

## LOW PHONETIC VOICE ASSIMILATION WITH OBSTRUENTS IN POLISH AND ENGLISH

JERZY RUBACH

*University of Warsaw*

Obstruents are different from sonorants in that they are produced "with a cavity configuration that makes spontaneous voicing impossible" (Chomsky and Halle 1968: 302). The mere fact that voicing or unvoicing of obstruents must be determinate suggests the importance of the feature [voice] for distinctions among obstruents. In some contexts, however, these distinctions may be obliterated completely (as in Polish) or partially (as in English). This obliteration is caused by different assimilation processes referring to voicing and unvoicing. In this paper an attempt will be made to analyze such processes in Polish and English. We shall be primarily, though not exclusively, concerned with low phonetic rules and since such rules may be at least partly accent-specific it is important to note that we shall be considering *Warszawska Polszczyzna Kulturalna* for Polish and *Received Pronunciation* for English. No attempt is made to account for alternations such as, for example, /d/—/s/ in *offend* — *offence*, /d/—/ʃ/ in *pretend* — *pretension* (and probably /b/—/p/ in *transcribe* — *transcription*) as these are clearly not conditioned by low phonetic contexts<sup>1</sup> and consequently not by low phonetic rules of voice assimilation.

It seems best from the organizational point of view to discuss the process of voice assimilation first in a progressive aspect (an adjustment to the seg-

<sup>1</sup> In this paper we accept the view that, e.g., the alternant of /b/ in *babka* is an output of a low phonetic rule active in the context of a phonetic voiceless segment, similarly the [ʃp] in *gróźb* is conditioned by a low phonetic context, cf., *gróźb złowieszczych* [-ʒb # z-].

ment which precedes) and then in a regressive one (an adjustment to the segment which follows) Further on, in each type statements must be made about voicing and unvoicing of segments.

### Progressive assimilation

Progressive assimilation in Polish and English involves only unvoicing of segments. In the traditional approach to Polish phonology (cf., for instance, Wierzchowska 1971: 203-4) the progressive assimilation of unvoicing is invariably considered (at least for WPK<sup>2</sup>) to be a historical process non-productive synchronically for modern Polish. This view is clearly untenable within the framework of generative phonology accepted in this paper. In our opinion the progressive assimilation of unvoicing is productive. There are basically three arguments in support of this interpretation:

a) the often mentioned fact (cf. Wierzchowska 1971: 204) that in the South-West accent of Polish this assimilation may not occur, i.e., forms like [kv'at] or [kv'jat] are permissible<sup>3</sup>.

Within the generative framework where an attempt is made at giving generalizations and phonological and phonetic rules account for language specific or as in this case accent specific diversification of phonetic forms the above quoted data may point to the fact that *kwiat* should be entered with an underlying /v/ in the lexicon; this is the least convincing argument as there might be cases of dialectal differences reflected directly in the underlying representations.

b) stylistic alternations in both Polish accents in cases such as *trwać* where the prevocalic obstruent can be voiced or voiceless;

c) finally the most powerful argument: nonstylistic obligatory voicing of the phonetic [f] of *marchwi*, *rzodkwi*, *modlitwa* in *marchewek*, *rzodkiewek*, *modlitewnik*.

At first glance it may seem that these alternations can be explained by a voicing rule having the shape<sup>4</sup>:

$$(1) \quad [+obstr] \rightarrow [+voice] / [+voice] - [+voice]$$

<sup>1</sup> WPK hereafter will denote "Warszawska Polszczyzna Kulturalna".

<sup>2</sup> It is also often attested in WPK but only in songs as the singers make deliberate attempts to avoid voiceless segments (e.g. Bogdana Zagórska, Wielka gra. 6.05.1973. TVP).

<sup>3</sup> Kiparsky's alternation condition as the *only* premise for setting up underlying representations has been generally rejected, cf. Hyman (1970), for recent discussion Gussmann (forthcoming) and for a controversy over the indeterminacy of phonological representations cf. K. E. Zimmer (1969), J. L. Malone (1970), Th. Lightner (1971: 521 - 54).

The rule is easily proved to be false since in, e.g. *chatek*, *matnia* we have the phonetic [t] not [d]. Consequently, *modlitwa* and the like should be rather viewed as having the underlying /v/ which is unvoiced by the assimilation rule (2):

$$(2) \quad [+obstr] \rightarrow [-voice] / [-voice] -$$

The above mentioned alternation seems to provide enough evidence to postulate underlying voiced obstruents also in words such as *tworzyć*, *twarz*, *krzak*, etc., although for these specific instances no alternants have been discovered. Furthermore, let us notice that in *trwać*, *krwi*, *plwać* the prevocalic obstruent is usually (though not always) realized as voiceless. This would suggest a necessary extension of rule (2) to apply also over phonologically voiced segments. As is immediately clear these segments are liquids. Thus rule (2) in its extended version takes the following shape:

$$(3) \quad \begin{array}{l} [+obstr] \rightarrow [-voice] / [-voice] \\ +contin \end{array} \left( \begin{array}{c} [+voc] \\ +cons \end{array} \right) -$$

