

## ASPIRATION IN ENGLISH AND POLISH: AN OVERVIEW

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The phonetic nature of aspiration has been variously described.<sup>1</sup> For instance, Jones (1956:68, 70, 74; 1960:138) speaks about a little (or noticeable) "puff of breath". Abercrombie (1967:148) and Gimson (1970:151) refer to "a period of voicelessness" and "a voiceless interval" respectively in describing aspiration. Jassem (1954:64; 1971:172) observes that aspiration can be compared to a voiceless vowel. Since in connected speech several types of periods of voicelessness can be observed, phoneticians feel obliged to supply their definitions of aspiration with details concerning its distribution or the state of the larynx which gives rise to aspiration. It is in the last-mentioned part of their statements that phoneticians and linguists differ most.

Of the two languages mentioned in the title of the present article, English has been more thoroughly investigated in respect of aspiration than Polish. In addition to the sources mentioned above as well as numerous works by American descriptivists (not mentioned here on account of the lack of space), aspiration in English and aspiration in general have been discussed in the generative literature, compare e.g. Chomsky and Halle (1968:326, *passim*), Hoard (1971), Kahn (1976), Selkirk (1980a, b), to mention a few authors. Polish phoneticians, on the other hand, describing normal Polish speech, ignore the phenomenon of aspiration almost completely. For instance, there is no mention of aspiration in Benni (1964). Wierzchowska (1971:151, note 1) observes that:

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<sup>1</sup> We will see later that aspiration in both English and Polish is rule-governed, i.e., it is a redundant phenomenon. The reason why we are concerned with it here is that an adequate phonetic theory should account for all features, distinctive or redundant, with respect to which languages can systematically differ from one another. For discussion see Anderson (1974:8ff.)

- (1) In Polish aspiration is extremely weak and generally escapes the speakers' attention (translation mine, P.R.).

In Wierzchowska (1980:43, and note 9), she states that aspiration is more clearly marked in the *p*, *t*, *k* when articulated forcefully and adds that it can be clearly seen on spectrograms of these consonants.

Biedrzycki (1972:27) instructs the German students of Polish not to insert the German equivalents of Polish /*p*, *t*, *k*/ when learning the language and includes the following warning:

- (2) So klingen die Wörter *pan*, *ten*, *kał*, wenn sie mit deutschem /*p*, *t*, *k*/ gesprochen werden, für den Polen as /*p*-h-an/, /*t*-h-en/, /*k*-h-ont/. Man muss also daran denken, dass das polnische /*p*, *t*, *c*, *k*/ schwach, ohne Behauchung gesprochen wird.

In Biedrzycki (1975:21) he observes that the stressed syllable of *taki* 'such, one like this' is devoiced when the word is pronounced emphatically with a rising tune, but does not relate this fact to the phenomenon of aspiration.

The Polish linguistic literature contains only sporadic references to the occurrence of aspiration in connected speech. Dłuska (1950:80) links aspiration to hesitant speech. Doroszewski (1952) notes the occurrence of aspiration in the dialects of Western and Northern Poland and attributes it to the influence of German. Moreover, he mentions emphasis as a factor conditioning the presence of aspiration. More recently, Rubach (1974) brings a few observations on aspiration in Educated Warsaw Polish.

In the remainder of the paper I will concentrate on, among other things, emphasis as a factor conditioning aspiration in Polish. Hesitant speech, which affects only isolated words, will be left out from discussion here. Also, no attention will be given to aspiration when it results from foreign influence.

Pregenerative studies of aspiration in English concentrated on the following issues:

- (3) a. identifying the set of segments which undergo aspiration;  
 b. locating aspiration with respect to the segments identified in (3a) and the environment that follows in a sound sequence;  
 c. singling out the factor(s) that condition(s) the occurrence of aspiration; pointing out factors which block it; and  
 d. describing the articulatory or acoustic nature of aspiration.

It is fair to say that whereas the structuralists were successful in dealing with the problems in (3a, d), their solutions offered to (3b, c) were far less satisfactory. The set mentioned in (3a) obviously includes /*p*, *t*, *k*/.

Consider a few statements relating to (3b):

- (4) a. between the phase of closure [of a voiceless plosive] and the beginning of a [following] vowel we simply exhale air (Jassem 1951:100; translation mine, P.R.);

- b. there is a little puff of breath, ..., immediately following the plosion and preceding the vowel (Jones 1956:68);  
 c. there is a voiceless interval consisting of strongly expelled breath between the release of the plosive and the onset of a following vowel (Gimson 1970:151);  
 d. a period of voicelessness that follows the voiceless closure phase of a stop (Abercrombie 1967:148).

Of the above-mentioned authors, only Abercrombie is careful enough not to rule out aspiration in, for instance, *play*, *try*, *cure*, *qualm*, and *mat*. The statements adduced in (4a-c) all fail to account for the occurrence of obligatory aspiration in the first four of the words and for the presence of optional aspiration in the fifth.<sup>2</sup>

Consider next a set of proposals concerning (3c):

