography with English translation below the target sentence, since the orthography lacks marking for tone. The participants were instructed to read the sentence on the slide silently and consult the English translation in case of tonal ambiguities. After this step, they were asked to produce the sentence aloud. The presentation flow was self-paced.

3.3 Data processing

Data annotation and acoustic f0 analysis were conducted in Praat (Boersma and Weenink 2023). The data were hand-labelled at the levels of the syllable and segments. This includes pauses if there were any silent intervals between words. ProsodyPro (Xu 2013) was run to measure f0 means of syllabic nuclei (vowels). The f0 contours present time-normalized f0 values averaged across the four speakers.

4 Results

The results are presented in three sections, organized according to the prosodic cues indicating phrasing. The analyzed cues include pauses, pitch reset, and downstep.

4.1 Pauses

Listening to the recorded sentences revealed that speakers always produced a pause after a topicalized constituent, while speakers produced substantially less pauses after a subject constituent in an SVO sentence, rendering the pause as optional in SVO sentences. Counting the presence of pauses in the data and calculating their mean duration supports the impressionistic analysis (see Table 1). All sentences containing a topic, either with or without a topic marker, contain unanimously a pause between the topic constituent and the matrix clause. In Table 1, the presence of pause is aggregated over four speakers realizing four sentences per sentence type each, resulting in a maximum of 16 pauses per sentence type condition. In SVO sentences, pauses were realized, albeit less frequently. The number of pauses varies between nine and twelve in the different SVO sentences.

Sentence Type	Sentence length [no of syllables]	Number of pauses [$n = 16$]	Mean pause duration [ms]
Topic	5	16	501
SVO	5	10	179
Topic marker	8	16	367
Topic	8	16	634
SVO	8	9	208
Topic	9	16	528
SVO	9	12	83

Table 1: Number of and mean duration of pauses between subject or topic constituent and verb object or matrix clause.

Concerning the mean pause duration, the data shows that a pause after a topic constituent is much longer than a pause between a subject and verb in an SVO sentence (see Table 1). In long SVO sentences, the pause is about 83 ms on average. In shorter SVO sentences, the pause is at least twice as long, between 179 ms and 208 ms. Note however that silent intervals of less than 200 ms are not considered a pause (Krivokapić 2007). Hence, the conclusion can be drawn that in SVO sentences, speakers may optionally insert a pause, but many instances of 'silent intervals' cannot be considered to be a pause at all, but only a slight interruption of the speech flow. In contrast, the average pause duration after a topic constituent can be considered a real pause. Following a topic lacking a morphological topic marker, the average duration of pauses ranges from 500 to 630 milliseconds. After a topic marker, the pause is shorter, about 370 ms on average, suggesting that the presence of a morphological topic marker may compensate for pause duration.

4.2 f0 contours and pitch reset

The averaged time-normalized f0 contours measured in Hz are depicted in the following figures. Each syllable corresponds to five measurement points. Figure 1 represents sentences with eight syllables, Figure 2 the short sentences with only five syllables, and Figure 3 the longer sentences, which, in comparison to Figure 2, have the same length of the initial subject or topic constituent but a longer matrix clause. In all figures, there is an interruption of the contour between the subject or topic constituent (point 20 in Figure 1, point 10 in Figure 2 and 3) to highlight the potential break of the f0 contour between the topic and matrix clause. The gray line in each Figure corresponds to the SVO baseline sentence. The orange line shows a sentence with a topic constituent that does not contain a morphological topic marker. Figure 1 additionally includes the sentence with a topic marker represented by the blue line.

In comparing the f0 contours between sentences with and without a topic marker with comparable SVO sentences (Figure 1), it is noticeable that there is no clear pitch reset at the beginning of the matrix clause. Recall that in the upper panel of Figure 1, the subject or topic ends in a H tone, in the lower panel, it ends in a L tone. The topic marker (blue) in both panels carries a lexical L tone.

Comparing the SVO sentence (gray) with the sentence without a topic marker (orange) in Figure 1, it can be seen that the f0 contour with the subject or with the topic constituent forms a coherent descending f0 pattern. There is no pitch reset at point 21. Comparing the two contours with the sentence that contains a topic marker (blue), it is observed that there is a slight pitch reset (10 Hz upper panel, 25 Hz lower panel). The f0 difference between the gray and orange line

