

Focus and Phonological Structure*

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Abstract

This paper shows how focus affects the application of phonological rules in several languages. Since the phonological rules in question are postlexical rules, the crucial issue is which prosodic constituent serves as their domain, and thus as the locus of the interaction between focus and phonology. We argue that this constituent is the Phonological Phrase. Since the original definitions of this constituent do not allow for flexibility in relation to focus, however, we propose that this possibility must be added in the form of a restructuring rule which modifies the basic Phonological Phrase structure of a sentence in relation to the presence and position of focused material.

1. Introduction

It has often been observed that focus is relevant for phonology in as much as different focus patterns in sentences tend to correlate with different phonological patterns. Typically, the latter have been identified as intonation contours, though recent work has shown that focus may also influence segmental and tonal rules (cf. Vogel & Kenesei 1987, 1990 for Hungarian; Kanerva 1989, 1990 for Chiche^{wa}; Hayes & Lahiri 1991 for Bengali). Despite the longstanding recognition of the connection between focus and phonology, however, there has been relatively little work on how a model of grammar is to provide information about focus to the phonological apparatus responsible for its expression. In this paper, we briefly discuss several recent proposals for treating focus within the framework of prosodic phonology and show that there are problems with each of these. We then propose an alternative on the basis of the Rhythm Rule of English, and proceed to demonstrate how this analysis allows us to account for focus related phenomena in Italian, as well as in three unrelated languages: Hungarian, Chiche^{wa} and Bengali.

2. The nature of Focus

2.1. Focus in semantics

Discussions of focus often distinguish two categories: presentational focus and narrow focus. Presentational focus is understood to be 'broad' and is interpreted as new, as

opposed to old, information. This discourse dependent phenomenon is often identified on the basis of question-answer pairs such as those in #1) and #2), where capital letters indicate prominence.¹

(1) How is Jack doing at his new job?

(2) a. He sold a used car to BILL.

b. He sold a used CAR to Bill.

c. He SOLD a used CAR to BILL.

Since #2a-c) are all possible answers to #1), the new information in them is the VP: sold a used car to Bill. This type of focus is dependent on syntactic structure in that it observes relations between heads, arguments and adjuncts. Following Selkirk 1984, if in some constituent, the head and/or any of its arguments are prominent, the constituent itself can be considered to be semantically prominent and thus interpreted as new information. In #2a), the NP Bill is prosodically prominent. What is prominent in #2b) is the head of the object NP: car. In #2c) the head of the VP, i.e. sold is prominent, as well as car, the head of the object NP, and Bill, the argument of the PP. What all of these cases have in

¹ Acoustically, focus is most noticeably characterized by a pitch accent on the primary stressed syllable of the word bearing it (e.g. Pierrehumbert 1980, Selkirk 1984, among others). We have relied in this paper on perceptual identification of this phonetic prominence as is typically done in nonexperimental treatments of this subject (e.g. Selkirk 1984, Rooth 1985).

common is an interpretation in which the VP can be the locus of presentational focus or new information.

Selkirk argues that a crucial distinction must be drawn between heads on the one hand, and adjuncts on the other. If an adjunct is prominent, it cannot distribute this property over the constituent of which it is a member. For example, #3) is not a possible answer to #1) since the AP used is not an argument of the head noun car. So its prominence cannot be transmitted to the NP, and, consequently, it also fails to be transmitted to the VP.²

The sentence in #3) is not a possible answer to #1), although it is a special case of English presentational focus.

(3) He sold a USED car to Bill.

The only prosodically prominent element here is interpreted as new information and thus conveys contrast: "It wasn't a

² The way Selkirk (1984:207) proposes to account for focus in these different cases is via the following rules:

(a) Basic Focus Rule

A constituent [= word or smaller] to which a pitch accent is assigned is a focus.

(b) Phrasal Focus Rule

A constituent may be a focus if (i) or (ii) (or both) is true:

(i) The constituent that is its head is a focus.

(ii) A constituent contained within it that is an argument of the head is a focus.

new car that he sold to Bill; it was a used one." Similarly, if in #2a) the NP Bill does not transmit its semantic prominence to the entire VP but rather is the only constituent representing new information, it is understood as being contrasted. That is, "It was Bill that he sold a used car to, not someone else."³

This type of focus is generally analyzed as a quantifier, much the same as universal or existential quantifiers.⁴ Thus a contrastively focused constituent such as Bill in #2a), repeated in #4a), undergoes Quantifier Raising in one version of Logical Form as shown in #4b). The corresponding reading is given in #4c).⁵

- (4) a. He sold a used car to BILL.
b. [Bill_i [he sold a used car to e_i]],
c. λx (he sold a used car to x), Bill

It is this last type of contrastive or narrow focus that we will be primarily concerned with in this paper since it is most consistently manifested phonetically (typically by pitch accent, duration and intensity), and it has a straightforward

³ See Selkirk 1984:209.

⁴ See among others Chomsky 1971, 1976, 1981; May 1985; Rochemont 1986.

⁵ Since the actual LF representation of focus, and in general quantifier structure, is not at issue in this paper, we remain uncommitted as to what particular operation accounts for quantifier scope and interpretation. (See Watanabe 1992, among others, for an alternative to Quantifier Raising.)

semantic correlate. It thus differs, on the one hand, from the type of focus encountered in languages that express focus exclusively by morphological or syntactic means and, on the other hand, from the type of phonological prominence corresponding to emotional or corrective emphasis.⁶ The phenomena investigated here minimally involve phonological prominence as an expression of focus, although syntactic means such as movement may be used in some cases as well.

2.2. Focus in prosodic phonology

Despite the general agreement that focus often contributes to the phonological form of a sentence, there is little agreement on how this is to be handled formally. In this section, we will briefly consider the major proposals, all advanced in the prosodic phonology framework, and then examine two problems they raise.

2.2.1. The domain of focus

The earliest explicit treatment of focus in prosodic phonology is Selkirk's 1984 analysis, according to which at least in English "the focus structure of a sentence is inextricably related to its intonational structure" (p.200). The expression and interpretation of focus are determined by

⁶ This type of 'highlighting' adds emotional value to lexical items or contrastive value to parts of them and has little, if any, relevance for semantics proper (e.g. *I HATE papayas, This is the whisky they want to EXport, not IMport*). See among others Bolinger 1961, 1972 for a discussion of such phenomena.

two rules: the Basic Focus Rule (BFR) and the Phrasal Focus Rule (PFR), (cf. fn. 2). Pitch accent, the phonetic manifestation of focus, is assigned to the main stressed syllable of a word by the BFR, while the PFR spells out how variously placed pitch accents within phrases may be interpreted on the basis of the phrasal argument structure. Given the essentially free assignment of pitch accents and foci to sentences, including the possibility of one focus embedded within another, there is not necessarily a correlation between the location of focus and any prosodic constituent in Selkirk's proposal. It should be noted, furthermore, that since there may, in principle, be any number of pitch accents per Intonational Phrase (IPh), this phonological constituent could not serve as the domain for focus.

A different approach is found in Nespor & Vogel 1986. Here focus is associated with a phonological constituent, the Intonational Phrase, rather than a syntactic constituent. Although no rules are provided for determining where focus falls within the IPh, once its position is known it is used in determining the prominence relations within this constituent. That is, the node dominating the semantically prominent (i.e. focused or new) element is strong, while its sisters are weak (p.191).

Vogel & Kenesei 1987 propose a different role for focus in prosodic phonology on the basis of two phonological rules of Hungarian: l-Palatalization (LP) and Stress Reduction

(SR). Here, as in Nespor & Vogel 1986, focus and phonological structure come together in the IPh. The two proposals differ significantly, however, in the way they incorporate focus. Specifically, in Vogel & Kenesei 1987 focus, as well as other logical operators, contribute to the actual construction of IPhs, while in Nespor & Vogel 1986 focus only serves to determine the strong constituent within an IPh. Vogel & Kenesei argue that the leftmost element that is a logical operator constitutes the left boundary for LP and SR application. Since other operators may block LP and SR, the presence and position of operators in a sentence must be referred to in the definition of the domain of these rules, claimed to be the IPh. Thus, focus has a direct role in prosodic phonology, that of contributing to the construction of one of the constituents of the prosodic hierarchy.

In another proposal for incorporating focus into prosodic phonology, Kanerva (1989, 1990) argues that an additional constituent, the Focal Phrase (FP), must be defined to handle phonological rules that are sensitive to the focus structure of a sentence. The FP, which Kanerva identifies on the basis of several rules of the Bantu language Chiche^{wa}, would in principle fall between the PPh and the IPh in the prosodic hierarchy, although no evidence is provided for the PPh in this language.

According to Kanerva, the FP not only allows us to predict where the rules of (Vowel) Lengthening, (Tone) Retraction, Nonfinal Doubling and Prehigh Doubling apply, but

it also has several other advantages. If the FP were not introduced, the domain for the rules in question would have to be either the smaller PPh or the larger IPh. Kanerva argues against the PPh as the domain of the rules in question on the grounds that it would require a substantially different construction algorithm to handle the Chiche^{wa} data from those which have been proposed for a fairly large and diverse set of languages including English, Ewe, Italian, Japanese and Xiamen Chinese. In particular, the precise syntactic definitions of the PPh in these languages would not work for the focus dependent and rather variable groupings required by Chiche^{wa}. Modification of the PPh definition to account for these factors would, according to Kanerva, obscure the crosslinguistic generalizations captured by current formulations.

