The role of intonation in floating quantifiers

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This paper will examine the role of focus structure and prosody in the determination of so-called floating quantifiers' placement. It will be shown that focus structure plays a crucial role in determining where floating quantifiers (FQ) occur in relationship to the constituent being modifying. The final position that the FQ occupies in the linear string is determined by prosodic constraints. It will be shown that the existing theories do not take these factors into account and subsequently fail to provide an adequate explanation for FQ placement.

1. Introduction

What determines the position floating quantifiers (FQ) occupy in a sentence? The two main approaches to this phenomena can explain FQ placement to a relative extent, but do not provide a concise explanation for which of the several possibilities will be realized in a given sentence. In this paper I will account for the specific distinctions in FQ placement. Moreover the prevalent theories disagree on in which structural position an element can be considered a floating quantifier; there is no precise agreement on what can be considered an FQ. In this paper I will persist in the nomenclature FQ simply for convenience sake, but I show that the categorization of which elements fall under this guise needs to be expanded. It will be shown how phonology and focus structure are the determining force in the final placement of FQs. I will then show how this phonological approach, with a few modifications can be implemented into either of the two predominant approaches and I also present a third possible approach that places FQ on a separate plane and has linearization constrained by focus structure and prosody. It is this third option that I will show to be the most viable of the three.

2. Floating quantifiers

Floating quantifiers are elements that can have several possible locations in a sentence.

(1) The carpets have been cleaned
   a. The carpets have been all cleaned.
   b. The carpets have all been cleaned
   c. The carpets all have been cleaned
   d. All the carpets have been cleaned.

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All theories regard (b-c) as floating quantifiers. There is no apparent difference in meaning or scope in these sentences and the FQ can felicitously appear in either position.[1] Sentences (1)a,b) are often given different interpretations. (a) is frequently treated as different from FQs, it is sometimes treated as a completative adverb (Bobaljik, 1995) while in other theories it is treated as an FQ (Sportiche, 1988). The most controversial sentence is (d), as we will see later it is this type of sentence that creates a great chiasm in the two different approaches. Some theories consider (d) to be the non-floated version of (a-c) but essentially the same type of element, while other theories treat DP initial *all* as a different element completely, these theories consider DP initial *all* to be determiner quantifier (D-quantifier) and the floated *all* to be an adverb. At this point it is crucial to point out that judgments of FQ vary widely. Except for sentences like (b) there is seldom any consensus on the acceptability of a sentence. I return to this issue later as the significance of it is one of the major effects that phonology has on FQ placement. In short there is no one clear delineation of what an FQ is, nor in what position an FQ can appear in; minimally it is a quantifier like element (although even this point is contested) that seems to be modifying the DP yet is located structurally below the subject.

It is important to understand that the addition of *all* has a significant effect on the sentence. (1) can felicitously be uttered in a situation where there are 100 carpets and 95 of the carpets have been cleaned. Given the same scenario informants take (a-d) to be infelicitous; as long as there is even one carpet that that has not been cleaned (a-d) will be perceived as infelicitous. *All* has a maximizing effect. It maximizes the constituent it is attached to.

3. Previous approaches

There are two main approaches to floating quantifiers; the stranding approach and the adverb approach. In this section I will briefly sketch out the main aspects of these two approaches.

3.1 DP trace approach

What has become the textbook approach to FQ placement was put forth by Sportiche in 1988. Proponents of this approach take the DP and its modifier to form a single constituent giving the structure [Q NP] (Sportiche; Shlonsky 1991; Merchant 1996; McCloskey 2000).[2] Sportiche, as a proponent of the VP internal subject hypothesis, takes this unit, the FQ+DP (then NP) to be base generated in Spec, VP. When the subject moves cyclicly to Spec, TP the FQ can remain in the base or any intermediate positions while the rest of the DP continues to rise.

(2) All the boys should have eaten
[[All [the boys]] [t should [t have [t eaten]]]]
(All) the boys (all) should (all) have (all) eaten.

Therefore FQs mark the position of DP traces. This theory takes FQ and their DP initial counterpart to be the same element stranded in the former case and non-stranded in the latter.

Since Sportiche put forth his theory in 1988 the modified versions of this approach have been used to account for FQ placement cross-linguistically to relative degrees of success. One such example is Hebrew. Shlonsky expands on Sportiche's ideas and applies them to

[1]1. See (Tsoulas, 2002) for a counter approach to this claim which takes FQ to be overt scope markers.
2. Furthermore, scope differences do arise when there is another operator in the sentence.

[2] There have been several variations on the implementation of this idea and what exact position the Q is in and whether the Q is a head taking and NP as a complement or whether the Q is in a specifier position.

quantifier float in Hebrew. He proposes that quantifiers head their own projections (QP) and the head Q takes a DP as its complement. When the DP raises to the specifier, on its way out of the QP en route to Spec TP, we get agreement.

(3) Kol ha-yeladim ?ohavim le-saxek
all the children like to play
'All the children like to play.'

(4) Ha-Yeladim kul-am ?ohavim le-saxek
the children all-[3MPL] like to play
'All the children like to play' (Shlonsky 1991)

While the stranding approach is successful in many accounts there are several crucial issues that it cannot adequately account for. Represented in(5)-(8) are a few of the obstacles that dissuade acceptance of the stranding approach. In(5) the FQ is unacceptable in the theorized base position of the subject contra what is expected.[3] In(6) the FQ is occurring in a position that the subject could not theoretically have occupied.[4] In(7) the FQ and the DP could not logically have formed a single constituent. And finally in(8) *all* in the base position of the subject leads to a different interpretation of *all* (I will return to this in the coming section).

(5) *The votes have been counted all. (Bobaljik 1995)

(6) The magicians disappeared all at the same time. (Bobaljik)

(7) a. Seth, Pilar and Diana have all left in one car
b. All (of) Seth, Pilar and Diana have all left in one car. (Bobaljik)

(8) The carpets (all) have (all) been (all) cleaned.

Recently in Bošković (2004) a stranding approach that adequately deals with(5)(6) was put forth. This approach, which is based on the premise that FQ cannot occur in theta positions, limited FQ occurrences to the positions it does appear and explained why it cannot show up sentence finally in passive and unaccusatives. In order to do this Bošković allows the FQ to enter the structure acyclically and posits overt object shift. This approach further modifies the previous stranding approaches by claiming that sentence initial *all* could be either an FQ or not. While this approach comprehensively deals with many of the major criticisms of the stranding approach it fully relies on the theorem that English has overt object shift and posits that the FQ could adjoin to the structure basically in whatever position it has to in order to avoid occurring in a theta marked position, which I feel are the weaknesses of the approach.

The stranding approach's beauty lies in its convenience and unified approach. That FQ appear in positions that the DP passed through paints a nice picture. Unfortunately the data cannot support this picture.

