

Prosodic Structure of Wh-In-Situ Construction

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ABSTRACT

The domain of prosodic phrasing of languages is not a new concept to the scientific community and it has been the topic of extensive research in the past. However, most of the compelling research discovered among prosodic phrasing has been based on verbal languages which solely rely on the auditory processing of sound waves. Subtle differences of intonation, that often convey crucial information from the speaker to the listener, are a major component of the syntax-prosody relationship. A relatively new area of research, the phonology-syntactic interface has been well established in that syntax influences prosody in spoken languages (Selkirk, 1986).

However, more recently, studies are suggesting that there may be instances when prosodic elements may actually 'trigger' a syntactic operation. In particular, Richards (2010) discusses the parameters of wh-question structure in various languages in support of the contention that prosody may become the licensing element for specific syntactic structures of languages. Richards uses wh-in-situ as evidence for this claim, and he stresses the importance of continuing research in other languages for additional support. In this paper, the relation between prosody and syntax in American Sign Language is used to test this claim.

Prosodic Structure of Wh-In-Situ Construction

To date, the majority of research validates syntactic influence on prosodic phrasing. Every language is governed by its own set of basic rules for how prosodic structures are formed. These rules have relied heavily on the auditory processing of sound waves. The mechanics of abstract phrasing formation is based on the notion that intensity is parallel in spoken and signed languages. The language structure of American Sign Language (ASL) and Fukuoka Japanese was examined for any similarities of intensity to mark a prosodic domain in both languages. Those similarities were applied to ASL, and may lend support for Richard's (2010) claim that prosody may serve as a licensing element for selected syntactic structures.

Wh-Phrase Construction Cross Linguistically:

Across spoken languages, the syntactic structure of wh-question formation varies. In languages such as Japanese and Chinese (1), wh-phrases remain in-situ, while other languages, like English (2), require an overtly moved wh-phrase to the sentence-initial position (Sandler & Lillo-Martin, 2006). French is an example of a language which allows both in-situ and moved wh-phrases (3 a-b); while still others (Russian) (4) require all wh-phrases to move.

1) CANTONESE CHINESE:

Léih gú [Wai Ling sung mātyéh béi bīngō] ?
you think Wai Ling send what to who

“What do you think Wai Ling is giving to whom?”

(Mycock, 2004)

2) ENGLISH:

What do you think Tom bought for whom?

(Mycock, 2004)

3) FRENCH:

‘What did he give to whom?’

a. Qu’ a-t-il donné à qui? --Fronting/Movement
 what has-he given to whom

b. Il a donné quoi à qui? --In-Situ
 he has given what to whom

(Boskovic, 1997)

4) RUSSIAN:

Kogo kogda ty xočeš' [čtoby ja priglasil] ?
 who.DAT when you want that.SUBJUNC I invite.PAST

Who do you want me to invite when?"