The IPh, on the other hand, allows more flexibility through various types of restructuring rules and might thus appear to be more appropriate. Kanerva rejects this possibility, too, on the grounds that modification of the IPh construction algorithm, which also appears to be valid cross-linguistically, would cause us to lose the generalizations it otherwise captures. Kanerva claims that this is what happens with Vogel & Kenesei's modified IPh construction rule for Hungarian, a point we will return to below.

Another observation of Kanerva's, however, argues more strongly against the IPh as the domain of the focus sensitive rules in Chiche^{wa}. There are three other phenomena,

Intonational Boundary Tones, Tonal Catathesis (downdrift) and IPh-Final Lengthening, that apply in relation to the usual type of IPh, and do not exhibit the same flexibility and focus sensitivity as the first set. It is thus necessary to distinguish the domain of the focus sensitive rules from the IPh, although it remains to be seen whether the domain for these rules is the FP, as Kanerva proposes.

Finally, in their analysis of Bengali, Hayes & Lahiri (1991) argue that focus plays a role in determining the structure of the PPh. They show, as Kanerva does for Chiche^{wa}, that there is evidence for an IPh on the basis of the intonation contours of the language. In addition, they argue, there are at least two P-rules, Voicing Assimilation and /r/ Assimilation, that take as their domain a smaller constituent, the PPh and which are sensitive to focus. Specifically, focus contributes to defining the PPh structure of a sentence and this, in turn, affects the application of the P-rules in question.

2.2.2. Reanalysis or proliferation of prosodic domains

At this point, there are several candidates for the constituent that is relevant for focus: the Intonational Phrase, the Phonological Phrase and the Focal Phrase. As Kanerva points out, selecting either of the first two would require modifying existing definitions of these constituents and thus possibly losing the crosslinguistic generalizations they have been shown to capture. Kanerva's solution, the introduction of the Focal Phrase, however, comes at the cost

of adding another constituent to the prosodic hierarchy, and the more general implications of the proliferation of prosodic domains.

Following Kanerva's line of reasoning that the IPh cannot be the domain of the focus sensitive rules in Chiche^{wa} since there are other IPh phenomena that do not show sensitivity to focus, we can now also eliminate the IPh as the domain for focus in other languages as well. In English, for example, if we retain the general characterization of the IPh as the domain over which an intonation contour is spread (cf. Selkirk 1978, Nespor & Vogel 1986), whether this constituent is defined on the basis of syntax as in Nespor & Vogel 1986 or on the basis of more discourse related considerations (cf. among others Selkirk 1984), we have seen that this is not the appropriate domain for focus. That is, while focus affects the actual intonation contour, it does not directly determine the grouping of smaller prosodic constituents into IPhs. For example, we can say the sentences in #5a-c with focus on each of the capitalized words.

- (5) a. GERTRUDE loves Archibald.
b. Gertrude LOVES Archibald.
c. Gertrude loves ARCHIBALD.

While the pitch contours associated with each of these sentences differ, in each case we only have one IPh. That is, the presence of focus on different positions in the sentences does not lead to the restructuring of the IPhs. Such

phenomena as final lengthening that are observed in relation to IPhs still apply at the end of the entire sentence here since it corresponds to the end of an IPh. Such lengthening does not vary along with a change in position of focus in a sentence, except where focus on the phrase final word contributes additional length, but this is orthogonal to the issue at hand.⁷

A closer look at Hungarian reveals that an analogous argument can be brought against the IPh as the domain of focus in this language as well. That is, there are intonation related phenomena that require reference to large domains corresponding to the IPh but which are not sensitive to focus.⁸ As with Chichewa and English, these phenomena are qualitatively different from the focus sensitive rules, involving more "automatic" phonetic processes (e.g. IPh final lengthening), rather than rules operating on potentially contrastive elements. For example, both sentences in #6 have a rising contour on the initial parenthetical phrase, followed by a falling one on the rest of the sentence. Focus on Pál in #6b, indicated by capitalization, however, triggers the application of Stress Reduction on the following two lexical items, indicated by ' in place of ", as well as l-Palatalization at the end of Pál itself, indicated by [j].

⁷ Observations of Italian seem to reveal similar patterns with regard to the independence of intonation contours and their domains with respect to the position of focus.

⁸ See Varga's 1983 detailed account of Hungarian intonation.

- (6) a. Amint te is tudod, "Pál "játszott a "kertben.
 As you also know Pál played the garden-in
 b. Amint te is tudod, "PÁ[J] 'játszott a 'kertben.

Thus, while focus affects the phonology of the PPh, the overall intonational phrasing is not affected by it.

Finally, it has been argued by Hayes & Lahiri (1991) that there are specific tonal patterns of Bengali that appear in relation to IPhs. These patterns are distinct from those that appear in relation to PPhs and only the latter are sensitive to focus, as are the two segmental rules that apply in the domain of the PPh, /r/ Assimilation and Voicing Assimilation. For example, while there is a single IPh in both #7a) and #7b), the presence of focus in the latter causes a change in the PPh structure, introducing a boundary to the left of chobi-r. /r/ Assimilation applies to the final -r of raja-r in the first case but not the second (cf. Hayes & Lahiri 1991:82).⁹

- (7) a. [a^ˇ ami [RAJA-R CHOBI-R JO^ˇNNO]PPh taka anlam]IPh
 today I king's pictures-gen. for money brought
 'Today I brought money FOR THE KING'S PICTURES'

⁹ We have replaced Hayes and Lahiri's P and I bracket labels with PPh and IPh to be consistent with the labels used throughout this paper. In addition, we have added the right PPh bracket after raja-r in (7b) in conformity with the Strict Layer Hypothesis, though it should be noted that Hayes and Lahiri do not discuss this issues and, in fact, leave the stretches of sentences they are not concerned with unbracketed within the IPh, a practice we have followed here.

- b. [a^ʔ ami [RAJA-R]PPh [chobi-r ʔonno]PPh taka anlam]IPh
'Today I brought money for THE KING'S pictures'

Grouping the focus sensitive rules with the IPh phenomena in any of the languages just discussed would obscure the difference between the two types of phenomena and incorrectly predict that the conditions governing their behavior should be the same. If we eliminate the IPh as a possible domain for focus, we are left with two options, the PPh or some other constituent such as the Focal Phrase.

It should be noted that the two studies that proposed a constituent other than the PPh were based on languages for which no PPh domain rules had been identified: Hungarian (cf. Vogel & Kenesei 1987, 1990) and Chiche[^]wa (cf. Kanerva 1989, 1990). While such a gap could be fortuitous, another interpretation is that the PPh was prematurely dismissed and that the focus sensitive rules in these languages are precisely the missing PPh rules. We would like to suggest that the latter is, in fact, the case, for what now seems to be an obvious reason. Since there was no independently motivated PPh in the languages in question, it was not possible to adequately evaluate this constituent as the domain of phonological rules. Instead, it is necessary to examine languages with the following characteristics:

- (a) a phonological, as opposed to a uniquely morphological or syntactic, expression of focus,
- (b) at least one phonological rule that has the PPh as its domain of application, and

(c) motivation for a distinct IPh on the basis of intonation contours and such general phenomena as final lengthening.

As will be demonstrated below, our examination of two such languages, English and Italian, leads to the conclusion that the PPh is, indeed, the domain for focus sensitive rules, and there is thus no need to introduce an additional phonological constituent. In light of this conclusion, we subsequently also reanalyze the Hungarian and Chiche^{wa} data and argue that the phenomena under consideration in these languages, too, can be more insightfully treated as PPh rules. We thus not only eliminate the need for a new prosodic constituent, we also avoid claiming that there is a set of languages with a gap at the level of the PPh.¹⁰ Hayes &

¹⁰ Recent work on Greek (cf. Condoravdi 1991) and Korean (cf. Cho 1991) and Shanghai Chinese (cf. Selkirk and Shen 1991) seems to indicate that these languages, too, would be relevant to the discussion of the interaction of focus and phonology. There is insufficient data in these sources, however, for us to evaluate the extent to which they either confirm or disconfirm the proposals advanced here. It has also been suggested that recent work on Hausa (cf. Inkelas 1988, 1989; Zec & Inkelas 1991) may be relevant to the present discussion (cf. Hayes & Lahiri 1991), although the discourse particle in question, *fa*, is not one of the focus markers generally recognized in Hausa (cf. Tuller 1986, among

Lahiri's 1991 analysis of Bengali will also briefly be considered since it essentially arrives at the same conclusion regarding the sensitivity of PPh domain rules to focus.¹¹

3. The English Rhythm Rule revisited

English exhibits the necessary characteristics for examining the place of focus in the phonological hierarchy. As was seen above in #5a-c, repeated below as #8a-c, English makes a difference in the focus interpretation of sentences by varying the phonetic prominence of their words.

- (8) a. GERTRUDE loves Archibald.
b. Gertrude LOVES Archibald.
c. Gertrude loves ARCHIBALD.