[3] To account for this Sportiche theorizes that in unaccusatives and passives the subject is not base generated in object position. See Erteschik-Shir and Rapaport (2000) for a similar claim on passives and unaccusatives.

[4] This has lead researchers to propose that the FQ in these situations there is not an FQ but a full DP. They claim this is supported by the fact that full DP can be substituted in theses position while in other floated position this is not possible.

i. Ben, Mike and Sara arrived all at the same time.
ii. Ben Mike and Sara arrived, Ben and Mike at the same time.
iii. *The children have Ben Sara and Mike seen the movie

3.2 Adverbial approach

The second major approach to FQs takes them to be adverbs/adjuncts. The FQ is adjoined to the left edge of the predicate whose subject they modify and the FQ has an interpretive relationship between itself and the DP (Dowty and Brodie 1984 Bowers 1993; Baltin 1995; Bobaljik 1995). It was observed that FQs pattern and behave like adverbs; both are subject to ordering restrictions, trigger semantic/syntactic effect and need interpretive rules.[5] Bobaljik takes the FQ to maximize the predicate to which the FQ is attached in relationship to the subject. The FQ and the DP at no stage of the derivation form a single constituent. Pre-DP quantifiers are of a different sort, generally considered to be determiner quantifiers, than their 'floated' counterpart.

The adverb approach is able to explain many of the cases that the stranding approach is unable to. For example, the stranding approach is unable to account for(9) where the DP and the FQ could not logically have formed one constituent, this sentence naturally falls in line with the adverbial approach.

(9) Larry, Darryl and Darryl came into the café all at the same time. (Bobaljik)

PPs are predicates and the FQ can attach to the left edge of predicates. Additionally this removes the problem of accounting for passive, unaccusatives and cases where the DP and the FQ could not logically have formed one constituent as was shown in examples (6),(7).

While the adverb approach can successfully account for several issues that plague the stranding approach, it too has several major draw backs. One of the strongest arguments against it is that in many languages FQ host agreement features of the nominal system that agree with the subject.[6]

(10) Strákunum leiddist ollum í skóla (Icelandic)
The.boys. DAT.PL bored all. DAT.PL in school
'The boys were all bored in school' (Boeckx, 2001)

As shown in(10) the DP *strákun**um*** agrees with the FQ *oll**um***. If the FQ is an adverb there is no obvious explanation for the nominal agreement especially since other adverbs do not exhibit this type of agreement.

The adverb approach has another problem. Frequently constituents can move around adverbs as in(11)a) and the resulting structure while frequently slightly degraded is acceptable. This is not available when the adverb is an FQ as evidenced by(11)c). If FQ adverbs are adjoined to XP the same way as adverbs (left adjunction) this should be an available option.

(11) a. The men forgot their keys probably/accidentally/surprisingly.
b. *The men forgot their keys all.

The adverb approach needs to be able to account for why(11)a) is acceptable but (11)b) is not.[7] Furthermore as pointed out by Bošković FQs can attach to PP but sentential/modal

[5]See Dowty and Brody (1984) and Bobalijik (1995) for the specifics on these interpretive/construal rules.

[6]Further research is required but at least in some languages the agreement is likely a resumptive pronominal element and not real agreement features. This idea is not new for Hebrew and Arabic where Benmanoun (1999) has proposed that the agreement features that Shlonky took to indicate the NP had moved out of the QP is in fact a clitic.

[7] This is not a major concern though because it can easily be resolved prosodically. The constituent *their keys* can move and leave the *all* sentence finally. Following the Tones and Break Indices (ToBI) approach to English prosody sentence final position bears two accents, the intonational phrase boundary and the intermediate phrase

adverbs (which are the type FQs are theorized to pattern like) cannot attach to PP. So if FQ are true adverbs then they should pattern like them.

The adverb approach posits that DP initial *all* is different from the floated *all.* My data in section 4.2.2 indicates that this is not the case. While I do not deny there are differences between DP initial *all* and floated *all* (given that the truth conditions of the two sentences are parallel and my data from section 4.2.2), I remain unconvinced that the difference warrants positing a different element.[8] The adverb approach deals with FQ placement much more successfully than the stranding approach but still leaves many gaps.

4. A prosodic approach

4.1 Overview

I will propose a third and quite viable alternative to the two main theories of FQ placement, an approach that takes the phonological details and the aspects of f-structure into account. In this section I will first go over the details relating to the prosody and f-structure of the FQs and then sketch out a third option that I feel more accurately accounts for FQ placement. This program will show that *all* is a maximizing element; *all* maximizes whatever constituent it is attached to. This approach takes FQs to be on a separate plane during syntax. During linearization f-structure will partially determine where the FQ aligns and then phonological movements can move the FQ into the phonologically optimal location.[9]

4.1.2 Data Acquisition

The focus of this research is to explain what determines which position the FQ will occupy when there are several possibilities. I am interested in the actual usage of the language. Therefore most data was obtained from spoken sources. As the different types of sources are important I will briefly discuss them. The initial source of data came from informants who memorized a sentence and then recited it. This data was intended to capture the overall prosody of sentences with FQ. The second source of data came from recordings of a native informant who was given contextualizing information then questions regarding the context and the informant had to choose the answer that they felt best suited the question. The answer choices consisted of the different possible word orders for FQ. A recording was made of the informant reading the question and the chosen answer. This data was used to see what position was preferred depending on the focus structure (f-structure) and to see what pitch accents were associated with which f-structure roles and to see if there was any difference in the prosodic boundaries. The third and fourth sources were corpora, The Santa Barbara Corpus (SBC) (Dubois et al. 2000) and the Variations in Conversation (VIC) corpus (Pitt et al. 2003). These provided the substance of the data. Corpora provide examples of freely

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boundary (Pierrehumbert and Hirshberg 1990). These two accents are not on the final constituent but yet still carried by it; they convey information about the entire sentence (see Beckman, in press for more on ToBI). I propose that *all* cannot bear sentence final tones because there is no element for *all* to prosodically incorporate with. *All*'s need to incorporate will be evidenced in the following section.

[8] Although one argument against my claim is that in most cases use of adverbs or their determiner counterpart do not result in different truth conditions either.

i. Most quadratic equations have two different solutions.
ii. A quadratic equation usually has two different solutions. (Partee1995)

(i) and (ii) have the same truth conditions and the D-quantifier and the A-quantifier are definitely not the same element.

[9] See Miyagawa (2004) for an approach to q-float that incorporates the NSR.

generated contextualized speech which were subsequently analyzed for f-structure, pitch, and boundaries. All sounds were analyzed using PRAAT speech analysis system (Boersma and Weenik, 1992). Utterances were transcribed following the ToBI guidelines (Beckman and Ayers 1994).

In addition to the recorded data 8 native speaking informants were surveyed in order to accumulate additional data on FQ placement in differing F-structures.