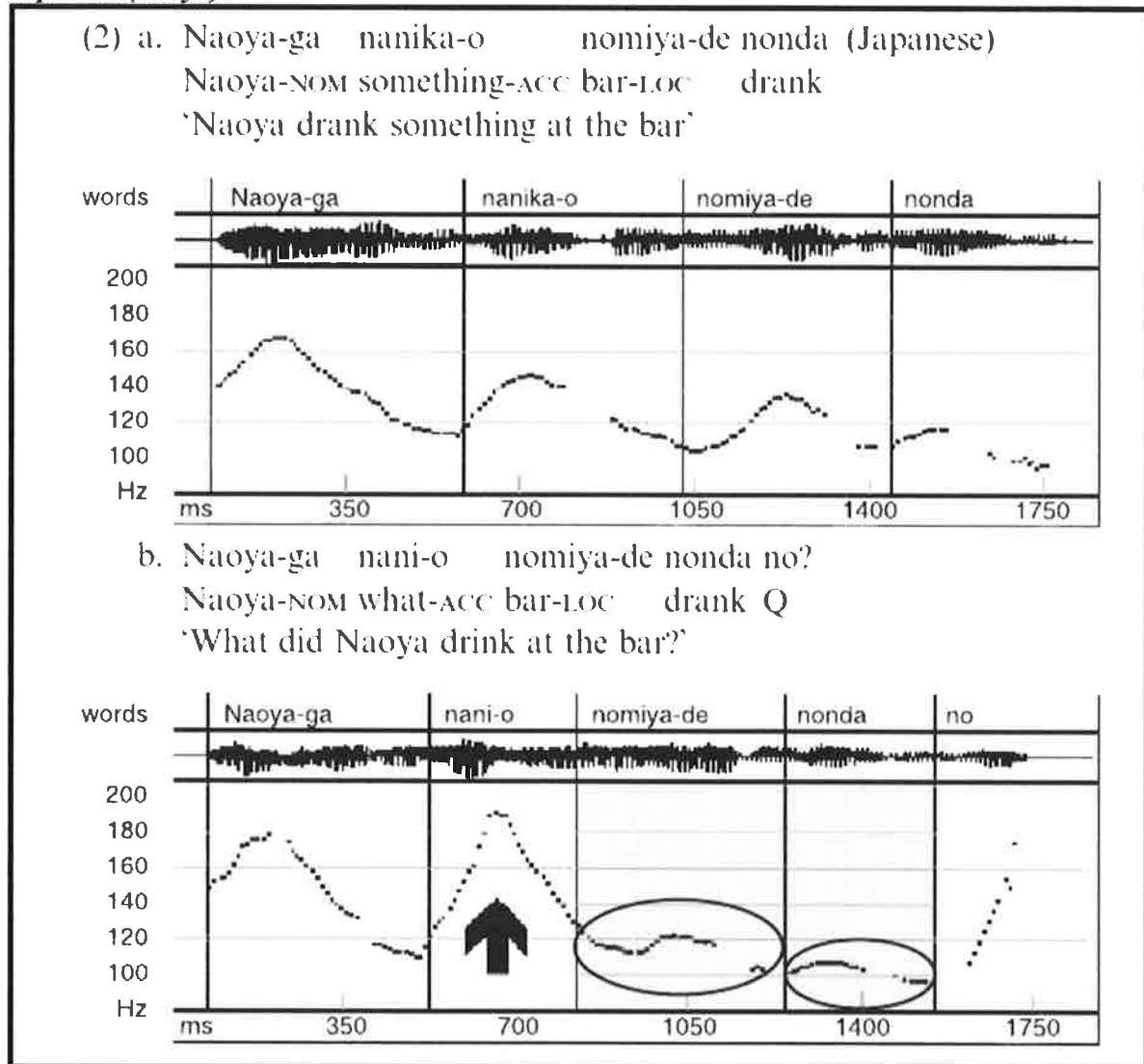
(Mycock, 2004)

The syntactic structure of a wh-question appears to be constructed in the same manner across all spoken languages. Each language arranges the wh-phrase and its complementizer with as few phrase boundaries as possible. The variation occurring in these constructions is based on each language's placement of the complementizer (Richards, 2010).

The distinct relationship between the wh-phrase and its complementizer is essential for creating prosodic structures in wh-questions. The prosodic domain of wh-questions discussed here typically begins with the wh-phrase and ends with the corresponding complementizer. According to Richards (2010), all languages attempt to create similar prosodic structures in wh-questions, depending on the placement of the complementizer and the prosodic rules of each language.

Japanese:

The following pitch track of a declarative sentence (a) and its corresponding wh-question (b) of a speaker of Tokyo Japanese illustrate prosodic domain formation in