English also has a phonological rule that applies in relation to the PPh, the so-called Rhythm Rule (cf. Selkirk 1978; Nespor & Vogel 1986). Moreover, there is detailed phonological and phonetic work on English intonation that provides evidence for the relatively large constituents that have been identified as IPhs (cf. among others Bing 1979; Ladd 1980; Pierrehumbert 1980, 1981). The delimitation of

others) and it appears in a variety of contexts, only sometimes related to emphasized material.

¹¹ It should be noted that although Hayes and Lahiri's (1991) article appeared before the present article, their conclusions were arrived at independently of our analysis, which first was presented at GLOW 1990 in Cambridge, England.

these constituents, furthermore, is crucially not sensitive to focus, as was mentioned above.

3.1. Current views of the Rhythm Rule

The Rhythm Rule (RR) has received much attention in recent years.¹² It is the rule that accounts for the familiar changes in stress patterns that eliminate the clashing effect of two adjacent primary word stresses, as illustrated in #9).

(9) a. thirtéén wómen --> thírteen wómen

b. Ténnessée législature --> Ténnessee législature

Earlier analyses tended to view this phenomenon as a matter of shifting stress from one position to another, often in terms of moving an 'x' from one grid position to another (cf. among others Liberman 1975; Liberman & Prince 1977). More recently, however, the weakening of stress in one position has been seen as separate from the strengthening of stress in some other position. That is, while both are determined by some sort of general principle of rhythmic alternation, they are the result of the operation of distinct rules (cf. among others Prince 1983; Selkirk 1984; Hayes 1984; Nespor & Vogel 1989). Furthermore, in relation to the clash avoidance phenomenon in English in particular, there is acoustic evidence that the stress on the final syllable of the first word is reduced, without the stress on a previous syllable necessarily being increased (cf. Horne 1989, Vogel et al.

¹² RR is also referred to by other names including Rhythm Rule, Stress Retraction, Stress Shift, Iambic Reversal and Beat Movement.

1995). While we assume an analysis involving stress reduction without the necessity of strengthening the stress of some other syllable, the actual mechanisms responsible for the observed modifications in stress are not relevant here.

What does concern us here is the domain within which RR takes place. While it is triggered by the adjacency of two stressed syllables, not all sequences of adjacent stresses give rise to RR, as can be seen in #10) and #11), respectively, where the relevant parts of the sentences are italicized.

(10) RR takes place

- a. I can't stand impolíte tóurists. --> ...ímpolite tóurists
- b. Routine chéck-ups don't usually take very long.
--> Róutine chéck-ups...
- c. Our committee's task is to okáy búdgets for research projects. --> ...ókay búdgets...

(11) RR does not take place

- a. The racketéer ácted innocent, but he really wasn't.
- b. It's hard to outcláss Délaware's football team.
- c. The bills were left unpáid lást month.

In terms of prosodic constituents, the domain of RR has been characterized as the PPh, as mentioned above. That is, RR takes place in #10) because the adjacent stresses are on words contained within the same PPh, as defined in #12). It

does not take place in #11), where the relevant words are not in the same PPh.¹³

(12) a. Phonological Phrase Formation (Nespor & Vogel 1986:168)

The domain of PPh consists of a CG [=Clitic Group] which contains a lexical head (X) and all CGs on its nonrecursive side up to the CG that contains another lexical head outside of the maximal projection of X.

b. Phonological Phrase Restructuring (optional) (p. 173)

A nonbranching PPh which is the first complement [or adjunct] of X on its recursive side is joined into the PPh that contains X.

¹³ It has been proposed that certain stress adjustment phenomena such as the Rhythm Rule and the Italian Stress Retraction rule discussed below are not prosodic rules in the same way postlexical segmental rules are. Instead, it is claimed that they are governed by the principles of a separate rhythmic component of phonology (e.g. Hayes 1984; Nespor 1988, 1990; Nespor and Vogel 1989). Such a position is not, however, incompatible with the present analysis since, at least in Nespor 1988, 1990 and Nespor and Vogel 1989, the grid structure in relation to which the rhythmic adjustments apply is developed on the basis of the postlexical prosodic structure of a sentence, including the level of PPh.

By nonrecursive side we understand the opposite side to where complements typically occur with respect to lexical heads at S-structure.¹⁴

3.2. Focus and the Rhythm Rule

In order to motivate an independent Focal Phrase constituent in the prosodic hierarchy, at this point it would be necessary to demonstrate, on the one hand, that there is at least one rule of English that is sensitive to focus and has a domain of application based on it, and on the other hand that other prosodic domain rules, such as RR, are not sensitive to focus. A closer examination of RR, however, provides the information needed to evaluate both points. While a great deal has been written about RR, the work has been based on sequences of words taken out of context or, when larger phrases have been considered, on neutral constructions devoid of any particular focus patterns.

It turns out, however, that when focus is placed on different words in a sentence, differences in the application of RR arise. For example, if we reconsider the sentences in #11), where RR was seen not to apply, and place focus on the

¹⁴ Note that the introduction of functional heads in syntactic structure has no effect on the type of syntactic information prosodic phonology relies on. Since functional heads are clitics or suffixes, they have a different status from that of lexical heads and they do not alter the head final or head initial nature of a language, which is now understood with reference to lexical heads.

second of the two relevant words, we find to the contrary that RR may occur, as shown in #13), where the focused words are capitalized.

(13) a. The racketéer ÁCTED innocent, but he really wasn't.

--> ...rácketeer ÁCTED...

b. It's hard to outcláss DÉLAWARE'S football team.

--> ...óutclass DÉLAWARE'S...

c. The bills were left unpáid LÁST month.

--> ... únpaid LÁST...

This pattern raises crucial questions with regard to prosodic constituents and the role of focus in determining phonological rule application. That is, we must now ask whether the domain of RR is not the PPh, but rather some other constituent, for example, the FP. Alternatively, we might say that focus is relevant at the PP level, and thus obviate the need for a separate FP. If we take this option, however, we must then ask how focus can be incorporated into the definition of the PPh, which currently makes no provision for focus.

In light of the absence of information on the effects of focus on RR, we carried out an experiment to supply the necessary data. A total of 72 sentences were submitted to 7 subjects. The sentences varied with regard to their PPh structure and the presence of focus, as illustrated in Figure 1. (See appendix for full list of sentences.)

Figure 1: PPh Structure and Focus in Test Sentences

GROUP A: Neutral sentence - word in final position

I just saw the new cantéén.

GROUP B: Neutral sentence - words in separate PPhs

He said he'd okáy Tína's proposal.

GROUP C: Neutral sentence - words in same PPh

The cantéén's céiling sprung a leak
during the storm.

GROUP D: Focus sentence - words in separate PPhs

(same sentence as Group B)

He said he'd okáy TÍNA'S proposal.

GROUP E: Focus sentence - words in same PPh

(same sentence as Group C)

The cantéén's CÉILING sprung a leak
during the storm.

GROUP F: Focus sentence - words in separate PPhs

(additional sentences; same structures as
Groups C and D)

(i) The new cantéén LÓOKS nice, but
really isn't.

(ii) They perform routÍne SÚRGERY as well
as check-ups.

The subjects first read the sentences without any special focus. They then read the sentences with focus, having been instructed to imagine an interpretation in which the underlined (i.e. focused) words had some special importance. Each subject received the sentences in a different random order and read the entire set of nonfocus and focus sentences twice. Two transcribers scored the targets as either a) no RR or b) RR (which included both i) increased prominence on a syllable to the left of the original stress and ii) reduction of the primary stress without increased stress elsewhere). The responses revealed a strong tendency to apply RR not only to those target items that were in a single PPh, but also crucially to those followed by a word that was focused, even when the focus bearing word was in a different PPh, as shown in Figure 2, where '1PPh' and '2PPh' indicate that the words involved in the potential clash are in the same or different PPhs, respectively.

Figure 2: Percentage RR Application in Neutral and Focus Sentences

	Neutral	Focus
1 PPh:	82%	88%
2 PPh:	19%	75%

What these results show is that while RR applies when the words in question are both in the same PPh, when focus is present, RR is even more frequent (88% compared with 82%). When the two words are in separate PPhs, the presence of focus greatly affects the incidence of RR, raising it from 19% to 75%. The fact that RR was observed in 19% of the cases in which the words were in separate PPhs reflects, at least in part, the fact that the subjects sometimes read the sentences as if focus were present even when they were not instructed to do so.

4. The domain of focus

Now that we have determined that RR is sensitive to focus, we have two alternatives. Either we can abandon the PPh as the domain of RR and posit a new constituent (e.g. the FP) as its domain, or we can modify the definition of the PPh to allow it to be sensitive to focus. The former option, that chosen by Kanerva for Chiche^{wa}, would only add to the already suspicious distribution mentioned above where the languages with focus sensitive phonological rules seem to lack PPh domain rules. We propose, instead, that the PPh is the level of the prosodic hierarchy at which focus is relevant and that the definition of the PPh constituent must be modified so as to incorporate information about focus.

