On Prosodic Variation and the Distribution of *Wh*- In-situ*

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ABSTRACT

Wh- in-situ is a pervasive feature of Tano interrogative syntax, yet the Tano languages differ from one another in subtle ways with respect to the distribution of in-situ interrogatives. Languages like Krachi and Bono allow *wh*- in-situ in both main and embedded complement clauses, whereas closely related languages like Wasa and Asante Twi only allow *wh*- in-situ in main clauses. In this article, I argue that the generalization underpinning this variation in Tano concerns a prohibition on *wh*- items phrasing with C^0 at the level of Intonational Phrase (ιP). I show that the ability of a *wh*- item to appear in-situ correlates with the prosodic status of its immediately containing clause. Embedded complement clauses are parsed as independent ιP units in Krachi and Bono, but not in Wasa and Asante Twi. Thus, ιP boundaries divide C^0 from embedded interrogatives in Krachi and Bono, preventing the items from forming a prosodic constituent at the level of ιP. Conversely, no such boundaries intervene between embedded C^0 and *wh*- in Wasa and Asante Twi, yielding prosodic mappings in which the items phrase together. Consequently, embedded *wh*- in-situ is prosodically licit in Krachi and Bono, but not in Wasa and Asante Twi. In this way, the Tano pattern of *wh*- in-situ variation described above reduces to a difference in how syntactic structures are externalized via prosodic mapping.

KEYWORDS

Prosodic Mapping • Prosodic Variation • *Wh*- In-situ • Partial *Wh*- Movement

Intonational Phrase • Embedded Clause • Krachi • Bono • Wasa • Asante Twi

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1. INTRODUCTION

Wh- in-situ is a pervasive feature of Tano interrogative syntax (Torrence and Kandybowicz 2012, 2013, 2015, Kandybowicz and Torrence 2013), yet the Tano languages differ from one another in subtle ways with respect to the distribution of in-situ interrogative expressions. For instance, Krachi, a North Guang Tano language (Williamson and Blench 2000), allows all *wh*-expressions apart from 'why' to appear in-situ in both main and embedded complement clauses. Bono, a Central Tano language of the Akan group (Williamson and Blench op. cit.), tolerates *wh*- in-situ in both main and embedded complement clauses, but draws the line at subject interrogatives and 'why' expressions in both domains. In Wasa and Asante Twi, two Tano languages closely related to Bono, the distribution of *wh*- in-situ in main clauses is identical to Bono's profile. However, whereas Bono allows both non-subject and non-'why' in-situ interrogatives in embedded complement clauses, Wasa and Asante Twi systematically disallow all instances of *wh*- in-situ in embedded domains.

What accounts for this variation? In this article, I argue that the distribution of *wh*- in-situ is as much a matter of prosody as it is a matter of syntax/semantics, following recent work by Richards (2010). While considerations at the syntax-semantics interface surely play a prominent role in determining the distribution of certain in-situ interrogatives both in Tano and cross-linguistically, I restrict my attention to a case where syntactic and semantic factors appear immaterial in the licensing of *wh*- in-situ. Unlike Richards (2010), who claims that at PF *wh*-items and complementizers must phrase together at the level of Minor Phrase, my claim is that *wh*- items are prohibited from phrasing with C^0 at the level of Intonational Phrase. Under this analysis, the ability of a *wh*- item to appear in an in-situ position correlates with the prosodic status of its immediately containing clause. I show that unlike in Wasa and Asante Twi, embedded complement clauses are parsed as separate Intonational Phrases in Krachi and Bono. As such, Intonational Phrase boundaries divide C^0 from embedded interrogatives in Krachi and Bono, preventing the two from forming a prosodic constituent at the level of Intonational Phrase. Conversely, no such boundaries intervene between embedded C^0 and *wh*- in Wasa and Asante Twi, yielding prosodic mappings in which the items phrase together under an Intonational Phrase when the root clause is spelled-out. Consequently, embedded *wh*- in-situ is prosodically licit in Krachi and Bono, but not in Wasa and Asante Twi. In this way, the Tano pattern of *wh*- in-situ variation described above reduces to a difference in how narrow syntactic structures are externalized at PF by way of prosodic mapping.

This article is organized as follows. Section two concretizes the variation in Tano *wh*- in-situ patterns described above by establishing the basic syntactic facts. Section three motivates a

prosodic approach to deriving the variable distribution of *wh-* in-situ in Tano by calling into question the adequacy of a purely syntactic/semantic analysis. In section four, I present the analysis, grounding my claims in the observable prosodic differences dividing one class of Tano languages from the other with respect to the status of embedded clauses. The article concludes in section five with a summary and brief closing remarks.

2. THE DISTRIBUTIONAL VARIATION OF *WH-* IN-SITU IN TANO

This article examines the distribution and prosodic conditions regulating in-situ interrogative expressions in two non-island domains: root and embedded complement clauses. Future work will expand on these results by extending coverage to other embedded domains, such as non-complement clauses (of which there are several varieties in each language). For now, I limit myself to just these two domains for reasons of space and analytical manageability.

2.1. The Distribution of Wh- In-situ in Krachi

With the exception of *nanɪ* 'why' (1d), which must be focused and appear clause-peripherally (1e) (Kandybowicz and Torrence 2011), all main clause *wh-* expressions in Krachi may surface clause-internally. As the data[1] below illustrate, in-situ interrogatives in the language may appear on the left edge of the clause, at the right edge of the clause, or in a non-edge position.

(1) a. Nsɛ ɛ-mɔ bwatɛ wʊ (ndiye)?
who PST-kill chicken the yesterday
'Who slaughtered the chicken (yesterday)?'

b. ɔkyɪ wʊ ɛ-mɔ nɛ (ndiye)?
woman the PST-kill what yesterday
'What did the woman slaughter (yesterday)?'

[1] The data presented in this article are based exclusively on fieldwork conducted in Ghana between the years 2010 and 2014. Krachi examples are presented in the official orthography developed by the Ghana Institute for Linguistics, Literacy, and Bible Translation (Dundaa 2007). As the orthography does not mark Krachi's two level tones (High and Low [Snider 1990, Adonae 2005]) or its Rising contour tone, I have omitted tone marking diacritics from all representations apart from those accompanying pitch tracks, where the representation of tone is relevant. To represent Bono and Wasa data, I have used a modified version of the Akan script, as I have been unable to locate written materials in either language. The Asante Twi data in this article have been written in conformity with the unified Akan orthography. As with Krachi, Bono, and Wasa, the Asante Twi data are non-IPA representations and tone marking diacritics appear only on data accompanying pitch tracks. The following diacritics are used to mark tone in all four languages: acute accents denote High tones; grave + acute accent sequences (e.g. ˇ) denote Rising tones; and acute + grave accent sequences (e.g. ˆ) denote Falling tones. Low tones are unmarked.

The following abbreviations are used in the glosses that appear in this article: CL.DET – clausal determiner; COMP – complementizer; COP – copula; FOC – focus; FUT – future; PL – plural; PRS – present; PST – past; Q – question marker; SG – singular.

c. ɔkyι wυ ε-mɔ bwatɛ wυ nfrɛ/kɛmιkɛ/nɛnɛ (ndiye)?
woman the PST-kill chicken the where/when/how yesterday
'Where/when/how did the woman slaughter the chicken (yesterday)?'

d. *ɔkyι wυ ε-mɔ bwatɛ wυ nanι (ndiye)?
woman the PST-kill chicken the why yesterday

e. Nanι yι ɔkyι wυ ε-mɔ bwatɛ wυ (ndiye)?
why FOC woman the PST-kill chicken the yesterday
'Why (for what reason) did the woman slaughter the chicken (yesterday)?'

The same *wh*- expressions that are permitted clause-internally in matrix contexts are permissible in comparable positions in embedded complement clauses. This is shown in (2). Once again, in-situ *nanι* 'why' is restricted.

(2) a. Kofi ε-gyιrι fɛɛ nsɛ ε-mɔ bwatɛ wυ (ndiye)?
Kofi PST-say COMP who PST-kill chicken the yesterday
'Who did Kofi say slaughtered the chicken (yesterday)?'

b. Kofi ε-gyιrι fɛɛ ɔkyι wυ ε-mɔ nɛ (ndiye)?
Kofi PST-say COMP woman the PST-kill what yesterday
'What did Kofi say that the woman slaughtered (yesterday)?'

c. Kofi ε-gyιrι fɛɛ ɔkyι wυ ε-mɔ bwatɛ wυ nfrɛ/kɛmιkɛ/nɛnɛ (ndiye)?
Kofi PST-say COMP woman the PST-kill chicken the where/when/how yesterday
'Where/when/how did Kofi say that the woman slaughtered the chicken (yesterday)?'

d. *Kofi ε-gyιrι fɛɛ ɔkyι wυ ε-mɔ bwatɛ wυ nanι (ndiye)?
Kofi PST-say COMP woman the PST-kill chicken the why yesterday

2.2. The Distribution of Wh- In-situ in Bono

Most *wh*- expressions in Bono may appear in-situ; however, there is an additional exception that renders Bono more restrictive than Krachi. This manifests itself in the form of a subject–non-subject asymmetry, a widespread phenomenon observed both within African languages and beyond (Bokamba 1976, Maxwell 1981, Green & Jaggar 2003, Muriungi 2005, Sabel & Zeller 2006, Potsdam 2006, Zentz 2015). In addition to its restriction on 'why' (3e), Bono disallows subject interrogatives from appearing clause-internally (3a). Both items must occur clause-peripherally in focus positions (3b,f). The remaining data in (3) below show that by contrast, object (3c) and non-'why' adjunct *wh*- items (3d) can appear in-situ in main clauses, either at the right edge of the clause or in a non-edge position.

(3) a. *Hwae sae (nra)?
who dance.PST yesterday

b. Hwae ne sae (nra)?
who FOC dance.PST yesterday
'Who danced (yesterday)?'

c. Bema kɛ̃ kum abe (nra)?
man the kill.PST what yesterday
'What did the man slaughter (yesterday)?'

d. Bema kɛ̃ kum akoko kɛ̃ ahĩfa/dabe/sɛ (nra)?
man the kill.PST chicken the where/when/how yesterday
'Where/when/how did the man slaughter the chicken (yesterday)?'

e. *Bema kɛ̃ kum akoko kɛ̃ senti (nra)?
man the kill.PST chicken the why yesterday

f. Senti ne bema kɛ̃ kum akoko kɛ̃ (nra)?
why FOC man the kill.PST chicken the yesterday
'Why did the man slaughter the chicken (yesterday)?'

We find a similar distribution in embedded complement clauses – subject interrogatives (4a) and 'why' expressions (4e) are barred from appearing in-situ, but all other *wh*- expressions may surface in-situ in embedded positions.

(4) a. *Wo dwene sɛ hwae kum akoko kɛ̃ (nra)?
2ND.SG think COMP who kill.PST chicken the yesterday

b. Hwae ne wo dwene sɛ kum akoko kɛ̃ (nra)?
who FOC 2ND.SG think COMP kill.PST chicken the yesterday
'Who do you think slaughtered the chicken (yesterday)?'

c. Wo dwene sɛ bema kɛ̃ kum abe (nra)?
2ND.SG think COMP man the kill.PST what yesterday
'What do you think that the man slaughtered (yesterday)?'

d. Wo dwene sɛ bema kɛ̃ kum akoko kɛ̃ ahĩfa/dabe/sɛ (nra)?
2ND.SG think COMP man the kill.PST chicken the where/when/how yesterday
'Where/when/how do you think that the man slaughtered the chicken (yesterday)?'

e. *Wo dwene sɛ bema kɛ̃ kum akoko kɛ̃ senti (nra)?
2ND.SG think COMP man the kill.PST chicken the why yesterday

f. Senti ne wo dwene sɛ bema kɛ̃ kum akoko kɛ̃ (nra)?
why FOC 2ND.SG think COMP man the kill.PST chicken the yesterday
'Why do you think that the man slaughtered the chicken (yesterday)?'

2.3. The Distribution of Wh- In-situ in Wasa

With respect to its distribution in main clauses, *wh*- in-situ patterns identically in Wasa and Bono. That is to say, we find both subject–object interrogative asymmetries and 'why'–non-'why' adjunct asymmetries. The data below reveal that subject interrogatives (5a) and 'why' adverbial interrogatives (5e) may not surface clause-internally in root contexts (they must be focused (5b,f)), but other *wh*- items may.

(5) a. *Hwae saaye (ɛndra)?
who dance.PST yesterday

b. Hwae na saaye (ɛndra)?
who FOC dance.PST yesterday
'Who danced (yesterday)?'

c. Bɛrɛma no kum ɛdiɛn (ɛndra)?
man the kill.PST what yesterday
'What did the man slaughter (yesterday)?'

d. Bɛrɛma no kum akoko no ɛhĩfa/mmɛrɛ bɛn/sen (ɛndra)?
man the kill.PST chicken the where/time which/how yesterday
'Where/when/how did the man slaughter the chicken (yesterday)?'

e. *Bɛrɛma no kum akoko no adiɛnti (ɛndra)?
man the kill.PST chicken the why yesterday

f. Adiɛnti na bɛrɛma no kum akoko no (ɛndra)?
why FOC man the kill.PST chicken the yesterday
'Why did the man slaughter the chicken (yesterday)?'

With respect to its distribution in embedded complement clauses, Wasa and Bono part ways. Bono permits embedded clause-internal non-subject and non-'why' interrogatives (4c-d). Wasa bans all interrogatives from appearing in-situ in embedded contexts in non-echo questions. The data in (6) highlight the fact that *wh*- items that are available clause-internally in root contexts (5c-d) are disallowed in clausal complements.