Japanese:***Japanese (Tokyo): Pitch Track***

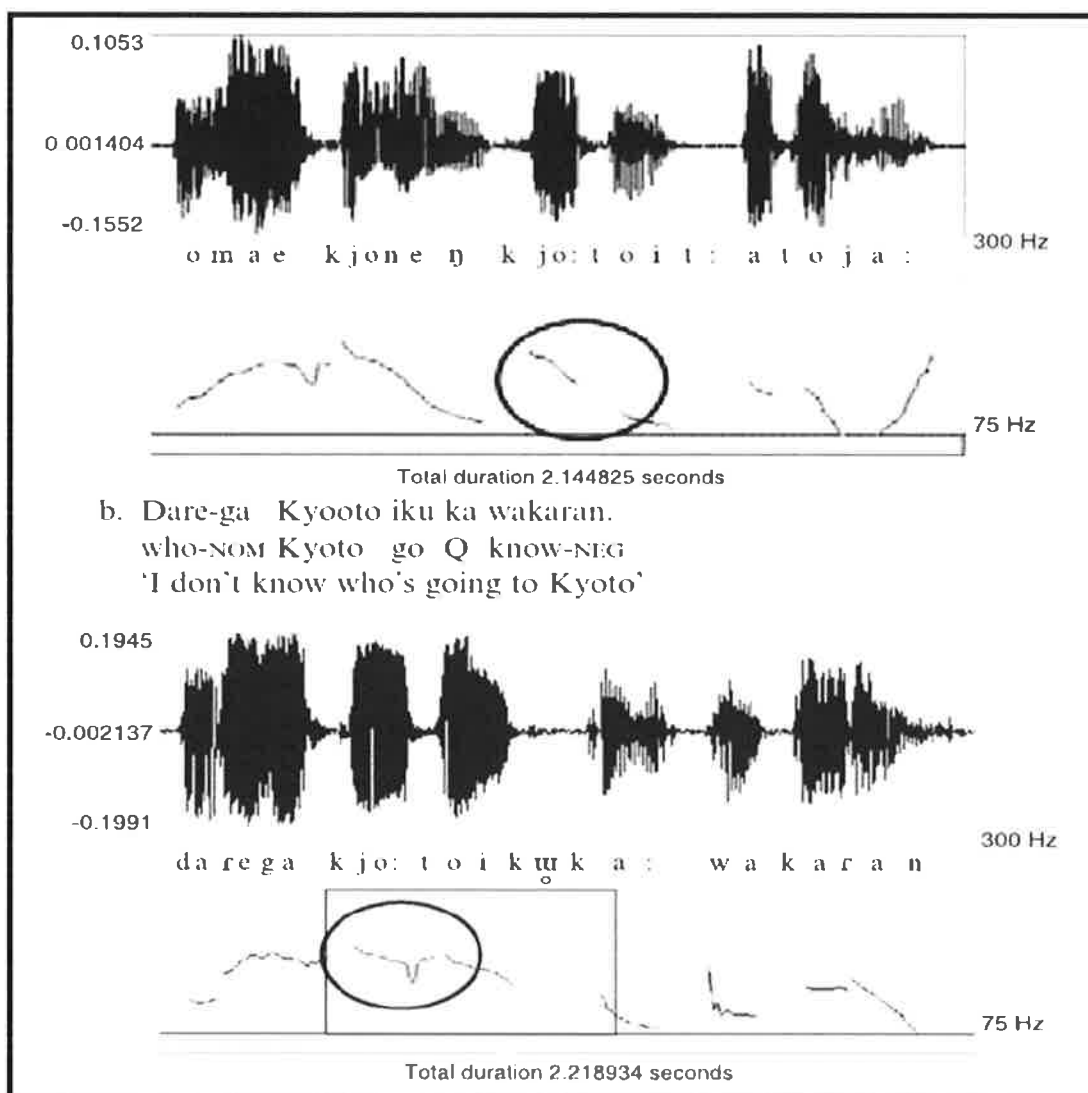
Source: Richards, Norvin (2010) *Uttering Trees* P. 144

Two important distinctions are observed in the example above. First, the direct object (wh-word) in the second sentence has a higher pitch level than the direct object of the first sentence. The second distinction, shown in the shaded area, includes the prosodic domain of

the second sentence that begins with the *wh*-phrase and ends with the *wh*-complementizer. This prosodic domain, according to Richards (2010), "is characterized by pitch compression: the peaks in this domain (circled) are lower than they would normally be" (p.145). However, the particulars of the construction of the prosodic domain cannot be applied to all languages with *wh*-in situ questions. In fact, it is instantiated differently even in another dialect of Japanese. Recent research indicates that although Fukuoka Japanese contains a special prosodic domain connecting *wh*-phrases with the complementizers, it is a high tone, not a pitch compression, that characterizes the prosodic domain (Smith 2005). Nonetheless, a special prosodic domain is constructed between the in-situ *wh*-phrase and the final question particle. However, as Smith (2005) points out:

*In some languages, α moves overtly to be closer to C, as in English. In other languages, α remains in situ but a large phonological phrase is formed that includes both α and C, and this is precisely what is observed in Fukuoka Japanese. ...The *wh*/C phrasing condition draws a connection between two formerly unrelated patterns: the syntactic parameter that determines whether a language will make use of overt or covert *wh* movement, and the existence of *wh*-specific phonological phrasing effects as seen in Fukuoka. (Smith, 2005, p. 547)*

This can be observed in the following pitch track which compares a statement (a) and a *wh*-question (b) in Fukuoka Japanese. It identifies the prosodic domain with the beginning of a high tone and then levelling off towards the end at the complementizer.

