

Are Syntax and Prosody Entangled? Insights from Krachi In-situ Interrogatives *

ABSTRACT

The relationship between syntax and phonology is often assumed to be unidirectional. On this view, the properties of phonological structures in certain domains are either determined or at least constrained by syntactic properties. This conception precludes causal interactions in the opposite direction, that is, operations in which phonological considerations drive phenomena at the syntactic level. Richards (2010) challenges this conception of the syntax-phonology interface, proposing that *wh-* in-situ phenomena furnish evidence for an architecture in which phonological computations such as prosodic mapping enter the derivation early (i.e. before Spell-Out) and thus exert a causal influence on some narrow syntactic operations. This article addresses Richards' prosodic entanglement theory by applying it to the investigation of in-situ *wh-* distribution in Krachi, an endangered North Guang language of Ghana. We show that although Richards' theory is sufficient to derive the distribution of matrix *wh-* in-situ from the prosodic mapping of DPs in the language, it is too restrictive to derive the distribution of *wh-* in-situ in embedded clauses. To account for the distribution of *wh-* in-situ in Krachi, therefore, it isn't necessary to assume that prosodic information is entangled with the narrow syntactic derivation.

KEYWORDS

prosodic entanglement • syntax-prosody interface • *wh-* prosody • *wh-* in-situ • Krachi

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1. INTRODUCTION: PROSODIC ENTANGLEMENT AND THE DISTRIBUTION OF *WH*-IN-SITU IN KRACHI

The relationship between syntax and phonology is often assumed to be unidirectional. On this view, the properties of phonological structures in certain domains are either determined or at least constrained by syntactic properties. This conception precludes causal interactions in the opposite direction, that is, operations in which phonological considerations drive phenomena at the syntactic level. While in a large part conceptual, this view finds support in a robust and continually growing body of empirical evidence (e.g. Clements 1978, Zwicky & Pullum 1986, Zwicky & Kaisse 1987, Pullum & Zwicky 1988, Guasti & Nespor 1999, Déchaine 2001, Pak 2008, Kahnemuyipour 2009, Selkirk 2011, Heath & McPherson 2013, Cheng & Downing, forthcoming, among many others) and crucially, a paucity of evidence to the contrary.

Richards (2010) challenges this conception of the syntax-phonology interface, proposing that *wh*-in-situ phenomena furnish evidence for an architecture in which at least some syntactic behavior is underpinned by phonology.¹ Richards' idea is that certain phonological computations enter the derivation early (i.e. before Spell-Out) and thus exert a causal influence on certain narrow syntactic operations. For Richards, prosodic mapping is one such computation. Accordingly, syntax and prosody are derivationally entangled in this ontology – the two proceed largely in parallel, with mappings between syntactic and prosodic structures firmly established prior to the transfer of those structures to the interfaces. The basis for Richards' proposal lies in his claim that the distribution of *wh*-items in a language (e.g. moved vs. in-situ) can be predicted largely on the basis of the prosodic properties of those expressions.

This article addresses Richards' prosodic entanglement theory by applying it directly to in-situ *wh*-distribution in Krachi², an endangered North Guang language related to Akan that is spoken in the Volta region of central eastern Ghana. *Wh*-expressions³ in this language may

appear both in-situ and in left peripheral focus positions with no apparent interpretative/information structural difference, as illustrated below.

- (1) a. $\text{ɔkyí wǔ é-mɔ bwaté wǔ mumu?}$
 woman the PST-kill chicken the which
 ‘Which chicken did the woman slaughter?’
- b. $\text{Bwaté wǔ mumu yí ɔkyí wǔ é-mɔ?}$
 chicken the which FOC woman the PST-kill
 ‘Which chicken did the woman slaughter?’

This dual distribution characterizes all Krachi interrogative expressions, with the exception of *náni* ‘why’. Unlike every other *wh*- item in the language (2a-c), ‘why’ may not appear clause-internally (2d). Instead, it must surface in the left periphery (2e), where it is interpreted as a reason operator⁴ (Kandybowicz & Torrence 2011). Similar facts obtain in Akan (Torrence & Kandybowicz, forthcoming, Kandybowicz, forthcoming) and many other languages (e.g. Kitharaka (Muriungi 2005); Bakweri (Marlo & Odden 2007); Lubukusu (Wasike 2007); Zulu (Buell 2011); Ikalanga (Letsholo 2011); Chinese (Lin 1992); English (Hornstein 1995, Thornton 2008, Stepanov & Tsai 2008); Italian (Rizzi 2001); Korean and Japanese (Ko 2005); Persian (Karimi 2005); Romanian (Shlonsky & Soare 2011); and New Testament Greek (Kirk 2010), among others).

- (2) a. $\text{Nsé é-mɔ bwaté wǔ?}$
 who PST-kill chicken the
 ‘Who slaughtered the chicken?’
- b. ɔkyí wǔ é-mɔ ně?
 woman the PST-kill what
 ‘What did the woman slaughter?’
- c. $\text{ɔkyí wǔ é-mɔ bwaté wǔ nfré/kemtké/nene?}$
 woman the PST-kill chicken the where/when/how
 ‘Where/when/how did the woman slaughter the chicken?’

- d. *ɔkʲí wǔ é-mɔ bwaté wǔ nání?
 woman the PST-kill chicken the why
- e. Nání yí ɔkʲí wǔ é-mɔ bwaté wǔ?
 why FOC woman the PST-kill chicken the
 ‘Why (for what reason) did the woman slaughter the chicken?’

Similar facts hold in embedded domains⁵, as illustrated below.

- (3) a. Kofi é-gyɪɪ fée ɔkʲí wǔ é-mɔ ně?
 Kofi PST-say COMP woman the PST-kill what
 ‘What did Kofi say that the woman slaughtered?’
- b. Kofi é-gyɪɪ fée ɔkʲí wǔ é-mɔ bwaté wǔ nene?
 Kofi PST-say COMP woman the PST-kill chicken the how
 ‘How did Kofi say that the woman slaughtered the chicken?’ (Matrix scope reading)
 ‘How did the woman slaughter the chicken, according to Kofi?’ (Embedded scope reading)
- c. *Kofi é-gyɪɪ fée ɔkʲí wǔ é-mɔ bwaté wǔ nání?
 Kofi PST-say COMP woman the PST-kill chicken the why
- d. Nání yí Kofi é-gyɪɪ fée ɔkʲí wǔ é-mɔ bwaté wǔ?
 why FOC Kofi PST-say COMP woman the PST-kill chicken the
 ‘Why did Kofi say that the woman slaughtered the chicken?’ (Matrix scope reading)
 ‘Why did the woman slaughter the chicken, according to Kofi?’ (Embedded scope reading)

In what follows, we show that although Richards’ theory of prosodic entanglement is sufficient to derive the distribution of matrix *wh*- in-situ from the prosodic mapping of DPs in the language, it is too restrictive to derive the distribution of *wh*- in-situ in embedded complement clauses. To show this, we first establish the prosodic status of embedded complement clauses in the language. We then demonstrate that Richards’ proposal incorrectly predicts the unavailability of *wh*- in-situ in this domain. To account for the distribution of *wh*- in-situ in Krachi, therefore, it isn’t necessary to assume that prosodic information is entangled with the narrow syntactic derivation. On the basis of this consideration, we conclude that syntactic-

prosodic entanglement does not universally underpin all aspects of *wh*- syntax, as envisioned by Richards.

The remainder of the article is organized as follows. In section two, we introduce Richards' proposal in more detail and consider the problem of main clause *wh*- distribution in Krachi with respect to it. Despite initial success in this domain, we demonstrate in section three that this approach fails to derive the distribution of *wh*- in-situ in embedded clauses. We conclude the article in section four with a summary and brief closing remarks.

2. AN ENTANGLEMENT-BASED APPROACH TO KRACHI *WH*- IN-SITU

2.1. *Overview of Richards' (2010) Proposal*

Richards proposes a universal PF condition regulating *wh*- constructions, according to which a *wh*- phrase and its scopally-associated complementizer must phrase together prosodically. When syntax and prosody collaborate to build structures satisfying this condition (recall from the previous section that Richards assumes prosodic information is available throughout the syntactic cycle), *wh*- movement is unnecessary and *wh*- in-situ obtains. When the appropriate phrasing of *wh*- and C cannot be achieved, *wh*- movement becomes obligatory, repositioning the interrogative item closer to C for prosodic grouping.

Richards adopts the Edge Alignment theory of prosodic mapping (Selkirk 1984, Nespor and Vogel 1986), according to which prosodic constituents are constructed by mapping certain syntactic boundaries (edges) onto prosodic boundaries.⁶ Assuming a version of the Prosodic Hierarchy in which Prosodic Words group together to form Minor Phrases (MiP), Minor Phrases combine to form Major Phrases, Major Phrases group together to form Intonational Phrases, and Intonational Phrases combine to form Utterances (Selkirk 1986, 1995), Richards assumes a

mechanism of extended Minor Phrase formation in which the Minor Phrase domain of an interrogative can be extended by way of an algorithm that takes an existing Minor Phrase boundary as one of its bounding edges (for his purposes, C) and the interrogative's independently determined boundary as its opposite edge. As such, this domain-building algorithm can yield larger (recursive) Minor Phrase constituents.

(4) Richards' (2010:150) algorithm for constructing extended Minor Phrases:

- a. For one end of the larger Minor Phrase, use a Minor Phrase boundary that was introduced by a *wh*- phrase.
- b. For the other end of the larger Minor Phrase, use any existing Minor Phrase boundary.

The algorithm in (4) is crucial for Richards because the relevant prosodic grouping of *wh*- and C involves the Minor Phrase constituent.

(5) Richards' (2010:151) PF condition on *wh*- prosody:

Given a *wh*- phrase α and a complementizer C where α takes scope, α and C must be separated by as few Minor Phrase boundaries as possible, for some level of Minor Phrasing.

Accordingly, if *wh*- and C are separated by one or more intervening Minor Phrase boundary, the algorithm in (4) can be pressed into service to produce an extended Minor Phrase in line with condition (5) containing both *wh*- and C, provided that the right conditions are met. Richards calls these extended Minor Phrase structures "*wh*- domains".

In Richards' framework, two conditions determine whether a *wh*- item can be phrased with C independent of movement in keeping with (5): a) whether Minor Phrase boundaries are mapped onto the interrogative's left or right syntactic edge and b) the position of C in the linear order. When a *wh*- item's Minor Phrase boundary and corresponding C fall on opposite sides, the algorithm in (4) can produce the required prosodic grouping satisfying (5), thus facilitating *wh*-

in-situ. Successful phrasing of this sort can happen in one of two ways according to Richards: a) C may precede a right edge-marked *wh*- (e.g. (6a)), as in Chichewa⁷ or b) C may follow a left edge-marked *wh*- (e.g. (6b)), as in Japanese.

- (6) a. $C \dots wh\text{-})_{\text{MiP}}$
 b. ${}_{\text{MiP}}(wh\text{-} \dots C$

When an interrogative's Minor Phrase boundary and corresponding C fall on the same side of the *wh*- item, however, the requisite phrasing can obtain only if movement to the opposite side of C occurs. For Richards, Tagalog (7a) and Basque (7b) exemplify these scenarios.

- (7) a. $C \dots {}_{\text{MiP}}(wh\text{-}$
 b. $wh\text{-})_{\text{MiP}} \dots C$

Thus, for Richards, the distinction between *wh*- movement and *wh* in-situ is a consequence of how Minor Phrase *wh*- domains are created. Crucially, this can vary from language to language.

2.2. Entanglement-style Analysis of Krachi Wh- In-situ

Richards' theory is based on case studies of languages in which the distribution of *wh*- items is uniform; either all interrogative constituents front or they all appear in-situ. On his analysis, this state of affairs follows as a consequence of the fact that the prosodic boundaries of DPs in these languages are uniformly determined (i.e. a particular Minor Phrase edge aligns across-the-board with a particular DP edge, for all DPs), as required by Edge Alignment theory. Nonetheless, distributional asymmetries like those in Krachi (which are not dealt with in Richards 2010) can be made to follow from Richards' system if a slight weakening of Edge Alignment theory is implemented. An approach in this vein would appeal to a prosodic asymmetry in the edge-

marking of Krachi interrogative DPs. More specifically, given the facts in (2), the structural requirements in (6-7), and the fact that Krachi has clause-initial complementizers, as shown in (8) below, an analysis along these lines might hypothesize that unlike all other interrogative DPs in the language, whose right edges mark the boundaries of Minor Phrase, Krachi exceptionally marks the left edge of ‘why’ as a Minor Phrase boundary.

- (8) a. Kofi é-gyɪɾɪ **fɛ́ɛ́** ɔkʲí wǔ é-mɔ nɛ́?
 Kofi PST-say COMP woman the PST-kill what
 ‘What did Kofi say that the woman slaughtered?’
- b. **Ke** Kofi é-mɔ bwatɛ́ wǔ ye wa wɪ ɲwanɲwa.
 COMP Kofi PST-kill chicken the it do 1ST.SG strange/surprising
 ‘That Kofi slaughtered the chicken is surprising (to me).’

Thus, under a Richardsonian entanglement analysis, all non-‘why’ interrogatives in the language would have their Minor Phrase boundaries and corresponding complementizers on opposite sides (as in (6a)), obviating the need for movement (when the focus marker is not merged). In the case of ‘why’, however, the DP’s Minor Phrase boundary and associated C would occur on the same (i.e. left) side of the interrogative (as in (7a)), forcing merger into a high (pre-C) peripheral position. As we show below, these facts are indeed borne out in the language, furnishing initial support for Richards’ entanglement theory.

2.2.1. Prosodic Evidence

2.2.1.1. The Prosody of Non-interrogative DPs

In Krachi, the right edge of a non-interrogative DP delimits the boundary of a Minor Phrase. The remainder of this section provides evidence⁸ for this claim.

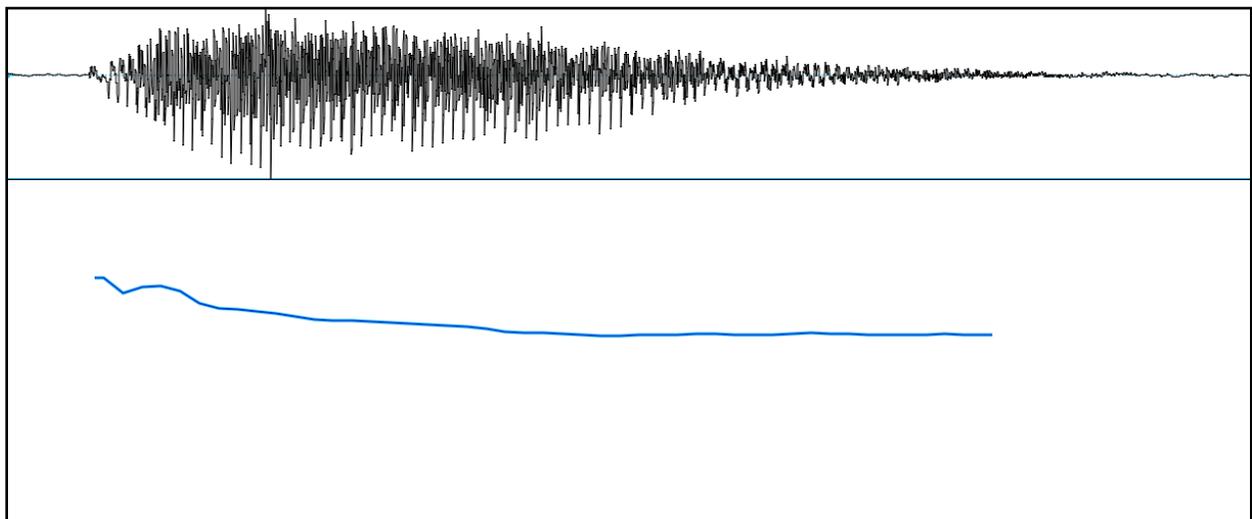
The presence of a Minor Phrase boundary in the language is signaled by a Low boundary tone (L%), which has certain phonetic and phonological consequences. Some of these consequences include F0 depression and suppression of otherwise productive tone sandhi processes like upstep. Let's first consider F0 lowering.

In Krachi, determiners appear final in the DP.