(6) a. *Wo dwene sɛ bɛrɛma no kum ɛdiɛn (ɛndra)?
2ND.SG think COMP man the kill.PST what yesterday

b. ɛdiɛn na wo dwene sɛ bɛrɛma no kum (ɛndra)?
what FOC 2ND.SG think COMP man the kill.PST yesterday
'What do you think that the man slaughtered (yesterday)?'

c. *Wo dwene sɛ bɛrɛma no kum akoko no ɛhĩfa/mmɛrɛ bɛn/sen (ɛndra)?
2ND.SG think COMP man the kill.PST chicken the where/time which/how yesterday

d. ɛhĩfa/mmɛrɛ bɛn/sen na wo dwene sɛ bɛrɛma no kum akoko no (ɛndra)?
where/time which/how FOC 2ND.SG think COMP man the kill.PST chicken the yesterday
'Where/when/how do you think that the man slaughtered the chicken (yesterday)?'

2.4. The Distribution of Wh- In-situ in Asante Twi

The distribution profile of *wh*- in-situ in Asante Twi mirrors that of Wasa. In main clauses, subject *wh*- items (7a) and 'why' (7e) must appear clause-externally in focused positions (7b,f). All other interrogative expressions (7c,d) may appear inside the clause in either edge or non-edge positions.

(7) a. *Hwan bɔɔ Ama (ɛnora)?
who hit.PST Ama yesterday

b. Hwan na ɔ-bɔɔ Ama (ɛnora)?
who FOC 3RD.SG-hit.PST Ama yesterday
'Who hit Ama (yesterday)?'

c. Ama bɔɔ hwan (ɛnora)?
Ama hit.PST who yesterday
'Who did Ama hit (yesterday)?'

d. Ama bɔɔ Kofi ɛhĩfa/(ɛ)berɛ bɛn/sɛn (ɛnora)?
Ama hit.PST Kofi where/time which/how yesterday
'Where/when/how did Ama hit Kofi (yesterday)?'

e. *Kwadwo bɔɔ Ama adɛn nti? (Saah: 1988:20)
Kwadwo hit.PST Ama reason why

f. Adɛn nti na Kwadwo bɔɔ Ama? (Saah: 1988:20)
reason why FOC Kwadwo hit.PST Ama
'Why did Kwadwo hit Ama?'

As is the case with Wasa, Asante Twi restricts all interrogatives from appearing in clausal complements in non-echo questions. The data below show that *wh*- items that are available clause-internally in matrix contexts (7c-d) are incapable of occurring in embedded complement clauses and must be fronted into the main clause left periphery.

(8) a. *Wo dwene sɛ Ama bɔɔ hwan (ɛnora)?
2ND.SG think COMP Ama hit.PST who yesterday

b. Hwan na wo dwene sɛ Ama bɔɔyɛ (ɛnora)?
who FOC 2ND.SG think COMP Ama hit.PST yesterday
'Who do you think that Ama hit yesterday?'

c. *Wo dwene sɛ Ama saa ɛhĩfa/(ɛ)berɛ bɛn/sɛn (ɛnora)?
2ND.SG think COMP Ama dance.PST where/time which/how yesterday

d. ɛhĩfa/(ɛ)berɛ bɛn/sɛn na wo dwene sɛ Ama saayɛ (ɛnora)?
where/time which/how FOC 2ND.SG think COMP Ama dance.PST yesterday
'Where/when/how do you think that Ama danced (yesterday)?'

2.5. Delimiting the Empirical Scope of the Article

To briefly recap, all four Tano languages under investigation allow *wh*- in-situ in main clauses, but restrict 'why' from appearing clause-internally. Additionally, Bono, Wasa, and Asante Twi all prohibit in-situ subject interrogatives. The bulk of the variation, however, takes place in the embedded domain. All *wh*- items that may independently appear in-situ in root contexts may also appear in-situ in complement clauses in both Krachi and Bono. Wasa and Asante Twi, on the other hand, systematically exclude *wh*- in-situ in embedded complement clauses. The table below summarizes.

Table 1. Distribution of *wh*- in-situ in Krachi, Bono, Wasa and Asante Twi

	KRACHI	BONO	WASA	ASANTE TWI
SUBJECT *wh*- IN-SITU (MAIN CLAUSES)	✓	×	×	×
NON-SUBJECT *wh*- IN-SITU (MAIN CLAUSES)	✓	✓	✓	✓
'why' IN-SITU	×	×	×	×
wh- IN-SITU (EMBEDDED CLAUSES)	✓	✓	×	×

In the remainder of this article, I will focus my inquiry on deriving the variable distribution of non-subject and non-'why' in-situ interrogatives in root and embedded complement clauses (i.e. the shaded rows in Table 1 above). My reason for this is that a growing body of research has converged on the conclusion that restrictions on the distribution of in-situ subject *wh*- items and 'why' interrogatives are cross-linguistically robust and plausibly syntactic/semantic in nature (see Green and Jaggar 2003; Potsdam 2006; and Sabel and Zeller 2006, among others, for

approaches to restrictions on in-situ subject interrogatives and Reinhart 1998; Rizzi 2001; Shlonsky and Soare 2011; and Torrence and Kandybowicz 2013 for accounts of the prohibition on 'why' in-situ). This of course raises the question of whether restrictions on the distributions of other in-situ interrogatives can likewise be grounded in syntactic/semantic considerations. In the next section, I consider whether such forces are at play, but conclude that the factors shaping the distribution of Tano's non-subject and non-'why' in-situ interrogatives cannot be purely syntactic/semantic in nature[2]. As a result, I pursue an analysis in which prosodic considerations play a role in constraining the positions that interrogatives may occupy in the interior of the clause, in the spirit of Richards 2010, but with a different implementation.

3. MOTIVATING A PROSODIC APPROACH TO TANO IN-SITU INTERROGATIVE DISTRIBUTION

Excluding subjects and 'why' expressions, all four languages under investigation permit *wh*- in-situ in root clauses. Because embedded domains introduce restrictions on the acceptability of *wh*- in-situ in Tano, we must probe these contexts to uncover the conditions that constrain the distribution of in-situ interrogatives. In this section, we consider one influential approach to the licensing of (embedded) in-situ interrogative items that appeals to the syntax-semantics interface. I show, however, that this approach makes incorrect predictions with respect to Tano embedded interrogative syntax, motivating a non-syntactic/semantic approach to embedded in-situ *wh*- distribution[3].

The syntactic/semantic approach to in-situ *wh*- licensing I am referring to is actually a family of proposals, each differing slightly in their technical implementation, but sharing the core idea that in-situ *wh*- items are semantically licensed via the formation of a syntactic dependency between *wh*- and a (potentially null) Q operator (Cheng 1991, Beck 1996, Hagstrom 1998, Pesetsky 2000, Cable 2010, among others). For some, this dependency is achieved via binding and for others, it is mediated by an agreement relation. Either way, a language will allow *wh*- in-situ if two conditions are met: one, the language has a dedicated Q operator (whether overt or null) and two, *wh*- is accessible to Q. Applied to the languages currently under investigation, the approach would offer the following analysis of in-situ interrogative distribution. To account for the fact that all four languages admit *wh*- in-situ (at least in matrix

[2] As pointed out by an anonymous reviewer, this should be the expected outcome given that the four languages all have strikingly similar syntax and the constructions under consideration do not deviate semantically from language to language.

[3] Perhaps the strongest arguments against the syntactic/locality account considered in this section come later in section 4.6 during the discussion of the distribution of partial *wh*- movement and its correlation with prosody. As pointed out by an anonymous reviewer, the considerations discussed there would be difficult for a purely syntactic approach to cope with.

clauses), it must be the case that all four languages have Q particles. And to account for the asymmetrical distribution of *wh*- in-situ in embedded clauses, it would have to be the case that embedded *wh*- is accessible to Q in Krachi and Bono (facilitating embedded *wh*- in-situ), but not in Wasa and Asante Twi (thereby blocking embedded *wh*- in-situ).

As for the first claim, there is sufficient evidence that all four languages have Q particles, whether overt or null. Evidence for null Q particles comes from the existence of (simple) partial *wh*- focus movement, in which a silent matrix Q operator marks the matrix scope of the partially moved interrogative that surfaces in the embedded clause. In these cases, despite the fact that the interrogatives do not surface in the main clause, the utterances are interpreted as true main clause questions and not embedded or indirect questions. These interpretations suggest the presence of silent matrix Q operators. This is illustrated below for Krachi and Bono.

(9) Krachi

a. Kofi ɛ-gyɪrɪ fɛɛ nɛ yɪ Ama ɛ-mɔ?
Kofi PST-say COMP what FOC Ama PST-kill
'What did Kofi say that Ama slaughtered?'

Bono

b. Wo dwene sɛ abe ne bema kɛ̃ kuye?
2nd.SG think COMP what FOC man the kill.PST
'What do you think that the man slaughtered?'

Evidence for overt Q comes in the form of clause-final particles deployed in the formation of polar questions. This is illustrated below for Krachi and Asante Twi. Similar facts obtain in Bono and Wasa.

(10) Krachi

a. ɔkyɪ wʊ ɛ-mɔ bwatɛ wʊ ɛɛ?
woman the PST-kill chicken the Q
'Did the woman slaughter the chicken?'

Asante Twi

b. Kofi dɔ Ama anaa?
Kofi love Ama Q
'Does Kofi love Ama?'

As for the second claim (i.e. embedded *wh*- is accessible to Q in Krachi and Bono, but not in Wasa and Asante Twi), a prediction is made. If Q is unable to non-locally bind/agree with an embedded *wh*- item in Wasa and Asante Twi, then neither Wasa nor Asante Twi should allow partial *wh*- focus movement to a position below embedded C^0 because otherwise, the matrix scope

of the partially moved *wh*- item in the embedded clause would be unaccounted for. This prediction is borne out in Asante Twi. As the data below illustrate, partial *wh*- focus movement is unavailable in the language[4].

(11) a. *Wo dwene sɛ hwan na ɔ-bɔɔ Ama?
2ND.SG think COMP who FOC 3RD.SG-hit.PST Ama

b. *Wo kaa sɛ dɛn na Kofi diiyɛ?
2ND.SG say.PST COMP what FOC Kofi eat.PST

c. *Wo nim sɛ ɛhĩfa/(ɛ)berɛ bɛn na Kofi saayɛ?
2ND.SG know COMP where/time which FOC Kofi dance.PST

Adding strength to the claim's accurate prediction is the fact that the phenomenon of embedded non-interrogative focus, where binding by matrix Q is not an issue, is not constrained in this way in the language. The data below reveal that short focus movement to an embedded peripheral position is attested in Asante Twi. Thus, it is not the case that the landing site of partial *wh*- focus movement is unavailable.

(12) a. Wo dwene sɛ Kofi na ɔ-bɔɔ Ama.
2ND.SG think COMP Kofi FOC 3RD.SG-hit.PST Ama
'You think that it's KOFI who hit Ama.'

b. Wo kaa sɛ nkonya no na Kofi diiyɛ.
2ND.SG say.PST COMP cake the FOC Kofi eat.PST
'You said that it's THE CAKE that Kofi ate.'

c. Wo nim sɛ ɛnora na Kofi saayɛ.
2ND.SG know COMP yesterday FOC Kofi dance.PST
'You know that it's YESTERDAY that Kofi danced.'

The prediction, however, fails to hold in Wasa. Despite the fact that in-situ interrogatives are restricted from appearing in embedded complement clauses, partial *wh*- focus movement is available in the language[5]. All Wasa *wh*- items may undergo partial focus movement, regardless of thematic status.

[4] *Wh*- movement to an embedded position above C^0 is also unavailable in Asante Twi, as exemplified below.

(i) *Wo kaa dɛn na sɛ Kofi diiyɛ?
2ND.SG say.PST what FOC COMP Kofi eat.PST

[5] Partial *wh*- focus movement with a null matrix Q is also robustly attested in Krachi and Bono (see Torrence and Kandybowicz 2013, 2015 for full paradigms). However, since the co-existence of partial *wh*- focus movement and

(13) a. Wo dwene sɛ bɛrɛma bɛn na o-kum akoko no?
2ND.SG think COMP man which FOC 3RD.SG-kill.PST chicken the
'Which man do you think slaughtered the chicken?'

b. Wo dwene sɛ ɛdiɛn na bɛrɛma no kumiye?
2ND.SG think COMP what FOC man the kill.PST
'What do you think that the man slaughtered?'

c. Wo dwene sɛ ɛhĩfa/adiɛnti na bɛrɛma no kum akoko no?
2ND.SG think COMP where/why FOC man the kill.PST chicken the
'Where/why do you think that the man slaughtered the chicken?'

Note that Wasa partial *wh*- focus movement is "simple" in the sense of Fanselow's (2006) typological characterization – the partially-moved interrogative is unaccompanied by an overt Q particle in the clause where it takes scope (i.e. the root clause). The availability of partial *wh*- focus movement in spite of the absence of embedded *wh*- in-situ is unexpected for another reason. According to Fanselow's (2006) Generalization S2, if a construction is grammatical with simple partial movement, it can also be constructed with the *wh*- phrase in-situ. Wasa, therefore, represents a clear counterexample to Fanselow's Generalization, as it allows simple partial movement of any interrogative item, yet prohibits those items from surfacing clause-internally in the embedded domain.