Fukuoka Japanese: Pitch Track

Source: Richards, Norvin (2010) *Uttering Trees* p. 146-147

Research on the intonational pattern of Fukuoka Japanese has been shown to be equivalent to the intonation focus constructions of Tokyo Japanese. This theory can only account for the right edge of the wh-prosody span, and relies on the focus phonology to initiate the pitch range reduction in Fukuoka Japanese (Smith, 2009).

American Sign Language:

American Sign Language (ASL), a topic-prominent language, uses many different sentence patterns to express ideas non-verbally in a contextual form. Although the dynamics of the discourse often govern this relatively "free style" language, the main elements of subject, verb and object are the underlying basis of the syntactic structure of ASL, making it similar to many verbal languages consisting of a SOV word order without the auditory component (Isenhath, 1990). The general sentence construction of ASL begins with the main focus or subject followed by any additional complementary information for support. For example, the English sentence, "The girl throws the dog a bone" would be signed in the order of:

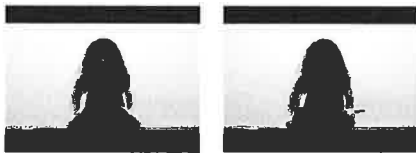
GIRL DOG BONE THROW

"The girl throws the dog a bone."

From a broad perspective, the wh-question retains the same word order as a declarative sentence. The distinction comes from adding an interrogative sign (wh-word) along with a non-manual marker in accompaniment. For example, a declarative sentence can change into an interrogative sentence simply by adding "what" to the sentence.

HAPPEN HERE

"It happened here."



Statement

HAPPEN HERE, WHAT?

"What is happening here?"



Question

In order to thoroughly examine the phonological structure of ASL, a few basic features unique to the signed languages should first be examined.

A common feature of ASL is the use of non-manual markings in addition to the manual signing. Non-manual markings consist of mainly body movements, such as the head, facial expressions and/or upper body movements. Research conducted on signed languages indicates that the use of non-manual markings provides important pragmatic clues for general discourse. The eyes and head often work together to express a variety of information. Turn-taking is often established with eye movements, whereas head movements can reveal needed backchannel information. It has been established and universally accepted that not only are non-manual markers used pragmatically in signed languages, they can relay information about syntactic structure on a sentence level as well (Neidle, et al., 2000). For example, the Brow Raise and Brow Furrow (see figure 1 and figure 2) are frequently expressed during interrogative phrases.

Why?



Figure 1:

Who?



Figure 2:

These markings illustrate more than just the emotions of the signer; they present information that is used both affectively and grammatically, which are very distinct in their own right (Neidle & Kegl, 2000). For example, the two pictures below demonstrate how adding a non-manual marker (in this case a facial expression) simultaneously while signing the word *look* changes the meaning of the sign to *doubtfully*.

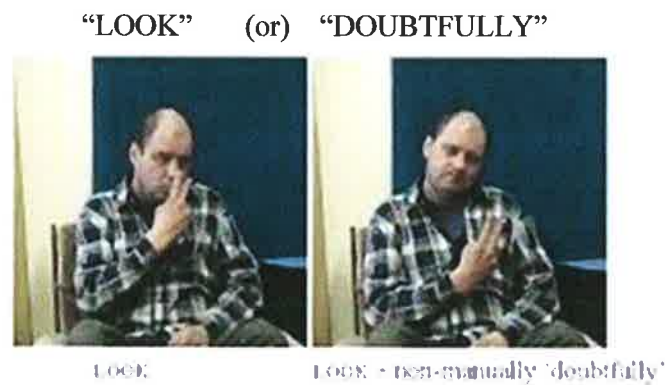


Figure 4: The difference in the non-manual expression between the first and the second occurrences of the verb LOOK.

Therefore, non-manual markers have the ability to change the lexical meaning of a sign, making it one of the central features associated with signed languages and a major component of syntactical and phonological phrasing in signed languages.

Prosodic Domain:

It appears from previous research (Nespor and Sandler, 1999; Miller, 1996; Nespor and Vogel, 1986) that the prosodic environment influences which signs are to be reduplicated and which are not. The number of iterations in ASL is an important feature which seems to establish a “general property of sign language prosody” (Sandler & Lillo-Martin, 2006). Sandler & Lillo-Martin, (2006) substantiate this concept by stating, "If a sign that is underlyingly non-reduplicated occurs in the prosodically strong position at the end of the

phrase, it often is reduplicated, even as many as three times (four iterations)" (Sandler & Lillo-Martin, 2006 p. 251).