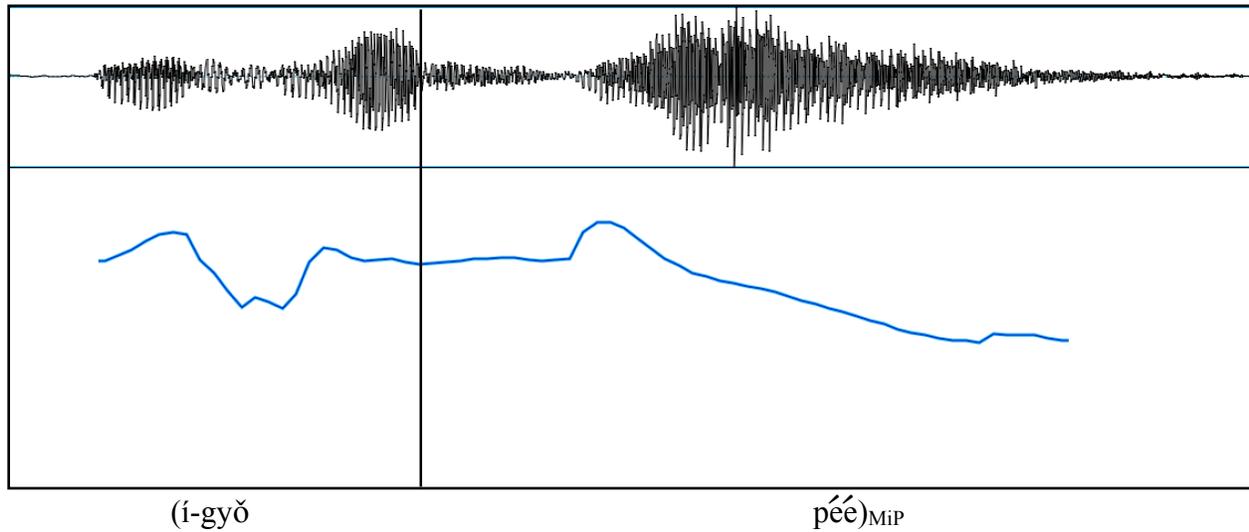
- (9) a. í-gyǒ pée
 PL-yam all
 'All the yams'
- b. ɔkyí wǔ
 woman the
 'The woman'

Determiners with lexically High or Rising tones are realized with low falling F0 contours when appearing phrase-finally in the DP. Such low falling contours are exemplified in (10b-c) below for the determiner *pée* 'all'. (10a) shows that 'all' is realized with a fairly flat high pitch when it occurs outside a DP in citation form, establishing that it is lexically High tone-bearing.

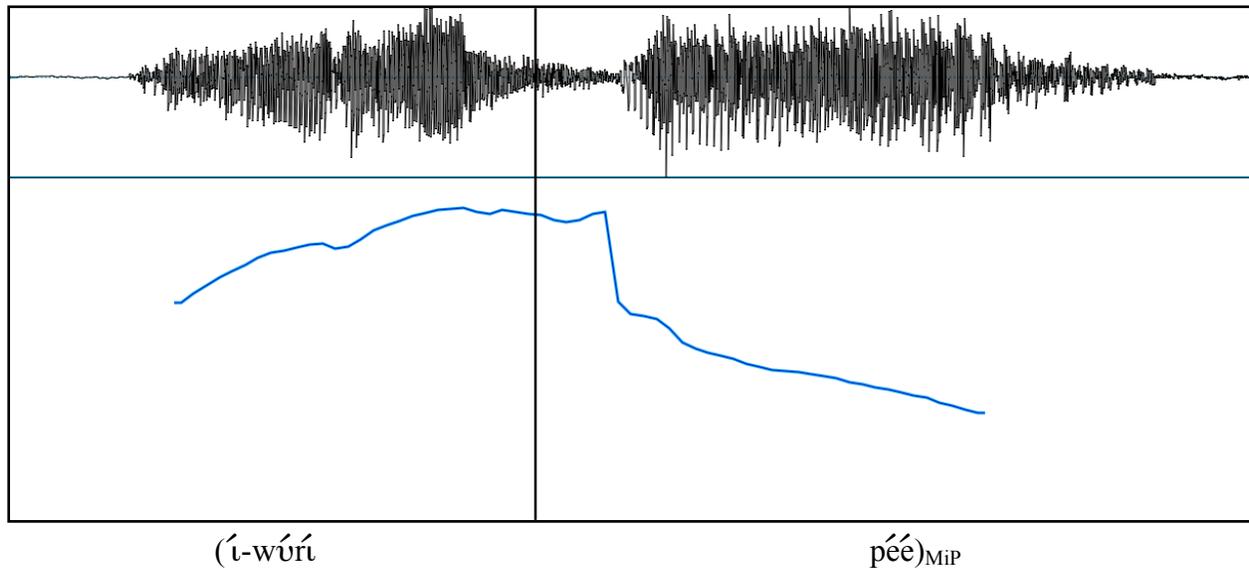
- (10) a. pée 'all'



b. í-gyǒ pée
 PL-yam all
 ‘all the yams’



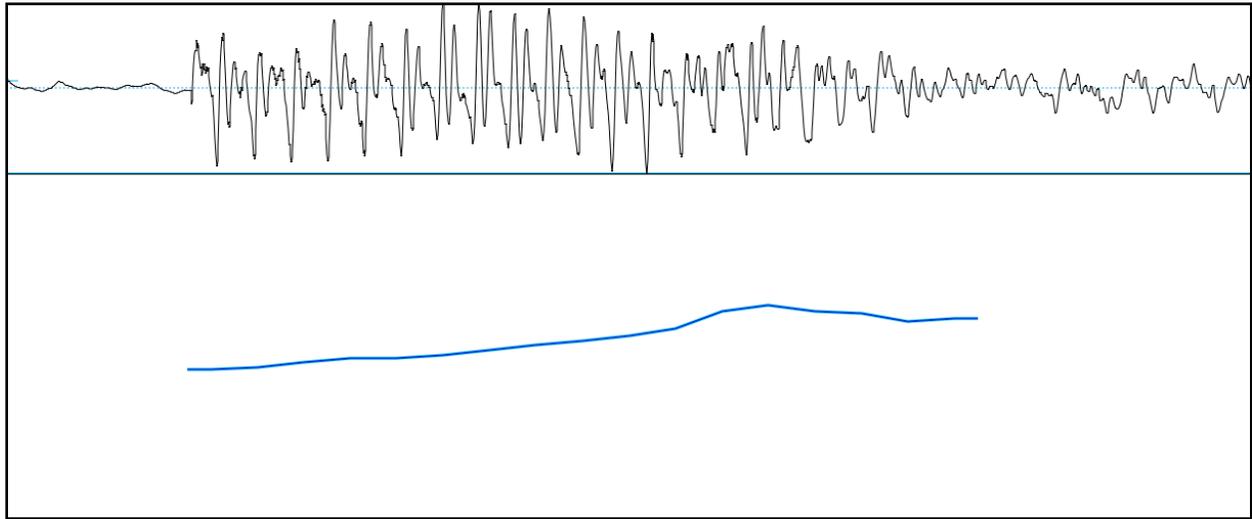
c. í-wúrí pée
 PL-book all
 ‘all the books’



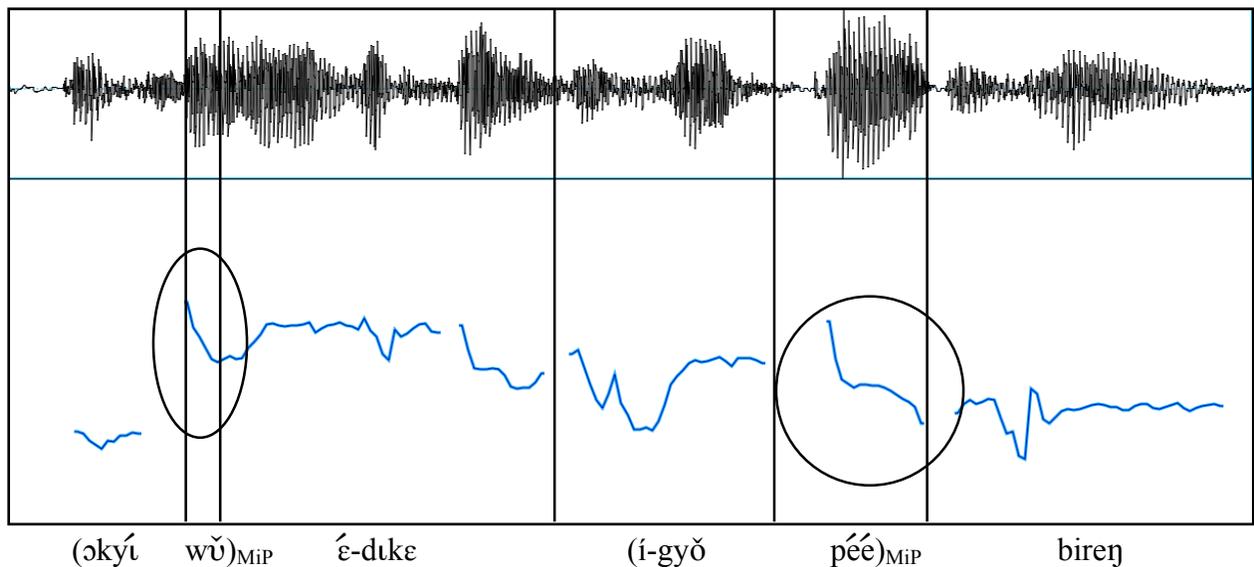
The determiner ‘the’ behaves in a similar fashion. (11a) shows that in citation form, *wǔ* surfaces with a high rising F₀, confirming that it bears a Rising tone lexically. (11b) illustrates that when occurring at the right edge of a DP, the item emerges with a sharp falling contour. The same

example also demonstrates the effect that right edge positioning has on the determiner ‘all’, which as in (10b-c) once again surfaces with a depressed/falling F0. Because we observe F0 lowering on both determiners in this example, we can conclude that the tonal lowering effects associated with the right edges of DPs are in fact fully general and not dependent on whether the item occurs in utterance-final position.

(11) a. wǔ ‘the’



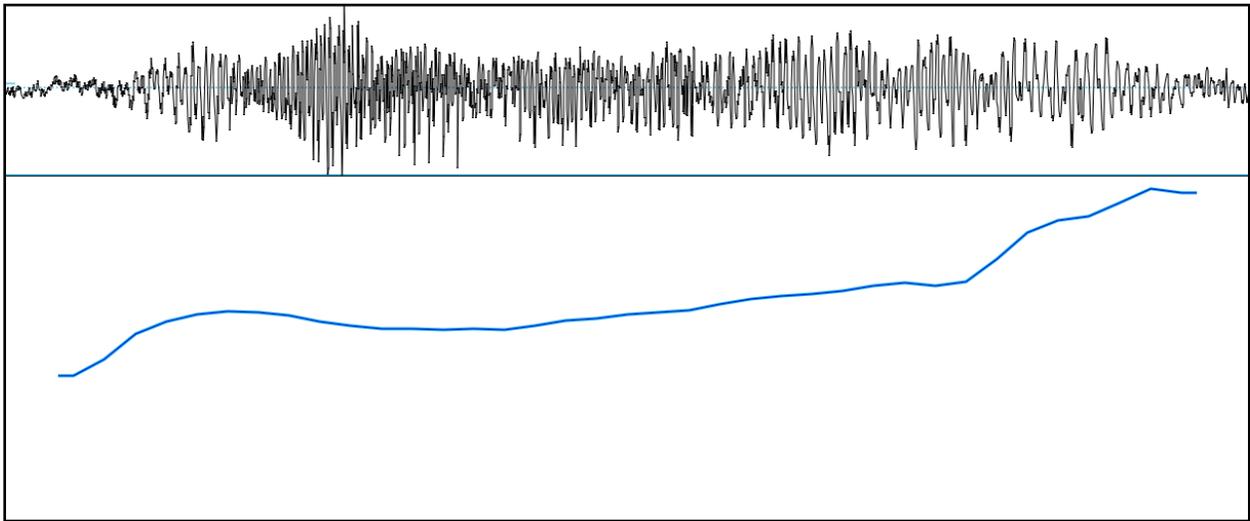
b. ɔkyí wǔ é-dɪkɛ í-gyɔ̃ péé bireŋ.
 woman the PST-cook PL-yam all quickly
 ‘The woman cooked all the yams quickly.’



We have demonstrated that determiners with lexical High/Rising tones are realized with low falling F0 contours when appearing phrase-finally inside the DP. This fact is evidence for the presence of a Minor Phrase-final L% and consequently for the claim that the right edge of a DP aligns with the right edge of a Minor Phrase. The presence of a right-aligned Minor Phrase boundary inside the DP is also detectable via the suppression of otherwise productive tone sandhi processes like upstep, which we discuss next.

In Krachi, the second in a series of consecutive High tones undergoes an F0 boost (Snider 1990). This is exemplified below in the tonal realization of the item *gyórí* ‘smooth’.

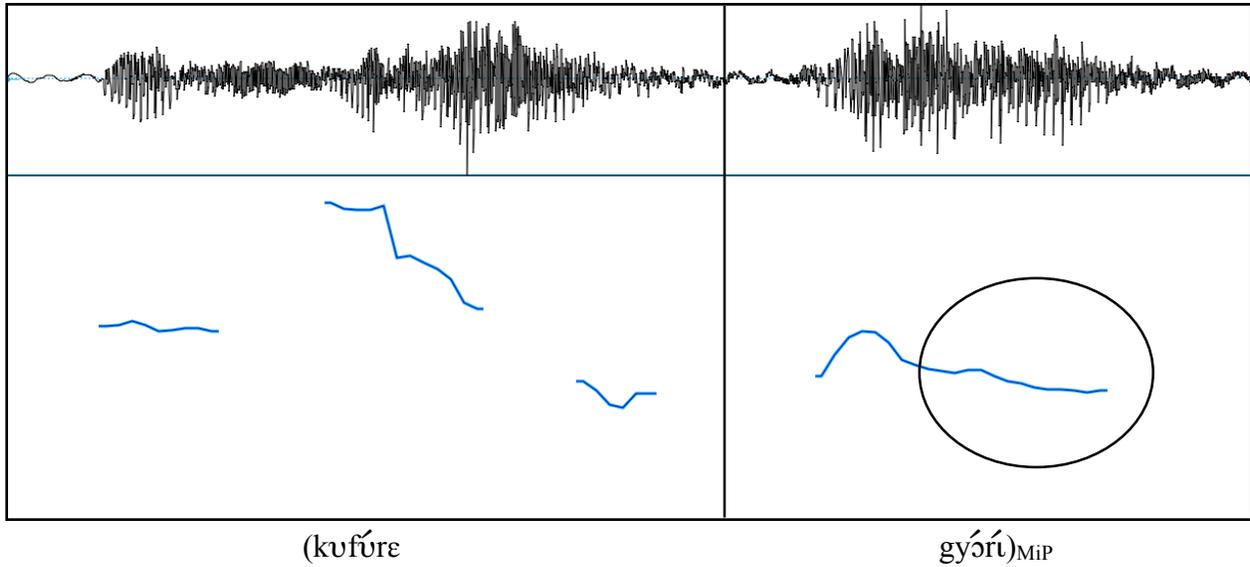
(12) *gyórí* ‘smooth’



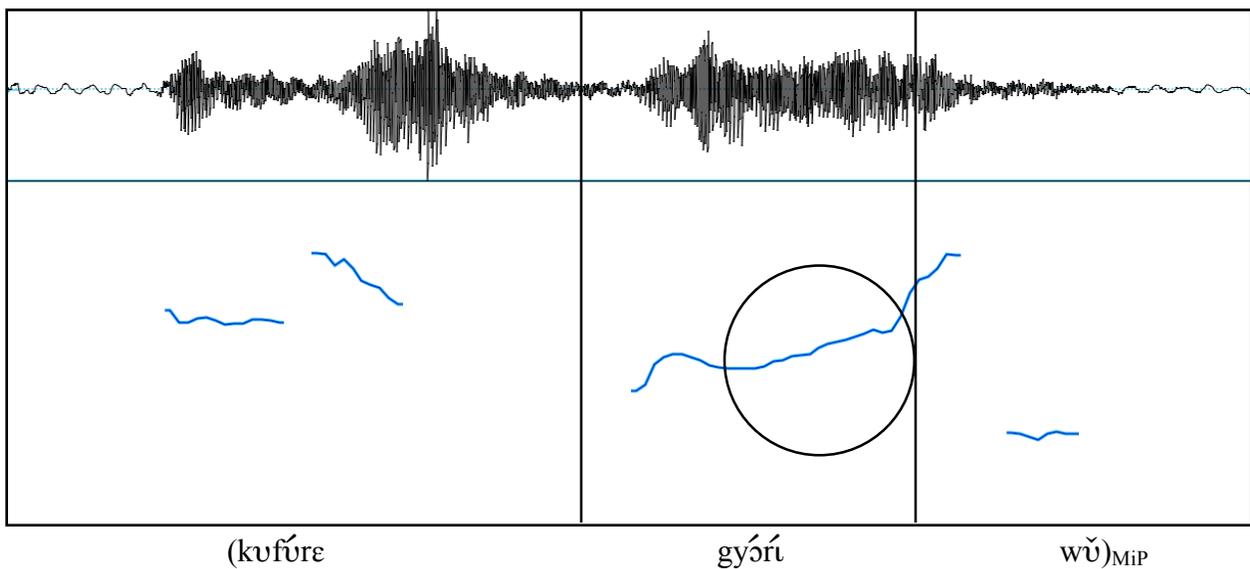
This sandhi process of upstep, however, is suppressed in DP-final position. Compare (13a) below, where ‘smooth’ appears at the right edge of the null-headed DP⁹, with (13b), where the definite determiner appears phrase-finally following the adjective. Only in the former structure is upstep overridden. In (13a), the adjective is realized with a low falling F0 characteristic of

items appearing at the right edge of DP. In (13b), upstep applies to the adjective as expected and the lexically Rising tone-bearing definite article surfaces with a significantly depressed F0.