4.2 Focus structure

Focus structure affects word order. In free word order languages it has been shown that the information structure role of a constituent affects its position. Many languages are theorized to have structural focus positions (eg Hungarian (Kiss 1998) Hebrew (Belletti and Shlonsky 1995) overview on focus positions in Spanish Italian and German (Büring 2003). While English is not a free word order language there are elements that exhibit relative freedom in their placement and it has been shown that in some case focus structure affects the placement of these constituents (Dehé 2001 for verb particle structure, Büring and references therein). A one-to-one correlation between focus structure role and FQ placement is not expected except in the case of contrast because while FQs can be contrastive they cannot be topics or foci; they can only be associated with a topic or a focus.[10]

4.2.2 Contrast

When the FQ is contrastive and modifying the subject it is highly favored left adjacent to the DP, in sentence initial position.[11] This result, while surprising for English, is well-attested to cross linguistically. Numerous languages posit a contrastive position in the left periphery (Rizzi, 1997, Dominguez in press). Speakers' preference for placing contrastive FQs in this position is unanimous in my experiments. The survey results showed unanimously that given (12)a) the preferred response was (b):

(12) a. Did any of the children see the movie?
b. All the children have seen the movie.

In this case there is contrast between the alternatives for *all*. Following the theory of focus structure put forth by Erteschik- Shir (1997) this sentence initial *all* being contrastive is not surprising since contrast is created by a focal element inside a topic. It is well known and accepted that *all* along with most quantifiers is prosodically highlighted; this is a type of focalization. Subjects are topical by default. A focus within a topic leads to a contrastive interpretation. Therefore the default reading of *all* (when it could have been floated) inside a topic will be that of contrast.

(13) $[[\{All\}]_{foc}[the\ children]]_{top}$ [have [seen the movie]]$_{foc.}$
{most}
{some}
{none}

The speaker is asserting that it is *all* and not an alternative to *all*. Obviously context can change the reading, change the f-structure, but the default reading should be contrastive in

[10] See Belletti (2003) for a quantifier stranding approach that incorporates information structure.
[11] When the FQ itself is contrastive, not the whole DP.

these cases unless the speaker refrains from accenting *all*. Survey results were not the only confirmation for contrastive FQ being favored initially. Experimental work in English has associated contrast with the pitch accent L+H* (Pierrehumbert 1980; Hedberg 2002). Analysis of two corpora, Santa Barbara Corpus (SBC) and Variations in Conversations (VIC) and recordings of elicited speech showed that frequently when *all* occurred DP initially it was marked by the L+H* pitch accent.

Figure 1

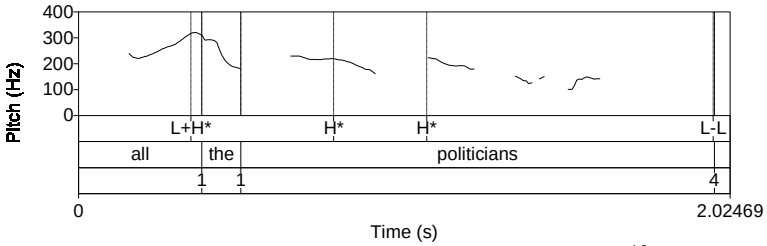
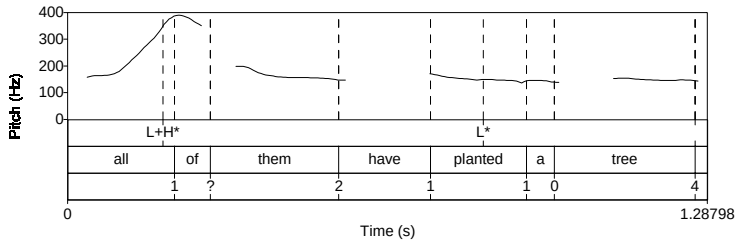


Figure 1 shows the contrastive pitch accent on *all*. [12] The context of the discourse illustrated that this was indeed a case of contrast.[13]

Figure 2



In figure 1and 2 the clear L+H* indicates that the FQ is contrastive. It should be pointed out that *all* can be contrastively pitch accented in the floated position and in such cases it will be interpreted contrastively. Therefore I propose that initial placement of the FQ is an optional way of marking contrast on FQs.

4.2.3 Topic/focus associations

FQ themselves are not the topic or focus of a sentence.[14] This explains why contrastive FQs have a specific position but topic or focus related FQ do not have a particular position. FQs related to topics clearly prefer non initial position. While it has been claimed that topics usually are not pitch accented in English my research has found that frequently non pronominal subject topics are pitch accented as well as the FQ associated with topics. Generally the pitch accent marking subject topic and the associated FQ pitch accent is H*. The relevance of this will be seen in section 4.3.1

[12] Following the ToBI guidelines utterance initial pitch accents should be marked L+H* only in cases of an unambiguous pitch accent type, in cases where the pitch accent type is not clear between H* and L+H* transcribers should choose the former (Beckman and Elam 1994). Therefore several initial FQ were transcribed as H*. In some cases duration was also taken into account as frequently the L+H* has has a longer duration than H*.

[13] There were a few cases where the initial FQ was clearly not pitch accented contrastively. These cases require more analysis before any conclusions can be drawn.

[14] The exception to this is when the FQ replaces the subject of the sentence: "All came."

Figure 3

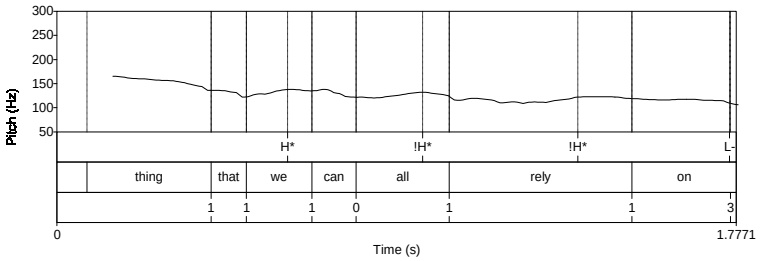


Figure 4

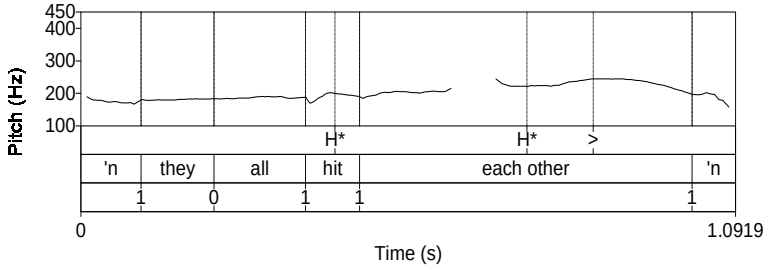
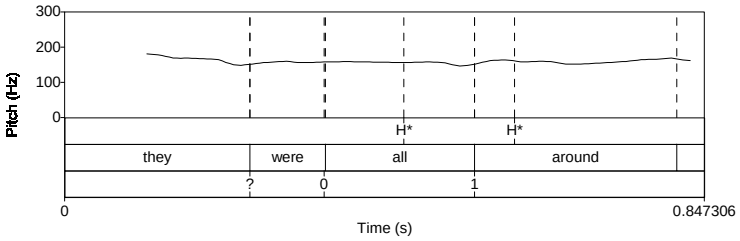