Double construction involves the repetition of a particular element in the sentence final position. This emphasizes the focus of the sentence. For example, in sentence 10(a) the focus of the sentence is the item that was bought, whereas in sentence 10(b), the focus remains on the total amount of siblings.¹

10 (a) _____ whq
What Frank Buy Yesterday What
"What did Frank buy yesterday?"

10 (b) _____ whq
How-Many Brother Sister You Have How-Many
"How many brothers and sisters do you have?"

Unlike many of the spoken languages, this type of double construction has been observed in many of the signed languages. (Sandler & Lillo-Martin, 2006). Together with the non-manual marker extending over the doubled element, the increased muscle tension in the non-manual markers places more emphasis on the doubled sign making it the focus of the sentence which could be the indicator of a final complementizer. Based on a study by Nespor and Sandler (1999), Sandler & Lillo-Martin (2006) point out that reiteration of the last sign is one element of the rhythmic phonetic cues that mark the end of the phonological phrase. They further add, "Nespor and Sandler's finding suggest that the end of the phrase is the prominent position in the phrase" (Sandler & Lillo-Martin, 2006).

¹ The labeled overbar (whq) indicates the domain of the non-manual marker.

Phonological Phrasing:

It has been established that domains of phonological phrasing of different sizes may be arranged according to a hierarchical system, where smaller (minor) phrases can combine with other phrases to create larger (major) phrases (Richards, 2010). According to Richards (2010), it has been suggested that many of these major phrases combine to produce the intonation of an utterance. He further states, “Japanese wh-questions allow Minor Phrases to be recursive, with multiple Minor Phrases being composed into a single, overarching Minor Phrase” (Richards, 2010 p. 149). In the same way, a hierarchical system of phrase marking in ASL is comparable to the Japanese prosodic hierarchical system. Determined by minor rhythmic breaks,² these phonological phrases can be rearranged or combined as well (Sandler & Lillo-Martin, 2006). The following is an example of a Japanese In-Situ Wh-Phrase and an ASL In-Situ Wh-Phrase:

Japanese *In-Situ* WH-Phrase:

John-ga	dare-ni	sono hon-o	age-ta	no
John	who	that book	give	Q

“Who did John give that book to?”

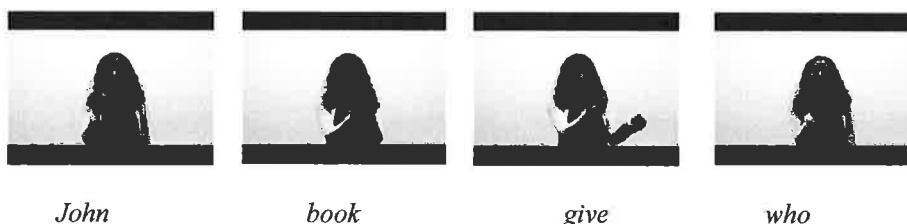
Source: Sandler & Lillo-Martin (2006) Sign Language & Linguistic Universals p. 432

² It has been suggested that eye-blinks in ASL are comparable to the breath in spoken languages (Sandler & Lillo-Martin, 2010).

American Sign Language *In-Situ* WH-Phrase³:

$\overline{\text{John book give who}}^{\text{whq}}$
John book give who
"Who did John give that book to?"

Source: Sandler & Lillo-Martin (2006) *Sign Language & Linguistic Universals* p. 435

**Syntax-Phonology Relationship:**

Research has demonstrated a possible link between the phonological and syntactic structure which was once considered distinctly separate. Although it has already been determined that non-manual markers of signed language is comparable to the intonation of spoken languages, the question arises of how closely the non-manual marking corresponds to the prosodic phrase formation in questions in oral languages. Many models attempting to describe the syntax-phonology interface have been proposed for a variety of languages. Specifically, research reveals that this interface is sensitive to the wh element and [+ wh] complementizer correlation within a language. In order to explain the relationship between wh prosody and syntactic wh movement, Richards (2006) presents the principal of the “wh/C phrasing condition.” This principle indicates that few prosodic boundaries as possible are

³ No restriction against leaving wh-elements in-situ have made it impossible to determine whether a wh-element has moved or not in some cases (Sandler & Lillo-Martin, 2006).