- (13) a. kufúre gyórí
 egg smooth
 ‘a smooth egg’



- b. kufúre gyórí wǔ
 egg smooth the
 ‘the smooth egg’

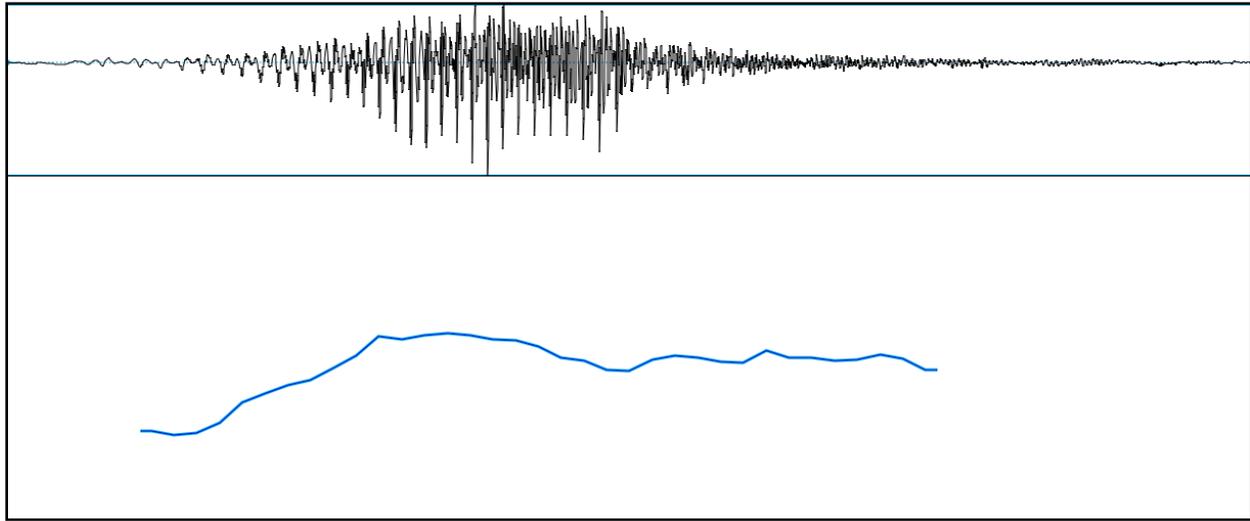


These facts provide additional evidence for the presence of Minor Phrase-final L% in the language and thus for the claim that the right edge of Minor Phrase corresponds to the right edge of DP in Krachi.

In addition to these considerations, we can furnish evidence that there is no Minor Phrase boundary mapped onto the left edge of the Krachi DP. We offer three arguments to this effect, all of which take on a similar character. The nature of these arguments is as follows. Suppose the left edges of DPs served as Minor Phrase boundaries in the language. Then, an immediately preceding DP-external item would fall at the end/right edge of the preceding Minor Phrase, an environment characterized by L% effects as previously shown. If a lexically High or Rising tone-bearing item were to surface with a depressed or falling F0 contour in this position, the pattern would be consistent with the presence of a right edge Minor Phrase boundary and hence an immediately following left edge DP Minor Phrase boundary. However, if the lexically High/Rising tone-bearing item were to retain its underlying tonal specification and surface without F0 depression, it would suggest that the item is prosodically phrasing with the following DP and thus is not situated at the juncture of two Minor Phrases. In what follows, we'll consider the tonal realizations of three immediately preceding DP-external items that end with High or Rising tones: the preposition *yě* 'with', the clausal coordinator *yĩ*, and the demonstrative *keníŋ*.

If the left edge of a DP marked a Minor Phrase boundary, the F0 realization of an immediately preceding preposition should be depressed. In this light, consider the preposition *yě* 'with', which as illustrated below is realized with a High/Rising F0 pattern in citation form.

(14) *yě* ‘with’

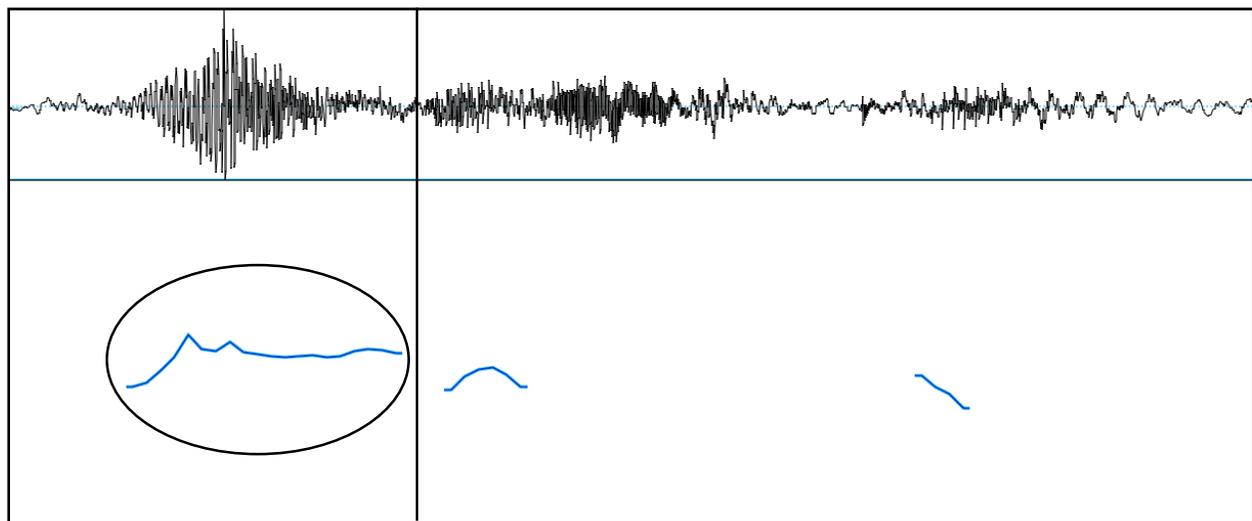


When *yě* immediately precedes a DP, however, the item fails to show evidence of F0 lowering.

Instead, the item surfaces with a rising F0 contour approximating its citation form realization.

This is shown below in (15).

(15) [_{PP} *yě* [_{DP} *óskán*]]
 with knife
 ‘with a knife’



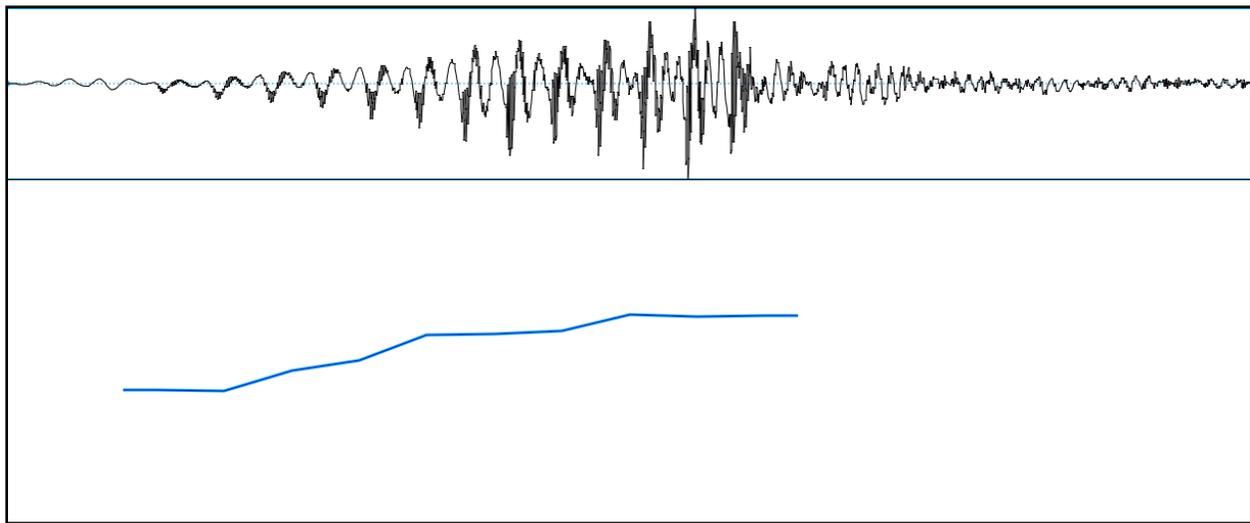
(*yě*)

óskán)_{MiP}

This lack of F0 lowering on ‘with’ suggests the absence of an L% at the juncture of P and DP and thus, the absence of a Minor Phrase boundary at the left edge of the following DP.

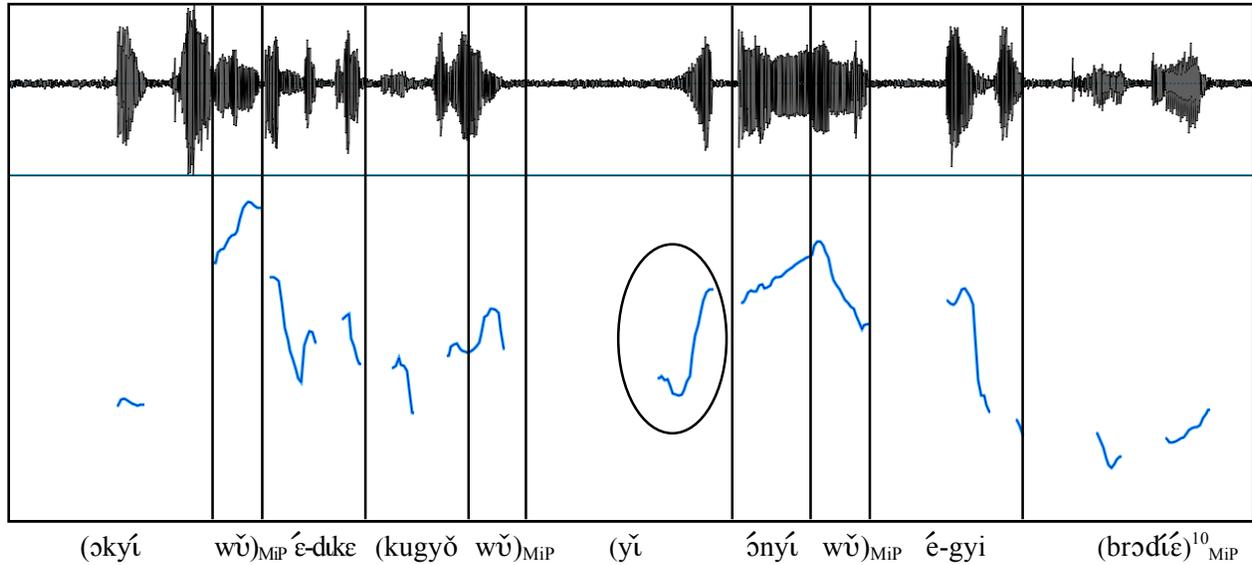
If the left edge of a DP constituted a Minor Phrase boundary, we would expect to find F0 depression on clausal coordinators immediately preceding subject DPs. As shown below, the coordinator *yĩ* is realized with a Rising F0 pattern in citation form.

(16) *yĩ* ‘and’



However, when immediately preceding subject DPs, the item fails to exhibit F0 lowering. Instead, it surfaces with the expected rising F0 pattern, as shown below, suggesting that it phrases prosodically with the following DP.

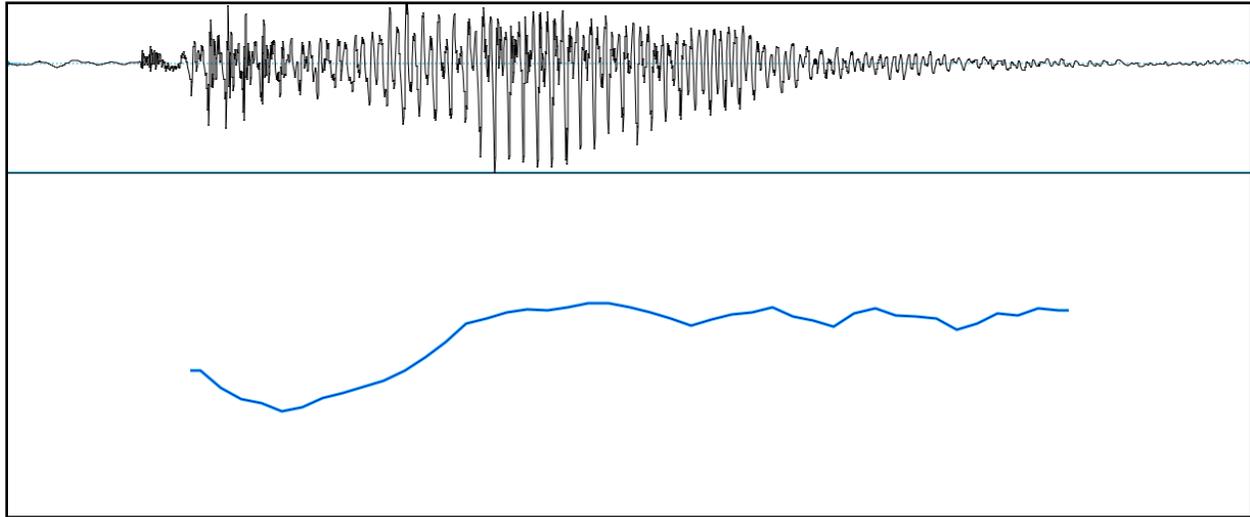
- (17) [TP əkyí wǔ é-dɪkɛ kugyɔ̃ wǔ] yĩ [TP [DP ɔnyí wǔ] é-gyi brɔ́dʲé].
 woman the PST-cook yam the and man the PST-eat plantain
 ‘The woman cooked the yam and the man ate a plantain.’



Once again, the absence of F0 lowering on ‘and’ suggests the absence of an L% before the DP subject of the coordinated clause and thus the absence of the right edge of a preceding Minor Phrase. This indicates that there is no Minor Phrase boundary at the left edge of the subject DP in the coordinated clause.