Returning to the implications of the syntactic/semantic approach's failed prediction in the case of embedded *wh*- licensing in Wasa, because the partially moved *wh*- item takes matrix scope, as revealed by the interpretations in (13), matrix Q must somehow non-locally bind/agree with the moved embedded interrogative in the spell-out domain of the embedded C phase. But if this dependency is available under partial movement, why is it not available when an interrogative remains in-situ?[6] The syntactic/semantic approach provides no satisfying

embedded *wh*- in-situ in these languages is fully consistent with the claims and predictions of the syntactic/semantic approach sketched above, it will not be discussed as it does not play a decisive role in the argumentation of this section.

[6] An anonymous reviewer has suggested that these facts might be amenable to a purely syntactic/locality-based account in which matrix interrogative Q in Wasa can probe as far as the C domain (i.e. the left periphery) of an embedded clause, but no further. The idea here would be that due to locality constraints like the Phase Impenetrability Condition (Chomsky 2001), a probe can only reach down as far as another probe with the same feature. This sort of analysis would surely capture the fact that a partially moved *wh*- expression, but not its in-situ counterpart, could be accessible to matrix Q, but it breaks down in cases of deeper embedding because it incorrectly predicts that a partially moved *wh*- expression will not be accessible to matrix Q if more than one clause boundary separates the two. More concretely, in a case involving two embedded clauses, for example, such an analysis incorrectly predicts that it should be impossible for a *wh*- item that originates in the most deeply embedded clause to partially move to the edge of its immediately containing clause and then stop. As the data below reveals, this is indeed possible in the language, suggesting once again that a purely syntactic/locality-based approach is insufficient.

(i) Wo dwene sɛ Kofi kaa sɛ ɛdiɛn na bɛrɛma no kumiye?
2ND.SG think COMP Kofi say.PST COMP what FOC man the kill.PST
'What do you think that Kofi said that the man slaughtered?'

answer to this analytical dilemma, leading to the reasonable conclusion that in actuality, embedded in-situ interrogatives are in fact bound by matrix Q. I conclude, therefore, that the principle active force constraining the distribution of Tano's non-subject/non-'why' embedded in-situ interrogatives is not purely syntactic/semantic in nature. Consequently, I maintain that approaching the problem from the decidedly opposite direction (i.e. from a prosodic perspective, as in the spirit of Richards 2010, for example) is reasonably justified.

4. PROSODIC ANALYSIS OF TANO IN-SITU INTERROGATIVES

Focusing on embedded complement clauses, the primary locus of variation with respect to the distribution of Tano in-situ interrogatives, I demonstrate in this section that a *wh*- item's ability to appear in an in-situ position correlates with the prosodic status[7] of its immediately containing clause. More specifically, I show that in languages where embedded clauses are parsed as Intonational Phrases, embedded *wh*- in-situ is available. In those languages where embedded domains do not have the status of separate Intonational Phrases, embedded *wh*- in-situ is restricted. I then exploit this finding to formulate an empirical generalization and develop a prosodic analysis that accounts for the distributional variation across the four languages as well as the asymmetry between root and embedded clause *wh*- in-situ.

This section is organized as follows. After a brief discussion of the methodology employed in the forthcoming prosodic analysis, I examine the prosodic status of embedded complement clauses in each of the four Tano languages under investigation. Prosodic data consisting of pitch tracks will be presented, allowing us to examine fundamental frequency, pauses/breaks and their duration, and pitch/register reset in the embedded domains of each language. The section concludes with the resulting prosodic analysis.

4.1. Methodology

The prosodic data presented in this article were collected over a period of four years from 2010 to 2014 in Ghana. A total of eight native speakers supplied the data. Two speakers of each language were recorded and twelve total hours of recordings were obtained, approximately

By contrast, the prosodic analysis developed in the next section correctly predicts and accounts for the existence of partial focus movement structures like those above.

[7] I assume the existence of the Prosodic Hierarchy (Selkirk 1984, Nespor and Vogel 1986), according to which prosodic constituents are hierarchically organized. I also adopt the Match theory of Selkirk 2011, which maintains that prosodic structures are built from and largely correspond to syntactic structures. Coupled with the Prosodic Hierarchy hypothesis, the Match theory constitutes a theory of prosodic mapping according to which a morphological word corresponds to a Prosodic Word (ω), a sub-sentential syntactic phrase maps onto a Phonological Phrase (φ), and a clause is prosodically realized as an Intonational Phrase (ι): ι > φ > ω.

three hours of recording for each language. The resulting database from which the tokens presented in this article were drawn consists of hundreds of recorded productions.

Only structures independently determined to be grammatical from prior elicitation sessions were presented to speakers during recording sessions. Speakers produced material one sentence at a time (i.e. in unconnected speech) and were asked to produce their utterances "naturally", that is, avoiding overly rapid, slow, careful or deliberate deliveries. Recordings obtained in this manner were then presented to the other native speaker consultant of the language to judge the naturalness of the production. Only those productions deemed "natural" sounding by native speakers were considered in the resulting analysis. Speakers who rejected certain tokens as unnatural cited overly rapid delivery, missing pauses/breaks, insufficient pause length, and lack of fluid delivery in their justifications.

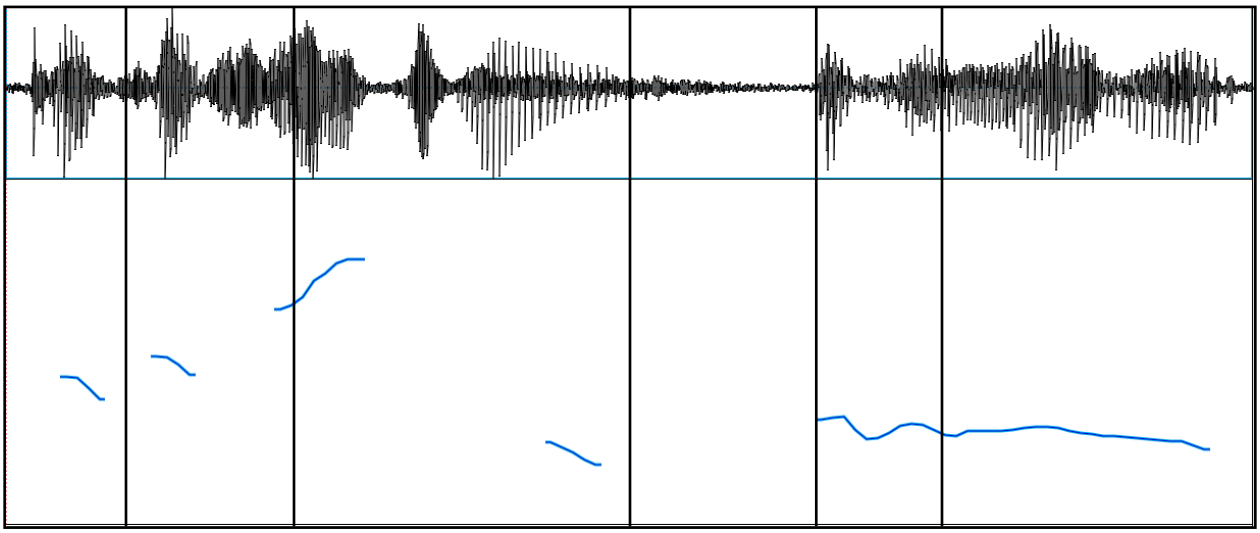
Efforts were made to produce the highest quality recordings possible. However, all recordings were made in the field. Thus, recording conditions were often suboptimal and despite efforts to minimize background noise, the sounds of the environment occasionally intruded into parts of the recordings. For this reason, certain pauses/breaks appear noisier than would be expected and minor pitch tracking errors sometimes occurred. The pitch tracks presented in this article were chosen because they displayed the least amount of background noise and pitch tracking errors.

In the analysis that follows, I rely on the existence of prosodic breaks and pitch/register reset, among other considerations, to diagnose the existence of prosodic phrase boundaries. In doing so, I will make the following assumptions. One, pauses greater than 100 milliseconds constitute major prosodic breaks/breath group boundaries and thus diagnose the divide between two Intonational Phrases. Pauses less than 100 milliseconds, on the other hand, do not constitute true breaks and thus do not indicate the presence of a major prosodic category boundary. This 100ms threshold was chosen because it represents a greater value than the average durations of non prosodically-motivated pauses such as those resulting from stop closures, which tend to range from 20-87ms for fast speech and 24-97ms for slow speech (Crystal and House 1988: 1555). Two, I will posit pitch/register reset when I observe Low-toned syllables surfacing at or above the pitch level of Low-toned syllables appearing at the right edge of the preceding putative Intonational Phrase boundary, an environment that induces F0 lowering effects in the four languages, as will be demonstrated. Both durational and pitch measurements were made using Praat (Boersma and Weenink 2014).

4.2. Prosodic Status of Krachi Embedded Complement Clauses

The right edges of phrasal prosodic constituents in Krachi are tonally marked and detectable via a number of salient phonetic cues. Kandybowicz and Torrence (2012, 2015) show that Phonological Phrases in the language are right edge-marked by way of Low boundary tones (L%). In the same way, the right boundaries of Intonational Phrases (ιPs) in the language are marked by L%. This is illustrated in the pitch track below by the depressed fundamental frequency (F0) of the (clausal) determiner *wʊ*, which bears a lexical rising tone in the language (Kandybowicz and Torrence 2015). In ιP-final position, the determiner fails to exhibit a rising F0 contour and instead surfaces with a Low tone realization.

(14) [[$_{CP}$ Kɛ Kofi ɛ-kya-wʊ] [$_{T}$′ ɛ-bɔ ŋwaŋwa]].
COMP Kofi PST-dance-CL.DET PRS-COP strange
'That Kofi danced is strange.'

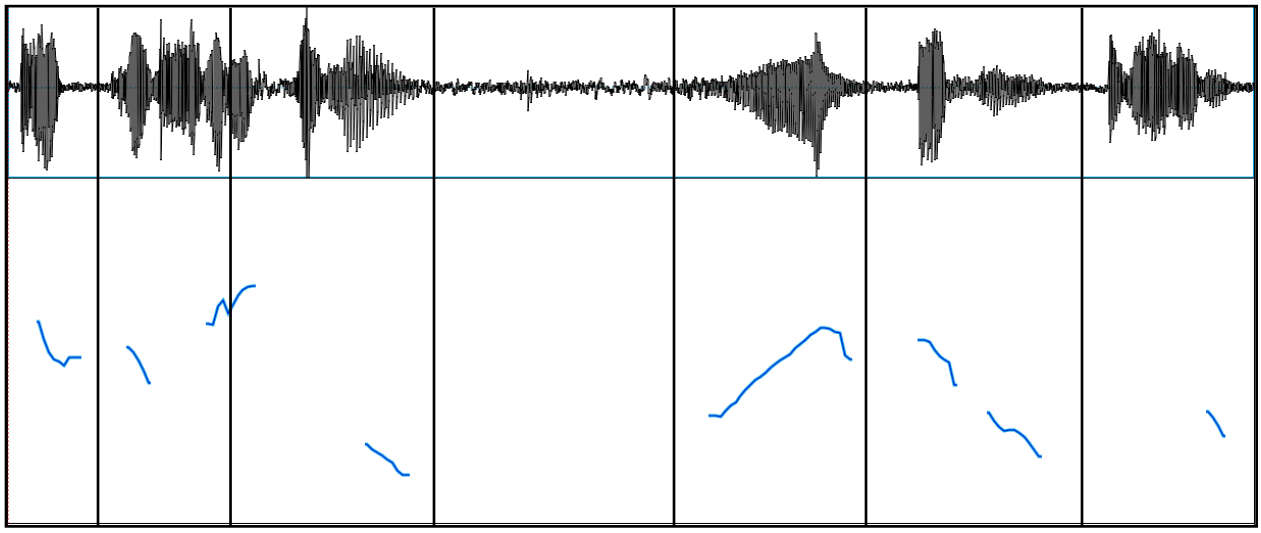


Structurally, (14) contains a sentential subject, cross-linguistically a structure regularly parsed as a separate ιP. The macro prosodic structure of the sentence above thus consists of two ιP constituents: the CP subject and the predicate phrase. Observe that the final items in each ιP (*ɛ-kya-wʊ* 'danced' and *ŋwaŋwa* 'strange') are realized with a low falling F0 pattern, demarcating the constituent's right edge.

Other phonetic correlates of right edge ιP-marking in the language can be identified. These include the presence of pauses and pitch/register reset in natural speech. The presence of a pause immediately following the first Intonational Phrase in (14) is evident in the lapse in articulation between the items *ɛ-kya-wʊ* and *ɛ-bɔ*. The duration of the pause is considerable,

namely, 236.6 milliseconds. In addition, pitch reset can be detected in (14) following the pause. Observe that the Low tone-bearing items that follow the break have greater F0 values than the L%-bearing clausal determiner at the right edge of ιP_1. The pitch track in (15) below perhaps more clearly exemplifies register reset following the right boundary of ιP_1. Notice that the Low tone-bearing second syllables of *odum* 'heart' and *ɛ-fwɪ* 'boil' are realized with higher F0 values than that of the Low tone-bearing item *kya-wʊ* 'danced' at the right edge of ιP_1.

(15) [[$_{CP}$ Kɛ Kofi ɛ-kya-wʊ] [me odum ɛ-fwɪ]].
COMP Kofi PST-dance-CL.DET 1ST.SG heart PST-boil
'That Kofi danced angered me (i.e. made my heart boil).'