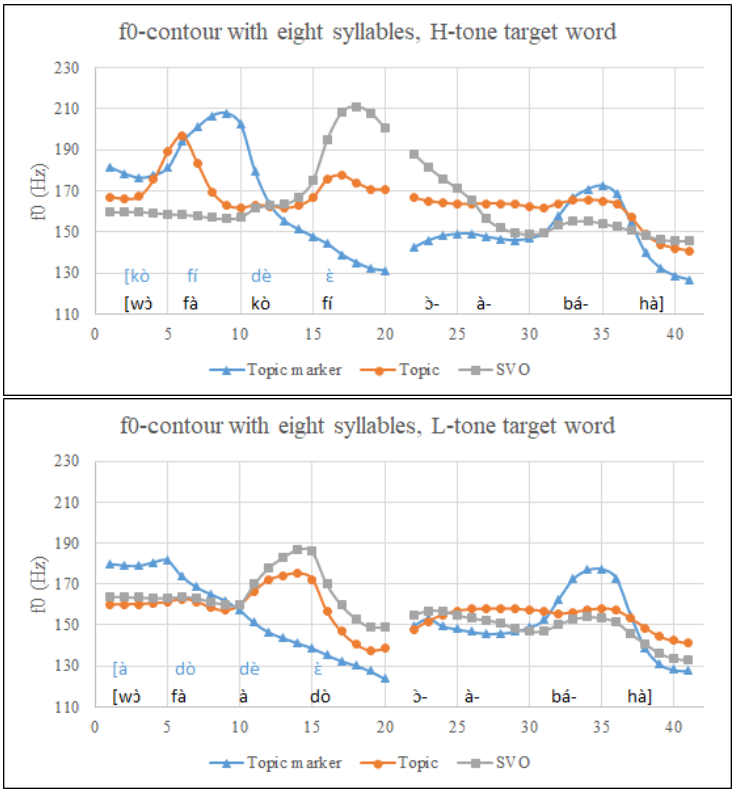

Figure 1: Time-normalized f0-contours for eight syllable sentences comparing SVO (gray) with topic sentences containing (blue) or not containing a morphological topic marker (orange). In the upper panel, the subject or topic constituent ends in a lexically H tone, while the topic marker ends in a lexically L tone. In the lower panel, the subject or topic constituents end in a lexically L tone.

compared to the blue line in the upper panel of Figure 1 results from a difference in lexical tone, which is H for the former two conditions and L for the latter one. In contrast, all three sentences on the lower panel of Figure 1 end in a L tone. The topic marker ends lower (on average by 10 to 25 Hz), suggesting the presence of a stronger phrase boundary. The f0 of the SVO sentence (gray) and of the sentence without a topic marker end roughly at the level at which the matrix clause continues. There is no pitch reset. The matrix clause begins with L tone syllables, creating a low-tone plateau.

Figure 2 shows short sentences where the subject and topic constituent each have two syllables. In the upper panel, the initial constituent ends in a H tone, while in the lower one, it ends in a L tone. After the H tone, the following f0 contour continues without a pitch reset in both cases. After the L tone, there is a slight pitch reset of approximately 18 to 25 Hz in both the SVO sentence and after the topic. Since the subsequent syllables carry L tones, a L tone plateau would be expected. However, the slight pitch reset is not attributed to the presence of the topic constituent because it occurs equally in both sentence conditions.

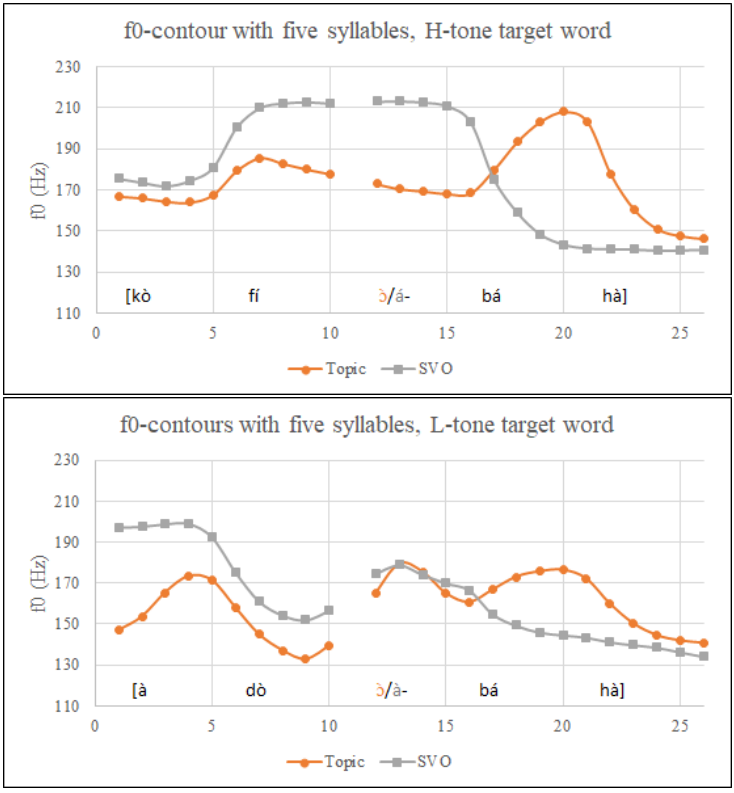

Figure 2: Time-normalized f0-contours for five syllable sentences comparing an SVO sentence (gray) with a topic sentence that contain no morphological topic marking (orange). In the upper panel, the subject or topic constituent ends in a lexically H tone, in the lower panel, in a lexically L tone.