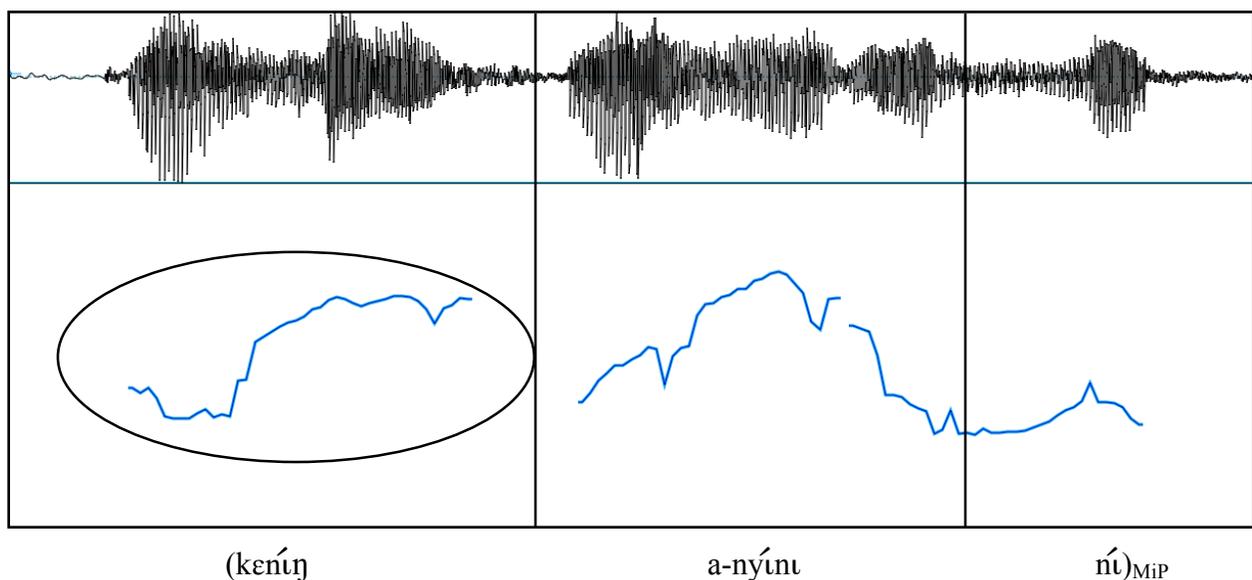
Our final argument that there is no Minor Phrase boundary mapped onto the left edge of the Krachi DP concerns the fact that when a demonstrative ending on a High tone immediately precedes the left edge of a DP, there is once again no F0 depression to indicate the presence of an L% that would delineate the right edge of a preceding Minor Phrase. Consider the tonal realization of the Krachi demonstrative *keníŋ* in citation form below.

(18) κενίη ‘DEM’



The tonal realization of the demonstrative does not deviate from this pattern when linearly adjacent to a DP, suggesting that there is no prosodic juncture dividing the two items. This is shown below.

(19) [_{DEMP} κενίη [_{DP} a-nyínu ní]]
 DEM PL-man the.PROX
 ‘these men’



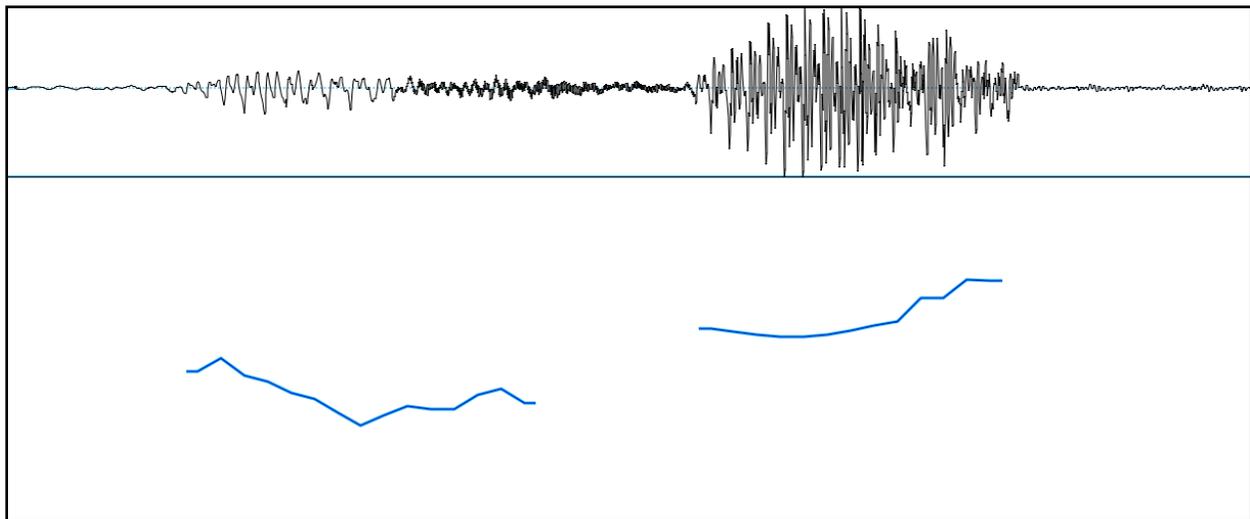
Thus, unlike the right edges of DPs, where the available evidence suggests the presence of Minor Phrase boundaries, there is no evidence that Minor Phrase boundaries are mapped onto the left edges of non-interrogative DPs in Krachi.¹¹

2.2.1.2. *The Prosody of Non-‘why’ Interrogative DPs*

Having established the presence of right-edge Minor Phrase boundaries in non-interrogative Krachi DPs, we consider next the prosody of in-situ non-‘why’ *wh*- items. As might be expected, all such expressions in the language pattern like non-interrogative DPs with respect to L% effects at their right edges, suggesting that they too are prosodically right edge-marked. Below, we present an assortment of pitch tracks demonstrating the comparable realizations of Krachi’s non-‘why’ interrogative DPs with respect to prosodic behavior at the right edge.

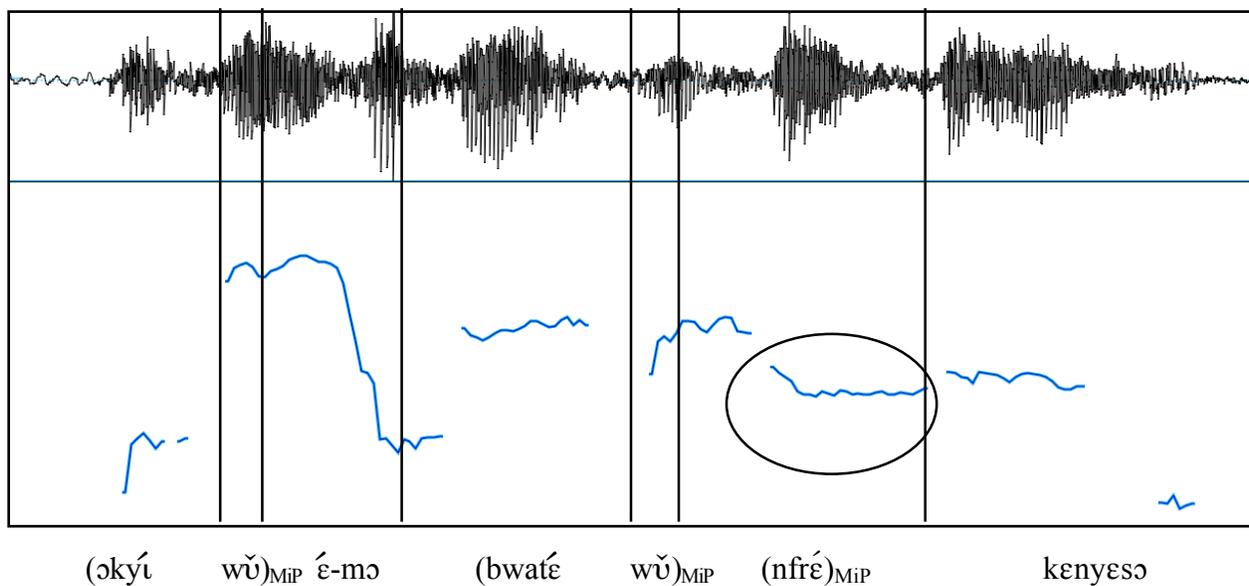
We begin with *nfré* ‘where’, which as shown below, surfaces in citation form with an L-H tonal sequence.

(20) *nfré* ‘where’



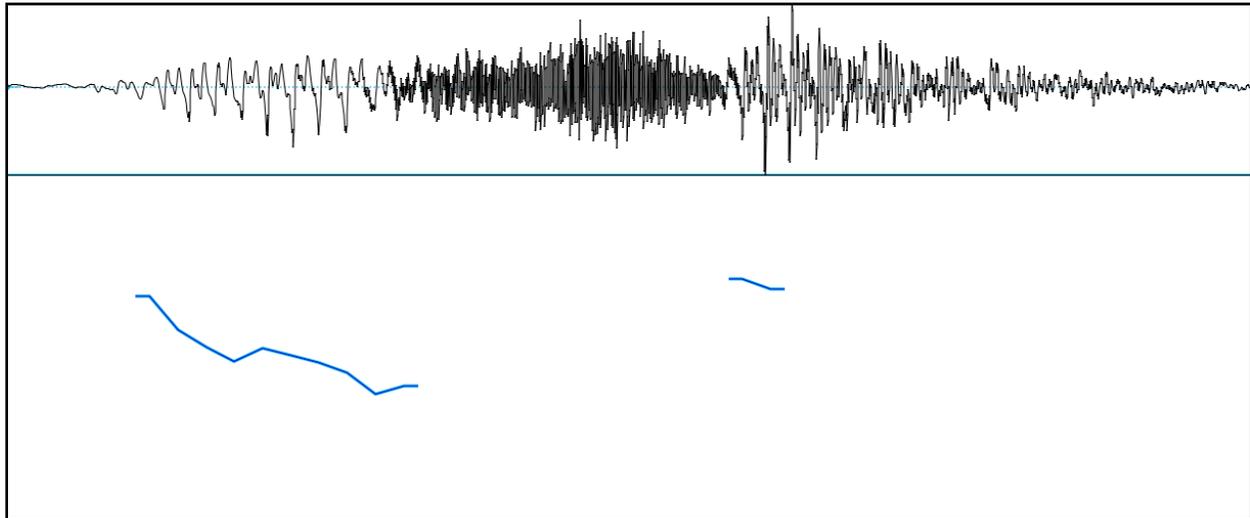
When it surfaces in an in-situ *wh*- question, however, the citation-final High tone is realized with a significantly lowered F0, suggesting the presence of L% at the right edge of the DP and thus a right edge Minor Phrase boundary, as in the non-interrogative DPs examined in the previous section.

- (21) ɔkyí wǔ é-mɔ bwaté wǔ nfré kenyeso?
 woman the PST-kill chicken the where night
 ‘Where did the woman slaughter the chicken at night?’

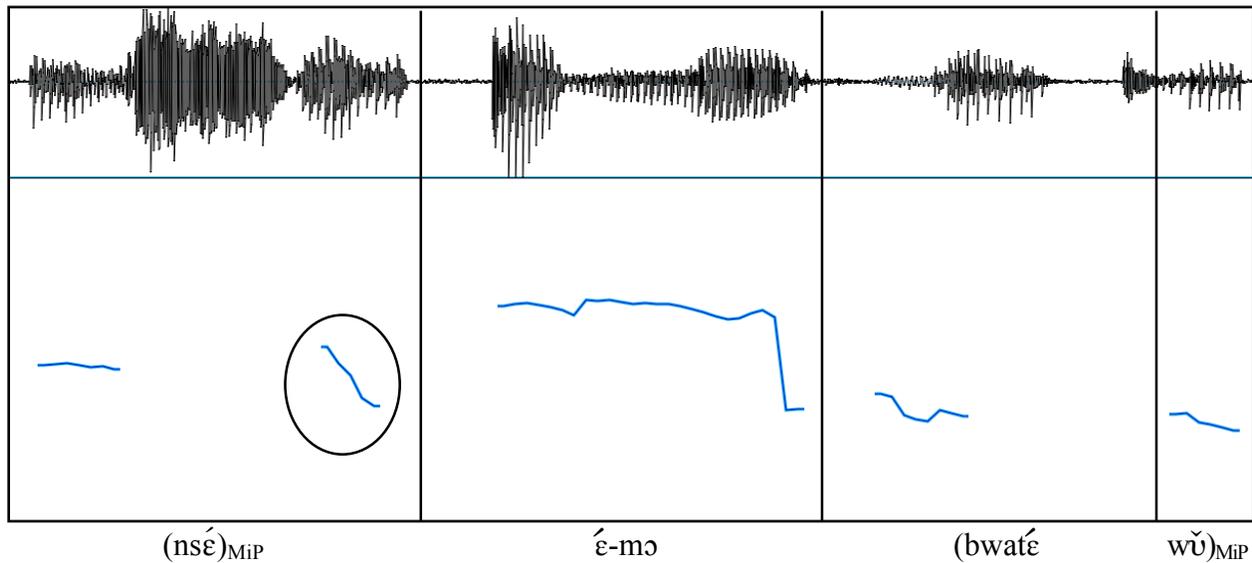


‘Who’ exhibits a comparable effect in the language. Although in citation form, the item *nsé* is realized with a final High tone (22a), it surfaces with a low falling F0 in an in-situ *wh*- question (22b).

(22) a. nsé 'who'

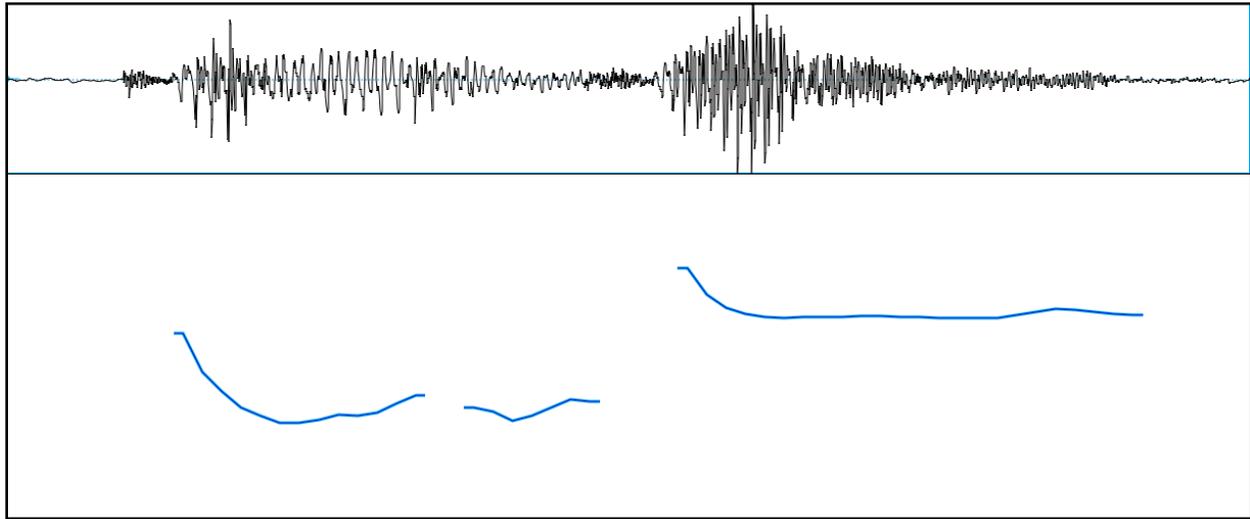


b. Nsé é-mɔ bwaté wǔ?
 who PST-kill chicken the
 'Who slaughtered the chicken?'