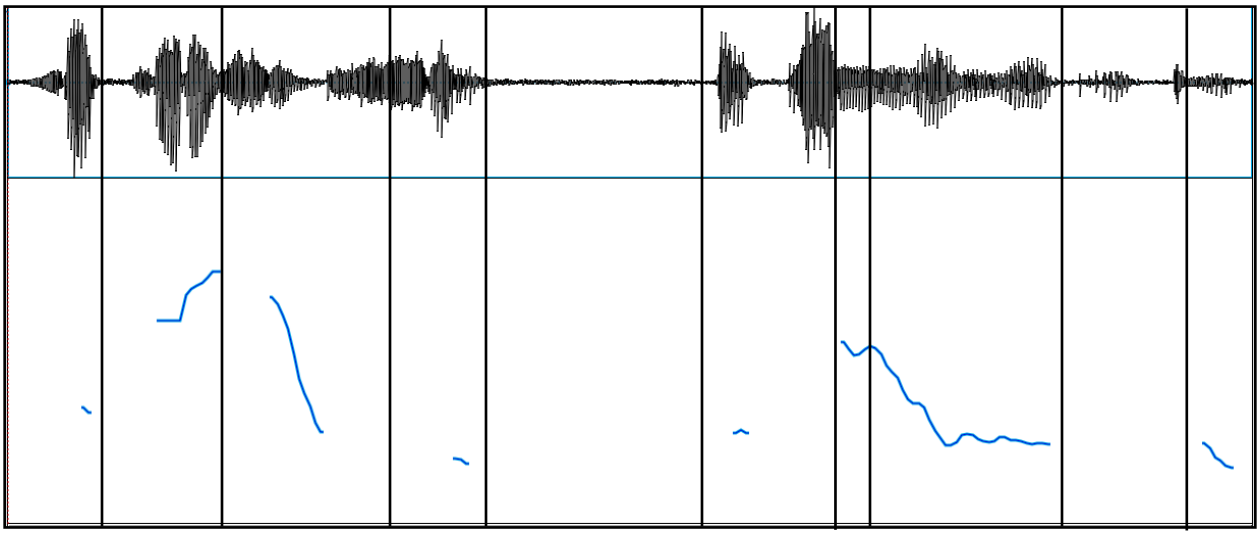
The pitch track in (15) also exemplifies the other phonetic correlates of Krachi ιP-marking previously discussed. The presence of L% can be detected in the low falling F0 values at the right edges of the two Intonational Phrases and in the lack of a Rising tone realization of the determiner at the right edge of ιP_1. Additionally, a substantial 590.4ms prosodic break divides the sentential subject (ιP_1) from the predicate (ιP_2) in natural speech.

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[8]. Evidence for this characterization comes from the following observations. One, the lexically High tone-bearing

[8] This finding is of independent theoretical interest given the debate initiated by Downing (1970) that only root clauses are mapped onto ιP. This position has been challenged recently by a growing body of research suggesting that in addition to root domains, embedded clauses in some languages are mapped onto ιP (Truckenbrodt 2005, Pak 2008, Selkirk 2009). My findings in this regard are thus consistent with these observations.

complementizer *fɛɛ* surfaces with a Low tone, indicating the presence of L%, the right-edge ιP boundary tone. Two, a significant pause separates the complementizer from the embedded subject in natural speech. In (16) below, the duration of this break is 534.4 milliseconds. And three, pitch reset affects the F0 range of tones in the embedded clause immediately following the complementizer. This prosodic behavior is illustrated in the pitch track below.

(16) Fɛ kwarɛ[9] fι-gyι[10] [$_{CP}$ fɛɛ [$_{TP}$ ɔkyι wυ ɛ-mɔ bwatɛ wυ]].
2ND.SG collect 2ND.SG-eat COMP woman the PST-kill chicken the
'You think that the woman slaughtered the chicken.'



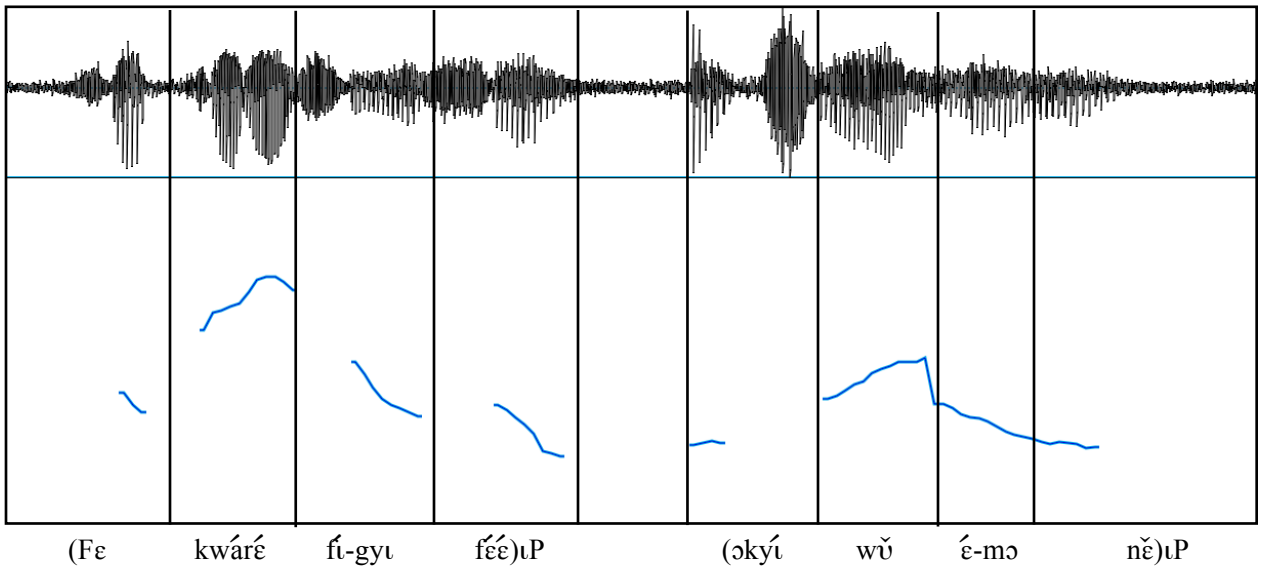
(Fɛ kwárɛ́ fι-gyι fɛ́ɛ́)ιP (ɔkýι wŭ ɛ́-mɔ bwatɛ́ wŭ)ιP

The prosodic 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 parsed as Intonational Phrases. Two pitch tracks exemplifying the ιP status of *wh*- internal embedded complement clauses are presented in (17) below. The data showcase clausal embedding under different bridge verbs ('think' (17a) and 'know' (17b)), illustrating that the ιP status of the embedded clause is independent of the embedding predicate. The three acoustic correlates of ι phrasing discussed above are clearly observable in each pitch track: a 207.2ms break separates ιP_1 from ιP_2 in (17a) and a 363.8ms pause divides the two ιPs in (17b); both complementizers surface with a low falling F0 instead of their lexically specified High tones;

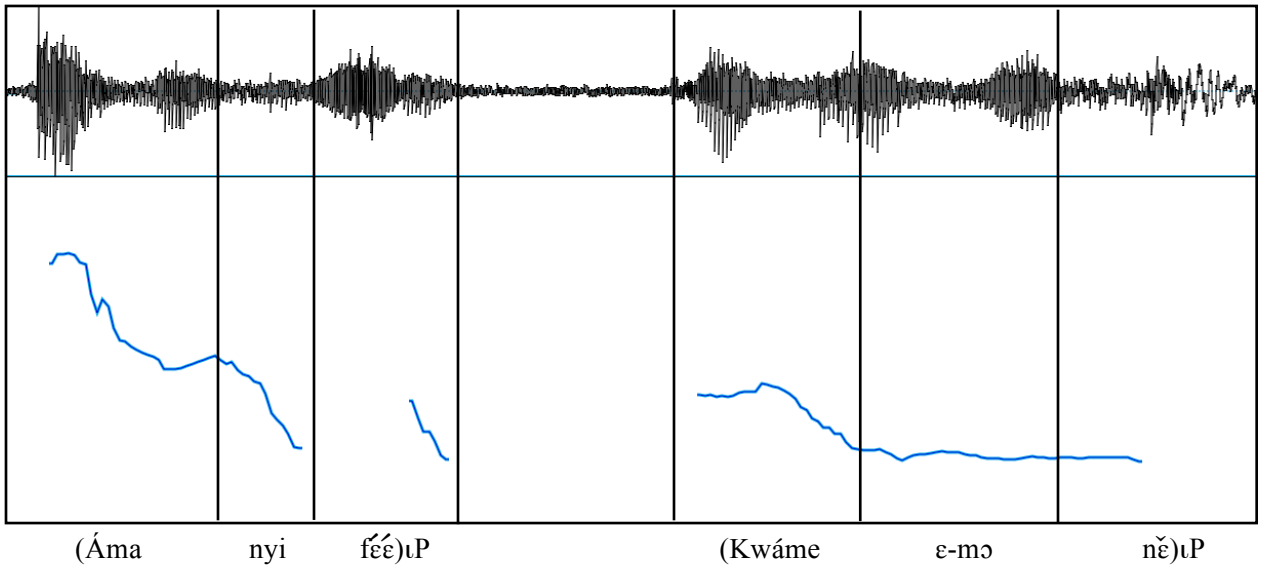
[9] Krachi has a tone sandhi process in which the second in a series of consecutive High tones is upstepped (Snider 1990, Kandybowicz and Torrence 2015). For this reason, the second syllable of *kwarɛ* is realized with a higher F0 than the first, despite both being H-bearing.
[10] The item *kwarɛ...gyι* 'think' is an idiosyncratic split verb in Krachi composed of the predicates *kwarɛ* and *gyι*, 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.

and pitch reset has occurred in the post-complementizer domain, as revealed by the fact that Low tone-bearing items in this domain surface with F0 values either at or above the pitch level of Low-toned syllables appearing at the right edge of the preceding Intonational Phrase.

(17) a. Fɛ kwarɛ fɪ-gyɪ [$_{CP}$ fɛɛ [$_{TP}$ ɔkyɪ wʊ ɛ-mɔ nɛ]]?
2ND.SG collect 2ND.SG-eat COMP woman the PST-kill what
'What do you think that the woman slaughtered?'



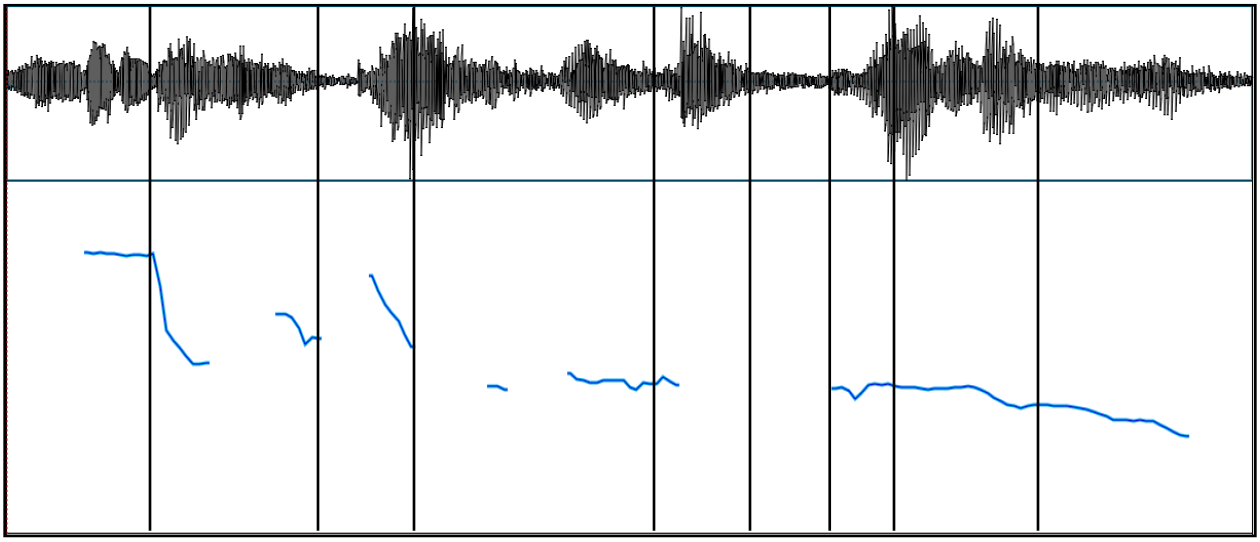
b. Ama nyi [$_{CP}$ fɛɛ [$_{TP}$ Kwame ɛ-mɔ nɛ]]?
Ama know COMP Kwame PST-kill what
'What does Ama know that Kwame slaughtered?'