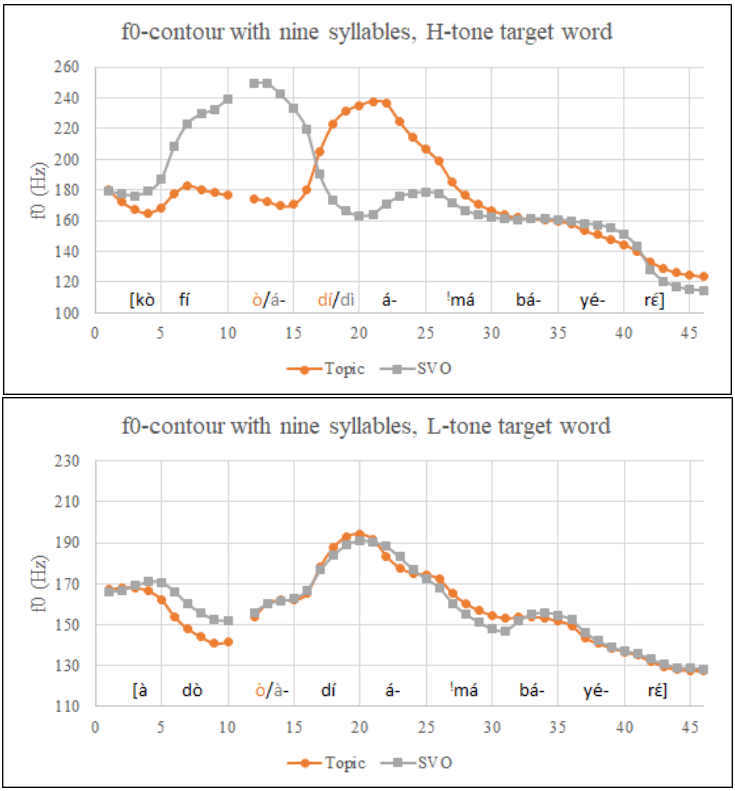

Figure 3: Time-normalized f0-contours for nine syllable sentences comparing an SVO sentence (gray) with a topic sentence that contain no morphological topic marking (orange). In the upper panel, the subject or topic constituent ends in a lexically H tone, in the lower panel, in a lexically L tone.

In Figure 3, long sentences are presented where the subject or topic constituent, as in Figure 2, consists of two syllables each. In this case, the matrix clauses are longer than in Figure 2. Since longer sentences are expected to have a higher overall pitch range (Genzel 2013), a potential effect of pitch reset should be more pronounced here. However, what we observe in Figure 3 is that there is no pitch reset between the topic constituent and the matrix clause. After the H tone (upper panel), the f0 contour integrates into the overall falling pitch contour of the sentences. After the L tone (lower panel), there is an f0 difference of 15 Hz in both sentence conditions, which is smaller than in Fig-

ure 2. Again, we cannot speak of a pitch reset in this case since it appears in both sentence conditions.

4.3 Downstep

In a typical SVO sentence, downstep occurs, indicating the lowering of the f0 of H tones after L tones (e.g., Dolphyne 1988, 1994, Genzel and Kügler 2011). Usually, the first H tone in an utterance defines the pitch range of that utterance, relative to which the subsequent H tones are scaled. The relationship from one H tone to the next can also be considered as an indicator of whether the tones are realized within a phrase or in separate phrases. If two non-adjacent H tones are realized at a similar height, one may conclude that there is a phrase break in between and each of the two H tones defines the ceiling of the pitch range of their corresponding phrase. If, on the other hand, downstep is observed, one may conclude that the words carrying the H tones are uttered in the same phrase.