In accordance with Harms's abbreviatory devices (1968: ch.7) the rule is expanded first in its fuller form (i.e. with the liquids) and thus applies to *krwi*, *plwać* and then in its shorter version applying to *twarz*, *kwiat*, *modlitwy*, *krzak*, etc. As mentioned above the prevocalic obstruent separated from the voiceless segment by a liquid (i.e., the environment of (3) in its expanded version) may be voiceless (i.e., when rule (3) applies) or voiced. It is voiced only in careful guarded speech (speeches made in public, texts read by radio-speakers). Thus (3) in its expanded version is an optional rule. Its application or non-application produces variant pronunciations comparable to those found in English in reference to the place or manner of articulation, the difference being that English variant pronunciations are a result of an intricate interplay of phonological rules while with Polish voiced - voiceless variants, as in *krwi*, the rules are clearly low phonetic.

In fact in English in the voiceless environment obstruents are invariably devoiced usually partially or with some speakers fully. If a voiced obstruent appears after a pause or a voiceless segment then it is devoiced in the part adjacent to the voiceless context. Thus in *bow*, *this bow*, *crossbow* [b] is devoiced in the first half (Jassem 1971: 189 ff).

The process can be described by rule (4) (to be collapsed with another rule, cf. below):

$$(4) \quad [+obstr] \rightarrow [-voice] / \left\{ \begin{array}{c} \# \# \\ [-voice] (\#) \end{array} \right\} -$$

Two points need explaining in this rule:

— the abbreviatory device of dotted bracketing denotes that the rule applies to parts of segments and furthermore to that part of the segment which is adjacent to the conditioning environment. A need for such an abbreviatory device and convention has been found on independent grounds (cf. Rubach 1975).

This solution is favoured over Halle's proposal quoted by Postal (1968: 78) where half-devoiced segments are denoted by the feature complex [+tense, +voice]. It seems that the devoicing of obstruents is not due to the introduction of articulatory tension but rather to the assimilation to [-voice] segments. Thus the half devoiced obstruent remains [-tense] unlike as in the above analysed Polish examples where the *fully* unvoiced obstruent could be equated with other voiceless obstruents (the phonetic [f] in *twarz* is not different from the [f] in *franka*).

— (4) is regarded as an assimilation rule. The difficulty arises with pauses as conditioning elements. It is hard to think of an assimilation of a segment to something which is not a segment such as pauses in our case. However, the rule can be maintained if we agree to regard pauses as functionally voiceless obstruents<sup>5</sup>, which points to a certain generalization.

From the phonetic material which we have examined it seems that this generalization is specific to English and its usefulness is limited as it is not only language specific but also restricted to the progressive type of assimilation. Let us regard it, however, as a first approximation and see whether it could not be extended to other cases.

#### *Regressive assimilation of voicing*

In English the situation is straightforward. In Received Pronunciation the regressive assimilation of voicing does not occur<sup>6</sup>. Polish seems somewhat complex in this respect. Apart from the obvious differences between the WPK and the South-West accent there are a few allegedly troublesome points. Consider the following words:

A. *liczba, także, prośba, Bohdan, ruszce, kupże, tak było, brat wiedział, prosić go*

B. a) *fakt że, kask dobry, fuchs wyjątkowy, szewc zapracowany*

b) *punkt dziesiętnasty, instykt zachowawczy, państwo budujących*

c) *tekst był, wydawnictwo dawnych*

<sup>5</sup> This is essentially a modification of Lass's idea (1971: 26-7) that for German word boundaries should be treated functionally as voiceless obstruents.

<sup>6</sup> It is not true for other English accents. In Scottish English such assimilations appear to be regular. Abercrombie (1965: 136) quotes *blackboard, birthday* as having [g] and [ð] respectively under the influence of the following voiced obstruent.

d) *przestępstw wojennych, ludoznawstw dawnych*

C. *zaniósłby, zgniółłby, podniósł wagę, włókl go.*

The phonologically voiceless obstruents in the words of A and B<sup>7</sup> appear in a voicing context, i.e., before other voiced obstruents. Consequently, they should be voiced in accordance with the well known rule of Polish phonology that sequences of obstruents are either fully voiced or fully voiceless. In normal speech it is in fact the case with all the examples quoted in A and B.a. Voicing of obstruent clusters in B.b, c, d is less obvious. One important reservation has to be made before we proceed: we are considering a style of Polish where no rapid speech deletions have taken place. Otherwise the whole argument would be pointless as consonant clusters may often have a reduced number of members. Thus in *tekst był* the /t/ is often elided and then the situation is that of B.a. In *państwo budujących* two final obstruents may be deleted and in *przestępstw wojennych* even three. Consequently, the words become parallel to those in A and by a regular process a single voiceless obstruent is voiced in the favourable environment: hence the pronunciations such as [pãz̃t bud-], [p̃st̃emz̃t vo-].