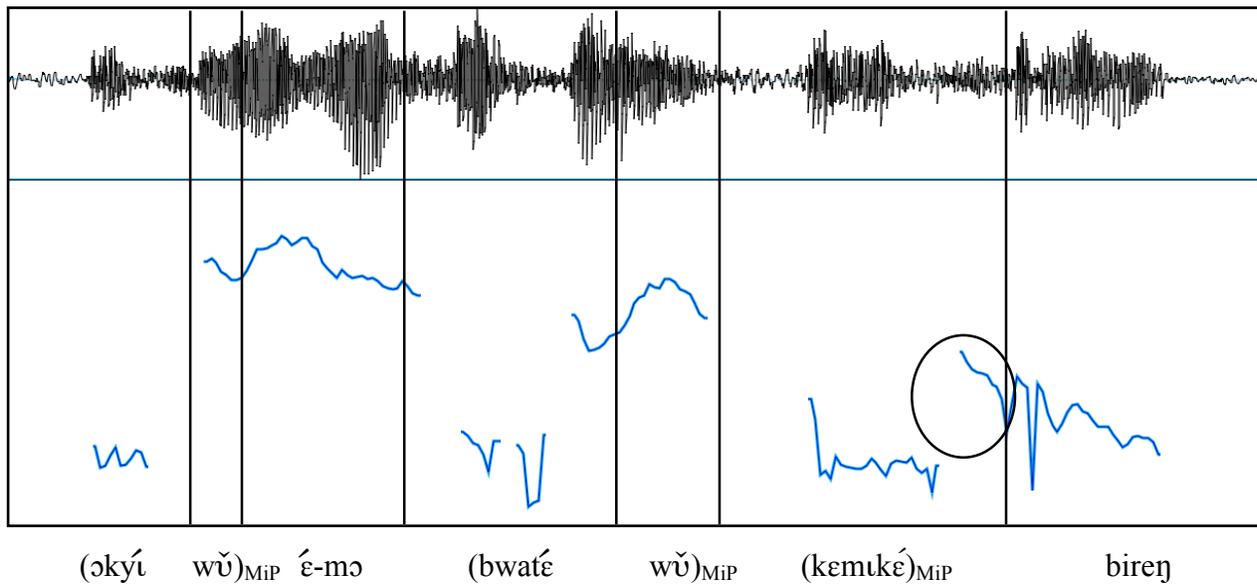


Likewise, the expression *kɛm tɛ* 'when' is realized with a final H tone in citation form (23a) that is considerably depressed and realized as a falling tone in the context of an in-situ *wh*- question (23b).

(23) a. *kemiké* ‘when’



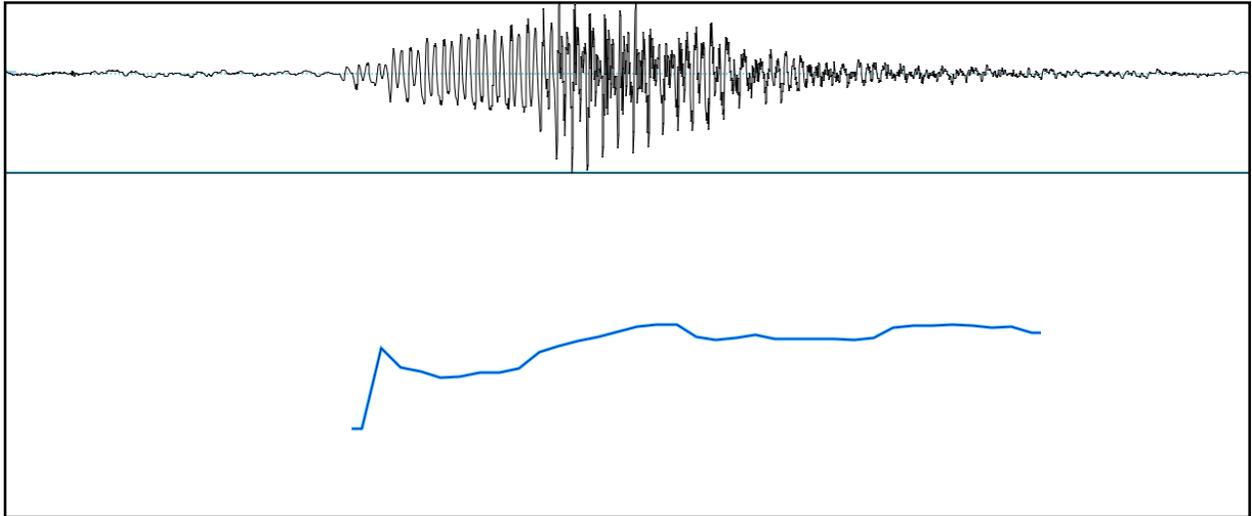
b. *ɔkyí wǔ é-mɔ bwaʔé wǔ kemiké bireŋ?*
 woman the PST-kill chicken the when quickly
 ‘When did the woman slaughter the chicken quickly?’



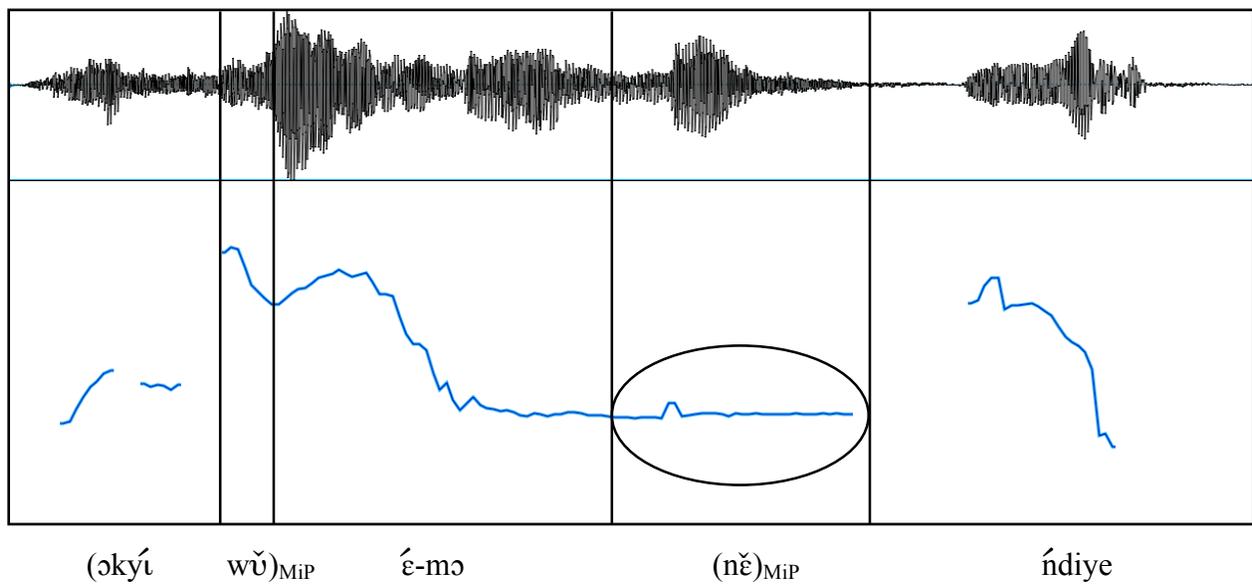
The presence of L% and therefore a Minor Phrase boundary at the right edge of an in-situ interrogative DP can also be detected by way of the item *ně* ‘what’. As (24a) shows, ‘what’

bears a Rising tone in citation form. However, when it appears clause-internally in a *wh*-question, the underlying Rising tone is flattened and what surfaces instead is a low F0 plateau.

(24) a. nə ‘what’

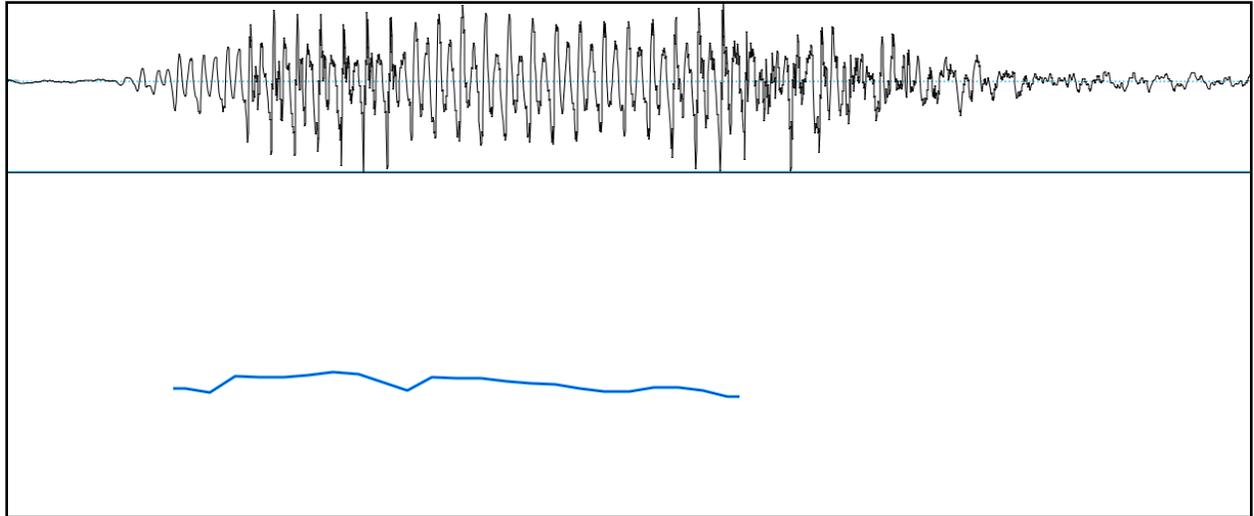


b. əkyí wǔ é-mə nə nídiye?
 woman the PST-kill what yesterday
 ‘What did the woman slaughter yesterday?’

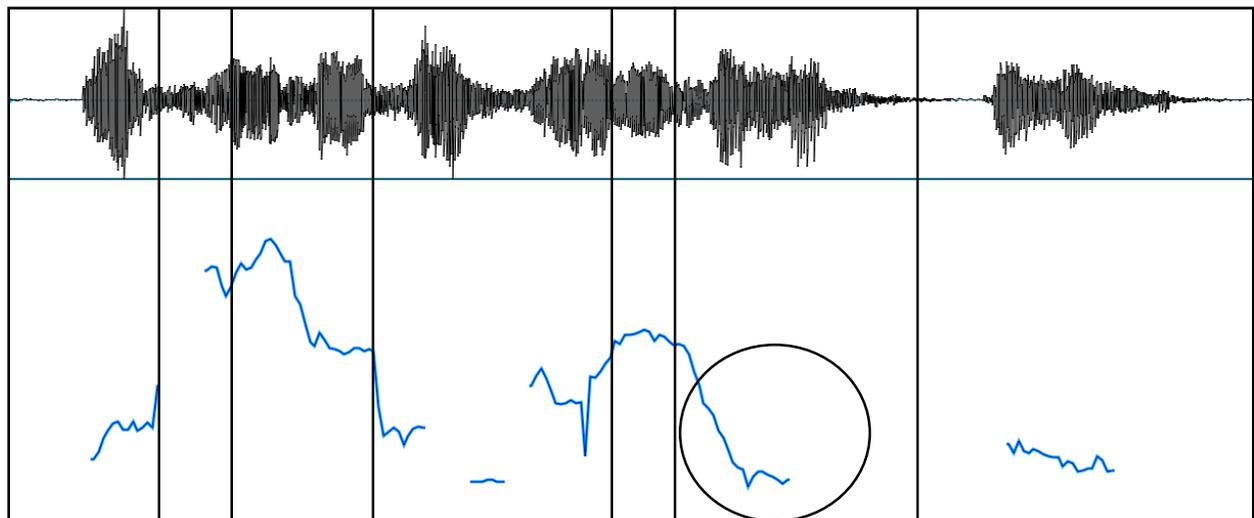


Lastly, consider the tonal behavior of *nɛnɛ* ‘how’, which in citation form surfaces with a flat F0 (25a). In the context of an in-situ *wh*- question, however, *nɛnɛ* is realized with a sharp falling F0 contour characteristic of the effect of a Low Minor Phrase boundary tone in the language (25b).

(25) a. *nɛnɛ* ‘how’



b. *ɔkyí wǔ é-mɔ bwatɛ wǔ nɛnɛ kenyesɔ?*
 woman the PST-kill chicken the how night
 ‘How did the woman slaughter the chicken at night?’



(*ɔkyí wǔ*)_{MiP} *é-mɔ*

(*bwatɛ wǔ*)_{MiP} (*nɛnɛ*)_{MiP}

kenyesɔ

To conclude this section, we remind the reader why these results are relevant to the discussion on Richardsonian entanglement. Richards' model predicts *wh*- in-situ for a language with a left-side C like Krachi if and only if its *wh*- items (DPs) have prosodic boundaries mapped onto their right edges. This is precisely what has been shown for non-‘why’ *wh*- expressions in Krachi.

2.2.1.3. *The Prosody of ‘Why’*

Despite the fact that ‘why’ expressions in Krachi are restricted to peripheral positions (2d-e) and thus do not generally interact with material to their left¹², there is evidence that the left edge of ‘why’ exceptionally demarcates a Minor Phrase boundary in the language.¹³ This evidence comes from sluicing in coordinate structures.

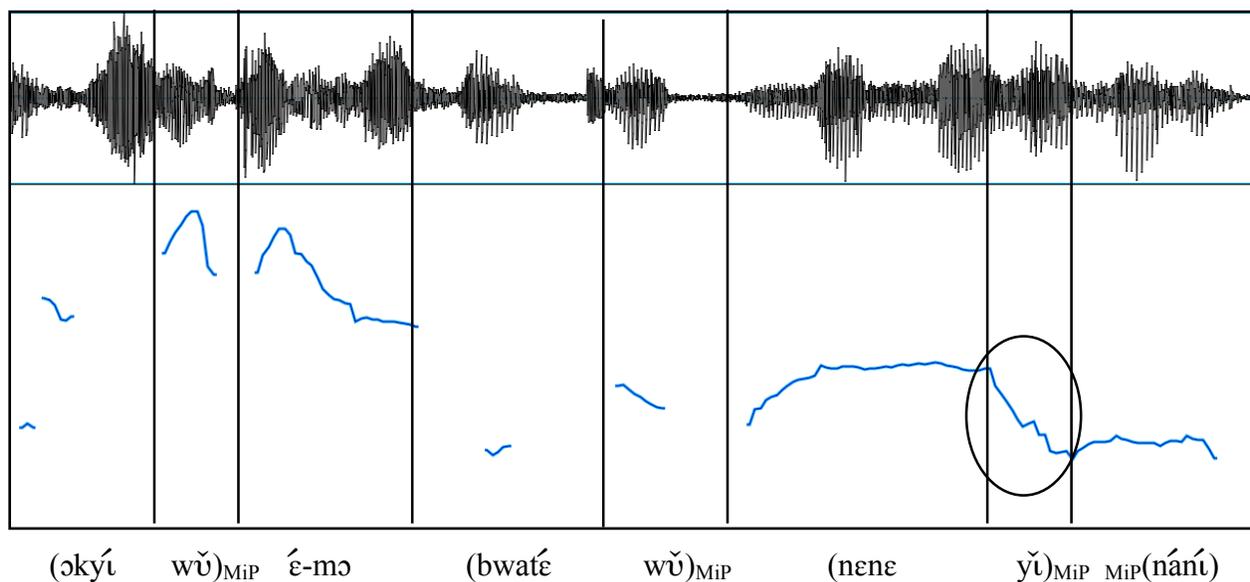
Consider a structure such as the one in (26) below, where a full clause with *wh*- in-situ is conjoined with a sluiced clause via the coordinator *yĩ*. (Recall from (16) that this coordinator bears an underlying Rising tone).

- (26) [CP ɔkyí wũ é-mɔ bwaté wũ nɛnɛ] yĩ [CP náńí]?
 woman the PST-kill chicken the how and why
 ‘How did the woman slaughter the chicken? And why?’

Like many Kwa languages, Krachi employs distinct connectives depending on the size of the coordinated constituents. The Rising tone-bearing connective *yĩ* is used for clausal coordination, while the Low tone-bearing item *yɛ* is used to coordinate sub-sentential constituents like DPs and PPs. As such, the phonological/tonological realization of the coordinator is evidence that examples like (26) involve true sluicing (clausal coordination + ellipsis), as opposed to mere coordination of *wh*- DPs.