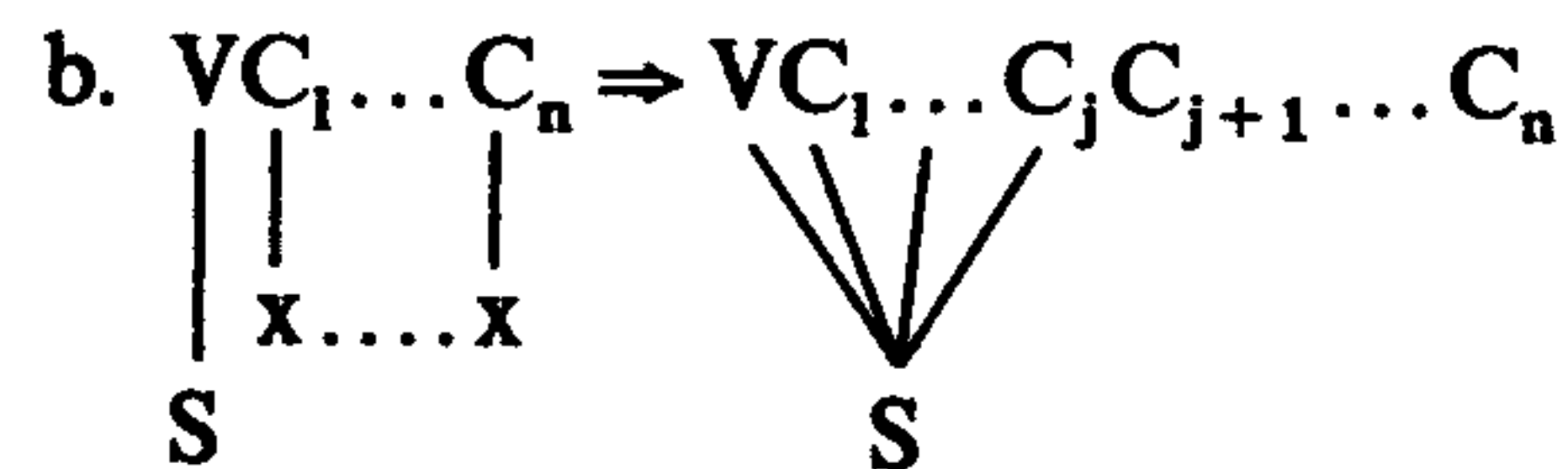
- (5) a. When *p* commences a strongly stressed syllable, it is somewhat "aspirated" in Southern speech (Jones 1956:68); *p* has little or no aspiration in weakly stressed syllables, as for instance in 'hapi (*happy*), 'wispə (*whisper*). Nor is there much aspiration when *s* precedes in a strongly stressed syllable, as in 'spendiŋ (*spending*) (*ibid.*, p. 69; cf. pp. 70 and 74 for a description of aspirated *t* and *k*);  
 b. The fortis series /*p*, *t*, *k*/, when initial in an accented syllable, are usually accompanied by aspiration... When /*l*, *r*, *w*, *j*/ follow /*p*, *t*, *k*/ in such position, the aspiration is manifested in the devoicing of /*l*, *r*, *w*, *j*/... In other positions, i.e. preceding a vowel in an unaccented syllable and finally, such aspiration as may occur is relatively weak... When /*s*/ precedes /*p*, *t*, *k*/ initially in a syllable, there is practically no aspiration, even when the syllable carries a strong stress (Gimson 1970:151);  
 c. The released aspiration, ..., occurs when a plosive is followed by a vowel in a stressed syllable. In other words, in *pertain*, for example, [t] will be accompanied by aspiration and [p] not, since it appears in an unstressed syllable. A restriction must be made here: there is no aspiration if a plosive is preceded by [s] in the same word (Rubach 1974:100);  
 d. Aspirated allophones of the fortis stop (occlusive) phonemes occur as complete onsets of accented syllables (Jassem 1983:198); The occlusives /*p*, *t*, *k*/ are also aspirated in utterance-final position (*ibidem*);

<sup>2</sup> To simplify matters, the question of optional aspiration will be left out from further discussion.

By obligatory aspiration I mean here that if a yet-to-be-discussed set of conditions is satisfied, aspiration will invariably occur.