4.3. Prosodic Status of Bono Embedded Complement Clauses

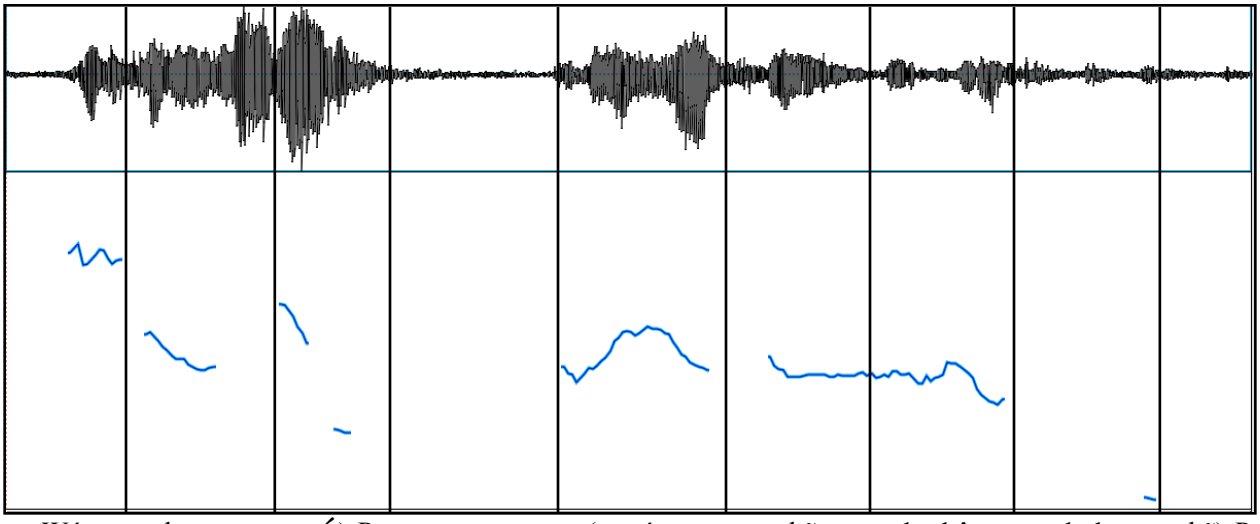
The phonetic correlates of right edge ιP marking in Krachi appear to be an areal feature of the Tano languages. Bono, Wasa, and Asante Twi all employ L%, prosodic breaks, and pitch reset to mark the right edge of an Intonational Phrase. The Bono datum in (18) below illustrates the prosodic behavior of the sentential subject construction, which as previously discussed, induces ι phrasing of the clausal subject. The presence of L% is signaled by the fact that items at the right edge of each ιP surface with falling/depressed F0s. The 201.4ms pause separating the sentential subject from the matrix predicate phrase is also observable in (18).

(18) [[$_{CP}$ Sɛ Kofi kum akoko kɛ̃] [$_{T}$′ yɛ Ama nwanwa]].
COMP Kofi kill.PST chicken the do Ama strange/surprise
'That Kofi slaughtered the chicken surprised Ama.'



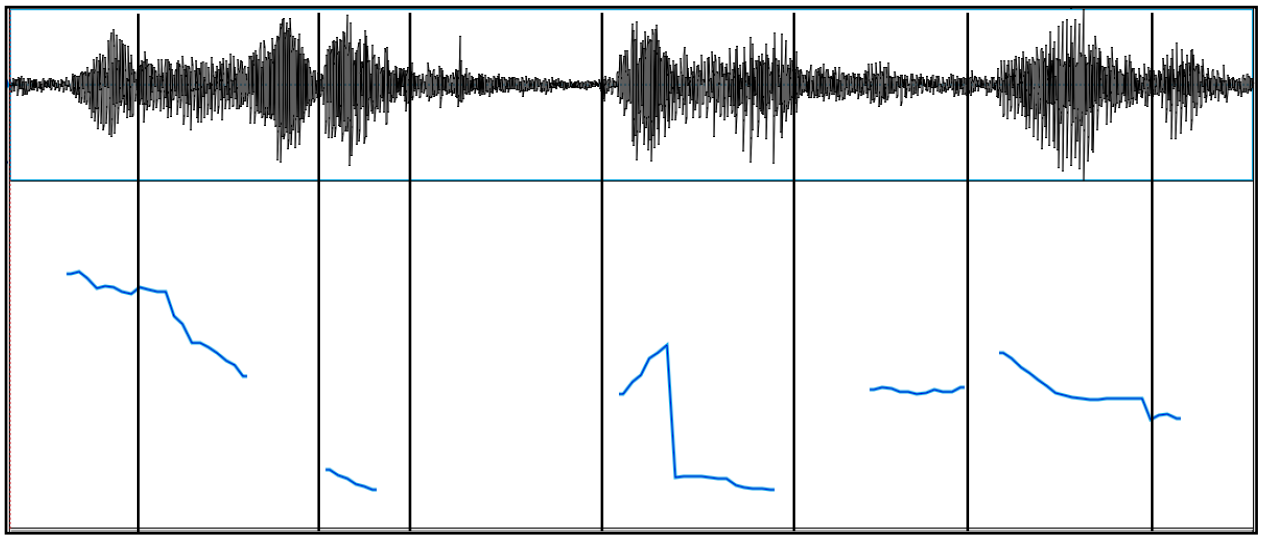
Although the pitch track in (18) does not appear to manifest F0 reset following the ιP$_{I}$ boundary in any obvious way, the presence of register reset accompanying ι phrasing can be clearly observed in the structure below involving clausal complementation. In addition to the boosted/reset F0 range in the embedded clause, the pitch track in (19) confirms that embedded complement clauses in Bono are parsed as Intonational Phrases. The presence of L% on the lexically High-bearing complementizer *sɛ* and the 422.7ms prosodic break that follows indicate the presence of an ιP boundary dividing the matrix clause from the embedded clause.

(19) Wo dwene [$_{CP}$ sɛ [$_{TP}$ mmema kɛ̃ be-kum akoko kɛ̃]].
2ND.SG think COMP man.PL the 3RD.PL-kill.PST chicken the
'You think that the men slaughtered the chicken.'

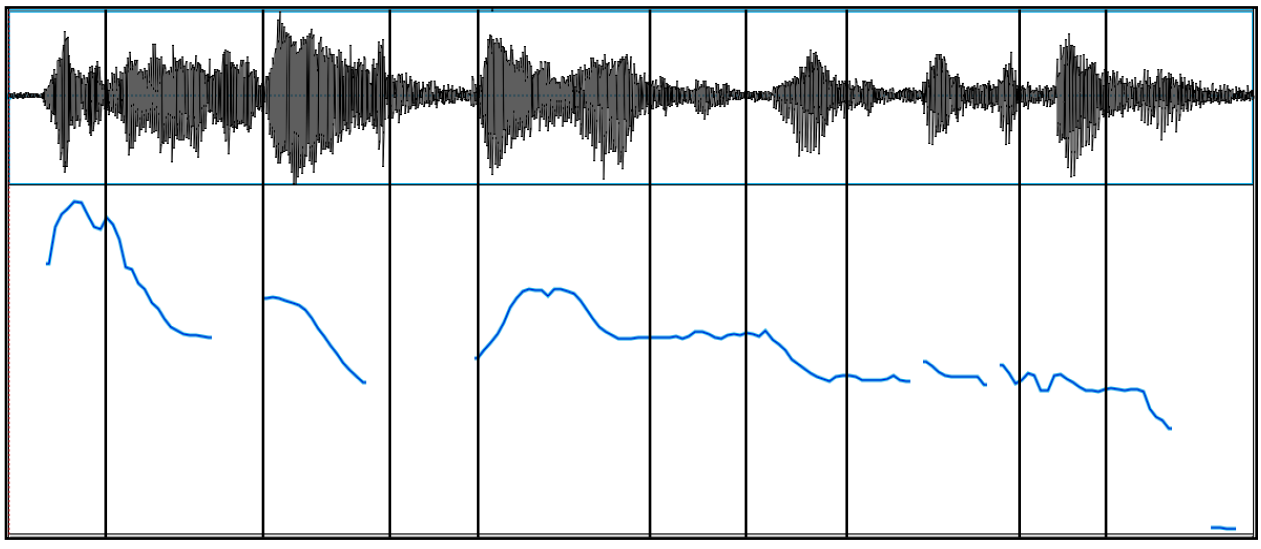


As was the case with Krachi, the prosodic status of Bono complement clauses is unaffected by the presence of in-situ interrogatives. Below I demonstrate that embedded clauses containing different in-situ *wh*- items also have the status of Intonational Phrases in the language. Two pitch tracks exemplifying the ιP status of *wh*- internal embedded complement clauses are presented in (20). The data also show that the ιP status of the embedded clause is independent of the *wh*- item contained within. Once again, the acoustic correlates of ι phrasing discussed above are observable in each pitch track: a 288.9ms break separates ιP_1 from ιP_2 in (20a) and a shorter 186.2ms pause divides the ιPs in (20b); both complementizers surface with low falling F0s rather than their lexically specified High tones; and pitch reset has clearly occurred in the post-complementizer domain, as revealed by the fact that Low tone-bearing items in this domain surface with F0 values either at or above the pitch level of Low-toned syllables appearing at the right edge of the preceding domain.

(20) a. Wo dwene [$_{CP}$ sɛ [$_{TP}$ bema kɛ̃ kum abe]]?
2ND.SG think COMP man the kill.PST what
'What do you think that the man slaughtered?'



b. Wo dwene [$_{CP}$ sɛ [$_{TP}$ bema kɛ̃ kum akoko kɛ̃ dabe]]?
2ND.SG think COMP man the kill.PST chicken the when
'When do you think that the man slaughtered the chicken?'



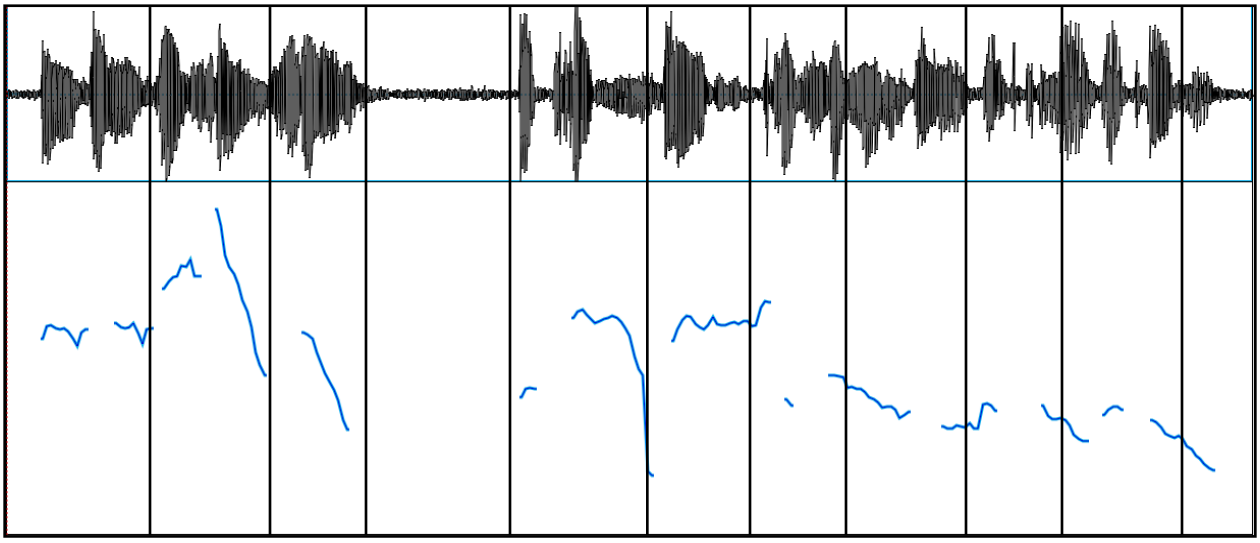
These facts demonstrate a correlation between the prosodic status of embedded/complement clauses and the possible occurrence of *wh*- in-situ within that domain. In Bono, as we observed in the previous subsection with Krachi, embedded complement clauses

are parsed as Intonational Phrases and embedded *wh*- in-situ is permitted. In the next two subsections, we will observe the reverse pattern. Comparable domains in Wasa and Asante Twi do not have the status of Intonational Phrases, nor do they tolerate *wh*- in-situ within them.

4.4. Prosodic Status of Wasa Embedded Complement Clauses

Comparable phonetic correlates of right edge ιP marking (i.e. L%, pause and pitch reset) exist in Wasa. This is demonstrated below by way of a structure involving modification by a reason adjunct. The resulting utterance is parsed into two Intonational Phrases that do not correspond to the sentence's two major syntactic constituents. In this construction, the lexically High tone-bearing complementizer *sɛ* at the right edge of $ιP_1$ surfaces with a depressed/falling F0, as we've seen before in the other languages. Following the complementizer is a considerable 497.2ms pause. The range of F0 values following the break is also clearly reset.

(21) [Nti ɛsan sɛ ɛkwan de Kofi] [nɪnti o-kum akoko no].
because *ɛsan* COMP hunger take Kofi therefore 3RD.SG-kill.PST chicken the
'Because Kofi was hungry, he slaughtered the chicken.'