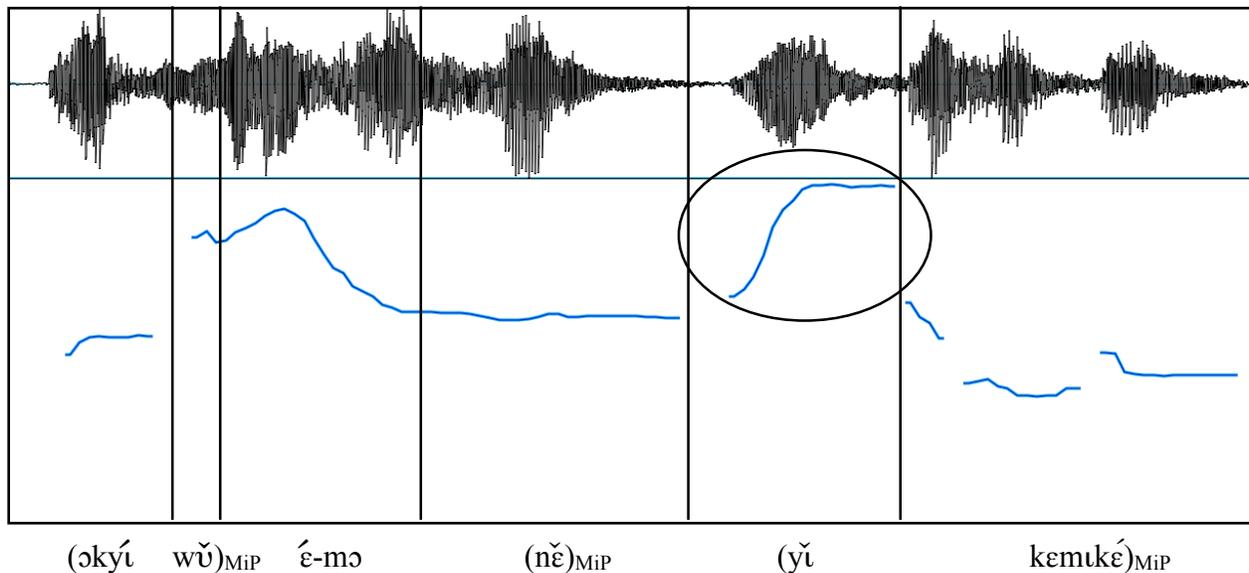
What is the tonal realization of the clausal coordinator in this construction? Recall the considerations deployed in section 2.2.1.1 to argue that the left edges of non-interrogative DPs lack Minor Phrase boundaries in the language. If ‘why’ imposed a Minor Phrase boundary on its left edge in this construction, the coordinator would consequently occupy the right edge of a preceding Minor Phrase and its tonal realization would thus be expected to be influenced by L%. However, if no such prosodic boundary occurs to the left of ‘why’, the coordinator would be expected to phrase prosodically with the sluiced *wh*- item and realize its underlying Rising tonal contour. As illustrated in the pitch track in (27) below, clausal coordinators surface with falling F0 contours when appearing before sluiced ‘why’ (compare the realization of ‘and’ in (17) with its realization in (27)). This suggests that the prosodic structure of ‘why’ is characterized by a Minor Phrase boundary on its left edge and thus that the clausal coordinator occupies a Minor Phrase-final position in constructions like (26).

- (27) [CP ɔkʲí wǔ é-mɔ bwaʔé wǔ nɛɛ] yĩ [CP náńí]?
 woman the PST-kill chicken the how and why
 ‘How did the woman slaughter the chicken? And why?’

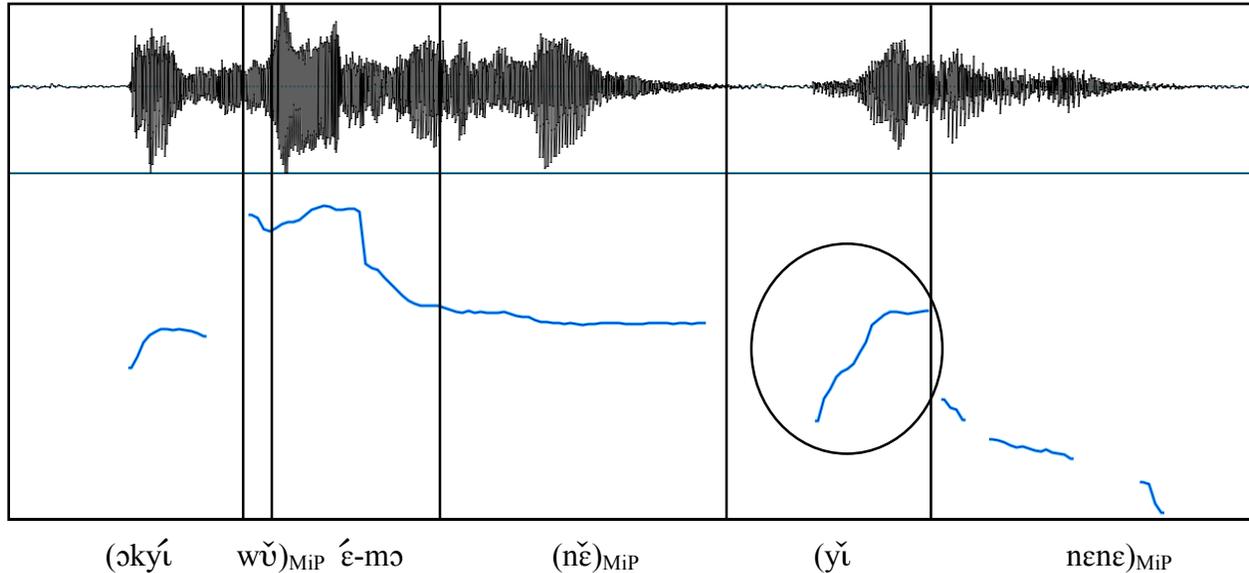


The prosodic edge marking of ‘why’, however, is demonstrably exceptional in the language. This is exemplified by the fact that when preceding other sluiced adjunct *wh*- expressions like ‘when’ (28a) and ‘how’ (28b), expressions that are prosodically bounded on their right edges as previously shown, the clausal coordinator surfaces with its lexically specified Rising contour. This suggests the absence of a prosodic juncture between the clausal coordinator and the sluiced *wh*- item in these cases (i.e. when the sluiced interrogative is a non-‘why’ *wh*- item).

- (28) a. [CP ɔkyí wǔ é-mɔ nə] yĩ [CP kemiké]?
 woman the PST-kill what and when
 ‘What did the woman slaughter? And when?’



- b. [CP ɔkʏ́ wǔ́ é-mɔ́ ně́] yǔ́ [CP nɛnɛ́]?
 woman the PST-kill what and how
 ‘What did the woman slaughter? And how?’



The contrast between the tonal realizations of the coordinators in these three examples suggests that *yǔ́* phrases prosodically with ‘when’ and ‘how’, but not ‘why’. This follows from the fact that the left edge of ‘why’ uniquely establishes a Minor Phrase boundary separating the sluiced *wh*- item from the coordinator.

Together, the results presented in sections 2.2.1.2 and 2.2.1.3 seem to confirm the analytical aspects of the Richardsonian entanglement approach sketched at the beginning of section 2.2. There is a clear and detectable prosodic asymmetry in the edge-marking of Krachi interrogatives: ‘why’ is bounded on its left edge, whereas all other *wh*- DPs are bounded on their right. Because the non-‘why’ interrogatives are right-edge bound, they may occur in-situ and successfully phrase with C at PF in keeping with condition (5). However, because ‘why’ is left-edge bound,

it cannot phrase with C from a clause-internal position and must therefore occupy a peripheral syntactic position in order to properly phrase with it.

2.2.2. *Refinement*

As mentioned at the outset of section 2.2, we have been pursuing an entanglement-based account of Krachi's 'why'-non-'why' in-situ asymmetry that exploits a weakening of the Edge Alignment theory that Richards assumes. The weakened/non-standard aspect of Edge Alignment theory we have drawn upon concerns our appeal to an asymmetry in the prosodic mapping/edge-marking of Krachi interrogative DPs. We have argued that the left edge of 'why' exceptionally demarcates the boundary of Minor Phrase, whereas the Minor Phrase boundaries of all other *wh*- items in the language fall on the item's right edge. Coupled with the various facets of Richards' theory outlined in section 2.1, this edge-marking difference made it possible to derive the fact that only 'why' is precluded from surfacing clause-internally and must surface in the left periphery.

However, in Edge Alignment theory a particular edge of a prosodic category is taken to align across-the-board with a specific edge of a particular syntactic category. Thus, it is non-standard to assume that a particular DP like 'why' can be assigned a prosodic structure distinct from all other DPs and hence be exempt from the general prosodic phrasing algorithm operative in the language. If 'why' has a different prosodic phrasing from the other *wh*- words, as we have demonstrated, this must somehow fall out from its syntax under this theory. More specifically, in virtue of being a DP, 'why' would receive a default mapping with a Minor Phrase boundary at its right edge. Its special left edge boundary must have its source in a syntactic property not shared with the other *wh*- DPs in the language. Below we discuss the respects in which 'why' is syntactically exceptional.

Reinhart (1998) accounts for the interpretation of *wh*- in-situ by invoking choice functions (functions that apply to non-empty sets and yield members of those sets). In order for a choice function to apply, though, its domain must include a set of individuals. In Reinhart's analysis, *wh*- adverbials like 'why' are semantically distinct from other *wh*- operators in that their domains crucially lack sets of individuals over which the choice function can range. Along these same lines, Szabolcsi & Zwarts (1993) argue that *wh*- adverbials like 'why' range over propositions, not individuals. Therefore, since choice functions are what enable *wh*- expressions to be interpreted in-situ and given that they cannot apply to the denotations of propositional *wh*- adverbials, Reinhart (1981, 1998) concludes that *wh*- items like 'why' must be base-generated in the left periphery. Rizzi (2001) and Shlonsky & Soare (2011) reach a similar conclusion. They posit a high left peripheral base merge position for 'why' and thus no movement from within the clausal mid field. Evidence for a high base-generated position for 'why' in Krachi comes from the fact that the item can precede/co-occur with non-interrogative focus fronted constituents, but not follow them. This is illustrated below both for locally (29a) and long-distance focused (29c) constituents.

- (29) a. Nání bwaté wǔ yĩ ɔkyí wǔ é-mɔ?
 why chicken the FOC woman the PST-kill
 'Why did the woman slaughter THE CHICKEN (as opposed to, say, *the goat*)?'
- b. *Bwaté wǔ (nání) yĩ (nání) ɔkyí wǔ é-mɔ?
 chicken the why FOC why woman the PST-kill
- c. Nání bwaté wǔ yĩ Kofi é-gyuru féé ɔkyí wǔ é-mɔ?
 why chicken the FOC Kofi PST-say COMP woman the PST-kill
 'Why did Kofi say that the woman slaughtered THE CHICKEN?' (Wide-scope reading)
 'Why did the woman slaughter THE CHICKEN, according to Kofi?' (Narrow-scope reading)

Strikingly, none of the other *wh*- operators in the language may co-occur with peripheral focused constituents, as shown below. These facts are strikingly similar to comparable patterns in Italian reported by Rizzi (2001).

- (30) a. *Nsé bwaté wǔ yǐ ɔ-mɔ?
 who chicken the FOC 3RD.SG-kill.PST
- b. *Nfré/kemké/nene bwaté wǔ yǐ ɔkyí wǔ é-mɔ?
 where/when/how chicken the FOC woman the PST-kill

Krachi's 'why' is thus syntactically special in that unlike other *wh*- items in the language, it is native to the left periphery and occupies a position higher than the landing site accessed by focus fronted constituents. (We set aside the issue of the precise structural position occupied by 'why' in Krachi, as it is not crucial to the point we are pursuing here.)

Perhaps *nání*'s special left edge Minor Phrase boundary is connected to this syntactic exceptionality. One possibility might be that the relevant prosodic phrasing requirement in Krachi is that *wh*- and Focus (whether overt or not) must form a *wh*- domain at PF, as opposed to *wh*- and C as proposed by Richards. Along these lines, given its pre-Focus base-merge position and default right edge Minor Phrase boundary, 'why' would require an additional (i.e. left) edge boundary in order to exploit the algorithm in (4) to construct an extended Minor Phrase grouping together *wh*- and Focus, as schematized below.

- (31) a. ☞ *nání* ... Focus)
- b. ☞ (*nání*) ... Focus) → (*nání* ... Focus)

The results presented in this section and the speculation above, by no means definitive, illustrate the fact that Richards' entanglement approach is sufficient to not only account for the

existence of main clause *wh*- in-situ in Krachi, but also derive the attested ‘why’-non-‘why’ in-situ asymmetry without resorting to a weakening of Edge Alignment theory. In other words, the syntactic and prosodic properties of main clause *wh*- in-situ in Krachi strongly support the Richardsonian entanglement theory. In the next section, however, we show that the predictions of Richards’ approach break down when embedded domains are taken into consideration.

3. THE BREAKDOWN OF ENTANGLEMENT IN KRACHI EMBEDDED CLAUSES

In developing his theory, Richards does not consider *wh*- domain formation in subordinate clauses. While his approach appears successful when applied to the domain of root clauses, it fares considerably worse when dealing with embedded contexts. In this section, we show that when applied to embedded *wh*- in-situ in Krachi, Richards’ entanglement approach breaks down and makes incorrect predictions.

Our critique of Richards’ proposal will center on his claim that *wh*- in-situ languages can “create a prosodic structure for *wh*- questions in which the *wh*- phrase and the corresponding complementizer are separated by as few prosodic boundaries as possible” (Richards 2010:145). We will show that embedded complement clauses in Krachi induce major prosodic domain breaks separating the root clause from the embedded domain and thus that embedding imposes a number of prosodic boundaries of varying sizes between the interrogative and the complementizer. Despite this state of affairs, *wh*- in-situ is robustly available in these contexts. More damaging to Richards, however, we show that embedded complement clauses in Krachi are prosodically mapped as Intonational Phrases, one of the largest prosodic constituents in the Prosodic Hierarchy. Therefore, unless we give up the notion of hierarchical prosodic structure and admit the possibility of “discontinuous” prosodic constituents, it will not be possible for an

embedded *wh*- item to form an extended Minor Phrase with a main clause complementizer across an intervening Intonational Phrase boundary. Taking his proposal at face value, then, Richards' system wrongly predicts the impossibility of embedded *wh*- in-situ in Krachi, a consequence of the fact that (4) cannot apply in this domain to satisfy (5).

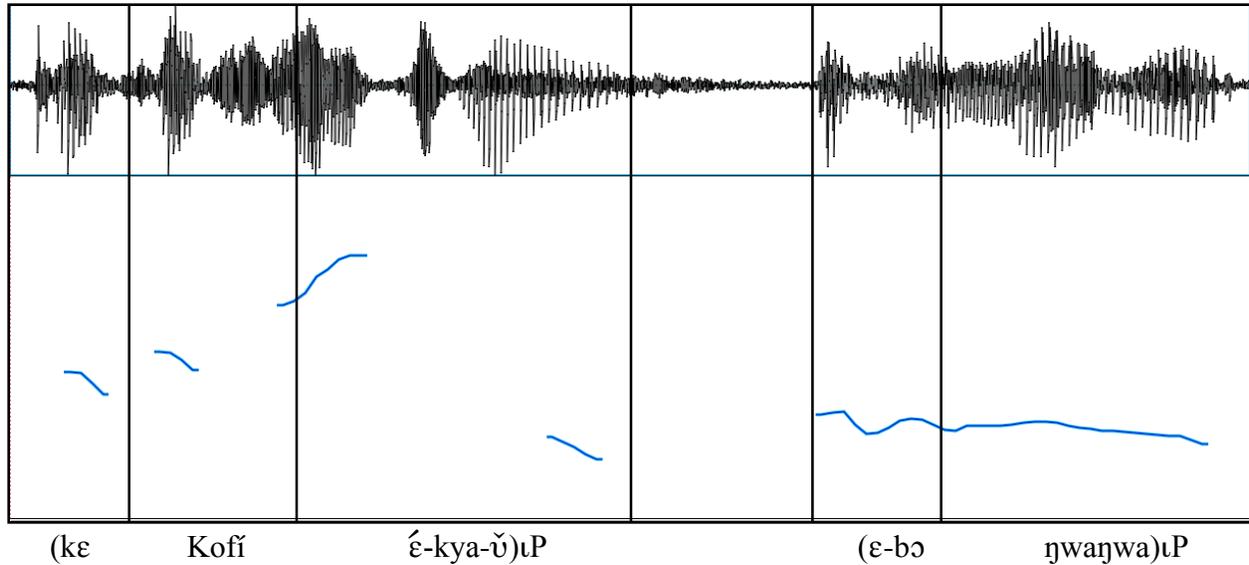
3.1. The Prosodic Status of Krachi Embedded Complement Clauses

In this section, we argue that embedded complement clauses in Krachi are prosodically mapped as Intonational Phrases (ι Ps). This finding is of independent theoretical value given the debate initiated by Downing (1970) that only root clauses are mapped onto ι P. In the context of this section, however, the finding plays a decisive role in illustrating the breakdown of the Richardsonian approach to *wh*- in-situ in the domain of Krachi embedded clauses.