Figure 5



Figures 3-5 show that topic associated *all* occurs to the right of the DP it modifies and can either be pitch accented or not. There appears to be no structural position that *all* favors, any position adjacent to a weak pronoun, auxiliary or modal is fine.[15]

FQs associated with focus do not seem to have a direct correlation to a specific position. There are prosodic events that indicate that an element might be focused. One indicator that appeared in several recordings with focus on the DP was a phrase boundary corresponding to a three on the ToBI break indices after the FQ. This boundary following the FQ is not consistently present in cases where the DP is focused. Further research is needed but I suspect that the different types of focus may lead to different manifestations of prosodic clues for focus. There also seems to be some favoring for floating FQ from topics as opposed to foci, I will return to this in section 4.6.

Evidently there is a favored position for contrastive FQs. I certainly do not intend to claim that the FQ will obligatorily occur left adjacent to the DP whenever there is contrast I do claim that analysis of freely generated speech does show that speakers prefer this position for contrastive FQs. While an analysis of why initial position in many languages is favored for contrast is a theoretical question well beyond the scope of this paper I will though put forth

[15] When there is no string of auxiliaries or modals and the only two positions are FQ DP or DP FQ then in many cases the FQ will occur initially for prosodic reasons. Initially the FQ is stronger and doesn't need to PI (see section 4.3 and 4.3.2), right adjacent to most DP (depending on the prosodic make up) the FQ cannot PI for prosodic reasons. There also maybe more f-structure constraints going on here that require more investigation.

two possibilities. Firstly it could be a way to link the contrast back to prior discourse as is seen in topicalization, which moves topics to Spec, CP, and provides a link back to the prior discourse. The contrast is with an element previously uttered in the discourse; by placing it initially it is easier to process the contrast. When *all* is related to a topic there is no need to refer back to anything outside the sentence because DP modifying FQs are anaphoric to the DP they are associated with. There may be further phonological reasons; contrast is usually distinctly pitch accented, this high peak maybe be easier to produce sentence initially before the down drift of the F0 (fundamental frequency) begins.

The role of f-structure has been shown in this section to play an important role in FQ placement. FQ which bear the f-structure role of contrast are favored initially while FQ associated with foci or topics are favored in non-initial position.

4.3 Role of Phonology

This section will explore the precise details of what determines the FQ positions within the maze of auxiliaries/modals. In(14) below, what determines which position *all* will occupy?

(14) The children (all) might (all) have (all) been (all) causing problems at the movies.

I claim that the position is determined by where the FQs can prosodically incorporate with another element. The idea that FQ need to prosodically incorporate is not new. McCloskey (2000) proposes that wh-quantifier float in West Ulster English (WUE), beyond the syntactic constraints, is further constrained by the requirement that the FQ prosodically combine with the verb. Sentences become progressively more degraded as more intervening material occurs between the verbs and the FQ. McCloskey's data provides, as of yet, unrefuted evidence for the role of prosody in FQ placement.[16] Interestingly, my data shows that FQ PI with intrinsically weak elements while in WUE the PI was with lexical verbs. To me, this provides further confirmation for the crucial role of language specific, perhaps more correctly dialect specific, phonology and prosody.

4.3.1 Prosodic incorporation

Prosodic incorporation is used more or less as a catchall for cliticization, lack of disjuncture, fast/slurred speech etc.. A precise classification of PI is needed before any claims can be made for the role it has in word order. The following definition of PI is based on my analysis of 20 utterances from the SBC and the VIC at the different word junctions.

(15)Prosodic incorporation in English

> Two words highly co-articulated without final lengthening of the first constituent, no initial glottalization of the second constituent, possibility of a reduced vowel in either of the two constituents, one constituent of the newly formed prosodic unit can be pitch accented and the two words are auditorally perceived as one word (corresponding to a break index of 0 within the ToBI framework).[17] (Cho 1999,2001, Turk and White 1999, Beckman and Ayers)

[16] McCloskey followed a stranding a approach and claimed the FQ could remain in any position the wh-phrases passed though as it cyclically moved to Spec, CP. If the FQ was in a position that was not prosodically optimal the sentence would be drastically reduced in acceptability but if the FQ occurred in a position that the wh-phrase had not passed through then the sentence would be completely unacceptable for the informants.

[17] Other indicators of juncture include: silent or filled pauses, breathing, Fo movements, intensity variation, and voice quality (Carlson, Granström et al. 2002). Therefore the presence of any of these indicate that PI is not

Actually classification of PI is quite difficult because frequently three out of four of the criteria are fulfilled but one is not. In this paper I attempted to adhere to the definition in(15) as closely as possible. Having established what PI is we now need to see what it does.

4.3.2 Role of prosodic incorporation

FQs appear in positions where PI is possible. The elements that can PI with *all* are intrinsically weak elements which include auxiliary verbs, modals, pronouns and although not intrinsically weak in a few rare cases unstressed monosyllabic NPs. In(16) the expectation is that if the DP is not contrastive then the FQ will occur right adjacent to the DP giving either (16)a) or (b).

(16) a. The children **have all** seen the movie.
b. The children **all have** seen the movie.

Intuitively speakers consistently produce(16)a). *The children* is an utterance initial disyllabic content word, and these are not traits that are conducive towards phonological weakening. The DP is pitch accented and the definition of PI does not allow a doubly pitch accented unit. These conditions prevent *all* from PI-ing with *the children* and therefore this word order is not favored. Additionally *all have* is less favored than *have all* since *all* is onsetless and will favor positions where it can acquire an onset. In my experiments where informants where given a sentence similar to(16)b) and (17)a-c) to memorize and recite they unknowingly and consistently produced (16)a) and (17)a'-c').

(17)Given:
a. The children all have probably seen the movie.
b. The children all should have seen the movie.
c. The children should all have seen the movie.
Produced:
a'. The children have all seen the movie.
b.' The children should have all seen the movie.
c'. The children should have all seen the movie.

This shows that the speakers natural produced the phonologically optimal sentence and not the one they actually memorized. FQ placement is apparently further constrained when(17)c) is considered where (c') is favored over (c). In(17)c) the FQ occurs right adjacent to a modal and left adjacent to an auxiliary and this position is evidently not the favored word order. Furthermore the results of my survey showed that the linear order of: *modal all auxiliary* was never the chosen word order. Given that in this position between the modal and the auxiliary *all* acquires an onset and can PI the role of PI evidently needs further refinement. We need to determine what linear position *all* will occupy in a given string of possible elements that can PI with *all*.