4.1. Redefining the PPh in English

There are essentially two options available for modifying the PPh at this point. We could reformulate the

basic PPh construction rule to incorporate reference to focus. Alternatively, we could add a restructuring possibility to the basic PPh rule. While the former might at first glance appear more economical, it would have undesirable implications for the nature of the PPh more generally. That is, it would imply that sentences with special focus and those without it are equally basic or unmarked. The latter, on the other hand, makes the claim that the unmarked formation of PPhs is without focus. Furthermore, since it appears that the differences in the PPh brought about by focus still require that the rest of the PPh be as defined by the basic rule. Thus, a formulation that does not begin with such a definition would nevertheless need to build in the same facts in some way, and the result would, at best, be cumbersome.¹⁵

¹⁵ Sharon Inkelas has pointed out that the two options also make different predictions as far as rule ordering is concerned. If a separate rule is used to rearrange prosodic structure in the presence of focus, we might expect there to be phonological rules that could intervene between the application of the basic PPh construction rule and that of PPh restructuring. This would only be an issue, however, if we allow phonological rules to be interspersed with the rules that build prosodic structure. Since there does not appear to be evidence that such a possibility is needed, we will assume the simpler model in which there is no interspersing of prosodic structure building rules and phonological rules.

between the (underlined) words in question it would apply, as shown in #16b).

(16) a. Martha, according to Pauline, ÓWNS the house.

--> *...Páuline, ÓWNS...

b. Pauline ÓWNS the house. --> Páuline ÓWNS...

Second, restructuring cannot destroy a PPh boundary that has already been established on the basis of focus. That is, if focus in some position in a sentence causes a particular PPh configuration to be created, this cannot be changed by restructuring involving another instance of focus in the sentence. For example, in #17b), given in answer to #17a), restructuring does not take place to join the focus bearing called with Pauline since Pauline itself bears focus and therefore requires a PPh boundary to its right. RR does not apply in this case, although it may apply if Pauline is not focused, as in #18b), given in answer to the question in #18a).

(17) a. Did Martha see Jim?

b. No, PAULÍNE CÁLLED Jim. --> *...PÁULINE CÁLLED...

(18) a. Did Pauline invite Jim?

b. No, Pauline CÁLLED Jim. --> ...Páuline CÁLLED...

A similar blocking of restructuring, and hence RR, is observed with gapping, as illustrated below.

(19) Martha plays flute and PAULÍNE TRÚMPET.

--> *...PÁULINE TRÚMPET

The reason RR is blocked here is not the gapping per se, as suggested by an anonymous referee, but rather the fact that

such constructions involve double focus, as in #17b), since Pauline and trumpet contrast with Martha and flute, respectively, and would therefore both bear focus. It is the presence of focus on Pauline that blocks the restructuring since it requires a PPh boundary to the right of this word. What #17) and #19) show is that PPh restructuring is essentially recursive in that each focus in a sentence determines a new set of PPh boundaries.

Returning to the cases in which the item marked for focus does join with the word to its left, another type of restructuring may optionally apply in addition to that formulated in #14). That is, when the PPh to which the focused item is originally assigned contains only one other word, the remaining PPh may be joined into a single PPh with the one on its right, as shown in #20).

(20) [X1 X2] [X3 X4] [X5 X6]
 +F
 --> [X1 X2 X3] [X4] [X5 X6]
 +F
 --> [X1 X2 X3] [X4 X5 X6]
 +F

To accommodate this change, all that is needed is a further addition to the restructuring rule such as #21).

(21) Focus Restructuring Rule: English (part 2)

If the remaining PPh is nonbranching, it may be joined into a single PPh with a PPh on its right.

Thus, while a sentence such as the one in #22) would not undergo further restructuring after the adjustment made for

focus, the one in #23) could undergo the additional change, as shown.

(22) It's hard [to outclass] [DELAWARE'S football team] [at home games]

--> ... [to outclass DELAWARE'S] [football team]...

(23) It's hard [to outclass] [DELAWARE'S team] [at home games]

--> ... [to outclass DELAWARE'S] [team] [at home games]

--> ... [to outclass DELAWARE'S] [team at home games]

Such an additional restructuring predicts that RR could take place in the new PPh, whereas the items in question would originally have been members of different PPhs and thus not subject to RR. This prediction is, in fact, borne out, as shown below.

(24) They managed [to outclásss] [DÉLAWARE'S cantéen] [éásily]

--> ... [to óutclass DÉLAWARE'S] [cantéen] [éásily]

--> ... [to óutclass DÉLAWARE'S] [cánteén éásily]

While canteen and easily were not originally in the same PPh, the second restructuring option results in their forming a single constituent. Under these circumstances, canteen may undergo RR.

5. Focus and PPh construction in other languages

5.1. Italian

Italian, like English, provides a testing ground for the present proposal of the interaction of focus and phonology, in that it both expresses focus phonologically and has phonological rules that have the PPh as their domain of

application, i.e. Raddoppiamento Sintattico and Stress Retraction (cf. Calabrese 1990; Marotta 1986; Nespor 1989, 1990; Nespor & Vogel 1979, 1986, 1989). In addition, Italian can express focus via the movement of a constituent into a focus position. Nevertheless, despite certain differences between the way Italian and English express focus, the effects of focus on the application of PPh rules, and thus the construction of PPhs, is essentially the same in the two languages.¹⁶

Taking phonetic prominence as an indication of focus in Italian, as in English, we observe a correlation between the stress and focus patterns in the sentences in #25) analogous to that seen above in English. As above, the capitalized words are phonetically prominent and are interpreted as being focused.

- (25) a. CARLA ama Paolo. 'CARLA loves Paolo.'
 b. Carla AMA Paolo. 'Carla LOVES Paolo.'
 c. Carla ama PAOLO. 'Carla loves PAOLO.'

Stress Retraction (SR), a rule found typically in northern varieties of Italian but which appears not to be limited to those varieties, has been identified as a PPh domain rule (cf. Nespor & Vogel 1979, 1986, 1989). Like its English counterpart, RR, SR operates to relieve a clash between two adjacent (primary) stressed syllables within a PPh but not across PPhs, as illustrated in #26), where the brackets indicate PPhs.

¹⁶ See Calabrese 1982 for a discussion of focus in Italian.

- (26) a. [Le ventitré dónne] [mangiano subito]
 ==> ...véntitre dónne...
 'The twenty-three women eat immediately.'
- b. [Le prime ventitré] [mángiano subito]
 ==> *...véntitre mángiano...
 'The first twenty-three eat immediately.'

Similarly, the rule of Raddoppiamento Sintattico (RS), which lengthens the initial consonant of a word, has been claimed to apply within PPhs but not across them (cf. Nespor and Vogel 1986, 1989). This rule, typical of central and southern varieties of Italian, thus applies in #27a) but not #27b).

- (27) a. [Il caffè turco] [piaceva a tutti]
 ==> ...caffé[t:]urco...
 'The Turkish coffee pleased everyone.'
- b. [Il caffè] [piaceva a tutti]
 ==> *...caffé[p:]iaceva...
 'The coffee pleased everyone.'

What has not been observed in the literature about either SR or RS, however, is that changing the focus of the sentence allows both rules to apply where they would otherwise be blocked. Thus, analogously to the behavior of RR in English, SR and RS can apply as shown in #28a) and #28b), respectively (vs. #26b) and #27b)).

- (28) a. [Le prime ventitré] [MÁNGIANO subito]
 ==> ...véntitre MÁNGIANO...
 'The first twenty-three EAT immediately.'

b. [Il caffè] [PIACEVA a tutti]

==> ...caffé[P:]IACEVA...

'The coffee PLEASED everyone.'

Since Italian works in the same way as English thus far, nothing new is needed to account for the data in #28). That is, the reanalysis of the PPh proposed for English in terms of the Focus Restructuring Rule (cf. #14) above) applies to Italian without modification. SR and RS apply as shown in #28) because the presence of focus on mangiano and piaceva results in their forming part of the same PPh as ventitré and caffé, respectively. By modifying the PPh structure in such cases, we are able to maintain the PPh as the domain of the rules in question.

The similiarity between Italian and English also suggests that the second part of the Focus Restructuring Rule (cf. #21) above), which groups a remaining nonbranching PPh with a PPh on its right, will hold for Italian. This appears to be the case, as indicated in #29), where Marilú is regrouped into a PPh with sabato after the focused word vede is regrouped into a single PPh with Artú. The correctness of the regrouping of Marilú with sabato can be tested with both SR and RS, since the segmental contexts for both rules are provided by the same sequence of words.

(29) [Artú] [VEDE Marilú] [sabato] 'Artú SEES Marilú Saturday.'

==> [Artú VEDE] [Marilú sabato]

Despite the similarity between Italian and English, there are some fundamental differences. While in both languages it is usually possible to introduce focus on some word in a sentence by increasing its phonetic prominence, as we have just seen, Italian also expresses focus with different word orders.¹⁷ For example, the subject of a neutral sentence such as #30a) can be focused by postposing it, as in #30b).

(30) a. Carla l'ha fatto. 'Carla did it.'

b. L'ha fatto CARLA. 'CARLA did it.'