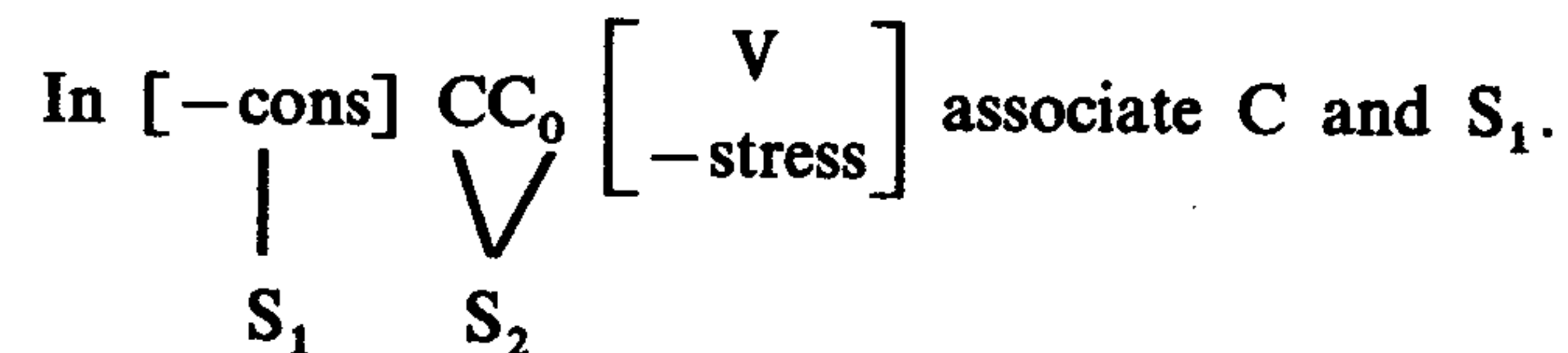




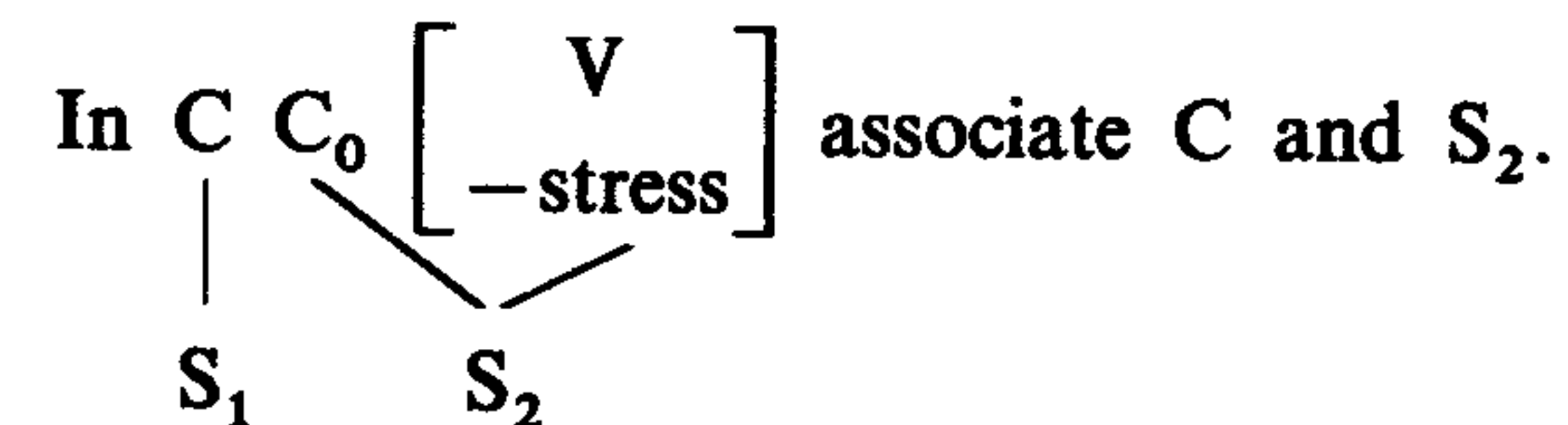


where  $C_1 \dots C_j$  is a permissible final cluster but  $C_1 \dots C_j C_{j+1}$  is not.

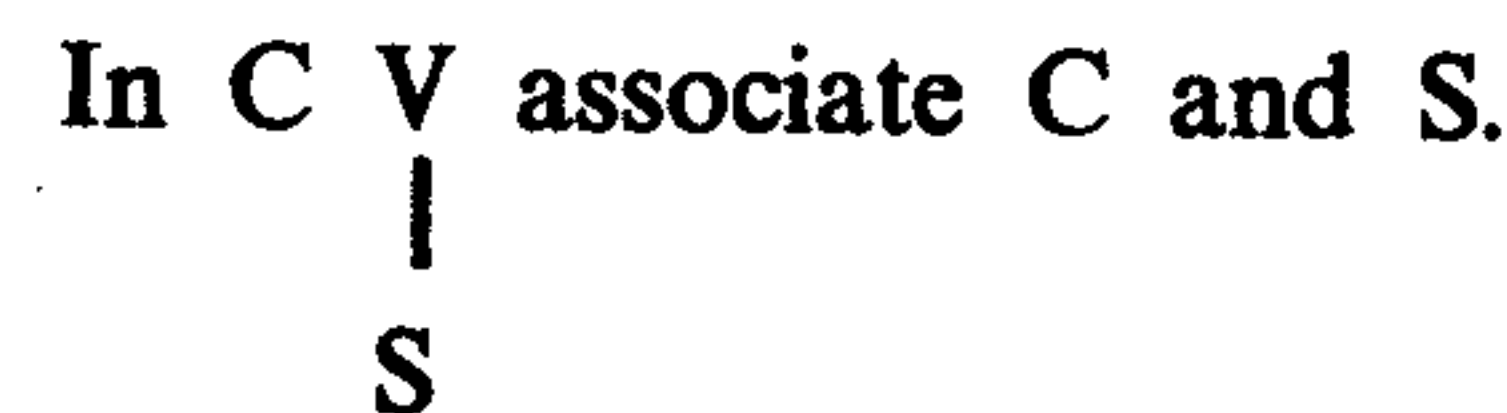
c. Rule III:



d. Rule IV:



e. Rule V:

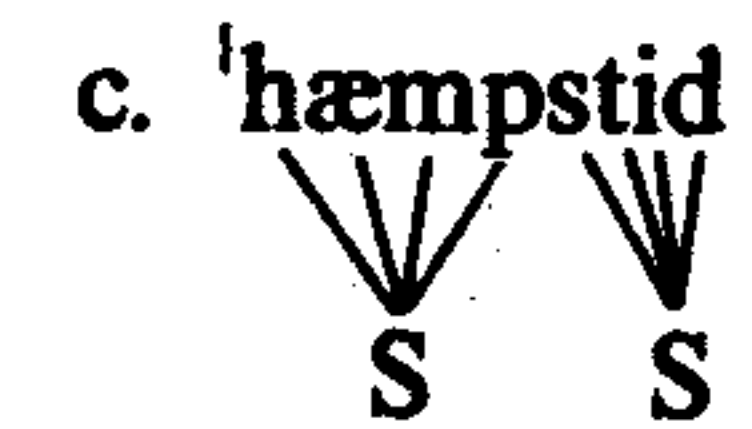
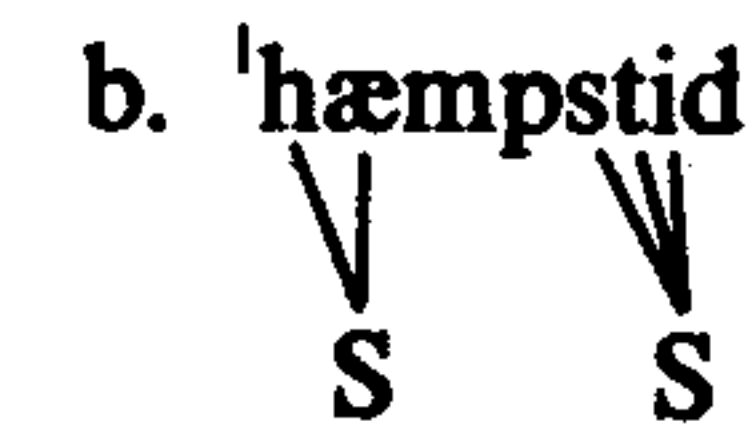
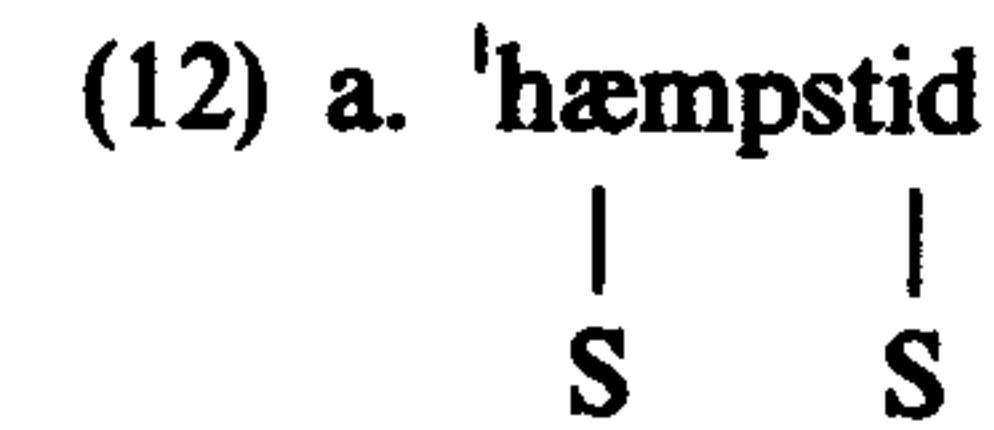


Rules I-IV have the word as their domain of application. Rule V alone is supposed to apply in connected speech.

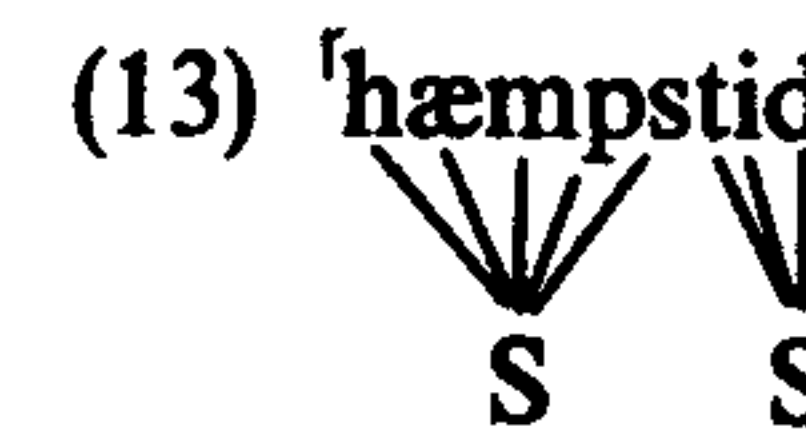
Rules I-IV do more than just formalize the structuralist concept of syllabication. The status of Rule I is uncontroversial. It states that the number of syllables in a sequence (i.e. a word) is determined by the number of the [+syllabic] segments. Rule II, which incorporates two subrules, formalizes, and somewhat modifies, the traditional, albeit controversial (for discussion see Cygan 1971:109ff.), view that intervocalic sequences of nonsyllabic segments are analysable into a word-final (and *ipso facto* syllable-final) cluster followed by a word-initial (*ipso facto* syllable-initial) cluster. Moreover, the rule chooses the preference for maximal syllable-initial clusters over one for maximal syllable-final clusters. This property of the rule follows from two facts: (1) that the rule may refer to the inventories of syllable-initial and syllable-final clusters in the language and (2) that Rule (IIa) is ordered before Rule (IIb). For instance, given (11):

(11) 'hæmpstid    *Hampstead*

Rules I, IIa and IIb, applied in this order, produce (12a, b, c), respectively:

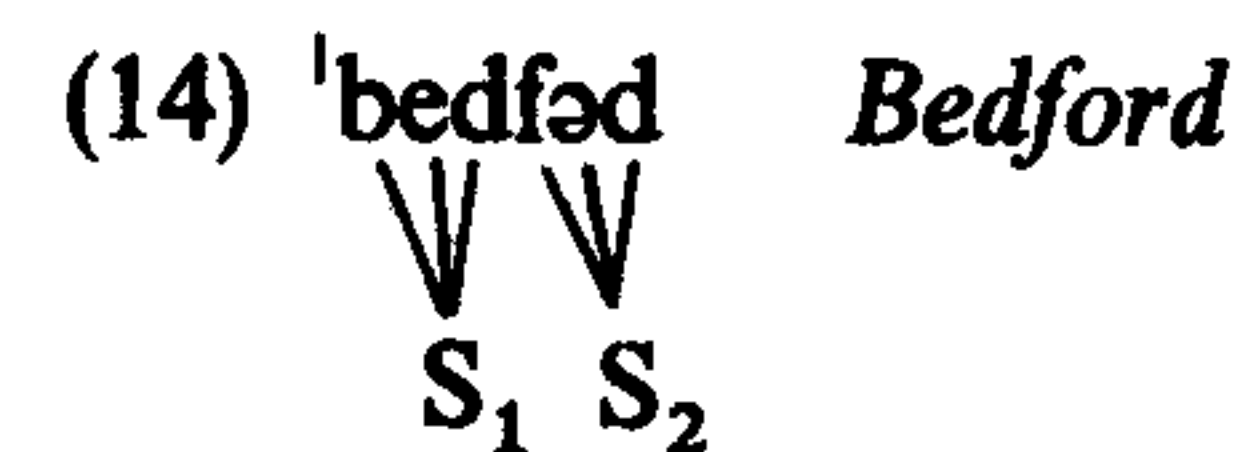


but not (13):



although there is nothing wrong with /mps/ as a syllable-final cluster (cf. *glimpse*).<sup>5</sup>

Rules III-IV make consonants ambisyllabic in certain environments. They are subject to both universal phonetic and language-specific restrictions on syllable-initial clusters. For instance, Rule IV will not convert (14):



<sup>5</sup> Certain problems arise when Rule II is applied in British English (and, probably, in American English, too). Consider the following examples from Jones (1963):

- (i) a. [dis'laik] *dislike*, [dis'lədʒ] *dislodge*, [dis'mæntl] *dismantle*,  
 b. [dis'roub] *disrobe*, [dis'rʌpt] *disrupt* (and other related forms)  
 c. [dis'plei] *display*, [dis'pli:z] *displease*, [dis'pru:vəl] *disproval*; but  
 d. [di'spirit] *dispirit*.


If the position of the stress-mark is taken to indicate syllable divisions, then the onsets of the stressed syllables are not maximal. The examples in (ib) can perhaps be explained by referring to the fact that /sr/ is not a word-initial cluster (for discussion see Gussmann 1978:127ff.; the few borrowings that exist in English (*Sri Lanka*, *Srinager*) do not invalidate the generalization though they cast doubt on Gussmann's (1978:127) claim that word-initial /sr/ is automatically changed into /ʃr/. It appears that a weaker constraint should be adopted, namely, /sr/ is not an absolute gap in word-initial position. This being the case, the generalization holds only of native words, but may be violated by borrowings). With regard to the forms in (ic) we may observe that in Hornby (1974) they have all been reanalysed to conform to the principle of maximizing syllable-initial clusters; they now fall under the pattern exhibited by (id). Despite the current forms like:

- (ii) *slant*, *slay*, *slight*; *smile*, *smoke*, *smuggle*; *snack*, *snake*, *snow* etc.

a medial sequence of /s/ plus a liquid or nasal does not tend to form a syllable-initial cluster. It is rather the case that it straddles the syllable boundary, with either member belonging to a different syllable.



into (15):

(15) \*bedfəd  


since as a syllable-initial cluster /df/ is ruled out on universal phonetic grounds.

As mentioned above, Rule V applies in connected speech, making for instance the /k/ in:

(16) *Look at John.*

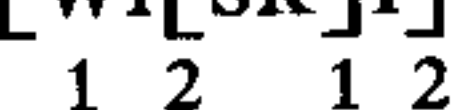
ambisyllabic. The working of this rule is irrelevant to our considerations here.

Not all linguists recognize the phenomenon of ambisyllabic consonants. For instance, in Selkirk (1980a, b) consonants are always assigned unambiguously to one syllable or another. Under certain conditions a consonant undergoes resyllabification. It is important to note, however, that resyllabification never makes consonants ambisyllabic. Her rule of aspiration, reproduced below (Selkirk's (1980b:577)(14)):

(17)  $\left[ \begin{array}{l} -\text{cont} \\ -\text{son} \\ -\text{voice} \end{array} \right] \rightarrow [+ \text{ aspirated}] /_{\sigma} (- \dots)_{\sigma}$

where  $\sigma$  symbolizes the syllable, makes slightly different predictions than Kahn's (1976) rule quoted above.<sup>6</sup>


Other linguists, for instance Anderson and Jones (1974), see the need for postulating ambisyllabic consonants but use the bracket notation to indicate this fact. For example, the word *whisky* would be syllabified in the following fashion:

(18) [wi[sk]i]  


It appears then that on the Anderson and Jones approach not only single consonants but also consonant clusters can be ambisyllabic. It is fair to say at this point that Kahn's (1976) approach is more restrictive in that it disallows clusters of two or more consonants to be ambisyllabic. The formal device that expresses this prohibition is the well-formedness condition quoted in (9c) above.<sup>7</sup>

<sup>6</sup> Selkirk's (1980) approach to the structure of the syllable differs from Kahn's (1976) in that, whereas Kahn's syllable consists of sister nodes alone, Selkirk organizes it into a hierarchical structure. However, she fails to refer to this structure while discussing the phenomenon of aspiration.

<sup>7</sup> In particular, (18), when translated into Kahn's diagram, assumes the form in (i):

(i) *wiski*  


which is illicit. Cf. the discussion in Kahn (1976:20).