Jassem and Łobacz (1972: 11) quote *tekst był* as an exception "running contrary to the rules of Polish phonotactics" since they have noted the pronunciation [-kst#b-] where the sequence of obstruents is not uniform in voice. In our opinion this should not be regarded as exceptional but rather as an example of regular stylistic variations. If we compare the words in B.b and B.d we notice that the probability of voicing of final obstruent clusters decreases quite rapidly. As a matter of fact those in B.d are (according to my observations) more often voiceless than voiced.

The regularity underlying these variations seems straightforward: *the more members in an obstruent cluster, the less obligatory is the voicing assimilation rule.*

In other words, if we analyse careful and guarded speech, in A all obstruents will be invariably voiced, the same in B.a (voiceless pronunciations can be noted only in overcareful unnatural speech). In B.b, B.c the probability of voiceless clusters increases, in B.d obstruent clusters are normally voiceless in this style of speech, i.e., the voicing rule does not apply in spite of the following voiced context. Now let us consider the words in C. *Zaniósłby* has three possible pronunciations: [sw#b], [zw#b], [z#b]. The last pronunciation may be disregarded here as after the deletion of [w], *zaniósłby* falls together with the examples in A and the voicing is obligatory by a regular process. The first two pronunciations prove that the rule of voicing assimilation does not obli-

<sup>7</sup> In some examples of B there are clusters of voiceless obstruents with the phonologically voiced /v/. It may be safely accepted, however, that at this stage the phonological /v/ is represented by the phonetic [f] due to unvoicing assimilations. This view stems from the fact that rules first apply to words and only then to phrases.

gatorily apply if the voiceless obstruent is separated from the voicing context by [w]. As [w] is phonologically a liquid (we are referring to the underlying representation here as this will have to be done anyway in rule (2) and then the similarity of environments of (5) and (3) will be more evident; for the justification of [w] as derived from an underlying liquid cf. Gussmann (forthcoming) the intervening segment should be described by the features  $\left[ \begin{array}{l} +\text{vocal} \\ +\text{conson} \end{array} \right]$ . Furthermore, notice that the stylistic variant with a voiced

obstruent in such situations is dependent on the presence of the voicing context (recall that in *trwać* this was not the case) which in the examples given in C is a voiced obstruent appearing after a word boundary (*zaniósłby* has a word boundary; for discussion see below).

We can sum up our discussion in a formal rule like (5):

$$(5) \quad [+obstr] \rightarrow [+voice] / - \left( \left[ \begin{array}{l} +\text{vocal} \\ +\text{conson} \end{array} \right] (\#) \left[ \begin{array}{l} +\text{obstr} \\ +\text{voice} \end{array} \right] \right)$$

Note that the obstruent specification in the environment is necessary here since, for example, in *zaniósł róże* the phonetic [zw] is not possible.

Rules (5) and (3) are clearly ordered. Rule (3) must precede (5) so as to cause the unvoicing of /v/ in *marchwi*, etc. If (5) preceded (3) then we would get incorrect outputs (in our example /x/ would be voiced):

#### *Regressive assimilation of unvoicing*

As before, English presents no difficulty here. Voiced obstruents are partially devoiced (with some speakers fully, cf. Gimson 1966: 147) before a pause or a voiceless segment, e.g. *Bob, bed, bag, leave, bathe, rose, rouge, absolute, adsorb, Bob to, bed for*.

The appropriate rule is:

$$(6) \quad [+obstr] \rightarrow [-voice] / - \left\{ \begin{array}{l} \# \# \\ (\#) [-voice] \end{array} \right\}$$

The rule is similar to (4) both in its shape and interpretation; even more (6) is a mirror image of (4) hence the collapsing of the two rules is called for. This can be done using Bach's 'neighbourhood convention':

$$(7) \quad [+obstr] \rightarrow [-voice] / \left\{ \begin{array}{l} \# \# \\ (\#) [-voice] (\#) \end{array} \right\}$$

There is still one case to be examined for English. If a voiced obstruent occurs between a phonologically voiced obstruent and a pause or a voiceless

segment then it is fully unvoiced (cf. Jassem 1971: 211), e.g. *robs, beds, bags, robs for, bags from*<sup>8</sup>, etc.