Postposing a subject, however, does not necessarily mean it is focused. A neutral reading of L'ha fatto Carla 'Carla did it' is also possible. What is crucial here is the fact that there seems to be a consistent phonetic difference between the two cases of postposition (cf. Calabrese 1990). In particular, Calabrese observes that in the neutral sentence there is some sort of break before the subject, while in the case of focus, the subject seems to be "phonetically unified" with the preceding element. This difference, in fact, follows from the reanalysis of focus in relation to the PPh proposed here. That is, it is predicted that a postposed subject bearing focus will be incorporated into a single PPh with the item to its left, accounting for "phonetic unification" Calabrese observed. More specifically,

¹⁷ Calabrese (1990) makes this point for both presentational and contrastive focus, although he is primarily concerned with the former.

we predict that if the subject forms a PPh with the material to its left, under the appropriate segmental conditions the two PPh domain rules we have been examining will apply between the postposed subject and the adjacent word on its left. Since no phonetic unification takes place between a postposed subject that is not focused, it is predicted that SR and RS will not apply between the subject and the item to its left. These predictions seem to be correct, as seen in the comparison of #31) and #32); the boldface type in #31a,b) indicates focus.

and the word +
V its left

(31) [Lo fará CÁRLA] 'CARLA will do it.'

a. ==> Lo fára **Cár**la. (by SR)

b. ==> Lo fará[**k:**]arla. (by RS)

(32) [Lo fará] [Cár]la 'Carla will do it.'

a. ==> *Lo fára Cár]la. (by SR)

b. ==> *Lo fará[**k:**]arla. (by RS)

Finally, it should be noted that the general constraints on restructuring observed in English hold in Italian as well. That is, restructuring may only apply to PPh boundaries and is blocked if the juncture in question also involves an IPh boundary, as illustrated in #33a), where the parenthetical expression induces an obligatory IPh. Both SR and RS are blocked here, although they apply in #33b), where only a PPh boundary intervenes between Marilú and canta and restructuring may thus occur. The relevant portions of the sentences are underlined.

(33) a. [[Marta]PPh]IPh [[secondo Marilú]PPh]IPh [[CÁNTA
bene]PPh]IPh

'Marta, according to Marilú, SINGS well.'

b. [[Marilú]PPh]IPh [[CANTA bene]PPh]IPh

'Marilú SINGS well.'

In addition, as was seen in English, multiple cases of focus require their own PPh phrasing, and restructuring is blocked across a boundary established on the basis of focus, as illustrated in #34a). In #34b), where Marilú does not bear focus, restructuring may occur and SR and/or RS may apply. (Only the relevant PPhs are indicated.)

(34) a. Carlo ha visto Gianni lunedì [e MARILÚ]PPh [SÁBATO]PPh.

'Carlo has seen Gianni Monday and MARILU SATURDAY.'

b. Carlo ha visto [Marilú]PPh [SÁBATO]PPh

'Carlo has seen Marilú SATURDAY.'

The Italian data we have just examined not only lend support to our analysis of focus as a PPh domain phenomenon, they also provide evidence that earlier definitions of the PPh that do not take focus into consideration are inadequate. A definition such as Nespør and Vogel's (cf. #12) above), for example, dictates that a (preverbal) subject cannot be joined into a PPh with a following verb and that a postposed subject cannot be joined into a PPh with the element to its left. The incorrect prediction is thus made that SR and RS will not apply in such contexts. The proposal advanced here yields precisely such groupings when the appropriate element bears

focus and the application of SR and RS follows automatically from the fact that the relevant words are in a single PPh.

5.2. Hungarian

As mentioned above, in our earlier studies of Hungarian (cf. Vogel & Kenesei 1987, 1990), we demonstrated that two domain span rules, l-Palatalization (LP) and Stress Reduction (SR), are sensitive to focus, and proposed that they apply in the IPh. Since IPhs and PPhs were taken to be coextensive in neutral sentences, either could account for the blocking of LP and SR in #35a between Pál and játszik, although they apply within a single constituent between angol and játékkal. If Pál is focused, however, the optional rule of LP results in the assimilation of l to the following /j/ and SR reduces the stress of each lexical item by one degree, as illustrated in #35b.¹⁸

- (35) a. [A "téren] ["Pál] ["játszik] [az "angol 'játékkal]
the square-in Paul plays the English toy-with
'In the square Paul is playing with the English toy.'
- b. [A "téren] ["PÁL játszik az 'angol 'játékkal]
'It is Paul that is playing with the English toy in
the square.'

The domain of SR and LP was originally proposed to be the IPh since it was large enough to include several (syntactic) constituents in sentences with a focused item. In

¹⁸ The symbol ["] indicates heavy stress, ['] indicates reduced stress; l = palatalized /l/. The acute accent marks are orthographic indications of long vowels.

addition, the usual definitions of the next smaller prosodic constituent, the PPh, did not allow all the necessary items to be grouped together in Hungarian. As was mentioned above, furthermore, it was generally assumed that the domain sensitive to semantic information was the IPh, not the PPh. The problem posed by this treatment, however, was that the definition of the constituent given, for example in Nespor & Vogel 1986, did not work for the Hungarian data. An IPh restructuring rule was, therefore, proposed in Vogel & Kenesei 1987 that applied in relation to the focused element(s) in the sentence. Despite the insight gained by incorporating focus in the analysis of LP and SR, however, the following difficulties remained. If LP and SR are IPh rules, Hungarian is left with no PPh rules and thus a gap at this level in the prosodic hierarchy. Furthermore, while there can be two intonation contours in #35b), #35a) only has one contour.

What we propose here instead is that the level at which focus is relevant is the PPh in Hungarian, too. The general definition given in #12) holds for neutral sentences. A restructuring rule similar to that seen above for English can then be introduced for sentences with focus as given in #36), where it should be noted that the left, rather than the right, edge is the relevant one, a point we will address below.

(36) Focus Restructuring Rule: Hungarian

If some word in a sentence bears focus, place a PPh boundary at its left edge and join it into a single PPh with all the PPhs on its right.

By introducing #36), we are able to treat focus in Hungarian in the same way it is treated in English and Italian, that is, with a restructuring rule beyond the basic PPh rule that regroups specific items in the case of focus. Furthermore, by introducing focus at the PPh rather than the IPh level in Hungarian, we can now attribute to the IPh the same role here as it has in other languages, that of delimiting the domain of an intonation contour.

Although the span of restructuring in Hungarian is larger than it is in English or Italian, it observes the same restriction on its scope since restructuring cannot involve another constituent that bears (contrastive) focus. That is, multiple focus constructions of the kind seen in English (cf. #17 and #19) and Italian (cf. #34a) behave the same way in Hungarian, as illustrated below.

- (37) a. ["TEGNAP vett 'Pál] ["JÁTÉKOT] ("ma PEDIG "BICIKLIT)
yesterday bought Paul toy-ACC today however bike-ACC
'YESTERDAY Paul bought TOYS (and TODAY BIKES).'
b. *["TEGNAP vett 'Pál 'JÁTÉKOT] (ma PEDIG BICIKLIT)

It will be recalled, further, that in English and Italian an additional restructuring possibility exists when a single word remains in a PPh after a focused element is

joined to the preceding constituent. In this regard, let us also consider the following Hungarian sentences:

- (38) a. [A "kicsi 'nyúl] ["jeges 'rúpája] ["el-veszett]
the little rabbit-nom. iced carrot-3sg got-lost
'The little rabbit's iced carrot got-lost.'
- b. [A "kicsi] ["NYÚL 'JEGes 'rúpája veszett 'el]
'It is the little RABBIT'S iced carrot that got-lost.'
- c. [A "kicsi 'nyúl] ["jeges] ["RÉPÁJA veszett 'el]
'It is the little rabbit's iced CARROT that got-lost.'
- d. [A "kicsi 'nyúl 'jeges] ["RÉPÁJA veszett 'el]

The sentence in #38a) is neutral, while #38b) and #38c) are versions with focus on the capitalized item. The absence of LP in #38c) and its presence in #38d) show that a single word remaining to the left of a new PPh boundary established by restructuring may be joined with a PPh to its left. In #39a,b), however, we see that this additional restructuring does not take place if more than one word remains after the first restructuring operation.

- (39) a. [A "kicsi 'nyúl] ["jégben tárolt] ["RÉPÁJA veszett 'el]
ice-in packed
'It's the little rabbit's iced CARROT that got lost.'
- b. *[A "kicsi 'nyúl 'jégben tárolt] ["RÉPÁJA veszett 'el]

Given such patterns, the Hungarian PPh restructuring rule must be supplemented by the following statement, analogous to that provided for English and Italian.

(40) Focus Restructuring Rule: Hungarian (part 2)

If the remaining PPh is nonbranching, it may be joined with the PP on its left.

Thus, a unified treatment of focus can be invoked for all of the languages seen so far. That is, focus restructures the basic PPhs of a sentence by inducing a PPh boundary at either the right or left edge of a focused item. This item is then regrouped with one or more adjacent PPhs at the opposite side. The determination of the appropriate edge for the PPh boundary and consequently the direction of regrouping, as well as the number of PPhs involved in restructuring, will be addressed in section 6.

5.3. Chichew^a

As was mentioned earlier (cf. section 2.2), Kanerva 1989, 1990 argues for an additional level of prosodic structure between the PPh and the IPh. He bases his claim on sentences such as those in #41), where capitalization indicates focus, the accents indicate high tone, and the brackets indicate the domains of the focus sensitive rules under consideration.

(41) a. [Anaményá nyu^{mbá} ndí MWÁÁLA]

pro-hit (the) house with (a) rock

'He hit the house with a ROCK.'

b. [Anaményá NYUÚ^{MBA}] [ndí mwáála]

'He hit the HOUSE with a rock.'

c. [ANAMÉENYA] [nyuú^mba] [ndí mwáála]

'He HIT the house with a rock.'