Let us now consider the predictions made by Kahn's approach to aspiration in English in relation to the description of aspiration by the structural linguists quoted above. The first difference involves a shift in what is to be considered the decisive factor: being followed by a stressed vowel versus occupying the initial position in a syllable (regardless of stress). Thus, contrary to Rubach's (1974:100) claim (quoted in (5c)) concerning the distribution of aspiration in *pertain*, Kahn's (1976) analysis predicts that since both /p/ and /t/ occur in syllable-initial position, they get aspirated. Jassem's (1983:198) condition (quoted in (5d) above) that /p, t, k/ "occur as complete onsets of accented syllables" also turns out to be irrelevant. The inclusion of the requirement that /p, t, k/ constitute "complete onsets" makes aspiration impossible in (19):

(19) *pray, clean, cure, twice*

contrary to Gimson's (1970:151) statement adduced in (5b).

Observe that no additional statement is required to block aspiration in (20):

(20) *spirit, strident, scrutiny*

since /p, t, k/ simply do not occur in the initial position of the respective syllables.

Kahn's (1976) and Selkirk's (1980) approaches make different predictions with respect to the *happy* class of words referred to in (5a). Since on the Selkirk analysis /p/ starts a new syllable, it invariably gets aspirated. On the Kahn approach, on the other hand, the position of /p/ with respect to the neighbouring syllabic peaks depends on the rate of speaking. In slow, syllable-by-syllable speech, Rule III does not apply, leaving intact Rule II's assignment of /p/ to the following peak. In normal-rate speech Rule III does apply and makes /p/ ambisyllabic, thereby preventing the aspiration rule from applying (for details, see Kahn 1976:26-28, and 31).

Structural phoneticians noted several degrees of strength in connection with aspiration. On the approach followed here aspiration is also characterized by several degrees of strength. Its strength is a function of the degree of stress. Kahn (1976:42) presents the following series:

(20) *těn, tén, tèmperaméntal, tòmorrow, stem*

and observes that "there appears to exist a categorical distinction between the first four cases and the last" (*ibidem*). He adds that "no amount of emphasis will introduce aspiration in the post-/s/ cases: [st<sup>h</sup>äpit] is not possible for *stop it!*" (*ibid.*, p. 43).<sup>8</sup> It will prove interesting to relate the last-mentioned statement to some Polish data discussed later in the paper.

<sup>8</sup> In the examples from Kahn (1976) a double acute accent indicates emphatic stress, a single acute accent stands for primary stress and a grave accent symbolizes secondary stress.

Before switching to the discussion of the Polish data, let us discuss briefly the question of how Kahn's (1976) (or Selkirk's 1980) approach accounts for a set of marginal data listed in (21) (from Jones 1963):

- (21) a. [pʰfemisl]            *Przemysł*  
 b. [pʰseʰfələdzist]        *psephologist*  
 c. [pʰsju:dənim]            *pseudonym*  
 d. [psai]                    *psi*  
 e. [psitə'kousis]            *psittacosis*  
 etc.

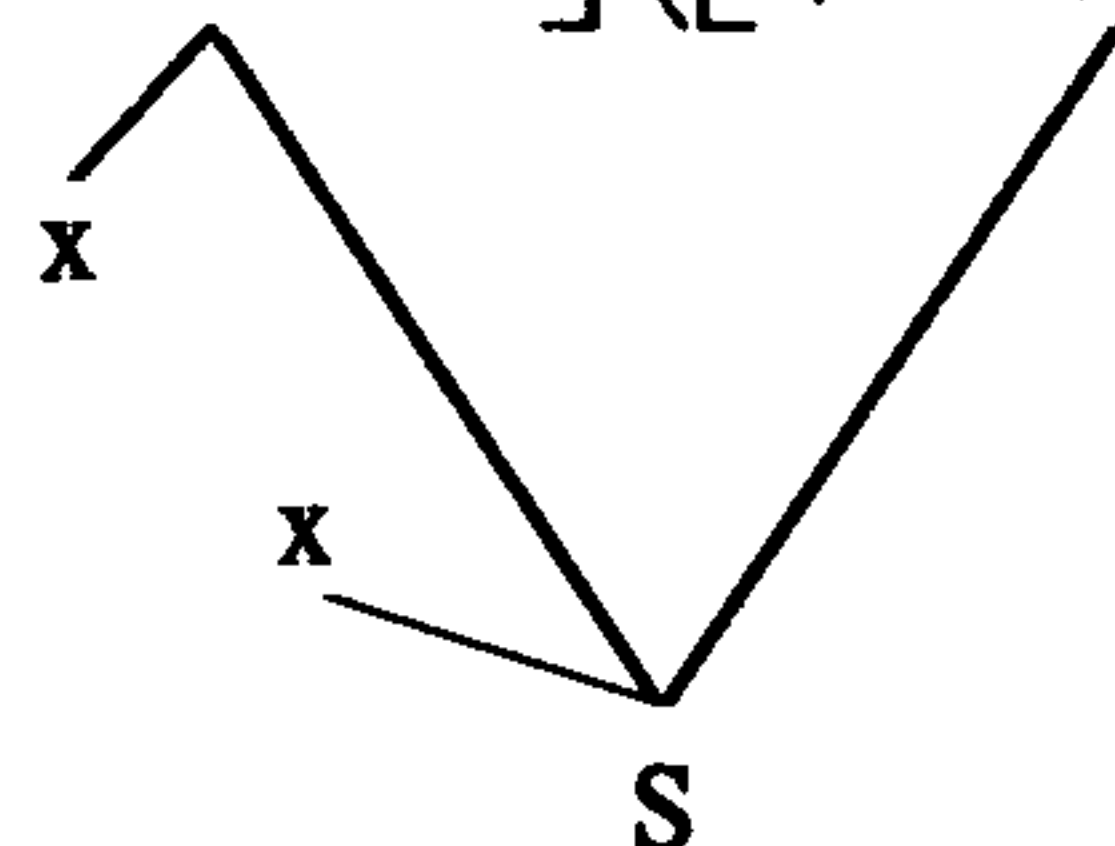
It is true that some of the examples in (21a-e) are only second-place pronunciations. This observation applies to (21b, c), but not to the remaining cases.