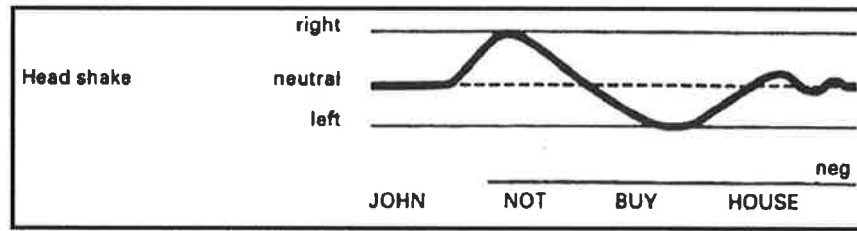
needed to separate a wh phrase and its complementizer (Richards, 2006). However, Smith (2009) indicates that it is the complementizer C, not the wh-element that is the driving force of the phrasing condition. Specifically speaking, the “nested” wh questions of Fukuoka Japanese, which contain two wh elements and two complements, maintain one pair of wh/C embedded within the other pair (Smith, 2009).

As previously mentioned, a variety of information is conveyed through the use of non-manual markings in ASL. Muscle tension and timing of the non-manual markings are crucial for the correct interpretation of the intended meaning. Linguistically speaking, some non-manual markings are an integral part of ASL which must co-occur with certain manual signs. The absence of these critical non-manual markings would cause the sign to be considered ill-formed (Neidle & Kegl, 2000). These non-manual markings are produced over the individual sign itself; it does not carry over the remaining signs of the utterance, marking the specific sign as a lexical item. Neidle et al (2000) state that:

Careful examination of the characteristics of these markings provides critical information about hierarchical syntactic structure in ASL. The distribution and intensity of these non-manual markings of agreement provide evidence that may help to resolve recent controversies about the existence of agreement projections cross linguistically. (Neidle et al., 2000 p.48)

Intensity is systematically used in non-manual markers as proposed by Neidle, et al. (2000), who states, “The intensity of the non-manual marking is greatest at the node of origin and decreases as distance from the source increases” (Neidle, et al. 2000, p. 45). The following schematic drawing illustrates the intensity level with a non-manual marking of negation:

John is not buying a house.



Source: The Syntax of American Sign Language. Kegle, Maclaughlin, Bahan, and Lee (2000)

The specific non-manual markings of ASL must similarly occur simultaneously with wh-questions. These non-manual markings consist of furrowed brows, squinted eyes and a side to side head movement. In cases of wh-phrase remaining in situ, the wh-marking extends over the entire phrase. Neidle et al. (2000) determine "this is because there is no manual material available locally to be co-articulated with the wh-marking associated with the +wh-feature in C unless the marking spreads over its c-command domain" (Neidle & Kegl, 2010). For example, the following sentence (5) is demonstrated by the accompanying video:

(5) _____ **whq** _____
JOHN SEE WHO YESTERDAY

'Who did John see yesterday?'

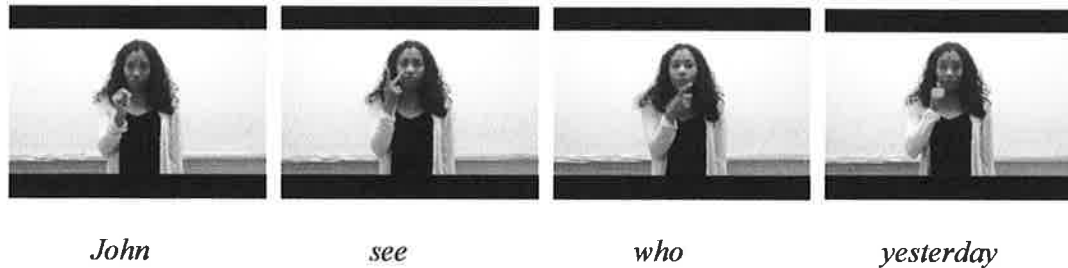
* (6) _____ **whq** _____
JOHN SEE WHO YESTERDAY

'Who did John see yesterday?'



[Video](#)

While signing, the signer holds the non-manual marking of furrowed brows, squinted eyes and a side to side head movement over the entire phrase (5) not just while signing the word (*who*) as in (6).



In a sentence construction in which the non-manual marking spreads over the entire clause, as is the case for *wh* in-situ (see sentence 7), the intensity is stronger near the position of the *wh*-feature associated with the marking and then decreasing with distance. Similarly, when a second *wh*-feature is present as when a *wh*-phrase is clause initial when preceding a *wh*-question (see sentence 8), the intensity begins at the position of the first *wh*-feature and continuing until the second feature position is reached (C) as dictated by the phenomenon of perseveration.⁴ Based on the claim that C is to the right of TP in ASL (Neidle, 2000), the spreading of the non-manual marking extending over the entire phrase predicts the intensity to be greatest at the end because all of the *wh*-features are to the right of TP. However, in constructions involving two *wh*-features, maximal intensity is maintained between the two occurrences.