(cf. Kanerva 1989:73, 90, 98)

To arrive at the phonological domains shown above, Kanerva first divides any syntactic phrase that contains a focus into its component syntactic phrases, which he calls Focal Phrases (FPs). These FPs are then restructured into larger FPs starting from the lexical head of the projection which contains focus and continuing up to and including the focused constituent.¹⁹

In addition, if the entire VP is focused, it forms a single FP, as shown in (42), because it is a daughter of S. Since S has no lexical head, this FP is never subject to restructuring.

(42) [ANAMÉENYÁ NYU^MBÁ NDÍ MWÁÁLA]

'HE HIT THE HOUSE WITH A ROCK.'

Closer examination of (41) - (42) reveals, however, that Kanerva's Focal Phrasing algorithm fails to account for some

¹⁹ Kanerva's (1989:109) formulation of this procedure is the following:

- a. FP Division: If a syntactic constituent contains a focus, each of its daughter constituents forms a separate FP.
- b. FP Integration: Integrate into a single FP the stretch of material from a lexical head H to a focused constituent contained in the maximal projection of H.

of the sentences for which it was originally proposed. Specifically, in order to arrive at the structure in (41a), where the entire VP forms a single FP, Kanerva must crucially consider the full PP ndí mwáála 'with (a) rock' to be the focused item. This is in conflict, however, with the sense translation which indicates that it is the NP, or the noun itself, that is focused. In fact, according to the algorithm, focus on the NP or N should result in an FP that also includes the preposition, but nothing else, assuming that the preposition is the lexical head of the maximal projection that contains the focused constituent.

A further contradiction to the phrasing algorithm arises in Kanerva's 1989 example (106a), repeated in (43b).²⁰ The relevant syntactic structure is given in (43a).

(43) a. [VP V [PP P [NP N [NP Mavuto]]]]

b. [anaaⁿgógóná mnyu^mbá yá MÁVÚUTO]

they-only-slept in-house Poss Mavuto

'They only slept in MAVUTO's house.'

If the NP Mavuto is focused, as indicated by Kanerva's translation, the smallest syntactic constituent that contains a focus is the NP (or DP) corresponding to 'Mavuto's house' and FP restructuring should be able to stop at the boundary of that NP (or DP). The next higher lexical head which may constitute the left boundary of restructuring is the preposition, assuming that prepositions are lexical heads.

²⁰ Since Kanerva uses glosses sparingly, most of the glosses given here are our own reconstructions.

Although Kanerva's (1989) phrasing algorithm can also correctly include the verb in a single FP with the NP Mavuto in (43), it fails to exclude the alternative structures which are claimed to be impossible by his descriptive generalization (125): "if there is focus inside the VP, [...] a domain starts at the verb and ends at the focused constituent" (p. 108). Thus, the proposed algorithm is empirically inadequate.

Thus, while there is evidence for phonological constituency below the IPh, there is no evidence that this must be the FP. On theoretical grounds, this is not motivated, in fact, since it involves the proliferation of constituents, and it has not actually been demonstrated that the relevant domain cannot be the PPh. In addition, as we have just seen, the algorithm for constructing the FP is itself flawed. Finally, even if Kanerva's FP analysis did account for all the data, it would distinguish Chiche^{wa} from the other languages under examination here in treating the focus restructuring of phonological constituents in terms of syntactic, rather than phonological, structure.

Furthermore, while Kanerva demonstrates that the IPh as usually defined cannot be the domain for the rules in question, he does not demonstrate that the PPh cannot be the appropriate domain. That is, he does not demonstrate that the FP must be distinct from the PPh. Kanerva argues for the existence of the FP only on the grounds that the phonological rules he examines, Vowel Lengthening and Tone Retraction

(domain limit rules) and Nonfinal Doubling and Prehigh Doubling (domain span rules), operate in contexts that do not coincide with the PPh as defined elsewhere.

The proposal we advance here is that the domain for Kanerva's FP rules is, in fact, the PPh. Specifically, since the basic rule for constructing this constituent (cf. #12a) holds for Chiche^{wa}, all that is needed to account for the focus related phenomena discussed by Kanerva is a restructuring rule like those proposed above (cf. #44)). This allows us to treat Chiche^{wa} in the same way as the other languages rather than distinguishing it from them by introducing another constituent.

(44) Focus Restructuring: Chiche^{wa}

If some word in a sentence bears focus, place a PPh boundary at its right edge and join it into a single PPh with all the PPhs on its left.

The rule in #44) gives the same groupings as Kanerva's rule for sentences such as those in #41). Thus, in #41a), the VP final element is focused and it joins into a single PPh with the constituent immediately to its left as well as the verb. The focused object in #41b) only joins into a PPh with the constituent on its left, the verb; the PrepP to the right forms its own PPh. The focused verb in #41c) has no PPhs to its left to combine with, so no restructuring takes place.²¹

²¹ We will not discuss Kanerva's claims that subjects are phrased separately when focused, since they do not bear directly on the issues at hand. Furthermore, Kanerva's data

Rule #44), however, also makes the correct predictions in the cases seen above where Kanerva's algorithm fails. That is, instead of taking the head of the constituent containing focus as the starting point for restructuring, whether this head is the N or P in sentences such as #41a) and #43), our proposed restructuring rule first places a PPh boundary at the right edge of the focused item. While Kanerva's rule proceeds from the head to the focused item, grouping only the words in this string into a single FP, #44) incorporates all the PPhs to the left of the boundary located after the focused item into a single PPh which, in the sentences in question, causes the whole VP to form a single PPh.

Despite the fact that #44) appears to yield unbounded restructuring under focus, the evidence indicates that, similarly to the languages discussed above, focus restructuring in Chiche^{wa} is not unbounded. One absolute boundary is provided by another focused item in the same sentence, as shown in #45) (cf. Kanerva 1989: 131).²²

are not unambiguous in this respect, as seen below, where the embedded subject does not necessarily form a phonological constituent on its own.

- i) [ndi-naáⁿgo-néna kutí mfúúmú inapátsá MWAÁNA] [zóóváala]
 I-rec pst-only-say that chief gave CHILD clothes
 'I only said that the chief gave the child clothes.'
- ii) [ndinaáⁿgonéna kutí mfúúmú] [inapátsá MWAÁNA] [zóóváala]
 'I only said that the chief gave the CHILD clothes.'

²² Chiche^{wa} has in-situ wh-phrases.

(45) a. [anapátsá YAANI] [CHIYÁANI]

they-gave whom what

'WHAT did they give to WHOM?'

b. [anapátsá MWAÁNA] [CHIYÁANI]

they-gave the-child what

'WHAT did they give to the CHILD?'

The other general boundary is found between the subject and the VP, especially, though not exclusively, in matrix clauses.²³ Since referential NPs as subjects are also interpretable as topics, it is possible that focus restructuring is bounded not only by another focused item, but also by a topic.

The only respect in which Chiche^{wa} departs from the other languages examined here is thus in the fact that the entire VP forms a PPh in sentences that have no focus, or that have subject focus, as illustrated below.

(46) a. [fíisi] [anagíla chipéwa ku-San Franciscó dzuulo]

hyena bought hat CL-San Francisco yesterday

'The hyena bought the hat in San Francisco yesterday.'

²³ Kanerva himself lists examples in which the embedded verb is in a single Focal Phrase with the embedded subject, as shown below (cf. Kanerva's (160b), p. 120):

i) [mavúuto] [akugáníza kutí njúchí ZÍIFA]

Mavuto thinks that bees die

'Mavuto thinks that the bees will DIE.'

- b. [MWAÁANA] [anaményá nyu^mbá ndí mwáála]
 child hit house with rock
 'The CHILD hit the house with the rock.'
 (cf. Kanerva 1989: 99)

While on the basis of other SVO languages such as English and Italian, we might expect the verb to form a PPh with only one of the complements, the neutral Chiche[^]wa sentence exhibits a prosodic structure identical to that of a sentence which has focus on the rightmost constituent. In fact, a prosodic structural homonymy of this kind can also be found in English, where contrastive and presentational foci are indistinguishable if assigned to the same head (of an argument) of the VP, as shown below.

(47) a. Jack bought Jim a CAR.

'It is a CAR that Jack bought Jim (not a truck).'

b. Jack bought Jim a CAR.

(answer to question: "What happened?")

As Selkirk (1984) points out, the pitch accent patterns of contrastive and presentational focus in cases such as (47a) and (47b) are identical. It thus seems plausible that an analogous overlap is responsible for the fact that neutral sentences in Chiche[^]wa have the same prosodic structure as those with focus on the final constituent. Chiche[^]wa seems to

differ from English and Italian, however, in restricting Presentational Focus to the VP final constituent.²⁴

In sum, there is no motivation for establishing an intermediate prosodic constituent between the IPh and the PPh on the one hand, or for ruling out the PPh as the domain of focus related phenomena on the other hand. To the contrary, we have shown that there is evidence in favor of introducing focus into the postlexical phonology at the level of the PPh. Thus, Chichew^a does not differ with respect to its prosodic structure from the other languages discussed here. The only difference lies in the details of focus assignment. We propose that the apparent idiosyncratic role attributed to topics, including subjects, in delimiting prosodic constituents in Chiche^{wa} may, in fact, be more widespread, although the other languages examined here happen not to manifest it. For the rest, our analysis treats Chichew^a like the other languages in determining the PPh in relation to the focused item, not some other element such as the verb, as proposed by Kanerva.