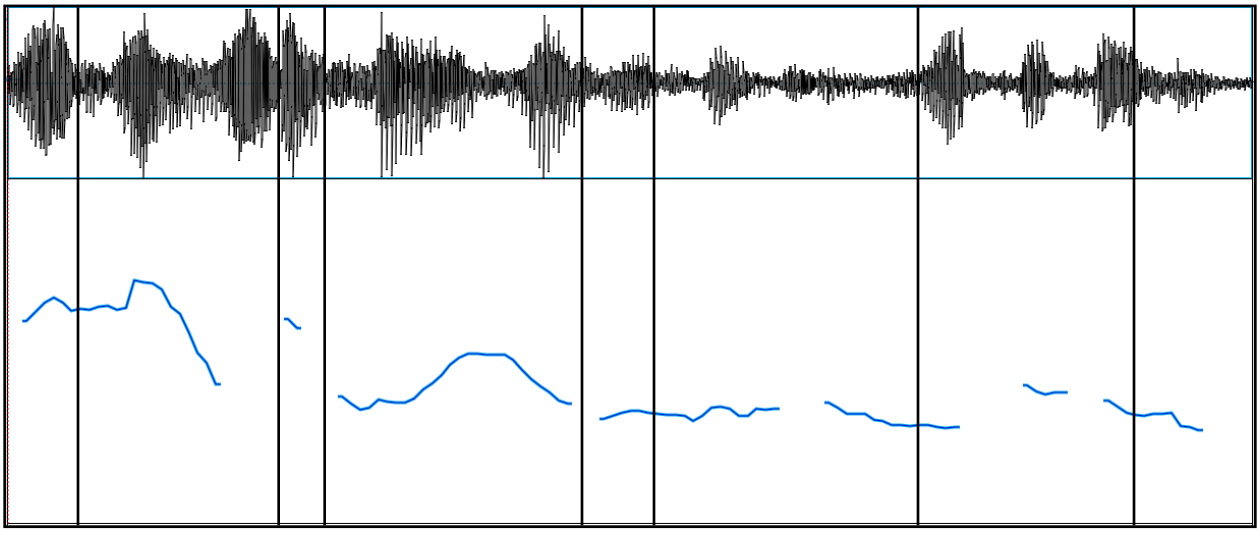


Unlike Krachi and Bono, Wasa embedded complement clauses do not have the prosodic status of Intonational Phrases[11]. As illustrated in (22) below, the prosodic status of a Wasa

[11] Note that this mapping constitutes a violation of Selkirk's (2011) Match condition because a clausal syntactic constituent (i.e. the embedded TP) does not correspond to an Intonational Phrase in the prosody (see footnote 7 for a brief description of Match theory). This, however, is unproblematic, as the Match condition is taken to be a violable constraint in Selkirk's (2011) framework.

complement clause is revealed by the tonal realization of complementizer *sɛ*, whose lexical High tone is not overridden by a Low boundary tone in this construction. (Contrast the F0 realization of the complementizer in (22) below with that in (21).) Furthermore, if the post-C^0 domain in this construction constituted an independent Intonational Phrase, we would expect to find an accompanying prosodic break and pitch reset. However, as (22) shows, there is neither a pause separating the complementizer from the embedded subject, nor does pitch reset occur in the embedded domain. Instead, we find a continuous pattern of F0 downdrift persisting from the main clause into the embedded clause.

(22) Wo dwene [$_{CP}$ sɛ [$_{TP}$ mɛrɛma no be-kum akoko no]].
2ND.SG think COMP man.PL the 3RD.PL-kill.PST chicken the
'You think that the men slaughtered the chicken.'



(Wó dwéne sɛ́ mɛrɛ́ma no be-kûm akóko no)ιP

Once again, these facts illustrate the correlation between the prosodic status of embedded complement clauses and the availability of *wh-* in-situ across the Tano languages. Unlike Krachi and Bono, these domains fail to be parsed prosodically as Intonational Phrases. And unlike Krachi and Bono, these domains may not support in-situ *wh-* expressions.

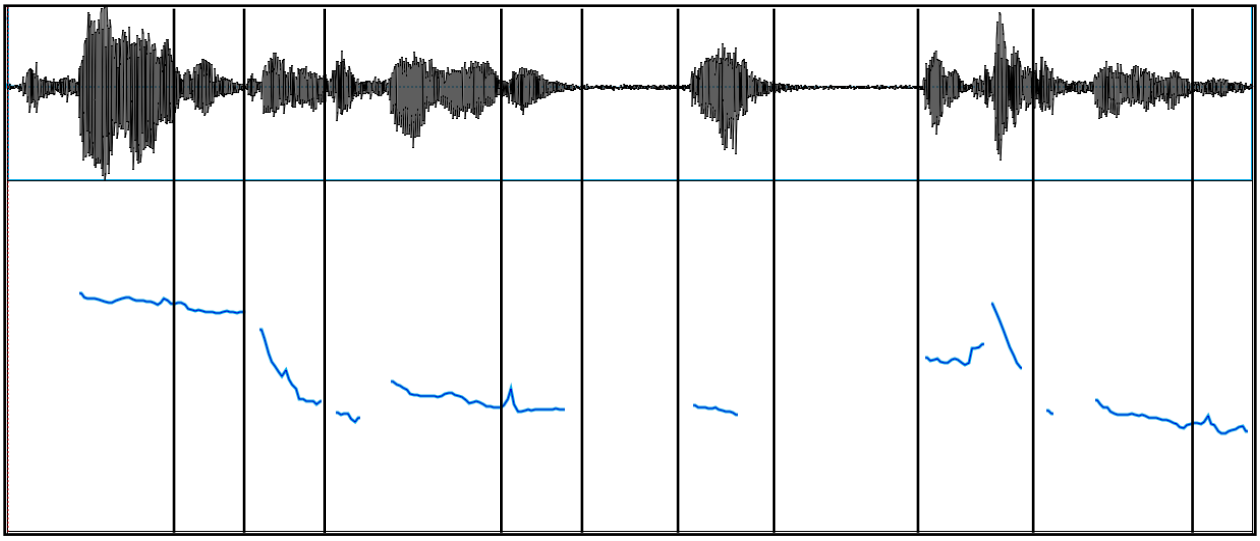
(23) a. *Wo dwene sɛ bɛrɛma no kum ɛdiɛn (ɛndra)?
2ND.SG think COMP man the kill.PST what yesterday

b. *Wo dwene sɛ bɛrɛma no kum akoko no ɛhĩfa/mmɛrɛ bɛn/sen (ɛndra)?
2ND.SG think COMP man the kill.PST chicken the where/time which/how yesterday

4.5. Prosodic Status of Asante Twi Embedded Complement Clauses

As with all the Tano languages surveyed in this article, L%, pause, and pitch reset mark the right edge of ιP in Asante Twi. I illustrate this via the clausal coordination structure in (24) below, which furnishes an opportunity to simultaneously observe the right edges of two Intonational Phrases in the language. In this construction, the presence of L% at the right edges of the ιPs can be detected by way of its F0 lowering effects on the lexically High tone-bearing quantifier *bi* that surfaces at the right edge of both constituents. The two clauses are set off by pauses flanking the coordinator *na*. The duration of the first break is 450.9 milliseconds, while the second is slightly longer at 520.7ms. Additionally, the range of F0 values in the clause following the coordinator is reset.

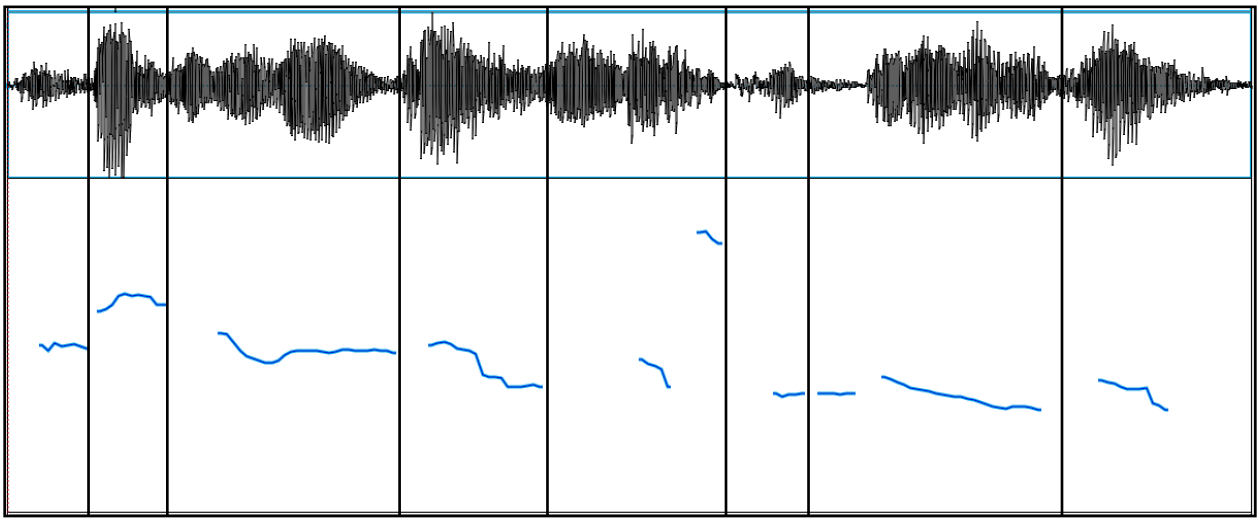
(24) [$_{TP}$ ɔkraman bi kuu ɔkraman bi] na [$_{TP}$ o-kuu ɔkraman bi].
dog some kill.PST dog some and 3RD.SG-kill.PST dog some
'A dog killed a dog and (s)he killed a dog.'



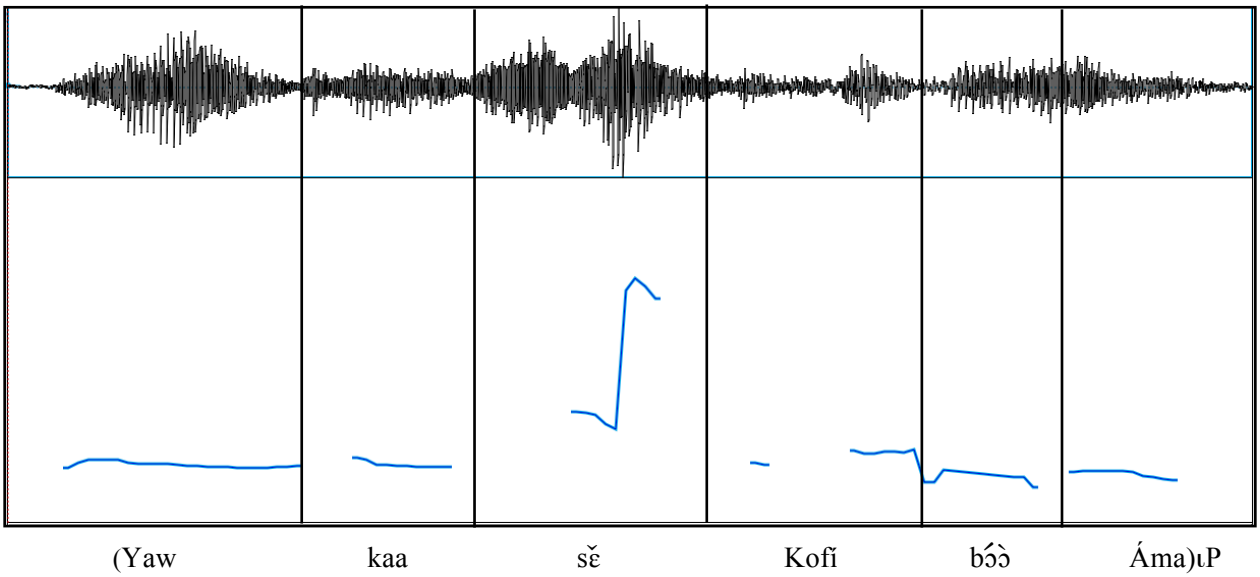
Like Wasa, embedded complement clauses in Asante Twi are not parsed as Intonational Phrases. As shown below in two different sentences, the lexically Rising tone-bearing complementizer *sɛ* faithfully surfaces with a rising F0 (following a brief initial fall), indicating the absence of a subsequent Low ιP boundary tone. The remaining phonetic correlates of right edge ιP marking are absent in both examples as well. We fail to find a prosodic break separating the complementizer from the embedded clause in both sentences. Moreover, pitch reset does not occur

in the embedded domain of either production. Rather, we observe a continuous pattern of F0 downdrift from the main clause into the embedded clause.

(25) a. ɛ bɛ tumi a-yɛ [$_{CP}$ sɛ [$_{TP}$ me dɔɔ Ama]].
3RD.SG FUT able PERF-do COMP 1ST.SG love.PST Ama
'It is possible that I loved Ama.'



b. Yaw kaa [$_{CP}$ sɛ [$_{TP}$ Kofi bɔɔ Ama]].
Yaw say.PST COMP Kofi hit.PST Ama
'Yaw said that Kofi hit Ama.'



When paired with the Wasa findings, the prosodic status of embedded complement clauses in Asante Twi completes the negative correlation between lack of Intonational Phrase parsing and unavailability of *wh*- in-situ that was illustrated in the previous subsection. Just as in Wasa, embedded complement clauses do not have the status of Intonational Phrases in Asante Twi, nor do they allow for the occurrence of in-situ interrogative expressions.

(26) a. *Wo dwene sɛ Ama bɔɔ hwan (ɛnora)?
2ND.SG think COMP Ama hit.PST who yesterday

b. *Wo nim sɛ Ama saa ɛhĩfa/(ɛ)berɛ bɛn/sɛn (ɛnora)?
2ND.SG know COMP Ama dance.PST where/time which/how yesterday

4.6. Analysis

Over the course of the last four subsections, I have demonstrated that there is variation in the prosodic realization of Tano embedded complement clauses. These domains are parsed as Intonational Phrases in certain languages, but not in others. In doing so, I have shown that there is a correlation between the prosodic status of a clause and its ability to host in-situ interrogative expressions. In those languages that map embedded clauses onto ιP, embedded *wh*-in-situ is permissible. Languages like Krachi and Bono meet this description. In those languages that do not parse clausal complements as Intonational Phrases (i.e. Wasa and Asante Twi), the embedding of in-situ interrogatives is prohibited. The table below summarizes this correlation.

Table 2. Correlation of embedded clause prosodic status and availability of *wh*- in-situ in Tano

	KRACHI	**BONO**	**WASA**	**ASANTE TWI**
EMBEDDED CLAUSE = ιP	✓	✓	×	×
wh- IN-SITU (EMBEDDED CLAUSES)	✓	✓	×	×

In this section, I propose an empirical generalization that accounts for the distributional variation of *wh*- in-situ in Tano and underpins this correlation.

The generalization I propose is prohibitional in nature and specific to Tano: *wh*- items may not form prosodic constituents with overt complementizers at the level of Intonational Phrase. Put another way, my claim is that *wh*- and C^0 may not phrase together under a single ιP:

(27) No ιP may contain both overt C^0 and *wh*-.