An auditory analysis of recordings of(17)b',c') clearly indicates that *should have* PIs. If *all* were to occur right adjacent to the modal it would break up this prosodic unit, but when *all* occurs after *have* then *all* can attach to the unit formed by *should have*. Survey and corpora

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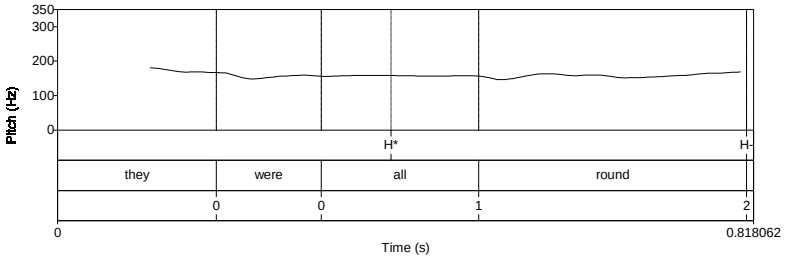
occurring. It should be noted that co-articulation and vowel quality will be affected if the syllable is stressed, bears a pitch accent and by its level of sonority- degree of coarticulatory resistance is inversely proportional to the degree of sonority of the segments (Cho 1999).

results show that *modal+aux+all* is the preferred order for a string of modal auxiliary and FQ.[18] In cases without the modal and just a pronoun and an auxiliary *all* is favored where it can form a unit with the pronoun and auxiliary.

Figure 6



In figure 6 the *pronoun+auxiliary+FQ* form a prosodic unit with *all* being pitch accented.

Having partially established the preferred word order given a string of auxiliaries/modals still left open is the question of why *been all* is not the preferred word order.

(18) The dogs have been all petted.

There is no reason to suppose that PI could not occur in(18). *All* can acquire an onset here and there is no prosodic unit formed by *been* and the main verbs so what is the problem? Interpretively there is a difference. This position (when the subject is plural) leads to ambiguity in interpretation or to a completely different interpretation for many speakers.

(19) The dog has been all petted.
= the dog has been completely petted.

Note the singular DP which could not possibly take *all*. This word order leads to a different interpretation. When *all* occurs following *been* before the main verb it gives a completative reading. I discuss this difference in meaning in section 4.6.3.

It has been shown that FQs get their position based on two main factors; focus structure and phonological constraints. *All* needs to be in a position where it can PI. Knowledge of the phonology at play here also helps clarify an additional factor plaguing theories on floating quantifiers; the lack of reliable judgments on the acceptability of sentences. Having fleshed out the role that phonology plays in these sentences we can see that the lack of reliability comes from whether or not the speaker/listener PIs the FQ. When the FQ is not PI-ed there will be a marked decrease in acceptability.

4.4 Incorporation of prosodic data into other theoretical frameworks

The phonological data discussed in this section could be cohesively incorporated to either of the two predominant FQ theories discussed in sections 3.1 and 3.2. For the stranding approach this would entail that the FQ can only be stranded in positions where PI is possible and in cases of contrast the FQ cannot strand. This would explain why(17)a-c) are possible but not optimal. Syntactically the FQ can be stranded in any position the DP passes through but phonologically it is disfavored if the FQ cannot PI, similar to the proposal for WUE put forth

[18] In some cases with a pronoun+modal+auxiliary the FQ is favored between the modal and auxiliary. At this point I am not sure why these cases differ from the norm.

by McCloskey. In the cases of contrast one could investigate the possibility of some [+contrast] feature in English and the possibility of an optional contrast XP. The FQs that occur attached to a secondary predicate are attached to a copy of the subject with in the secondary predicate (I will return to this in section 4.6.4) and therefore they can still obtain their position and be part of the DP. To incorporate the phonological data into the adverb approach this would mean allowing the FQ to attach as usual, to any XP but having p-movement occur to put the FQ in a phonologically optimal location. The only major obstacle would be to account for the fact that contrastive FQs occur initially since the adverb approach takes DP initial FQs to be of a different sort. This could perhaps be dealt with through some sort of feature checking of a feature on the FQ when it is contrastive. Or perhaps maintaining that the two are different elements and the DP initial on more readily allows a contrastive interpretation. While the phonological data could be incorporated into a main stream approach to FQ those theories, based upon syntactic movements and structures do not attribute enough weight to the role of f-structure and prosody. I will present a third approach attributes a much more significant role to f-structure and phonology and deviates from the classic views of syntax and phonology.

4.5 Base generation

It has been observed that adverbs are invisible to some syntactic operations and hypothesized that this is because adverbs are on a different plane during syntax (Bobaljik 2002). The main stream approach to syntax is two dimensional structures and motivated movement generally for feature checking, and perhaps most significantly no movement is optional (Chomsky 1995).With FQs and many other adverbs in general there is no difference in meaning that could justify the positing of a feature that needs to be checked in a specific configuration.[19] By acknowledging that syntax tree is not constrained to two dimensions one can explain the freedom of the element and allows the attribution of phonology and focus structure. This multi-dimensional syntax can be seen as having elements on another plane, having unordered pairs or having a third (or more) dimension to syntax. I will refer to what is outside of the parts of the tree that syntax has access to as the third dimension noting that the nomenclature is insignificant. The FQ is attached in a third dimension to the constituent that is being maximized.[20] Obviously by claiming this I will include more cases under the heading of floating quantifier than standard theories which posit Q-float only from the subject DP. During syntax FQs are not visible as syntax is two dimensional and therefore does not have access to the FQ which is in the third dimension. At PF linearization occurs and here the FQ is linearized into the string along with the output from the syntax. FQs need to be placed in the third dimension in order to adequately account for their placement.

4.6 F-structure and prosody

4.6.2 DP modifiers

It was shown in section 4.2.2 that in English contrastive FQs are favored DP initially and when the FQ is associated with a focus or a topic it is favored non sentence initially in a prosodically optimal position. Elements are selected from the lexicon with interpretive features. Deviating from the standard minimalist assumptions on features, these features are

[19] See fn. 1

[20]See Goodall, G. (1987). Erteschik-Shir, N. (to appear), Åfarli, T. A. (1997) for more on the third dimension

interpretive features that do not require checking but instead derive the intonation and interpretation. The distribution pattern of FQs can be accounted for if linearization is sensitive to f-structure as follows: the FQ linearizes left adjacent to the DP if it is contrastive and right adjacent to the DP if it is not. From the right adjacent position a phonological metathesis type process may move the FQ into a position that is prosodically optimal i.e. where the FQ can PI without preventing the PI of other constituents.

(20) a. The children all will have seen the movie.
b. The children will have all seen the movie.