3.1.1. Detecting Intonational Phrase Edges

In section 2.2.1, we established that the right edge of the Minor Phrase constituent in Krachi is marked by way of a Low boundary tone. The right boundaries of Intonational Phrases in the language are also marked by L%. Consider the pitch track below.

- (32) [CP Kε Kofĩ é-kya-ǔ] [T' ε-bɔ ŋwaŋwa].
 COMP Kofĩ PST-dance-CL.DET PRS-COP strange
 'That Kofi danced is strange.'

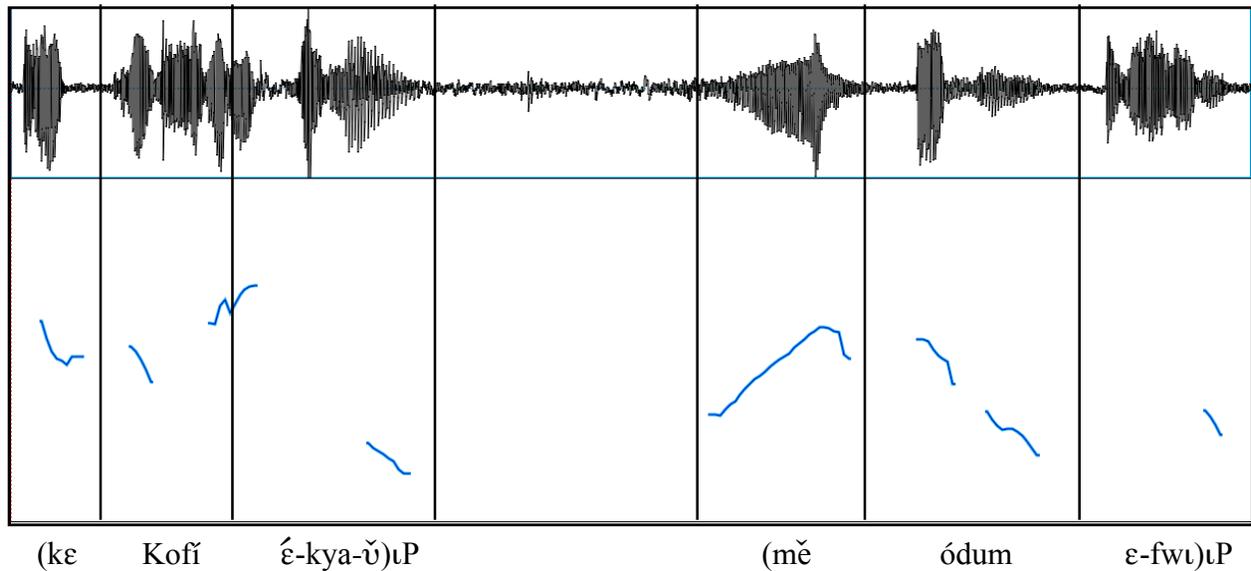


Structurally, (32) contains a sentential subject, cross-linguistically a structure regularly parsed as an obligatory ι P. The macro prosodic structure of the sentence above thus consists of two ι P constituents: the CP subject and the predicate phrase. Observe that the final item in each ι P (*é-kya-ǔ* ‘danced’ and *ŋwaŋwa* ‘strange’) is realized with a low/falling F0 pattern, demarcating the constituent’s right edge.

Other phonetic correlates of right edge ι P-marking in the language can be identified. These include the presence of pauses and (partial) pitch reset in non-fast speech. The presence of a pause immediately following the first ι P in (32) is evident in the lapse in articulation between the items *é-kya-ǔ* and *ε-bɔ*. Partial pitch reset or upstepping can be detected in (32) following the pause, however because most of the items in ι P₂ are lexically Low tone bearing, the effect is subtle and easy to miss. The pitch track in (33) below more clearly exemplifies pitch reset following the right boundary of ι P₁. Notice that the Low tone-bearing final syllables of *ódum*

‘heart’ and $\varepsilon\text{-fw}\iota$ ‘boil’ at the right edge of the utterance are upstepped, that is, realized with higher F0s than that of the final syllable of the L%-bearing item $\acute{\varepsilon}\text{-kya-}\check{\upsilon}$ ‘danced’ at the right edge of ιP_1 .

- (33) $[_{\text{CP}} \text{K}\varepsilon \quad \text{Kof}\acute{\text{i}} \quad \acute{\varepsilon}\text{-kya-}\check{\upsilon}] \quad [\text{m}\check{\varepsilon} \quad \acute{\text{o}}\text{dum} \quad \varepsilon\text{-fw}\iota].$
 COMP Kofi PST-dance-CL.DET 1ST.SG heart PRS-boil
 ‘That Kofi danced angers me (i.e. makes my heart boil).’



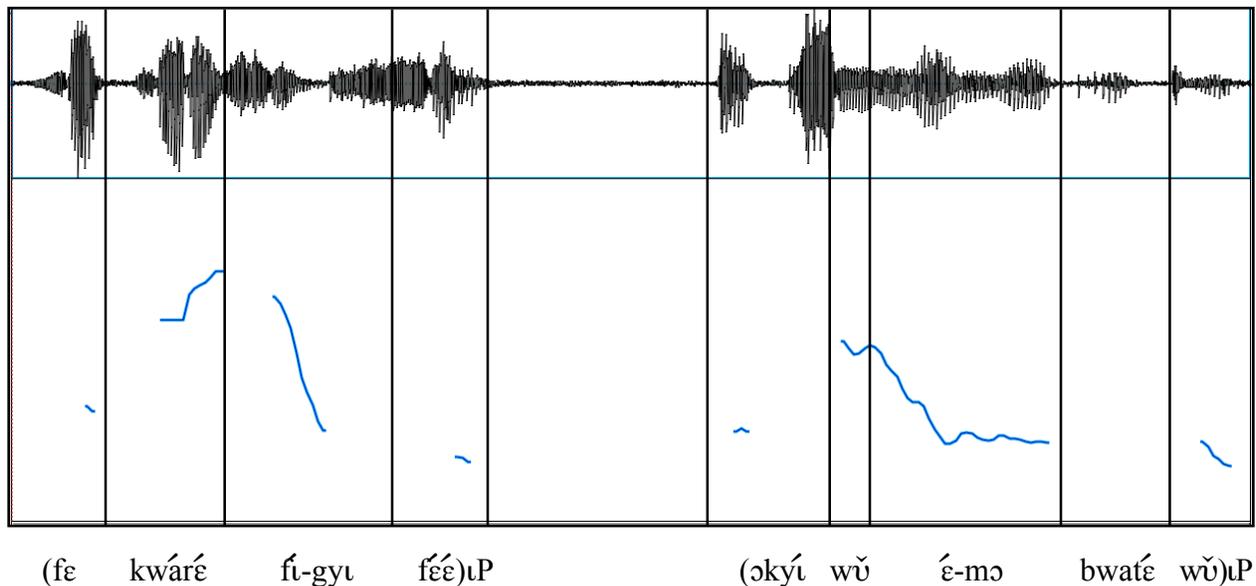
The pitch track in (33) also exemplifies the other phonetic correlates of Krachi ιP -marking previously discussed. The presence of L% can be detected in the low/falling F0 values at the right edges of the two Intonational Phrases and a clear prosodic break divides the sentential subject (ιP_1) from the predicate (ιP_2).

3.1.2. Embedded Complement Clauses as Intonational Phrases

Having established the phonetic correlates of right edge ιP marking in Krachi, we can proceed to evaluate the prosodic status of embedded complement clauses in the language. Prosodic

considerations reveal that these structures are parsed as Intonational Phrases. Evidence for this characterization comes from the following observations. One, the lexically High tone-bearing complementizer *fě* surfaces with a low/falling F0, indicating the presence of a right ι P boundary tone. Two, a significant pause separates the complementizer from the embedded subject in non-fast speech. And three, partial pitch reset/upstepping affects the F0 range of tones in the embedded clause immediately following the complementizer. This prosodic behavior is illustrated in the pitch track below.

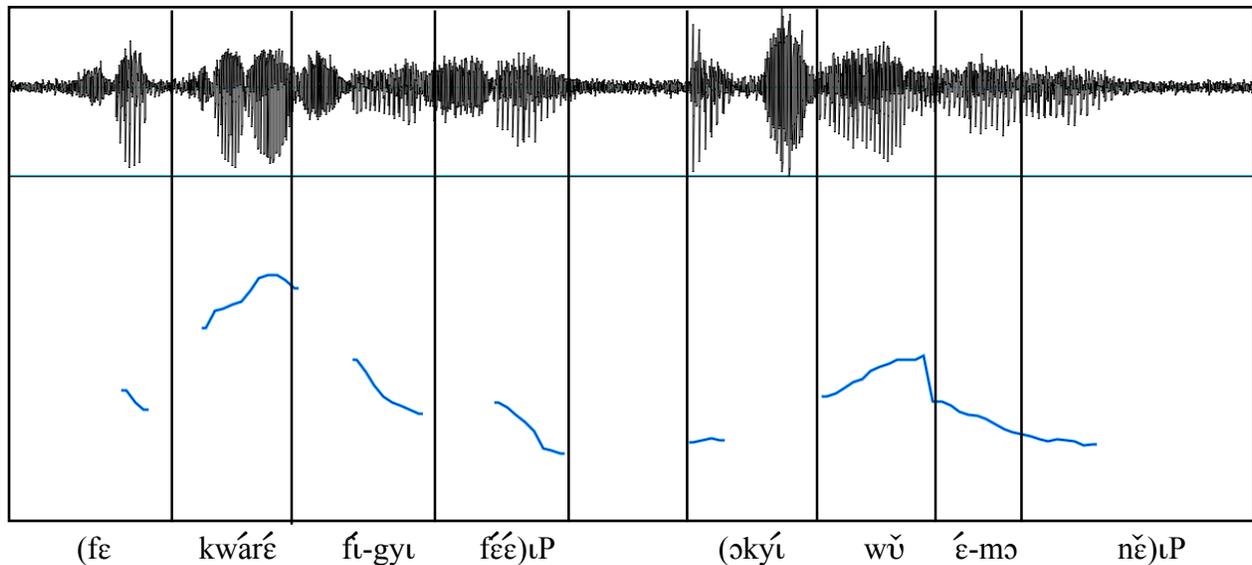
- (34) F ϵ kwáré fí-gyɪ¹⁴ [CP fěé [TP ɔkyí wǔ é-mɔ bwaté wǔ]].
 2ND.SG collect 2ND.SG-eat COMP woman the PST-kill chicken the
 ‘You believe that the woman slaughtered the chicken.’



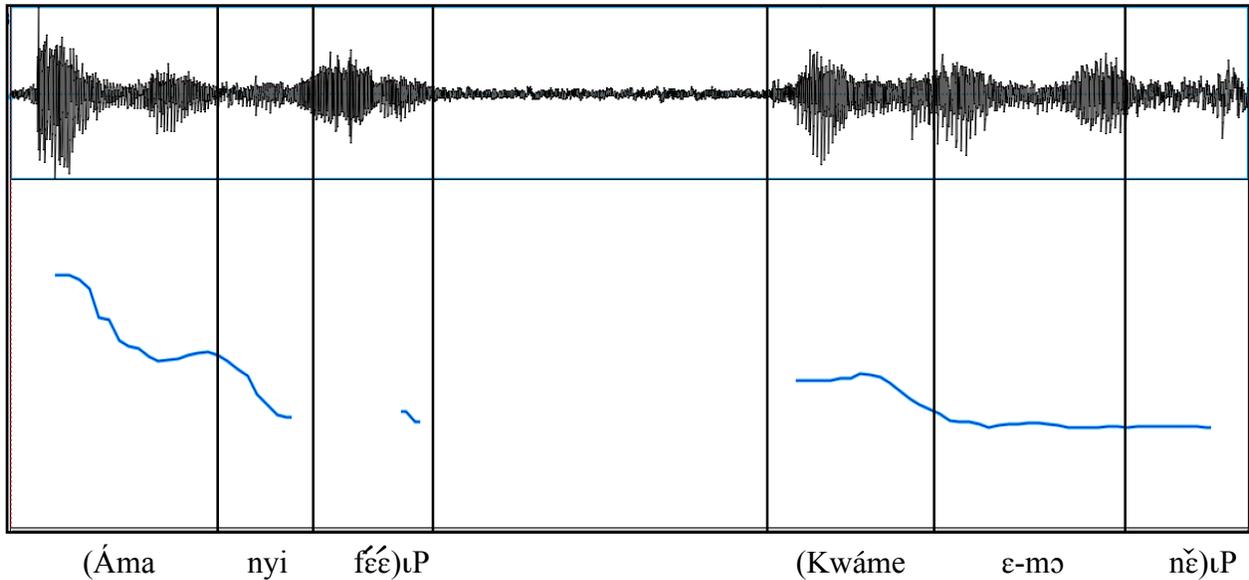
The ι P status of complement clauses in Krachi is unaffected by the presence of in-situ interrogatives. The following data confirm that embedded complement clauses harboring in-situ *wh*- items are also prosodically mapped as Intonational Phrases. Two pitch tracks exemplifying the ι P status of *wh*- internal embedded complement clauses are presented below. The data

showcase clausal embedding under different bridge verbs ('believe' in (35a) and 'know' in (35b)), illustrating that the ι P status of the embedded clause is independent of the embedding predicate. The three acoustic correlates of ι P phrasing discussed above (L%, pause, and partial pitch reset/upstepping) are clearly observable in each pitch track.

- (35) a. Fε kwáré fí-gyɪ [CP fée [TP ɔkyí wǔ é-mɔ nə]]?
 2ND.SG collect 2ND.SG-eat COMP woman the PST-kill what
 'What do you believe that the woman slaughtered?'



- b. Áma nyi [_{CP} fěé [_{TP} Kwáme ε-mə ně]]?
 Ama know COMP Kwame PRS-kill what
 ‘What does Ama know that Kwame slaughters?’



3.2. Consequences for Entanglement Theory

Richards claims that *wh*-in-situ structures involve interrogatives that are separated from C by as few prosodic boundaries as possible (5). But how many prosodic boundaries count as too many? And which boundaries are relevant? Richards does not explicitly state an upper limit on the number of intervening boundaries nor does he specify which boundaries matter in such a calculation. It is clear, however, that the existence of one or two intervening Minor Phrase boundaries is insufficient to block *wh*-domain formation in his system by way of algorithm (4). Consider (21), repeated below as (36), with DP Minor Phrase boundaries indicated.

- (36) [_{DP} əkyí wǔ)_{MIP} é-mə [_{DP} bwaté wǔ)_{MIP} [_{DP} nfré)_{MIP} kényɛsɔ?
 woman the PST-kill chicken the where night
 ‘Where did the woman slaughter the chicken at night?’

If we concern ourselves solely with Minor Phrases formed from DPs and consider no other prosodic mappings in matrix contexts, the right MiP boundary of the in-situ interrogative *nfré* above will be separated from the phonetically null left edge C by two Minor Phrase boundaries (shaded above). In this case, *wh*- domain formation must be able to proceed because *wh*- in-situ is possible. In the case of embedded *wh*- in-situ, however, other categories of prosodic boundaries will intervene between *wh*- and C. In virtue of the fact that embedded clauses are parsed as Intonational Phrases in the language, a structure like (35b) (repeated below as (37)) will impose two intervening MiP boundaries and at least one ι P boundary between the items looking to phrase together under a single *wh*- domain.

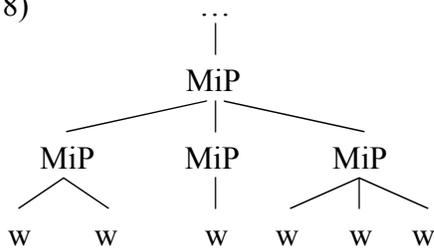
- (37) [CP C [DP Áma)_{MiP} nyi fěé) _{ι P} [TP [DP Kwáme)_{MiP} ε-mɔ [DP ně)_{MiP}) ι P?
 Ama know COMP Kwame PRS-kill what
 ‘What does Ama know that Kwame slaughters?’