⁴ Perseveration (maintenance of a particular articulation that will recur later) is found with non-manual expressions (Neidle, et al., 2000).

(7) $\overline{\text{wh-----wh}}$ (8a) $\overline{\text{wh-----wh}}$
 [[WHO LOVE JOHN]TP [+wh]C] [[JOHN SEE WHO YESTERDAY] TP [+wh]C]CP

'Who loves John?'

(WHO = Subject)

'Who did John see yesterday?'

(WHO = Object)

Keeping in mind that the constraints of movement involving wh-phrases in ASL are affected by the furrowed brow facial expression, these non-manual markers can occur on the right, left or can remain in situ; the direction of movement is a current topic of debate (Sandler, 2010). (See Appendix A) Although this debate constitutes two different structures, both confirm separately that the non-manual markers are in fact syntactically related. One claim, according to a study by Cecchetto et al. (2009) on Italian Sign Language (LIS), involves rightward movement relying on the non-manual marker. According to Sandler, "the authors attempt to explain why, in LIS, object WH words are never initial, this explanation relying crucially on the position and spreading or non-spreading of the non-manual marker" (Sandler, 2010). The explanation is supported by the notion that wh in-situ question formation is licensed prosodically.

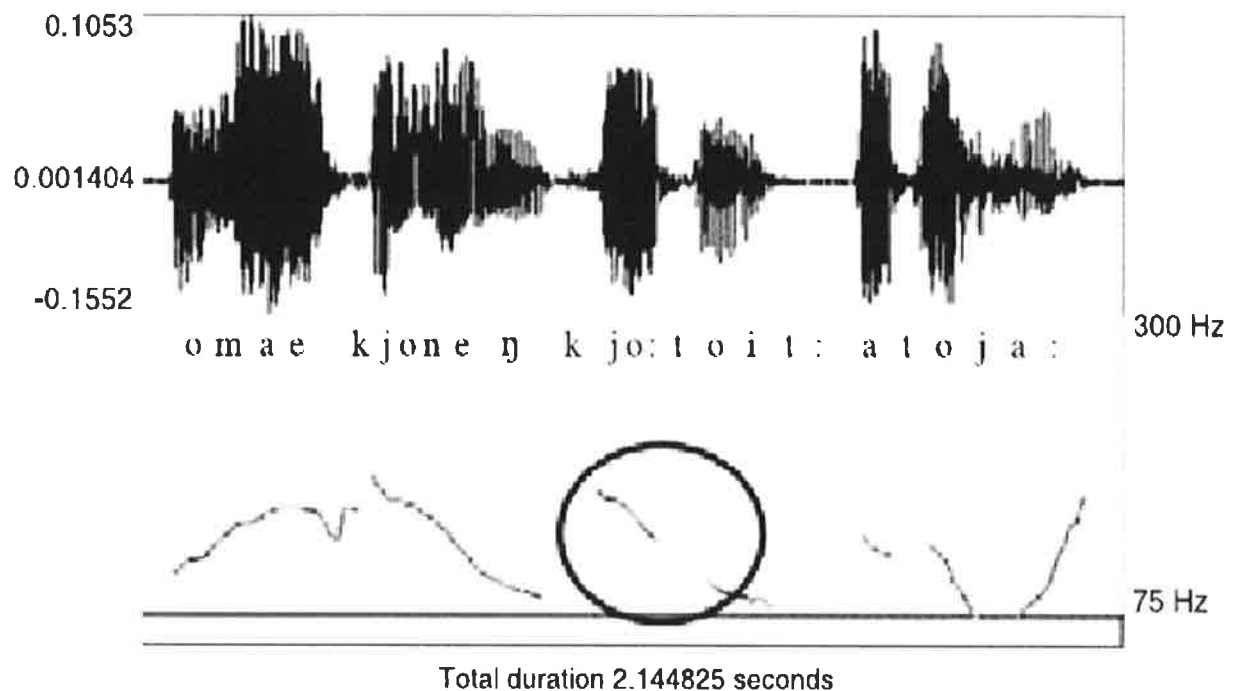
Obligatory head movement associated with a wh-phrase must occur when in sentence final tag position. These tags consist of a repeated but reduced version of the wh element from the main clause. Consistent with tags of other languages, a slight prosodic break exists before the tag in a sentence such as (9):

(9) $\overline{\text{WHO LIKE JOHN, WHO}}$

"Who likes John, who (does)?"