(20)a) shows the output of PF linearization for non-contrastive *all; all* linearizes right adjacent to the DP. This position though is not phonologically optimal for pronunciation because PI is not possible here, as discussed in section 4.3.2, so then the FQ undergoes phonological metathesis and forms a prosodic unit with *have* resulting in the word order in (20)b). The naturalness of this pronunciation was attested to in(17) when the speakers unknowingly pronounced *The children have all seen* instead of *The children all have seen*.

4.6.3 Verb attachment

It has been claimed that FQs can only modify DP subjects. When *all* occurs adjacent to the lexical verbs and gives a different interpretation many theories no longer consider it an FQ (Bobaljik 1995). This separation though is unwarranted in a theory that takes the FQ to be an element that maximizes the constituent that it is attached to. FQs can modify Vs:

(21) The carpet has been all cleaned.

and constituents internal to the VP:[21]

(22) The men were told all at the same time.

(23) The boss told all of them.

In(21) *all* is attached in to the V, in(22) it is attached to the adverbial PP in(23) the attachment is to the object DP. Turning first to(21), when *all* is attached to the V it gives a completative meaning, *all* maximizes the V. As mentioned earlier researchers have noted this difference and claimed that in these cases *all* is not a FQ but a completative adverb. The theory sketched out here anticipates a difference in interpretation from FQs that satellite around the DP, no special disclaimer is needed; FQs maximize the constituent they are attached to. In most cases maximizing a V entails a completion of the activity. (21) means that the carpet has been completely cleaned; since the DP is singular there is no way for *all* to be construed with it. Further support for this claim comes from the fact that FQs cannot attach to stative verbs because in these cases there can be no maximizing.

(24) *He all owns the bike.

(25)*They all own the bike. (under the reading the bike is completely owned by them)

[21] This point is highly contested. Floating quantifier approaches in general take quantifier floating in English to occur only from subject DPs.

When *all* attaches to a verb it maximizes it, therefore *all* can only attach to verbs that allow maximizing. When a plural subject replaces the singular one the sentence is be fine but *all* is construed with the subject. It cannot be interpreted with the verb.

(26) They were all loved.
a. Each person was loved
b. Each person was completely/full loved

(27) The dogs were all petted.
a. Each dog was petted
b. The dogs (not necessarily every dog in the groups) were completely/fully petted.

(26) can only mean (a) there is no ambiguity. In(27) the sentence is ambiguous between reading (a) and (b). Informants are more likely to interpret (27) as (a) because that is the more common use of a sentence like this, but if the plural subject was replaced by a singular subject, thereby removing (a) as a viable option the sentence is fully comprehensible but has the (b) reading.[22] Additionally if the subject is focused and there is no pitch accent on *all* informants found that with this interpretation (b) was the most viable interpretation.

(28) The dog was all petted.
= the dog was completely/fully petted

One problematic aspect is that not all cases where the FQ is adjacent to the main verb allow for the completative reading.

(29) a. The children have all eaten.
b. *The child has all eaten.

(29)a)cannot mean that the children have completely eaten, this is illustrated by the unacceptability of (b) where there is a single subject. The acceptability of the completative reading depends on the availability of the interpretation; therefore the acceptability will depend on context and especially verb type.[23] When attached to the V *all* gives a completative reading. This is not because in this position *all* is a different element than that which occurs adjacent to the DP but because it is the verb being modified not the subject.

4.6.4 Secondary Predicates and PP's

FQs that occur within the VP attached to non-verbal constituents have been eluded a comprehensive treatment. As mentioned in section 3.1 theses types of construction have inspired strong criticisms of the DP stranding approach since the DP could never have occupied this position.

[22] *All* can also maximize adjectives for many speakers, particularly in non-standard English.
i. She's all fat. = She is totally fat.
ii.. He's all that. = He is completely/totally cool person.
iii.. She's all sexy …= she is sexy in every aspect

[23]a. Cross-linguistic research is needed to determine if in other languages FQ can modify verbs as they do in English.
b. There is a marked increase in acceptability with passive verbs. I have no comment at this point on this.

The first case I will examine of an FQ attached to VP internal constituents will be the case of secondary predicates.

(30) They arrived at the party all ill.

(31) Ben Mike and Drew came into the café all (very) tired.

In sentences(30),(31) it is apparent that *all* is modifying the subject of the sentence.[24] (30) means that each member of the set was ill upon their arrival; (31) means that when Ben Mike and Drew came in they were tired. In these sentences *all* has the same effect as when it occurs adjoined to the DP in that it is infelicitous in the context of even one member of the group not conforming to the condition under discussion(as discussed in section2). For instance(30) would be infelicitous in the situation where ten students are the relevant set and nine arrived ill and one arrived healthy. At first it is difficult to see how *all* can be modifying the subject. As pointed out by proponents of the adverb approach, at no point did the subject form a constituent with *all,* nor is the subject close to the FQ, in fact the only apparent relationship is c-command. The adverb approach can deal with this problem by positing an interpretive rule between the subject and the adverb (Bobaljik, Dowty and Brodie 1984). But a comprehensive account for these constructions requires no extra machinery only an adequate account of secondary predicates. Following Rapoport (1999) secondary predicates are attached on a separate plane. The secondary predicate contains a copy of the subject.

(32) John fried the potatoes naked. (Rapoport 1999)

A sentence of the type in(32) can only mean that *John* was naked. Here the AP would contain a copy of the NP *John* and the *naked* giving:

(33) John fried the potatoes [$_{AP}$~~John~~ naked].

Since the subject is repeated in the AP, if there is a FQ this FQ will also be repeated. A further example of this can be seen from the lack of ambiguity in(34).

(34) The boys bought the dogs all very sick. (p.c Rapoport)

While some speakers find(34) totally unacceptable, other speakers find it acceptable only under the reading that the boys were ill and not the dogs. This illustrates that *all* is part of the secondary predicate and not part of the object *the dogs.* The syntactic tree has two planes and in that second plane we have the secondary predicate which contains the subject. When the tree is shipped to phonology the phonological content of the copy of the subjects deletes.[25] The features remain and this enables the interpretation of *all* as modifying the subject and leads to the correct pronunciation. By following Rapoport's approach to secondary predicates there is no problem in accounting for *all* modifying the subject when it is attached to a secondary predicate.

[24] A disclaimer at this point is in order since I found an absolute lack of consistence in judgments. All sentences were put to at least five informants. Any sentence judged as unacceptable by half or more was not included unless it is a sentence that other researcher have used and judged to be acceptable. More work is needed on understanding the incredible lack of reliability in judgments..

[25]a. Rapoport (1999) had deletion occurring differently, for her when the verbal subject lined up with the adjectival subject the adjectival subject could delete in an ATB fashion.

b. One could implement this approach with slight modification without positing a second plane since copy deletion happens in at PF.

A more problematic puzzle is illustrated in(35), (36). *All* can attach to some adverbial PPs, but judgments vary widely.

(35) The men were told all at the same time.