5.4. Bengali

Finally, we briefly consider Bengali here since this language, too, appears to be relevant to the discussion of the effect of focus on phonology, and in particular, the prosodic domain within which it plays a role (cf. Hayes & Lahiri 1991). Since Bengali has been argued to exhibit

²⁴ Note that Hungarian also has S-final Presentational Focus in neutral sentences.

effects of focus on phonological phenomena at the level of the Phonological Phrase, it potentially provides a further testing ground for the proposals we have advanced above.

Hayes & Lahiri 1991 (henceforth H&L) argue that focus affects the application of two segmental rules (i.e. /r/ Assimilation and Voicing Assimilation) that have the PPh as their domain of application, and that this is to be accounted for in terms of the definition of the PPh itself. Thus, their approach to the interaction between focus and the application of PPh rules is similar to the one proposed here, that of allowing focus to determine, at least in part, the domain of the PPh constituent. There are, nevertheless, some differences between their proposal and those advanced here that merit consideration.

One problem in comparing L&H's analysis to the analysis of the PPh-focus interaction developed here is that L&H say nothing about how their treatment of Bengali might generalize beyond that language.²⁵ In fact, the algorithm L&H use for constructing the PPh in Bengali is somewhat idiosyncratic with respect to other approaches that posit prosodic constituents in postlexical phonology. Among other things, it makes crucial reference to c-command, which is not used in either the end based approach (cf. Selkirk 1986, among

²⁵ They do mention that focus appears to play a role in relation to PPhs in other languages, but there are enormous discrepancies among the sources they cite, so it remains unclear precisely how the analysis of Bengali fits in.

others) or the relational approach (cf. Nespor & Vogel 1986, among others).

According to L&H, in Bengali the beginning of a focused PPh is marked by a low tone (L*) on the first syllable and a high boundary tone (Hp) at the end of the PPh; a low tone appears at the end of the entire Intonational Phrase (LI). They claim, further, that with changes in the position of focus in a sentence, the locations of L* and Hp may vary, and concomitantly, the domains within which /r/ Assimilation and Voicing Assimilation apply. While we were not able to replicate all of H&L's results with a native speaker of Bengali we interviewed, it is nevertheless instructive to consider a series of illustrations provided by H&L and examine some of the different (and similar) results we obtained.²⁶ The sentence in (48) (cf. H&L, p.61) can be uttered with different focus patterns which, according to

²⁶ It is worth noting that H&L primarily base their data on the speech of one of the authors, although several other native speakers were consulted as well. We are not systematically informed, however, about the agreement across speakers or the statistical significance of the patterns reported. Given the impressive scope of L&H, this observation is not intended to minimize their research, which the authors clearly state is a first contribution to the questions at hand, but only as a reminder that it might not be surprising to find certain discrepancies between their data and those of the speaker we consulted.

c^hobi-r and jonno, except in #49f), where jonno is focused, and b) KK always treated taka anlam as a phonological unit, with the final -a of taka and the initial one of anlam coalesced into a single vowel, regardless of the presence or absence of a high tone on taka.

Since one of the central points of our proposal is its generalizability across languages, it is crucial that we be able to handle the Bengali data with the same mechanisms that have been advanced for the other languages we have examined. If we try to extend our proposal for PPh construction and its sensitivity to focus to Bengali, we find that it not only applies with little difficulty, but also that it predicts the slightly different patterns produced by KK. Using the general PPh algorithm given above in #12), we must build basic PPhs in relation to the right side of a lexical head in Bengali, since it is an SOV language. The basic PPh and the restructuring rules give the groupings of (48), a neutral version of the sentence, shown in (50a) and (50b), respectively. The brackets indicate PPhs.²⁷

- (50) a. aj ami [raja-r] [c^hobi-r jonno] [taka] [anlam]
b. aj ami [raja-r c^hobi-r jonno] [taka anlam]

²⁷ H&L give no information about the phrasing of aj and ami, so we also leave these unphrased here.

Given (50a), nothing needs to be said about a) the break before raja-r in all cases²⁸ and b) the fact that jonno 'for' always groups with chobi-r in KK's speech, except when it is focused, a point we return to below. The restructuring rule, which allows the grouping of material on the recursive side of the head with the head itself, (50b), accounts for the fact that KK always grouped taka anlam together, contrary to L&H's claims that they are sometimes separate. The possibility of separation, however, is not excluded if restructuring is taken to be optional, as it is in English and Italian. The restructuring option also correctly predicts the grouping of raja-r and chobi-r except when the latter is focused; it does not, however, account for the break between these two words in (49d), points we now turn to.

According to the proposal advanced in this paper, when there is focus on a word in Bengali, it is predicted that this should induce a PPh break to its left, the recursive side. This accounts for the breaks observed before chobi-r, jonno, and taka in (49e) - (49g), respectively, although the last is independently predicted by the basic PPh rule. Since KK never separated jonno from chobi-r, as mentioned above, nothing needs to be done beyond the basic PPh rule to account for the righthand boundary after jonno, given that it is a nonlexical item on the nonrecursive side of the head chobi-r.

²⁸ We are assuming a break before raja-r although H&L do not indicate the phrasing of anything other than the focused constituent.

The basic PPh rule also accounts for KK's inability to group taka with the preceding phrase in (49a).

What remains to be accounted for at this point is the break after raja-r in KK's speech and the H&L data, and the additional breaks in the H&L data after chobi-r in (49c, e). One possibility is that the words in question were produced with especially emphatic pronunciations, perhaps precisely to make the differences among the sentences clear. The result in this case could be additional separation of the emphasized words from their surrounding contexts, a phenomenon that is independent of the treatment of focus itself, and is observed in other languages as well. For example, while we saw in the discussion of English that focus on a word typically results in its forming part of the PPh to its left, as in the regrouping of Delaware's in #51b), another structure seems possible if a particularly emphatic pronunciation is used. That is, Delaware's can be set off not only from what follows, as predicted by the focus restructuring rule, but it is our intuition that an additional break may be inserted to its left, as in #51c) although this was never observed in all the repetitions of the test sentences produced by our subjects.

- (51) a. It's hard [to outclass] [Delaware's team]
b. --> It's hard [to outclass DELAWARE'S] [team]
c. --> It's hard [to outclass] [DELAWARE'S] [team]

Given that the H&L study is the first systematic study of prosodic structure and related phonological phenomena in

Bengali, it is obvious that a great deal of work remains to be done before we can resolve a number of the questions raised here. As mentioned above, what is important here is that despite these questions, the conclusion that the PPh is the relevant domain for the interface of focus with phonological rules is in accord with our observations on a number of other, unrelated, languages. Ultimately, it will be necessary, as we have attempted here, to establish generalizations regarding this interface that apply not just to individual languages, but crosslinguistically.

What our brief examination of Bengali shows is that there is, indeed, further support from an unrelated language not only for our proposal that the PPh is the relevant prosodic constituent for the interface of focus with phonological structure, but also that one of the ways focus is manifested is by the placement of a PPh boundary on the (syntactically determined) recursive side of the focused word.

6. Phonological Phrase restructuring and the recursive side

6.1. Focus Restructuring

It will be recalled that the English and Italian focus restructuring rule makes reference to the left side of the focused expression, while the rule for Hungarian makes reference to the opposite side (right). These are the same directions in which the basic PPh construction rule operates for these languages, which suggests that the direction of

restructuring is not random. To the contrary, it seems that the restructuring rule adjoins the focused element, like the basic PPh construction rule, in the direction of the nonrecursive side for a given language. In this light, a more general statement of the main restructuring rule is possible, as shown in #52).²⁹

(52) Focus Restructuring Rule (part 1)

If some word in a sentence bears focus, it forms a single PPh with the adjacent prosodic constituent on the nonrecursive side with respect to a lexical head. Any items remaining in a PPh after the item bearing focus is regrouped retain their PPh status.

This rule operates in right and left branching languages as shown schematically in #53a) and #53b), respectively.

- (53) a. [X1 X2] [X3 X4 X5] --> [X1 X2 X3] [X4 X5]
 +F +F
- b. [X1 X2 X3] [X4 X5] --> [X1 X2] [X3 X4 X5]
 +F +F

²⁹ It has been suggested by Selkirk 1986 and Chen 1987 that the direction of PPh construction might not be predictable from the syntactic structure of a language, although the absence of such a correlation might represent the marked case. Nevertheless, it would still be possible to allow the direction of restructuring to follow from a language's PPh algorithm, independently of the relationship between this algorithm and the syntactic structure.

When a nonbranching PPh remains, the direction of the additional restructuring option also correlates with the recursive side in a given language. This rule may be generalized in a way analogous to #52) as follows:

(54) Focus Restructuring Rule (part 2)

If the PPh remaining after focus restructuring is nonbranching, it may be joined into a single PPh with a PPh on the (syntactic) recursive side.

The fact that this directionality is ultimately determined by syntactic parameters corroborates the position taken here that the PPh is the prosodic level relevant for focus since no other prosodic constituent has been defined with reference to the recursive side in syntax. Moreover, since the basic restructuring direction in Chiche^{wa}, a right branching language, is to the left as in English and Italian, we have additional support both for our analysis of the domain of focus phenomena and our reanalysis of focus in Chiche^{wa}. Although there are no examples in our sources of restructuring involving nonbranching PPhs in Chiche^{wa}, the prediction is made that this would operate to the right as in English and Italian.