For example, looking at the upper panel in Figure 1, in the SVO sentence (gray), it can be observed that the first H tone on the second syllable of the subject *Kofi* defines the pitch range of the sentence, and the following H tone on the verb *ba* is lowered relative to the first H tone. In comparison, it can be seen that in both sentences with a topic constituent (blue and orange), the H tone on the verb of the matrix clause is realized higher than in the SVO sentence. This difference in tonal scaling suggests that the H tone on the verb of the matrix clause is realized in a separate phrase. Although this H tone is also realized lower compared to the preceding H tone, the difference in scaling on the verb indicates that a separate phrase is realized after the topic. The fact that the H tone on the verb is not realized as high as the one on the subject, but still higher than a regular downstepped H tone, suggests that the phrase of the topicalized clause and that of the matrix clause are likely recursively embedded.

This effect is also evident in the upper panel of Figure 2. The H tone on the verb is higher than the H tone on the topic constituent (orange) and thus represents the pitch range for the prosodic phrase of the matrix clause. The effect may not be as pronounced in the L tone condition (lower panel of Figure 2) presumably because there is no preceding H tone in the topic constituent as a reference value. Thus, the H tone on the verb is the first H tone of the utterance in the SVO sentence as well as in the sentence with a topic, which is why both are scaled similarly high.

5 Conclusion

This paper investigated the prosodic realization of topics in Akan. For this purpose, sentences were constructed to control for the factors of topic construction, sentence length, and lexical tone. Although topics in Akan are morphologically expressed through a topic marker and syntactically through left-dislocated clauses, the goal of this study was to uncover any invariant patterns of the prosodic realization of topics. To achieve this, three prosodic cues were analyzed, which typically indicate prosodic phrasing. These cues are pauses, pitch reset, and downstep. Pitch reset has already proven to be a prosodic feature for signaling the boundaries of embedded phrases with their matrix clauses in Akan (Kügler 2016a).

In Akan, topics are often expressed with the help of morphological marking, such as a topic marker (Amfo 2010, Boadi 1974, Ermisch 2006, Saah 1994), but this is not necessarily obligatory, as demonstrated by the topic construction in (4). However, what these topic constructions have in common is the presence of an obligatory resumptive pronoun as a clitic on the verb of the matrix clause and the positioning of the topic constituent in sentence-initial position (Amfo 2010, Boadi 1974, Ermisch 2006, Saah 1994). This raises the question of whether the different topic constructions are uniformly expressed through prosodic cues. For the prosodic expression of *focus* in Akan, we have already identified a strategy in which the H tones of a focused constituent are realized lower than comparable H tones of a constituent that is not in focus (Kügler and Genzel 2012). Therefore, we may expect a prosodic strategy for topic marking as well.

The results of the present study indicate that pauses after a topic constituent are obligatory. In all sentences from all speakers, a pause after the topic constituent was realized. On average, this pause lasted 500 to 630 ms. In contrast, very short 'silent intervals' were measured in the SVO control sentences, most of which cannot be interpreted as pauses (e.g., Krivokapić 2007: for the lower limit of at least 200 milliseconds to consider it a pause), but rather as minimal interruptions of the speech flow. Furthermore, these short interruptions did not occur in all sentences. As a conclusion, we infer that a pause of 500 ms and longer serves as a clear indicator of the boundary of a topic constituent in a prosodic phrase. However, SVO sentences do not require a pause after the subject.

Regarding the pitch reset cue, the data indicates that a pitch reset after a topic constituent is not obligatory. Only after a final L tone in the topic constituent there is a slight f0 increase at the beginning of the matrix clause. On average, this increase is 10 to 25 Hz. In addition, this f0 increase occurred both after a topic and after a subject in the SVO sentence, suggesting that the tonal config-

uration causes the f0 rise rather than the presence of a topic constituent. When comparing these values with those of a pitch reset in an embedded clause of approximately 50 to 60 Hz (Kügler 2016a), it becomes apparent that the small f0 increase cannot be considered as a pitch reset and, therefore, not as an indicator of a phrase boundary.

Finally, we evaluated the criterion of downstep. Downstep usually occurs within a phrase. If there is an interruption in the downstep pattern, we expect the presence of a prosodic phrase boundary. The data from the present study suggests that H tones in the matrix clause indeed define a new pitch range, thus interrupting the donwstep pattern. This indicates that a separate prosodic phrase of the topic constituent is present, but it likely forms an embedded structure with the phrase of the matrix clause.

The fact that embedded clauses obligatorily exhibit a pitch reset while topic constituents do not raises the question of the nature of the prosodic phrase in which a topic is phrased. If we assume that an embedded clause represents its own, possibly recursively embedded intonation phrase (Kügler 2016a), then a topic constituent may only project a phonological phrase instead. However, this is speculative and requires further investigation. Undoubtedly, though, topics in Akan are prosodically phrased within a separate prosodic phrase, as indicated by the presence of an obligatory pause and the interruption of a downstep pattern within a whole utterance.

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