(36) The votes were cast all in alphabetical order. (Bošković 2004)

Prosodically, it is quite evident that the FQ is phrased with the PP and not with the V. Frequently there is a prosodic boundary after the V before the FQ and PI between the FQ and the P. This indicates that this in not a case of FQ linearizing right adjacent to the verb but left adjacent to the PP. Additionally most informants felt that by placing *all* adjacent to the PP it highlighted the PP (focused it). Interestingly not all PP adverbials can have *all* modifying them.

(37) a. The children saw the movie all at the same time.
b.*The children saw the movie all at three o'clock.

The temporal adverbial does not appear to be able to host an FQ.[26] The understanding of which PP can host an FQ becomes more convoluted when(38) is taken into account.

(38) a.*The man was told all at the same time.
b. The men were told all at the same time
c. ??The man was told at the same time.
d. The men were told at the same time.

What accounts for why(38)c) is marked? Whatever renders(38)a) ungrammatical also renders (38)c) marked, since *all* is emphatic it is natural that the addition of *all* exacerbates the markedness. Consider the adverbial under question, *at the same time* requires a plural subject. Therefore whether or not *all* is present this PP is not felicitous with a singular subject. Addition of *all* exaggerates the infelicity of this sentence. The idea that some modifiers require plural subjects is well known, take *together:*

(39) a. *Ben built the sandcastle together.
b. They built the sandcastle together.

Together requires a plural subject, as does *at the same time.* (39)a) illustrates that *together* cannot occur with a single subject since it is subject orientated and requires a plural subject. *Together* can function both as an adnominal and as an adverbial, but in either case it minimally two elements collectively (Moltmann 2004). A similar explanation can explain why(37)a) is acceptable while (38)b) is ruled out. In(38)a) the FQ can maximize *at the same time* since *same time* requires a plural reference; at least two events happening in parallel. Conversely(38)b) has a single reference, reference to a particular time, and therefore there is nothing that can be maximized either in relationship to the subject or otherwise. When FQs modify adverbials they are maximizing the adverbial and therefore require that the adverbial can be pluralized. This is reinforced by the fact that *all* can co-*occur* with *together.*

[26] Some speakers allow *all* to attach to time adverbials when the word exactly follows it.
i. The kids came all exactly at six.
ii. *The kids came all at six.
Perhaps *exactly* impacts the meaning in some way to allow it to be maximized. I have no further explanation for this at present.

(40) a. The children sang the song together.
b. The children sang the song all together.

In(40)a) the sentence means there was a group of children and at the same time they sang. It does allow for one or two children to not have sung. (40)b) on the other hand leaves no room for any child not to have sung. *All* maximizes the group reading to force the inclusiveness of every member of the group.

This maximizing is not only construed in relationship to the DP.

(41) The linguists cleaned their apartments all on the same day. (Bobaljik)

In(41) the *same day* refers to the cleaning of the apartment by the linguists not just to the linguists. Obviously if something happens *on the same* day there must be minimally two events happening. So FQ can modify predicates that can be maximized in relationship to anything contextually relevant.[27]

4.6.5 Objects

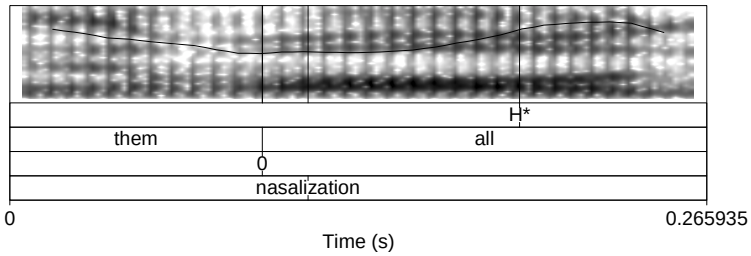
While the standard line on q-float in English is that it only occurs from the subject, I propose to challenge that view. In(42) the FQ can occur on either side of the object DP.

(42) a. The boss told all of them.
b. The boss told them all.

This has been approached as pronoun/quantifier inversion (q-flip) and not q-float since full DPs can not float quantifiers when the DP is the object of a simple transitive verb. (42) needs reanalysis as object q-float because once the prosodic details are incorporated into the analysis it clearly is q-float.

On the surface(42) seems to contradict the phonological claim that FQs cannot bear a phrase and a boundary tones. A phonological analysis shows that *them* and *all* PI.

Figure 7



Pronouns are weak and they PI with FQs and this strengthens the FQ; once the FQ has PI-ed it can occur sentence finally. This solves the structural problem but determination of what order *pronoun/all* will occur in is quite problematic. Initially there does not seem to be a connection between the order and f-structure. One may be inclined to claim the choice depends on whether the context requires a strong partitive as in(42)a) or not as in (42)b). Yet when this

[27] *all at once* seemingly contradicts this claim. But the complete difference in meaning between (i) and (ii) seems to indicate that *all at once* is an expression and therefore not relevant to this discussion.
i. The men were told at once. = The men were told immediately.
ii. The men were told all at once. = The men were told at the same time.

data is looked at in light of data from the double object construction there seems to be more happening more than just a partitive difference.

In order to understand object q-float we need to look at other cases of object q-float. Some double object constructions also allow quantifiers to float from the direct object.

(43) a. John sold the books all to Mary.
b. John sold all (of) the books to Mary.

It is well known that double object constructions have different interpretations depending on whether the direct or indirect objects come first. Following Erteschik- Shir in the double object construction when the direct object occurs initially, in the unmarked case the direct object will be the topic. In the reverse order, indirect object preceding direct object there is no such condition on the unmarked f-structure. So in(44)a) *the books* is the topic while not necessarily in (b).

(44) a. Mary sent (all) the books (all) to Peter.
b. Mary sent Peter (all) the books (*all).

(44)b) has the implication that Peter received the books while (a) has no such implication associated with it. In(44)a) the FQ can float while in (44)b) floating is impossible unless additional material is added after the direct object as in (45).

(45) a. Mary sent Peter the books all on the same day.
b. *Mary sent Peter the books all at five o'clock.

As was shown earlier *all* can occur only with PP that allow maximalization. Obviously in (45)b) the problem is with the adverbial and not *all* otherwise there would be no way to account for the grammaticality of (45)a). For this I conclude that when the direct object occurs after the indirect object then floating no longer becomes an option. Interestingly when informants were presented with the following questions different answer choices were permitted.

(46) a. What did Mary send to Peter?
b. Who did Mary send the books to?

(46)a) asks for the direct object focus while (b) asks for an indirect object focus. Informants chose non-floated *all* as the response in both(46)a,b) but allowed floated *all* only in response to (46)b). So when the direct object is a topic the floated order is possible while with focal direct objects the floating option is unavailable. There is an interesting parallel here. Recall that only pronouns allow for FQ to float in simple transitive sentences.

(47) The man hates (all) them (all).