Note that in this respect, this generalization/analysis would seem to diametrically oppose that of Richards (2010), who proposes that *wh*- in-situ is licensed precisely when a *wh*- item is able to phrase with its scope-marking complementizer at PF. A number of other differences between Richards' theory and the analysis put forth above are worth noting. For Richards, the requisite phrasing of C^0 and *wh*- takes place at the Minor (Phonological) Phrase level, not the Intonational Phrase. Additionally, the generalization formulated in (27) above restricts *wh*- items from prosodically grouping with any and all overt complementizers, whereas Richards' proposal concerns the phrasing of *wh*- items with scope-marking interrogative complementizers, which are not always overtly realized. It is not the aim of this article to use Tano facts to either mount an argument against or motivate a refinement of Richards 2010. For that, the interested reader is invited to consult Kandybowicz and Torrence 2015, whose sole objective is to show that Richards' approach cannot account for the existence of *wh*- in-situ in languages where embedded domains are prosodically mapped as Intonational Phrases. Rather, the goal of this article is to develop an empirical generalization that accounts for the distributional variation of Tano *wh*- in-situ.

The empirical generalization expressed in (27) accounts for the variable distribution of *wh*- in-situ in Tano. In languages like Krachi and Bono, where embedded complement clauses are parsed as independent Intonational Phrases, embedded in-situ *wh*- constructions satisfy (27) in virtue of the fact that an ιP boundary will always intervene between C^0 and the embedded *wh*- item. The presence of this intermediate ιP boundary will thus prevent the two items from phrasing together under a single Intonational Phrase. The following representations illustrate.

(28) Krachi

a. (Ama nyi **fɛɛ**)ιP (Kwame ɛ-mɔ **nɛ**)ιP?
Ama know COMP Kwame PST-kill what
'What does Ama know that Kwame slaughtered?'

Bono

b. (Wo dwene **sɛ**)ιP (bema kɛ̃ kum **abe**)ιP?
2ND.SG think COMP man the kill.PST what
'What do you think that the man slaughtered?'

In contrast, embedded in-situ *wh*- constructions in languages like Wasa and Asante Twi violate (27) in virtue of the fact that in these languages embedded complement clauses fail to be mapped as Intonational Phrases. As such, no ιP boundary separates C^0 from the embedded *wh*- item, yielding a prosodic mapping in which the items phrase together under a single macro

clausal Intonational Phrase when the root clause is spelled-out.[12] The representations in (29) below exemplify this state of affairs.

(29) Wasa

a. *(Wo dwene **sɛ** bɛrɛma no kum **ɛdiɛn**)ιP?
2ND.SG think COMP man the kill.PST what
Intended: 'What do you think that the man slaughtered?'

Asante Twi

b. *(Wo dwene **sɛ** Ama bɔɔ **hwan**)ιP?
2ND.SG think COMP Ama hit.PST who
Intended: 'Who do you think that Ama hit?'

If we assume that (27) holds unconditionally in Wasa and Asante Twi, the prohibition on embedded *wh*- in-situ in these languages follows directly.[13]

In addition to accounting for the variation in Tano embedded *wh*- in-situ distribution, this proposal also captures something more fundamental, namely, the asymmetry between root and embedded clause *wh*- in-situ. In the Tano languages, it is not possible to drop or omit the complementizer in embedded contexts. Thus, (27) correctly predicts that only some instances of embedded *wh*- in-situ will be prosodically well-formed and that this will depend on the prosodic status of the mapped embedded clause (as discussed above). By contrast, because C^0 is not phonetically realized in Tano matrix contexts, (27) accounts for the fact that *wh*- in-situ (of semantically appropriate items) is widely available (i.e. distributionally unrestricted) in Tano root clauses. (27) is vacuously satisfied in these contexts. Thus, (27) covers significant empirical ground. It allows us to reduce the variation in Tano embedded *wh*- in-situ distribution to a more basic difference concerning the way narrow syntactic structures are externalized at PF by way

[12] An anonymous reviewer points to an interesting prediction for Wasa made by this analysis. In (21), it was established that reason adjuncts in the language (e.g. 'because Kofi was hungry') are prosodically divided by an ιP boundary. Because this ιP boundary divides C^0 from the material where a *wh*- item might surface in this construction, the generalization in (27) predicts that although Wasa can't have *wh*- in-situ in a complement clause, it should tolerate *wh*- in-situ in an embedded reason adjunct clause. If this were true, it would represent a strong argument against the purely syntactic/locality-based alternative considered in section 3. Unfortunately, I do not presently have the data to address this prediction and so must reserve exploring it for future research.

[13] This analysis makes a very interesting and testable prediction that lies beyond the scope of the present article given its psycholinguistic nature. If the restriction on embedded *wh*- in-situ in languages like Wasa and Asante Twi is ultimately (accidently) related to the fact that embedded complement clauses in these languages fail to be prosodically realized as ιPs, it is conceivable that Wasa and Asante Twi speakers could be "coerced" into accepting instances of embedded *wh*- in-situ if those embedded clauses were produced with an unnatural (i.e. forced) ιP phrasing. In those cases, the PF outputs in question would evade violation of (27), despite having artificial prosodies. Such structures might then be expected to exceptionally support embedded in-situ interrogatives. The prediction/experiment would also work in the opposite direction. By manipulating the prosody of complement clauses in languages like Krachi and Bono so that they fail to be mapped onto ιP (contrary to norm), it might be possible to engineer special contexts in which speakers of these languages exceptionally reject embedded *wh*- in-situ. Findings of this sort would greatly strengthen the central claim of this article, namely, that the distribution of *wh*- in-situ is as much a matter of prosody as it is a matter of syntax/semantics. I leave the pursuit of this prediction for future research.

of prosodic mapping. Furthermore, it sheds light on why *wh*- in-situ is more prevalent in root domains than in embedded contexts.

4.7. Extending the Analysis: Deriving the Distribution of Partial Wh- Movement in Tano

Recall from section 4.4 that embedded complement clauses in Wasa do not have the status of Intonational Phrases at PF (see (22)). In keeping with the generalization formalized in (27), it follows that *wh*- in-situ is unavailable in embedded domains in the language. However, another consequence of the analysis is that all *wh*- items, whether in-situ or moved, should be restricted from appearing inside Wasa complement clauses. On the surface, then, it would appear that (27) is stated too restrictively because a limited class of interrogative expressions may in fact surface within Wasa embedded clauses. Recall from section 3 that partial *wh*- focus movement is attested in the language. The data originally presented in (13) are repeated below.

(30) a. Wo dwene sɛ bɛrɛma bɛn na o-kum akoko no?
2ND.SG think COMP man which FOC 3RD.SG-kill.PST chicken the
'Which man do you think slaughtered the chicken?'

b. Wo dwene sɛ ɛdiɛn na bɛrɛma no kumiye?
2ND.SG think COMP what FOC man the kill.PST
'What do you think that the man slaughtered?'

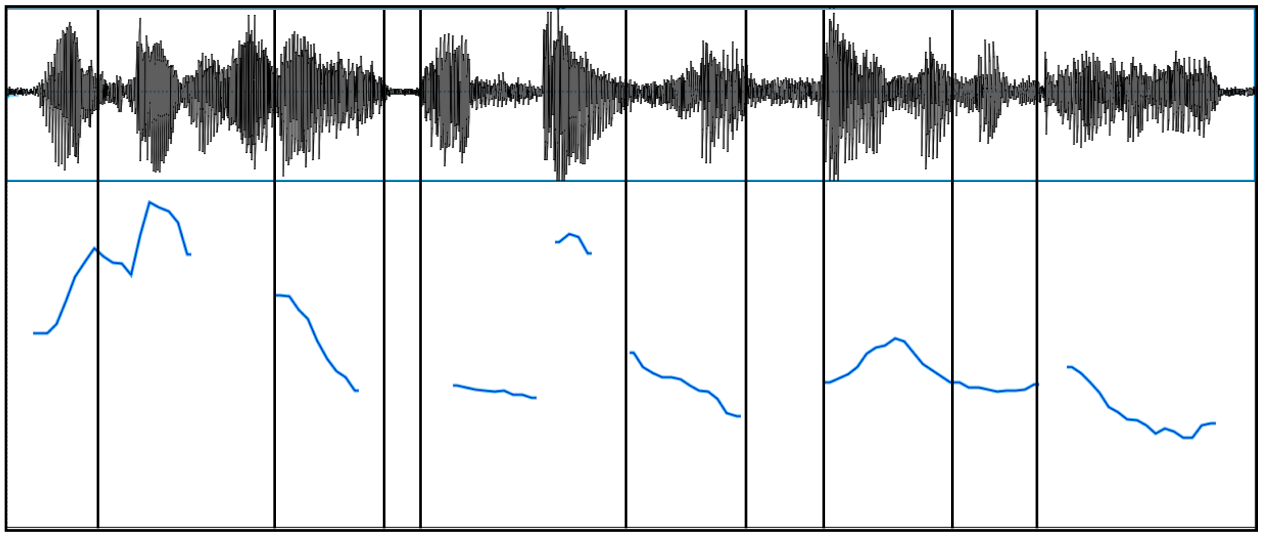
c. Wo dwene sɛ ɛhĩfa/adiɛnti na bɛrɛma no kum akoko no?
2ND.SG think COMP where/why FOC man the kill.PST chicken the
'Where/why do you think that the man slaughtered the chicken?'

If the post-complementizer strings in (30) fail to be parsed into independent ιP constituents, then the structures above would stand in violation of (27) and partial *wh*- focus movement would wrongly be predicted to be ungrammatical in the language. In this section, I address this issue, applying the current analysis (unmodified) to account for both the existence of partial *wh*- focus movement in Wasa and the non-existence of partial *wh*- focus movement in Asante Twi. In doing so, I develop a general account of the variation in availability of partial *wh*- focus movement across the Tano languages.

Although complement clauses in Wasa fail to achieve ιP status, prosodic pathways exist in the language for inducing ι phrasing in embedded domains. These pathways may be exploited to smuggle *wh*- expressions into otherwise unacceptable domains. One such pathway involves the creation of ιP constituents through focus movement. In Wasa, focused constituents (in the case relevant to this discussion, partially moved *wh*- DPs) are prosodically realized as

independent Intonational Phrases. The pitch track below demonstrates that partially moved *wh-* expressions in the language (and their associate focus markers) are set off from the remainder of the clause by way of flanking ιP boundaries. Observe that the lexically High tone-bearing complementizer *sɛ* surfaces with a low/falling F0 pattern when appearing before the partially moved *wh-* expression. As before, this indicates the presence of a right ιP boundary. The 112.6ms pause that follows the complementizer is also consistent with the introduction of a major prosodic boundary in this position. The relative brevity of this break is due to the fact that this utterance was produced at a slightly higher rate of speech than the other productions considered in this article. In addition, the F0 range of the focused constituent is clearly boosted, indicating register reset associated with Intonational Phrasing. The presence of an additional right ιP boundary closing off the partially moved *wh-* expression and focus marker is signaled by the L% realization of the lexically High tone-bearing focus marker *na*, the subsequent 205.4ms pause that follows the item, and the existence of pitch reset in the remainder of the utterance.

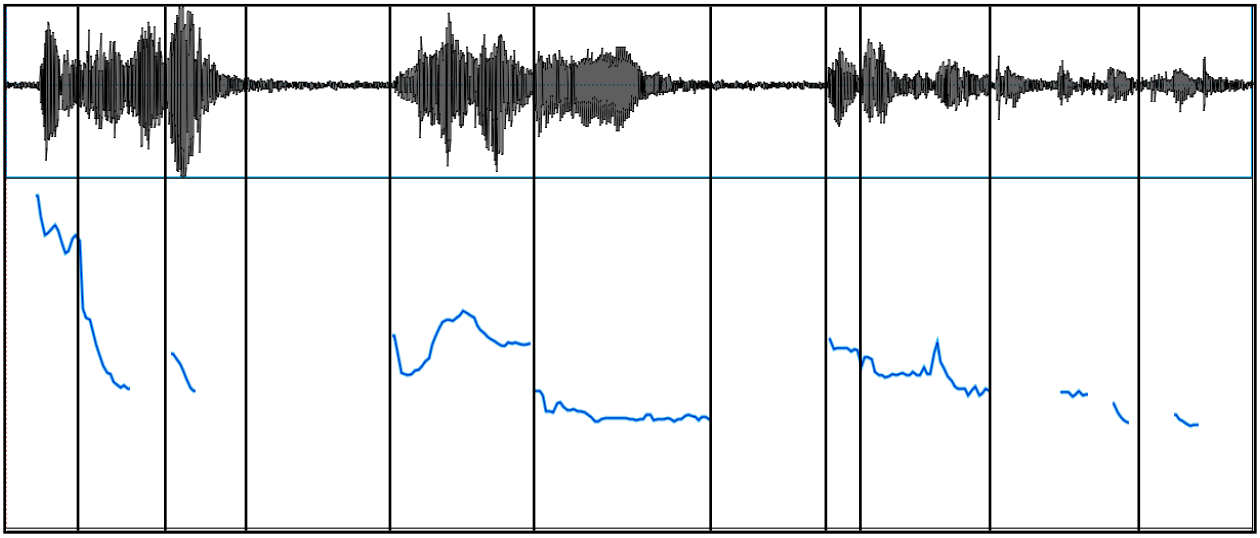
(31) Wo dwene [$_{CP}$ sɛ [$_{FOCP}$ ɛdiɛn na [$_{TP}$ bɛrɛma no kumiye]]]?
2ND.SG think COMP what FOC man the kill.PST
'What do you think that the man slaughtered?'