6.2. Generalized Focus Restructuring

Thus far, we have only been concerned with that aspect of restructuring that involves adding a focused item to an adjacent PPh, making it larger. If focus falls on a word in the middle of a PPh, however, a slightly different pattern is observed. In English, for example, if there is material (i.e.

at least one CG) to the left of the focused item in a PPh, the focused item is already part of a PPh with the adjacent prosodic constituent (i.e. CG) on its nonrecursive side. Restructuring thus does not induce further changes on this side (cf. #60b) below). Nevertheless, RR may be blocked where we might otherwise expect it to apply - to the right of the focused item. As was seen above, RR would normally apply to the word Japanese in a sentence such as #60a) since Japanese is in the same PPh as tourists. If Japanese bears focus as in #60b), however, RR does not apply. Furthermore, if the PPh is the domain of RR but RR does not apply between Japanese and tourists in #60b), we must conclude that these two words are not in the same PPh in this case, as shown in the PPh divisions below.

(60) a. Clarence counted eleven Japanese tourists.

--> ...[eleven Japanese tourists]pPh

b. Clarence counted eleven JAPANESE tourists.

--> *...[eleven JAPANESE]pPh [tourists]pPh

If we compare the facts of #60) with those observed above in relation to restructuring the PPh by adding a single word to an adjacent constituent (cf. #24)), we see that there is a common feature. That is, in both cases, the focused item becomes the boundary of a PPh. The result may be either to augment a PPh or to cause it to end sooner than it would otherwise, or both where the focused item is the first one in its PPh, as illustrated in #61).

(61) Clarence [only counted]pph [JAPANESE tourists]pph
--> *...[only counted JAPANESE]pph [tourists]pph

All of these facts can be handled by a single restructuring rule. What is needed is only a slight reformulation that explicitly refers to the edge status of the focused item in a PPh, as in #62). It should be noted that the new version of the restructuring rule differs from the original one only as far as (a) is concerned; (b) remains unchanged.

(62) Generalized Focus Restructuring Rule (Revised)

- a. If some prosodic constituent (i.e. Clitic Group) in a sentence bears focus, place a PPh boundary on its (syntactic) recursive side, and incorporate this constituent into a single PPh with the constituent(s) (if any) on its nonrecursive side. Any items remaining in a PPh after focus is reassigned retain their PPh status.
- b. If the remaining PPh is nonbranching, it may be joined into a single PPh with the PPh, if there is one, on its recursive side.

Given the similarities between English and Italian with regard to focus and PPh restructuring, we predict that the same patterns should be observed in Italian when some item in the middle of a PPh bears focus. The examples of RS and SR below show that restructuring does indeed work in Italian as it does in English. Specifically, while letto 'read' is typically in the same PPh as avrà 'will have' and thus gives

rise to RS or SR as shown in #63a), if avrá is focused, the PPh must be split before letto, as shown in #63b). The two rules are thus prevented from applying.

(63) a. Gianni [non avrá letto]pPh [il mio libro]pPh

--> ...[non avrá[1:]etto]pPh...

OR ...[non ávra létto]pPh...

'Gianni won't have read my book.'

b. Gianni [non AVRÁ letto]pPh [il mio libro]pPh

--> ...[non AVRÁ]pPh [letto]pPh [il mio libro]pPh

'Gianni WON'T have read my book.'

It should be noted that in Hungarian, unlike English and Italian, there is no difference between the cases of restructuring discussed earlier and those that involve focus on a word in the middle of a PPh. In both situations, the focused item begins a PPh that then extends as far rightward as possible. The original PPh grouping of the material to the right is not relevant here since all original PPh boundaries are lost up to the point at which another focused item is encountered, if there is one. We predict that the same observations are true for Chiche^w since it, too, restructures across multiple PPh boundaries.

7. Conclusions

In this paper, we have shown in depth how focus affects the application of phonological rules in English, Italian, Hungarian and Chiche^w. We have also briefly considered the same interaction in Bengali. What was observed is that in

each case when some word in a sentence is focused, it causes the relevant phonological rules either to extend beyond their usual range of application or to be interrupted precisely at the point of the focused item. It was shown that previous analyses of several of these rules were seriously flawed due to their incorrect identification of the domain of application of the rules, and more generally the identification of the level at which focus may provide input to phonology. We have argued here that the correct domain is the Phonological Phrase. Since the original definitions of this constituent do not allow for flexibility in relation to focus, however, we have proposed that this possibility must be added in the form of restructuring rules that make certain modifications in the basic Phonological Phrase structure in relation to the presence and position of a focused item in a sentence. On the basis of the languages we examined, two factors appear to be crucial in determining the application of the restructuring rule: the (syntactic) recursive side in the language and whether or not restructuring is restricted to a single adjacent prosodic constituent. While the first factor is the same as that referred to in the basic Phonological Phrase construction rule and appears to be predictable from the syntax, at this point it is not clear whether the second factor is derivable from some other characteristic of the language or must be specified in each case.

Appendix: Sentences for English Stress Retraction Experiment

Group A (neutral sentences - word in final position)

1. I just saw the new canteen.
2. That's where we keep the TV.
3. They have relatives in Tennessee.
4. I hope they arrest that French racketeer.
5. He won't be easy to outclass.
6. These are the plans I want him to okay.
7. Old photos are often hard to reproduce.
8. It's time for the meeting to reconvene.
9. The check-up was considered to be totally routine.
10. The landlord always complains when the rent is unpaid.
11. Our next-door neighbors think we're impolite.
12. All the bananas were overripe.

Group B (neutral sentences - words in separate PPhs)

- 13.. The new canteen usually opens at 6 on Sundays.
14. My brother's TV never gets Channel 12.
15. Tennessee didn't beat Michigan last time.
16. A good racketeer always escapes the police.
17. It's very hard to outclass Delaware's football team.
18. He said he would okay Tina's proposal.
19. That camera can reproduce old pictures very quickly.
20. We prefer that the meeting reconvene after lunch.
21. That type of examination is routine shortly after
surgery.

22. The bills were left unpaid last month.
23. They're impolite only to their rivals.
24. Fruit becomes overripe very quickly in this weather.

Group C (neutral sentences - words in same PPh)

25. The canteen's ceiling sprung a leak during the storm.
26. Sometimes my TV's picture gets fuzzy around the edges.
27. Tennessee's climate appeals to lots of people.
28. Our local racketeer's family tends to stay to itself.
29. Fred thought he could outclass everyone without even trying.
30. Our committee's task is to okay budgets for research projects.
31. Rabbits reproduce quickly even in captivity.
32. Our chairman tends to reconvene meetings on very short notice.
33. Routine check-ups don't usually take very long.
34. He's already accumulated over ten unpaid tickets since January.
35. I can't stand impolite tourists.
36. They had to dispose of many pounds of overripe fruit this year.

Group D (Focus sentences - words in separate PPhs)

37. The new canteen USUALLY OPENS At 6 on Sundays.
38. My brother's TV NEVER gets Channel 12.
39. Tennessee DIDN'T beat Michigan last time.

40. A good racketeer ALWAYS escapes the police.
41. It's very hard to outclass DELAWARE'S football team.
42. He said he would okay Tina's PROPOSAL.
43. That camera can reproduce OLD pictures very quickly.
44. We prefer that the meeting reconvene AFTER lunch.
45. That type of examination is routine SHORTLY after surgery.
46. The bills were left unpaid LAST month.
47. They're impolite ONLY to their rivals.
48. Fruit becomes overripe VERY quickly in this weather.

Group E (Focus sentences - words in same PPh)

49. The canteen's CEILING sprung a leak during the storm.
50. Sometimes my TV's PICTURE gets fuzzy around the edges.
51. Tennessee's CLIMATE appeals to lots of people.
52. Our local racketeer's FAMILY tends to stay to itself.
53. Fred thought he could outclass EVERYONE without even trying.
54. Our committee's task is to okay BUDGET for research projects.
55. Rabbits reproduce QUICKLY even in captivity.
56. Our chairman tends to reconvene MEETINGS on very short notice.
57. Routine CHECK-UPS don't usually take very long.
58. He's already accumulated over ten unpaid TICKETS since January.
59. I can't stand impolite TOURISTS.

60. They had to dispose of many pounds of overripe FRUIT this year.

Group F (Additional focus sentence)

i. words in separate PPhs

61. The new canteen LOOKS nice, but it really isn't.
62. That TV SOUNDS good, but it has a lousy picture.
63. Tennessee PLAYS better than Michigan, though they don't always beat them.
64. The racketeer ACTED innocent, but he really wasn't.

ii. words in same PPh

65. They tried to outclass PRINCETON, but they only managed to outclass Harvard.
66. That committee's job is to okay BUDGETS, not research grants.
67. They don't reproduce SLIDES, only snapshots.
68. That's the meeting I hope to reconvene SOONER, rather than later.
69. They perform routine SURGERY as well as check-ups.
70. Timothy tends to accumulate lots of unpaid TICKETS as well as bills.
71. An impolite FRENCHMAN is no worse than a rude Englishman.
72. I prefer overripe PEARS to bananas.

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