Observe that all of the examples violate the sequence redundancy statement of English which says that if a morpheme begins with two [-son] segments, the first must be a /s/. The fact that the forms quoted above do occur in English speech suggests that morpheme structure conditions do not have the power of an absolute filter. We should therefore opt for a weaker position taken in Rubach (1982:172) that "they [i.e. sequence redundancy rules, P.R.] exert what we might call 'a phonotactic pressure' on lexical entries which would violate them and, consequently, lead to a restructuring of underlying representations".

Kahn's (1976) and Selkirk's (1980) approaches erroneously predict that the /p/s in (21) all get aspirated. This is a highly undesirable state of affairs. The relevant rule needs revision.

As exemplified in (19), syllable-initial /p, t, k/ may be immediately followed by /r, l, j, w/ (cf. also (5b) above). The resulting clusters conform to the sequence redundancy statements of English. The rule of aspiration should be capable of differentiating between the syllable-initial clusters in (19) and those in (21). A plausible way to make it sensitive to this distinction is to write it in the following way:

(22) Aspiration (revised)

$$\left[ \begin{array}{l} -\text{continuant} \\ +\text{stiff v.c.} \end{array} \right] \left( \left[ \begin{array}{l} -\text{syllabic} \\ +\text{sonorant} \end{array} \right] \right) \rightarrow [+ \text{spread glottis}]$$


The specification in parentheses picks up /r, l, j, w/, but not, for instance, /s/. Rule (22) is of course subject to the familiar principles of rule application,

i.e., the rule should be tested for applicability in its expanded form before being tested in its reduced form.

Let us now turn to aspiration in Polish. As observed by other linguists (Doroszewski 1952; Rubach 1974), Polish /p, t, k/ are aspirated when they occur in emphatically stressed syllables. Of the two peripheral positions in the structure of the syllable occupied by consonants, the onset is of paramount importance here.

It thus appears that obligatory aspiration in English and Polish has two things in common: the set of segments that undergo the rule and their occurrence in the onset part of the syllable.

Let us look at some data from Polish, in particular the examples in (23)–(27):

- (23) Jan był wczoraj nad jeziorem i złapał *t*aką rybę.  
 'John was fishing in the lake yesterday and caught a huge fish'.  
 (24) *P*an mi to mówi? 'You're telling me that?'  
 (25) *K*ogo skrzywdziłem? 'Who did I hurt?'  
 (26) *K*tóż to powiedział? 'Who said that?'  
 (27) *S*taszek go widział? 'Stan saw him?'

as well as those in (28):

- (28) a. *C*ztery? 'Four?'  
 b. *K*iūr? 'Curium?'  
 c. *K*tóż? 'Who?'  
 d. *P*łusz? 'Plush?'  
 e. *P*łót? 'Fence?'  
 f. *P*rąwo? 'Law?'  
 g. *S*pört? 'Sports?'

The examples in (24)–(28) are supposed to be pronounced with high rising intonation. As was the case with Kahn's (1976) examples in (20), the double acute accent indicates emphatic stress. The italicized consonants are pronounced with aspiration. If /r, l, j, w/ follow them (cf. (28b, d, e, f)), they get devoiced. Unlike in English, Polish /p, t, k/ are aspirated even if preceded by a tautosyllabic fricative. However, no aspiration occurs in:

- (29) *P*să? (gen./acc. sing.) 'Dog?'

and other similar examples.

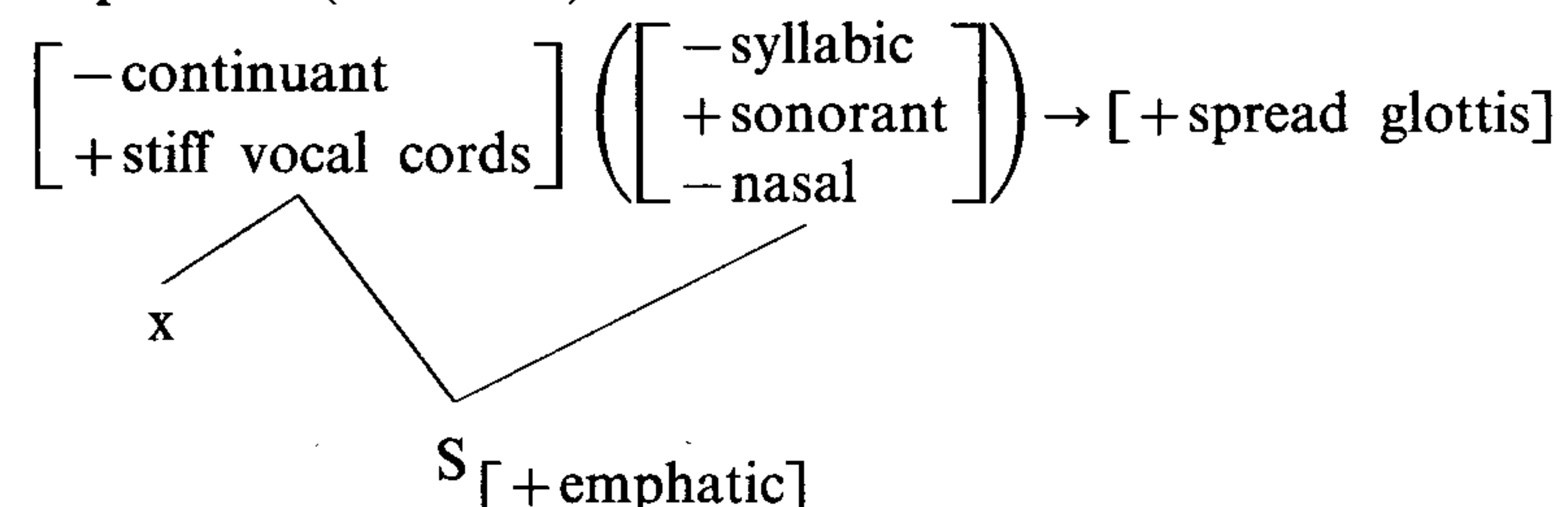
In the light of the foregoing discussion it appears that the /r, l, j, w/ following /p, t, k/ in the onset do not block aspiration. Polish differs from