The phenomenon of focus movement inducing ι phrasing is cross-linguistically robust. Even in languages closely related to Wasa, focus movement induces ιP mapping. Below I show that focused partially moved *wh-* items in Bono also form Intonational Phrase constituents at PF.

However, unlike Wasa, the focus marker does not phrase with the item in focus. The familiar indicators of ι phrasing in Tano are readily observable below: the lexically High-bearing complementizer surfaces with a low/falling F0 pattern before the partially moved *wh*-expression indicating the presence of a right ιP boundary; a major prosodic break of 518.9ms follows; pitch reset is observed within the focused constituent; the *wh*- constituent is separated from the remainder of the clause by an additional pause of 426.8 milliseconds; and the F0 range of the material following this second break is clearly boosted/reset.

(32) Wo dwene [$_{CP}$ sɛ [$_{FOCP}$ mmema benie ne [$_{TP}$ be-kum akoko kɛ̃]]]?
2ND.SG think COMP man.PL which FOC 3RD.PL-kill.PST chicken the
'Which men do you think slaughtered the chicken?'



In this way, the existence of partial *wh*- focus movement in Wasa does not conflict with generalization (27), despite the fact that embedded complement clauses in the language do not independently achieve ιP status. Because focus fronting induces Intonational Phrasing, a partially moved *wh*- expression will always be separated from the complementizer by an ιP boundary in accordance with (27).[14] Viewed in this light, the absence of partial *wh*- focus movement in Asante Twi (see (11) repeated below) remains puzzling.

[14] An anonymous reviewer points out a clever and interesting prediction for Wasa made by this account. If focus fronting induces Intonational Phrasing across the board in both matrix and embedded contexts as claimed above, then short focusing any embedded constituent will create a prosodic context in an embedded clause where an ιP boundary will be introduced, insulating *wh*- from C^0. All things being equal, this would mean that although it would be impossible to say 'You think that the men slaughtered what yesterday?', it should be possible to say 'You think

(33) a. *Wo dwene sɛ hwan na ɔ-bɔɔ Ama?
2ND.SG think COMP who FOC 3RD.SG-hit.PST Ama

b. *Wo kaa sɛ dɛn na Kofi diiyɛ?
2ND.SG say.PST COMP what FOC Kofi eat.PST

c. *Wo nim sɛ ɛhĩfa/(ɛ)berɛ bɛn na Kofi saayɛ?
2ND.SG know COMP where/time which FOC Kofi dance.PST

The unavailability of partial *wh*- focus movement in the language is mysterious for another reason. As demonstrated in (12) and repeated in (34) below, short focus movement of non-interrogative constituents is permitted. Thus, the restriction on partial *wh*- focus movement in Asante Twi cannot simply be due to the fact that embedded clauses lack the requisite syntactic position to host the partially moved *wh*- item (i.e. FocusP).

(34) a. Wo dwene sɛ Kofi na ɔ-bɔɔ Ama.
2ND.SG think COMP Kofi FOC 3RD.SG-hit.PST Ama
'You think that it's KOFI who hit Ama.'

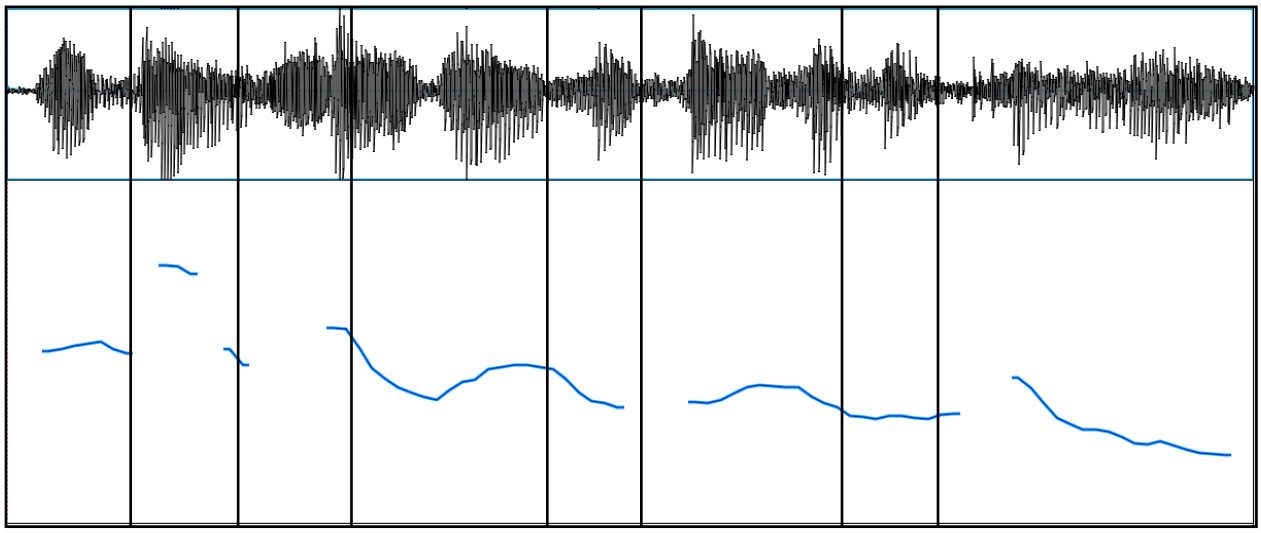
b. Wo kaa sɛ nkonya no na Kofi diiyɛ.
2ND.SG say.PST COMP cake the FOC Kofi eat.PST
'You said that it's THE CAKE that Kofi ate.'

c. Wo nim sɛ ɛnora na Kofi saayɛ.
2ND.SG know COMP yesterday FOC Kofi dance.PST
'You know that it's YESTERDAY that Kofi danced.'

I propose that the presence of partial *wh*- focus movement in both Wasa and Bono and its absence in Asante Twi derives from an important difference among the Tano languages concerning the prosodic realization of embedded focused constituents. Whereas embedded constituent focus induces Intonational Phrasing in Wasa and Bono, embedded constituent focus does not result in the creation of a special ιP domain in Asante Twi. Consider the prosodic realization of the embedded focused item *ɛnora* in the pitch track below.

that YESTERDAY, the men slaughtered what?'. I do not currently have the data to address this very insightful prediction and must therefore leave its exploration for future research.

(35) Wo dwene [$_{CP}$ sɛ [$_{FOCP}$ ɛnora na [$_{TP}$ barima no diiyɛ]]].
2ND.SG think COMP yesterday FOC man the eat.PST
'You think that it's YESTERDAY that the man ate.'



(Wo dwéne sɛ̌ ɛ́norá na baríma no dîiyɛ)ιP

Unlike focused constituents in Wasa and Bono, embedded foci in Asante Twi are not separated off from the utterance by way of pauses or prosodic breaks. A continuous and regular trend of downdrift persists in (35), indicating the absence of pitch reset. The prosodic realization of the complementizer also indicates the absence of a clause-medial ιP domain. Because its lexical Rising tone is not overridden by a Low boundary tone, we can conclude that the complementizer and focused constituent immediately following it phrase together under a single Intonational Phrase. In this way, the absence of partial *wh*- focus movement in the language can be understood as a direct consequence of the prohibition expressed in (27)[15]. In addition, the variation in availability of partial *wh*- focus movement across the Tano languages can be attributed to language-specific differences in whether or not displaced foci are parsed as Intonational Phrases[16].

[15] We may wonder, then, about the prosodic well-formedness of full *wh*- focus movement in languages like Asante Twi in light of (27). If embedded clauses in such languages are characterized by the absence of embedded ιP domains, then fully fronted *wh*- items and embedded complementizers might conceivably phrase together in violation of (27). Why, then, is long-distance *wh*- focus movement prosodically permissible in languages like Asante Twi? I believe the answer has to do with the well-known asymmetry in the prosodic status of embedded and matrix foci. Whereas the former may not always achieve independent ιP status (as in the case of Asante Twi), matrix foci are uniformly parsed as separate Intonational Phrases. In the case of Asante Twi, this means that the long-distance focus fronted *wh*- item will be parsed into its own ιP, shielding it from phrasing together with the embedded complementizer under a single Intonational Phrase.

[16] Analogous to the psycholinguistically oriented prediction/experiment outlined in footnote 13, this analysis makes the testable prediction that if focused constituents were unnaturally parsed as separate Intonational Phrase units in Asante Twi, partial *wh*- movement structures might then become acceptable outputs. As before, the test would be

5. CONCLUSION

An important discovery facilitated by the Minimalist paradigm shift is that many phenomena once thought to be purely syntactic in nature turn out instead to have more to do with the grammatical subsystems that interface with and impose well-formedness conditions on syntactic representations. The findings and conclusions presented in this article accord nicely with this position. I have argued that variation in the distribution of non-subject and non-'why' *wh*- in-situ in four Tano languages is interface-driven and ultimately prosodic in nature. My argument for this conclusion was based on an asymmetry in the availability of embedded *wh*- in-situ and partial *wh*- focus movement in Wasa that suggests that non-syntactic/semantic factors play an active role in constraining the distribution of non-subject/non-'why' *wh*- items. Further support came from the cross-Tano observation that the ability of a *wh*- item to appear in an in-situ position strongly correlates with the prosodic status of its immediately containing clause. In Krachi and Bono, where complement clauses have the prosodic status of Intonational Phrases, all in-situ interrogatives available in main clauses are also available in embedded domains. In Wasa and Asante Twi, however, where complement clauses do not have the status of Intonational Phrases, embedded *wh*- in-situ is restricted. To account for this correlation, I proposed a Tano-specific generalization (27) banning C^0 and *wh*- from phrasing together within a single Intonational Phrase. Because root clauses lack overtly realized complementizers and are prosodically mapped as Intonational Phrases in Tano, (27) accounts for the fact that *wh*- in-situ (of semantically appropriate items) is distributionally unrestricted in matrix domains at PF. However, because the realization of C^0 is obligatory in Tano embedded contexts, (27) also accounts for the fact that certain instances of embedded *wh*- in-situ will be restricted. Those complement clauses mapped as Intonational Phrases are able to support *wh*- in-situ, as in Krachi and Bono, because under such a prosodic mapping *wh*- and C^0 are separated by an ιP boundary. Conversely, those embedded clauses that are not mapped as Intonational Phrases cannot harbor in-situ interrogatives, as in Wasa and Asante Twi.

To the extent that (27) successfully accounts for the distributional variation in Tano *wh*- in-situ patterns, the prosodic approach adopted in this article seems encouraging. One deeper issue that remains difficult to reckon with, however, is the question of why a generalization like (27) would hold in the first place. What interface principle or design feature would underlie

whether native speakers could be coerced into accepting partial *wh*- movement constructions on the basis of exclusively manipulating the natural prosody of such structures. A positive finding in this regard would once again strengthen the contention at the heart of this article that in addition to syntactic/semantic factors, prosodic considerations play a role in constraining the positions that interrogative expressions may occupy in the interior of the clause.

such a prohibition?[17] And assuming one exists, could such a generalization be motivated for languages outside the Tano group? Our present ignorance in these domains does not, I believe, diminish or discredit the discovery of generalizations like (27). Other proposals claiming that *wh*- in-situ is prosodically licensed (for at least some subset of interrogative expressions in a given language) face a similar challenge. For instance, Richards (2010) proposes that *wh*- in-situ is licensed when an interrogative prosodically phrases with its scope-marking complementizer by minimizing the number of intervening major prosodic boundaries separating it from C^0. Putting aside the analytical difficulties for Richards' proposal posed by the Tano languages surveyed in this article[18], it is difficult to assign Richards' phrasing condition a deep and satisfying motivation grounded in PF interface pressures or optimal design considerations. This seems to be the current state of affairs when it comes to research on PF well-formedness conditions more generally. This may be the case because there simply is no deep explanation for the existence of certain PF well-formedness conditions. Or, perhaps more likely, it may be rooted in the fact that our understanding of the syntax-phonology interface is currently underdeveloped. It is my hope that the research reported in this article stimulates further development into this burgeoning field of linguistic inquiry to close the gap between our understanding of what we observe and why we observe it.

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[17] One possible approach to this question suggested to me by Chris Collins is to deny the existence of (27) as a PF interface condition and instead seek to explain the observed prosodic differences between the languages investigated in this article in purely syntactic terms. Along these lines, we might hypothesize a small but crucial syntactic difference between the left peripheries of embedded clauses in Krachi and Bono and those in Wasa and Asante Twi. In particular, suppose there is a phonetically null phrase (call it, InterrogativeP) that projects above TP in Krachi and Bono, but not in Wasa or Asante Twi. Suppose furthermore that InterrogativeP in these languages plays some crucial role linking the matrix Q to the embedded *wh*- item. The presence of InterrogativeP in Krachi and Bono would explain why embedded *wh*- in-situ is licensed in these languages, but not in Wasa and Asante Twi. It might also explain the differences in the prosodic status of embedded clauses in the languages if InterrogativeP is obligatorily parsed as ιP at the syntax-phonology interface. Space limitations preclude a more full exploration of this interesting analytical possibility, which I leave for future research. Thanks to Chris Collins for stimulating this line of thought.

[18] Given that complement clauses in Krachi and Bono induce additional ιP boundaries, unlike in Wasa and Asante Twi, Richards' (2010) proposal wrongly predicts that embedded *wh*- in-situ should be less likely in Krachi and Bono than in Wasa or Asante Twi because there are more major prosodic boundaries intervening between *wh*- and C^0 in the former. See Kandybowicz and Torrence 2015 for more details on how the distribution and nature of *wh*- in-situ in Krachi poses an analytical dilemma for Richards' proposal.

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