Because minimization of intervening prosodic boundaries is not quantified or formalized in his framework, we cannot say whether or not Richards’ system would predict the grammaticality of structures like (37) solely on the basis of his claim that in-situ *wh*- items should be separated from C by as few prosodic boundaries as possible. But there is a sense in which Richards’ system, when applied to data like (37), must make a negative (and therefore, incorrect) prediction. To see this, begin by considering the pitch track for (37) shown in (35b) with an eye to discerning whether any acoustic correlates of *wh*- domain formation can be detected. In this structure, there is simply no phonetic evidence that *wh*- and matrix C are wrapped in a single extended Minor Phrase – the two items occupy domains characterized by distinct F0 ranges and are furthermore separated from one another by a major prosodic break. On the contrary, the two items inhabit separate Intonational Phrases. The only prosodic domain containing both

embedded *wh*- and matrix C is the Utterance. But this is not the constituent that *wh*- domain formation is defined on in Richards' system.

For Richards, *wh*- licensing at PF requires the formation of a Minor Phrase constituent housing both *wh*- and C. "Languages will be able to leave *wh* in situ just in case they have Minor Phrase boundaries placed in such a way as to be able to use the procedure in [4] to create larger Minor Phrases containing both the *wh*-phrase and the complementizer (Richards 2010:151)." If, following Richards, we assume that prosodic constituents are hierarchically structured, potentially recursive, and able to embed units of equal or lower levels (i.e. Minor Phrases may contain other Minor Phrases or structures lower on the Prosodic Hierarchy, but not higher constituents, as in (38) below taken from Richards 2010:150)), then Richardsonian *wh*-domain formation can apply if and only if no higher prosodic categories intervene between *wh*- and C.

(38)



Given the version of the Prosodic Hierarchy assumed by Richards (as discussed in section 2.1), this means that intervening Major Phrase, Intonational Phrase and Utterance boundaries will block *wh*- domain formation because building an extended Minor Phrase in such a case would involve constructing a constituent not exclusively built from Minor Phrase (or smaller) subconstituents. In the case of Krachi embedded complement clauses, the presence of an intervening Intonational Phrase boundary guarantees that any extended Minor Phrase containing

embedded *wh*- and matrix C will be discontinuous – the relevant subconstituents of the *wh*-domain will not be immediately dominated by the same Minor Phrase. Effectively, this means that in a system like Richards', *wh*- domain formation (and hence, *wh*- in-situ) should be more prevalent in matrix contexts than in embedded contexts because in embedded domains intervening higher level prosodic boundaries are more likely to emerge. In the case of Krachi embedded complement clauses, then, because (4) will not yield prosodically well-formed *wh*-domains, Richards' system must wrongly predict that *wh*- in-situ will be unavailable in these contexts. In Krachi, however, there seems to be no constraint on how deeply embedded an in-situ interrogative can be, as shown below.

- (39) a. Kofi ε-gyɛnt fée Áma ε-nyi ně?
 Kofi PRS-think COMP Ama PRS-know what
 'What does Kofi think that Ama knows?'
- b. Kofi ε-gyɛnt fée Áma ε-nyi fée Kwáme é-mɔ ně?
 Kofi PRS-think COMP Ama PRS-know COMP Kwame PST-kill what
 'What does Kofi think that Ama knows that Kwame slaughtered?'
- c. Kofi ε-gyɛnt fée Áma ε-nyi fée Kwáme ε-kwáré ɔ-gyt fée
 Kofi PRS-think COMP Ama PRS-know COMP Kwame PRS-collect 3RD.SG COMP
 Gifty é-mɔ ně?
 Gifty PST-kill what
 'What does Kofi think that Ama knows that Kwame believes that Gifty slaughtered?'

This suggests that neither minimization of intervening prosodic boundaries nor extended Minor Phrase formation are necessary or sufficient conditions governing *wh*- in-situ distribution, as in Richards' framework. To account for the distribution of *wh*- in-situ in Krachi, therefore, it isn't necessary to assume that prosodic information drives/is entangled with the narrow syntactic

derivation. To do so would lead to incorrect predictions in the case of embedded domains, as we've seen.¹⁵

4. CONCLUSION

In virtue of its potential empirical reach and wide ranging theoretical implications, Richards' (2010) analysis of *wh*- licensing and phono-syntactic entanglement invites us to extend the system's coverage by applying it to languages it was not designed to handle in the name of confirming and testing the limits of the theory. This is what we have done in this article. We have found that while initially successful in one domain, the system falters in another. Richards' model predicts *wh*- in-situ for a language with a left-side C like Krachi if and only if its *wh*- items have prosodic boundaries mapped onto their right edges and no major prosodic boundaries intervene between *wh*- and C, allowing for the formation of a special prosodic constituent called a "*wh*- domain" wrapping the two items. In the case of matrix clauses, this condition is met when applied to all interrogative DPs except 'why', leading predictably to the existence of *wh*- in-situ for those expressions in that domain. This result is rather unsurprising given that Richards focuses entirely on root clause *wh*- phenomena in developing his theory. When applied to the domain of embedded clauses, however, the existence of intermediate intervening prosodic categories in Krachi leads to the incorrect prediction that *wh*- in-situ should be unavailable in non-root contexts. Although we find no phonetic evidence for the existence of a *wh*- domain grouping together embedded *wh*- and matrix C in these constructions, embedded *wh*- in-situ is nonetheless available in the language (and robustly so). More generally, a system like Richards' predicts that *wh*- domain formation (and hence, *wh*- in-situ) should be more prevalent in root contexts than in embedded ones because intervening prosodic boundaries are more likely to

emerge when clausal embedding occurs. In the case of Krachi, this prediction fails to pan out as well. We see this as a function of the fact that Richards' system is based entirely on root *wh*-phenomena, providing a cautionary lesson that both main clause and embedded contexts need to be equally taken into consideration when developing accounts of *wh*-phenomena.

For Richards, prosodic considerations like the ones outlined above influence the outcome of the narrow syntactic derivation. Thus, Richards' approach employs an unconventional architecture in which phonology and syntax are derivationally entangled. We have found no evidence for this relationship within the domain of Krachi interrogative syntax. That is to say, we have argued that it isn't necessary to assume that prosodic information is present within the narrow syntactic cycle in order to account for the distribution of *wh*-in-situ in Krachi. We conclude, therefore, that syntactic-prosodic entanglement does not universally underpin all aspects of *wh*-syntax, as proposed by Richards.

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NOTES

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¹ Richards is not the first challenge this architectural assumption. Other proposals that some sub-domains of phonology influence syntax include Bresnan 1971, Hetzron 1972, Zec & Inkelas 1990, and Golston 1995.

² The data presented in this article are based exclusively on fieldwork in Ghana conducted between the years 2010 and 2014. The examples are presented in the official Krachi orthography developed by the Ghana Institute for Linguistics, Literacy, and Bible Translation (Dundaa 2007). Although the orthography does not mark Krachi's two level tones (High and Low [Snider 1990, Adonae 2005]) or its Rising contour tone, we have included tone marking diacritics in our representations. Acute accents (e.g. ´) denote High tones and grave + acute accent sequences (e.g. ˘) denote Rising tones. Low tones are unmarked.

The following abbreviations are used in the glosses of example sentences in this article: CL.DET – clausal determiner; COMP – complementizer; COP – copula; DEM – demonstrative; DIST – distal; FOC – focus; ι P – Intonational Phrase; MiP – Minor Phrase; PL – plural; PROX – proximal; PRS – present; PST – past; SG – singular.

³ For the purposes of this paper, we set aside a number of interesting topics in Krachi *wh*-syntax such as islandhood and the internal structure of *wh*- items because these topics do not relate directly to our analytical focus. For more on these topics, see Torrence & Kandybowicz, forthcoming.

⁴ It is worth noting that not even purpose readings for ‘why’ are available in cases like (2d), as they are in languages like French (though, on the basis of distributional and interpretational evidence, it isn’t clear that Krachi makes a distinction between causal/epistemic ‘why’ and purpose ‘why’).

⁵ Although unable to occur clause-internally, the *wh*- item *nání* may scope over embedded clauses to express indirect questions, but only from an embedded left peripheral position lower than C (Torrence & Kandybowicz, forthcoming) - see note 12, example (i). As such, despite its inability to occur clause-internally, Krachi ‘why’ does not resist embedding. In this way, *nání* is not comparable to *how come* in English.

⁶ In this model, in the formal objects of syntax and prosody are assumed to be identical (e.g. Wagner 2005; Selkirk 2006, 2009; Adger 2007; Ishihara 2007; Kratzer & Selkirk 2007, among others).

⁷ Though see Cheng & Downing 2011 for empirical problems associated with the treatment of Chichewa in Richards’ framework.

⁸ The prosodic data presented throughout this article were elicited naturalistically with native speakers of the Krachi community in Kete Krachi, Ghana and acoustically analyzed months later in the United States.

⁹ Indefinite determiners in Krachi are phonetically null.

¹⁰ Despite appearing MiP/utterance-finally, the tonal realization of *brɔ́díé* in this sentence does not appear to be affected by L%. We suspect this may be related to the fact that *brɔ́díé* is a borrowed word, most likely from Akan. The same is true of the tonal realization of *bireŋ* in (11b). We speculate that utterance-final position may play a role, but leave a more thorough investigation for future research.

¹¹ A reviewer points out that the validity of the three arguments presented above against the existence of Minor Phrase boundaries at the left edges of DPs in Krachi depends upon the prosodic status of prepositions, clausal coordinators, and demonstratives. If these items are clitics, then regardless of their syntactic structure they will depend upon the following words as their hosts and thus prosodically phrase together with them. In this case, the absence of F0 lowering effects associated with these items would be entirely expected/accounted for.

Evidence that these items are not clitics comes from vowel harmony. In Krachi, the prosodic word is the domain for vowel harmony and with very few exceptions, all word-internal vowels share the same ATR specification (Adonae 2005, Dundaa 2007). If prepositions, clausal coordinators, and demonstratives were clitics and thus formed word-level groupings with the items immediately following them, we would expect to find variation in the surface forms of the items based on the ATR specifications of the following words (e.g. *yě ‘with’; *yĩ ‘and’; *keniŋ

‘DEM’). We do not, however, find variation of this sort in the phonological realization of the three items. Furthermore, if the items were procliticized we would incorrectly predict the ATR disharmonic outputs below to be ill-formed, where the functional element bears [-ATR] vowels and the linearly adjacent lexical element bears [+ATR] vowels. In fact, forms such as these are fully grammatical and widely attested in the language.

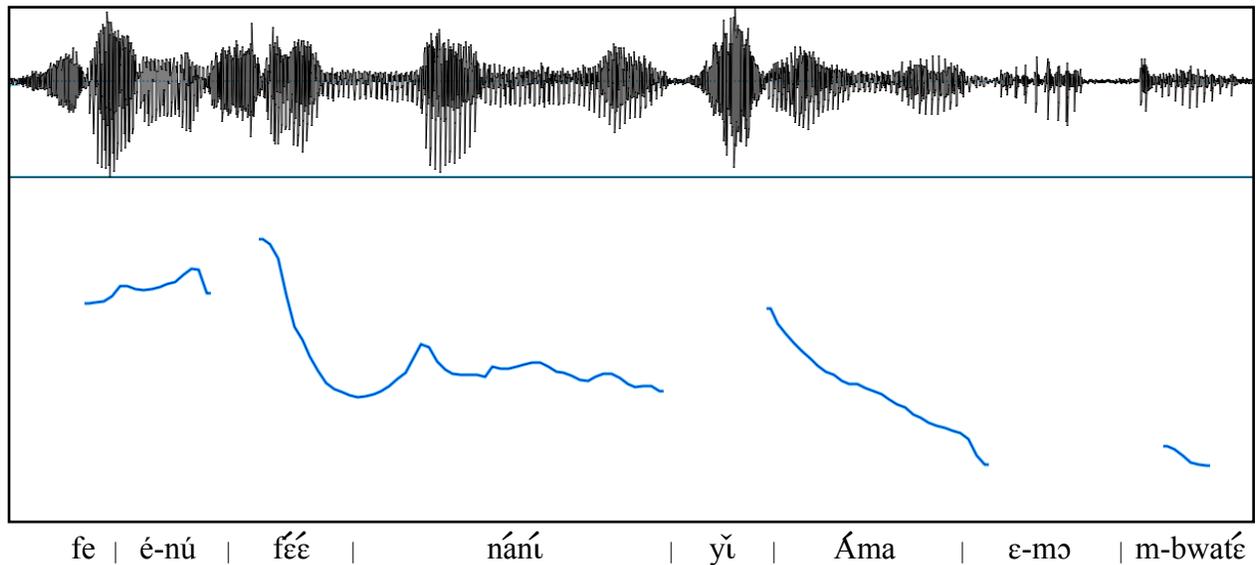
- (i) a. **yě í-gyǒ**
 with PL-yam
 ‘With the yams’
- b. **ɔkyí wǔ é-duke kugyǒ wǔ yǔ Kofi é-gyi brɔdíé.**
 woman the PST-cook yam the and Kofi PST-eat plantain
 ‘The woman cooked the yam and Kofi ate a plantain.’
- c. **keníŋ í-gyǒ wǔ**
 DEM PL-yam the.DIST
 ‘those yams’

¹² Partial *wh*- movement is available in Krachi and does not exclude ‘why’ (Torrence & Kandybowicz, forthcoming, Kandybowicz, forthcoming). As such, *nání* may appear in embedded peripheral positions and thus surface to the right of/interact with complementizers, contrary to the above description concerning the item’s general lack of interaction with material to its left.

- (i) **Fe é-nú fée nání yǔ Áma ε-mɔ m-bwaté?**
 2ND.SG PST-hear COMP why FOC Ama PRS-kill PL-chicken
 ‘Why does Ama slaughter chickens, according to what you heard?’

In these cases, the complementizer is realized with the familiar depressed/falling F0 pattern (see (ii) below), as would be expected if ‘why’ were bounded on its left by a prosodic edge, rendering the complementizer phrase-final in the preceding Minor Phrase domain and thus subject to lowering by a right edge L boundary tone.

(ii)



However, because C is a phase head, its complement (which includes ‘why’) is spelled-out separately. Thus, ‘why’ and C occupy separate prosodic domains in embedding constructions. The F0 lowering on C in this case is thus more accurately attributed to C’s position at the right edge of the preceding major prosodic domain (itself owing to the fact that C is a phase head) than to the fact that *nání*’s left edge is prosodically marked. As such, partial *wh*- movement constructions cannot be used to decisively establish an empirical argument for the exceptional left-edge marking of *nání*.

¹³ A reviewer asks whether Krachi’s expression for ‘why’ is a DP or an adverbial, pointing out the possibility that its exceptional prosody may derive from the fact that it belongs to a different

category than the other *wh*- items. Unfortunately, we know of no concrete morphosyntactic evidence to justify categorizing the expression as a DP and thus leave determining its categorial status for future research.

¹⁴ The item *kwáré...gyi* ‘think’ is an idiosyncratic split verb in Krachi composed of the predicates *kwáré* and *gyi*, which in isolation bear the independent meanings ‘to collect’ and ‘to eat’ respectively. In the non-compositional split verb construction, however, neither predicate contributes its independent lexical meaning.

¹⁵ In addition to these considerations, there is an additional technical concern raised by embedded *wh*- in-situ in Richards’ system that is independent of Krachi. Given the mechanics of phase-based derivation (Chomsky 2001) as assumed by Richards, an indeterminacy would arise in the case of the construction of a lower C phase when an in-situ interrogative has been merged. In an entanglement framework, on the basis of syntactic and prosodic information available at any given stage of the derivation, the system must determine for any *wh*- item whether or not it is necessary to move *wh*- in order to satisfy the phrasing requirement in (5). However, when *wh*- is merged in a lower C phase, the system does not have enough information to decide whether or not *wh*- can phrase with its scopally associated C because that item (matrix C) has not yet entered the derivation. This has the undesirable consequence that without the requisite phonosyntactic information/motivation to move, an embedded *wh*- item should remain positioned in the lower C phase at Spell-Out (i.e. unmoved). This means that at the point of Transfer, the required prosodic grouping of *wh*- and C will fail to obtain and the system should deem *wh*- in-situ prosodically ill-formed. Once again, the framework would make the incorrect prediction that embedded *wh*- in-situ is unavailable and long-distance *wh*- movement forced.