A comparable phrase construction involving intensity can also be found in Fukuoka Japanese. In a non-wh question construction (yes/no question), there is a dramatic pitch fall following a high pitch tone. The following sentence in Fukuoka Japanese illustrates the pitch fall:

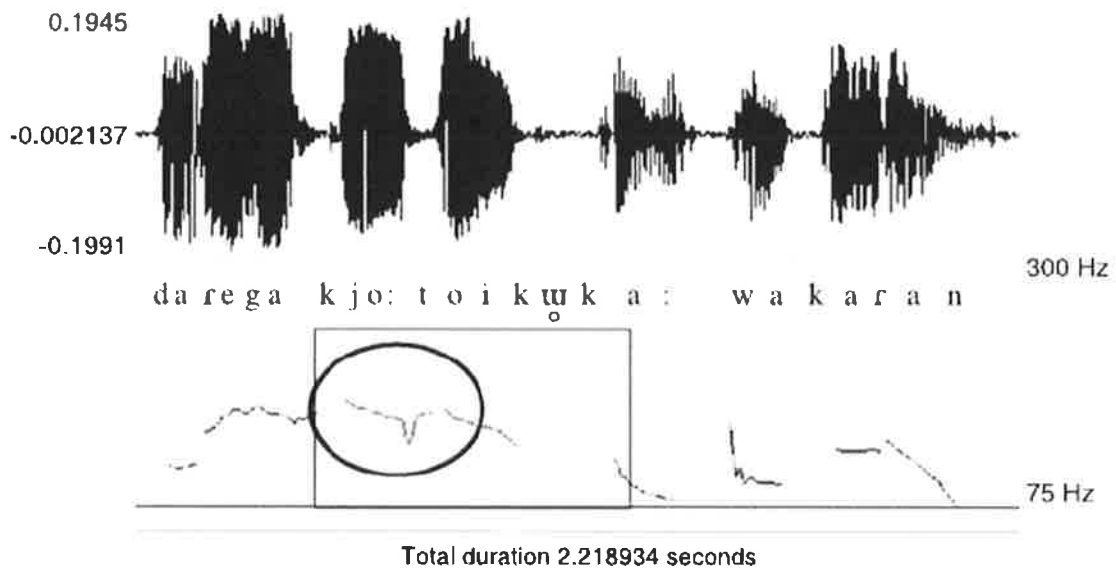
Omae kyonen Kyooto itta to ya? (Fukuoka Japanese)
 you last.year Kyoto went NLIZER COP
 'Did you go to Kyoto last year?'



Source: Richards, Norvin (2010) *Uttering Trees* p. 146-147

However, that pitch fall does not appear in a wh-question construction in Fukuoka Japanese. The intonational contour of the following wh-question forms a minimal contrast to the yes/no question above which begins with a high pitch tone followed by a slight decrease in the level of intensity (Smith, 2011).

Dare-ga Kyooto iku ka wakaran.
 who-NOM Kyoto go Q know-NEG
 'I don't know who's going to Kyoto'



Source: Richards, Norvin (2010) Uttering Trees p. 146-147

By comparing the pitch track for the word Kyoto (circled) in both examples, the contrast of the pitch is evident and according to Richards, represents the creation of a wh-domain that includes the wh phrase and its associate complementizer. It is these languages which allow wh in situ (Richards, 2010).

Conclusion:

The unique analysis of any aspect of signed languages brings with it added difficulties in data collection. Because no complete reference grammar has yet to be written for ASL, some discrepancies may arise in individual judgments regarding the evaluation of the data in question.

There is significant evidence from ASL to support a tight relationship between visual and auditory abstract phrasing in relation to the licensing of particular syntactic structures. The notion of intensity is parallel in spoken and signed languages, indicating that the nature of prosodic phrasing is modality independent. As Smith suggests, "Evidence from Fukuoka intonational structure shows that it is a requirement of the complementizer C, not the wh element α , that drives this phrasing condition" (Smith, 2005 p. 547). Similar is the emphasis of increased muscle tension in the non-manual markers of ASL on the doubled sign, making it the focus of the sentence. The distinct similarities of syntactic and phonological structure of American Sign Language and Fukuoka, Japanese contribute to additional potential support of prosody influencing specific aspects of syntax structure.

As Richards (2010) suggested, more research is needed, particularly in phonology-syntax interface of different languages for additional support of this claim. However, American Sign Language can be considered another example in support of this abstract conditioning.

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