(48) The man hates (all) the pictures (*all).

Pronouns are obligatorily topics. Pronouns are anaphoric on something already in the discourse and therefore cannot be new information.[28] (Erteschik-Shir 1997) The unmarked/default case is one in which the subject is the topic and the object is the focus.

[28] I am ignoring the deictic use of pronouns.

There seems to be a parallel here between transitive cases and the double objects. This parallel can be further exemplified by the overwhelming informant intuition that(44)a) with the floated quantifier can only be uttered felicitously with stress on the indirect object.

(49) Mary sent the books all to Peter.

Focus on the indirect object implies that the direct object is a topic. Erteschik- Shir (1979) proposed that the default f-structure for the word order (without the *all*) in(49) would have the direct object be the topic and the indirect object be the focus. In object position, there seems to be a favoring of floating only for topics. More research is required in order to confirm or disprove this hypothesis but given the data presented here I feel this is an approach that warrants further looking into.

4.7 The occurrence of multiple FQs

The approach sketched out here can account for sentences with more than one FQ; each FQ is attached to different constituents.

(50) All the carpets were all cleaned all at the same time.

While this sentence is a slightly difficult to parse due to the repetition of *all* it is judged as acceptable by my informants. The first *all* is attached to the DP contrasting the alternatives to *all*, the second *all* is attached to the V maximizing it and therefore making it completative, and the third *all* is attached within the PP. The stranding approach would have a very difficult time accounting for (50) besides the obvious problem of the final *all* the theory would have to allow two copies to be pronounced which does not occur elsewhere in English.

By approaching q-float from a phonological and focus structure perspective many aspects of these phenomena that plagued other theories are easily accounted for. Focus structure plays a role in determining whether the FQ will occur sentence initially and in determining which consistent can float a quantifier. Phonology determines which position the FQ will occupy given the linear string of possible placements. Phonological constraints will limit FQ placement to positions that are phonologically optimal.

4.8 Research questions

Approaching q-float from an f-structure and phonology perspective is a new approach and as of yet there are some aspects that seem to be problematic. In this section I will mention a few and put forth some research questions.

An explanation is required for why(51)a-b) are completely unacceptable.

(51) a. *The carpet has been cleaned all.
b. The carpets have been cleaned all.

If the FQ is attached to the V it should be able to linearize to the left or to the right of the V, evidently this is not the case. One possible explanation is that there are prosodic constraints that do not allow the FQ to occur sentence finally. We saw these prosodic constraints at work earlier. This explanation though does not account for the markedness of(52)a-b) with *all* modifying the V.

(52) a. *The carpet has been cleaned all three times this year.

b. *The carpets have been cleaned all three times this year.

The addition of post verbal material does not improve the sentence; this eliminates the possibility that the problematic aspect of(51) is the final boundary tones being carried by *all*. Making the subject plural also has no effect on the acceptability of the sentence. It is interesting to note that with truly weak element like pronouns and auxiliary/modal verbs the consistently favored order is *weak element+all.* When the element is not weak although there might be a relative degree of PI the same word order is not favored. An example of this from my recordings of sentences like(53) with a monosyllabic non pitch accented DP and auxiliaries showed that the FQ consistently occurred after the auxiliary and not the DP.

(53) The men (#all) have (all) seen the movie.

Evidently the FQ prefers to PI with a truly weak element and perhaps sentence initially DP are prosodically stronger. At this point I have no explanation for the question raised by (52)a,b) but propose that it be investigated from both the prosodic as well as the syntactic view.

A further aspect of q-float that requires more attention is FQs in ECM and control constructions.

(54) Ben believed (all) the boys (all) to have (all) left.

(55) I persuaded (all) the men (all) to resign. (Bowers 1993)

The FQ is attached to the DP *the boys* in(54) the question is what determines which position the FQ will occupy. To begin with the decision on which of the two positions to the right of the DP is quite simple. The FQ is favored right adjacent to the auxiliary verb; in this position PI will occur. If the monosyllabic noun *boys* is replaced by a heavier constituents the contrast between the two positions to the right of the DP becomes more obvious.

(56) Ben believed (all) the Minnesotans (#all) to have (all) left.

As discussed earlier FQs favor PI with weak elements. While the N in (54) is a monosyllabic content word, *boys,* and not intrinsically weak some speakers may successfully PI it thereby rendering the sentence acceptable while others who cannot PI judge it to be degraded. In(56) the quadrisyllabic N, *Minnesotans,* cannot PI and since *all* does not reduce that combination leads to a marked reduction in acceptability. So in(56) I hypothesize that if the FQ aligns to the right of the DP it will occur after *have.* In(54) the FQ will likely occur after *have* but some speakers may be able to PI it with *men* and therefore they may place it adjacent to the DP. The problem now is to figure out when the FQ will precede the DP and when it will follow the DP. I suspect here whether the FQ will float or not will depend on the information structure role of the constituent that the FQ is modifying. As evidence earlier there seems to be a connection between topics and q-float that I anticipate also to hold in control and ECM clauses, further research from this perspective is required.

In this section I have sketched out a plausible new approach to FQ placement. This theory helps explain several of the major issues plaguing FQ research cross linguistically; the lack of reliable judgments of sentences with FQ, FQ placement within a string of auxiliaries, FQ occurrence adjacent to V with singular subjects, FQ occurrence with select PP. This theory should hold cross-linguistically. In order to apply in a careful analysis of the f-structure and prosody of the language are needed. In some languages FQs seem to be involved in other

syntactic processes, e.g. French weak islands, I feel that a careful analysis of these languages will in fact show a phonological explanation.

A word of caution is called for at this point. This analysis of *all* seems to be indicating that in fact there is no such thing as floating quantifiers. Instead there is an element that can occur next to most constituents and subsequently maximizes these elements; additionally this element is subject to prosodic restrictions. This is the start of a larger study that sets out to determine what elements like *all* are and how they get their position. Before any broad conclusions can be made or any generalizations put forth, *both* and *each* need to be analyzed from the same perspective as *all* was. Following that a comprehensive analysis of these type elements cross-linguistically needs to be done. Then and only then can we see the real picture of that these elements are.

5. *Conclusion*

It has been said before that the term *floating quantifier* is a misnomer because nothing floats and nothing quantifies. In this paper I have set out to show that perhaps the name is not a misnomer, only the type of floating that it referred to is different. I hope I have shown that the role of prosody and f-structure cannot be sidelined as an addition to an existing theory of FQ placement. Instead phonology needs to be given a major role as it is quite evident that it is crucial to FQ placement. The broad ranges of possible FQ placements cross-linguistically indicate that each language needs to be evaluated prosodically in order to understand the FQ placement in it. The theory sketched out in this section raises interesting questions that have not been raised by the other theories. The approach outlined here has the potential to not only offer an account of FQs cross linguistically but also to shed light on the syntax-phonology interface.

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