<sup>9</sup> The set does not include /c/ and other palatalized plosives since they are derived from the basic series /p, t, k/ by the rule of surface palatalization in the environment before /i, j/. For details see Rubach (1981:13, *passim*).



English in that it allows other consonants to precede /p, t, k/ in the onset (cf. (28a, c, g)). It follows that the aspiration rule in Polish should assume the following form:

(30) Aspiration (in Polish)



The rule in (30) differs from that in (22) in a number of respects. First of all, /p, t, k/ need not be syllable-initial (hence the lower *x* is absent from (30)). Secondly, since the sequence redundancy statements of Polish do not rule out clusters consisting of a plosive followed by a nasal, as in (31):

(31) *kmieć* 'serf', *knur* 'boar', *pniak* 'stump' etc.

the /p, t, k/ being unaspirated in this position even under emphatic stress, it is necessary to include the feature [-nasal] to narrow down the class of segments designated by  $\left[ \begin{array}{l} -\text{syllabic} \\ +\text{sonorant} \end{array} \right]$ . Thirdly, and most importantly, the *S* has been provided with the specification [+emphatic].

The last-mentioned phenomenon calls for explanation. In the examples adduced in (23)–(28) the emphatically stressed syllable coincides with the one that carries the nuclear tune. As shown in Marek (1975), the assignment of the feature EMPH (emphasis) crucially depends on the feature FOCUS. In fact, emphasis can only be placed on an element that has already been assigned FOCUS. Focus in turn is assigned in clauses on the basis of semanto-syntactic data. The details of focus assignment need not concern us here (see Marek 1975:162-64). It is interesting to note though that only a single element in a particular clause can be assigned focus. Consequently, a clause can contain only a single occurrence of EMPH.<sup>10</sup>

<sup>10</sup> Dogil's (1980:243) examples like the one in (i):

(i) To trzeba ZAbudować, nie ROZbudować.

'This should be built over, not expanded'.

where the capitalized stretches, being contrastively stressed, bear the feature [+E] (E for *emphasis*), do not invalidate the last-mentioned generalization. Of the two syllables marked [+E], only the left-hand one is really strong, with the right-hand [+E] syllable only echoing the former in strength. Consequently, in a sentence like (ii):

Given the form of the aspiration rule in Polish, it is clear that the feature [emphatic] determines the distribution of aspirated plosives in the language. In particular, there can be only a single occurrence of aspirated /p, t, k/ in a clause.

This conclusion may appear strange at first sight. It depicts the distribution of aspiration in Polish as quite different from its counterpart in English. Recall, however, that Kahn's (1976) achievement consists, among other things, in dissociating aspiration from the parameter of stress. As we have seen, this solution does not work for Polish. The feature [+emphatic] presupposes stress and its distribution is determined by syntactic and semantic factors.<sup>11</sup>

Finally, let us consider Gussmann's (1975:123) suggestions concerning rule comparability in contrastive phonological analysis. He assumes rule comparability to include the following factors:

- (32) a. the scanning of strings meeting the structural description of the rule with phonological representations, i.e., is the rule exclusively fed by other rules or do phonological representations themselves require the rule?  
 b. interaction with other rules of the phonology, i.e., what rules feed or bleed it? what rules does it feed or bleed?  
 c. depth of ordering, i.e., is the rule placed relatively early or relatively late?

With respect to (32a) it appears that the aspiration rule in both English and Polish is exclusively fed by other rules. The two languages differ in terms of the rule's interaction with other rules. Although in both languages the rule depends crucially (i.e., is fed by) the rules of syllabication,<sup>12</sup> in Polish it is additionally fed by the rule of emphasis assignment. The latter is in turn fed by focus assignment.

In both languages the rule feeds the rule of sonorant devoicing.

(ii) Powiedziałem TAnie, nie PAnie.

'I said cheap, not ladies'.

only /t/ gets aspirated.

It is also to be noted at this point that (ii) is not made up of a single clause. Given that Polish personal pronouns in subject position are dropped if not contrastively stressed, the sequence *nie PAnie* appears to be an instance of gapping, the fully specified structure being *nie powiedziałem PAnie*.

<sup>11</sup> See Dogil (1980) for an autosegmental approach to focus and emphasis assignment in Polish (and English).

<sup>12</sup> It is true that the rules of syllabication in Polish have not been discussed here. I assume that they are similar to the rules developed for English by Kahn (1976) (see (10) above). It goes without saying that the syllabication rules in Polish depend on different inventories of word-initial and word-final clusters than the rules in (10), to break up medial clusters. For some basic differences in the respective inventories, see Rubach (1972).

Whatever other differences obtain in the effects produced by the aspiration rule in English and Polish, they are due to the differences in the formal make-up of rules (22) and (30).

In both languages the rule is exceptionless.

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