This fully unvoiced obstruent is not, however, phonetically identical with [s] as in *see*. The difference lies primarily in the force of articulation: [z] is [-tense] and [s] is [+tense], which must be marked in the rule:

$$(8) \quad \left[ \begin{array}{l} +\text{obstr} \\ -\text{tense} \end{array} \right] \rightarrow [-voice] / \left[ \begin{array}{l} +\text{obstr} \\ +\text{voice} \end{array} \right] - \left\{ \begin{array}{l} \# \# \\ \# [-voice] \end{array} \right\}$$

It seems to be a good point of departure to discuss briefly the feature [tense] in low phonetic considerations of consonants. First of all the feature is used in basically two senses: force of articulation (e.g. Gimson 1966: 32) and length (e.g. Hoard 1971: 134) or both at the same time (e.g. Chomsky and Halle 1968: 324).

The last approach is most appealing as clearly apart from the greater muscular effort length should also be considered. This explains, for instance, why the vowel in *bit* is shorter than in *bid* ([t] is long so the vowel is short, [d] is short so the vowel is long). There has been a long lasting controversy in linguistics about the role of the features [voice] and [tense] in phonetic differentiation of sounds. Some linguists claimed that [tense] was the distinctive feature e.g. in English, others were inclined to ascribe this role to [voice]. The discussion is summed up in Kim's article (1965: 339 ff.) and there is no need to repeat it here. We might only add Hultzén (1962: 310) to the list of the adherents of the [tense] feature as distinctive (in this case for English. It seems best to accept the view that at least for English and Polish [voice] and [tense] are concomitant features. For phonological and the majority of phonetic analyses [voice] provides sufficient distinction. It is only very rarely that these two features are separated (cf. rule (8)<sup>9</sup> and some Polish examples below, then [-tense] appears in the left side specification). In other cases in this paper whenever we state that an obstruent has been unvoiced (the whole segment, i.e. solid line in our notation) we always understand that the change from [+tense] to [-tense] has also taken place. Kim (1965: 457) rightly stresses that [tense] is a relative feature. Consequently, it may be different in absolute values in different languages. This seems to be the case with English and Polish. It appears correct to suggest that for Polish its

<sup>8</sup> It seems that the phonological representation of the plural morpheme (also of other morphemes having this shape as the 3rd person singular of the present tense) is /iz/.

<sup>9</sup> Harris (1969: 41) does for Spanish what we have done for English, i.e., he represents a phonologically voiced obstruent which is phonetically fully unvoiced by the feature specification  $\left[ \begin{array}{l} -\text{voice} \\ -\text{tense} \end{array} \right]$ .

absolute values are much lower than for English. It explains why for Slavic languages [voice] is more important for phonetic identification of segments<sup>10</sup>.

Coming back to the main issues taken up in this paper let us observe that the "pause" generalization we formulated earlier in a first approximation can be extended further, viz. rule (6). Thus the generalization should read as follows: in unvoicing assimilations in English pauses function as voiceless obstruents. Notice that (7) and (8) form an ordered set where (8) precedes (7), cf. a low phonetic derivation for *beds*:

$$\begin{array}{l} \text{bedz} \\ \text{rule 8} \quad \text{b e d z} \\ \text{rule 7} \quad \text{b e d z} \end{array} \quad \text{where "o" means} \quad \begin{array}{l} [-\text{voice}] \\ [-\text{tense}] \end{array}$$

Regressive assimilations of unvoicing are much more complex in Polish. Consider the following words:

A. *chleb, ród, Bóg, mów, bez, jeź, weź, chodź*;

B. *chleb ten, ród ksiązęcy, Bóg chrześcijański, mów ciszej, bez kwitnący, jeź klujący, weź sobie, chodź tutaj*;

C. *chleb razowy, ród osławiony, Bóg łaskawy, mów lepiej, bez różnoraki, jeź o ostrych ... , weź jej, chodź raczej wolniej*;

D. *róbmy, weźmy, postawmy, chodźmy, leźmy*;

E. *babka, budka, rowka, żelazko, brzeźka, buźka*.

As is immediately clear all the phonologically voiced obstruents (cf. *chleb-chleba, mów-mówi, babka-babek*, etc.) are represented phonetically by their voiceless counterparts.

The underlying process is regressive assimilation of unvoicing. Let us examine the environment in which it takes place:

- A — before a pause
- B — before a voiceless obstruent across word boundaries
- E — before a voiceless obstruent within words
- C, D — before a sonorant across word boundaries.

The collapsing of C and D may at first glance seem dubious. Superficially one may tend to regard *róbmy* as having a morpheme boundary. It will prove to be false when we compare it with *biedny* which clearly has such boundary after the second obstruent (*bieda — biedny, obrona — obronny*). With morpheme boundaries the unvoicing assimilation rule does not apply: *biedny* has a phonetic [d] though it may be auditorily slightly obliterated as the realization variant has usually a nasal plosion here (but, cf. *chleba+a, biegi+li*). Consequently, *róbmy* should be analysed as having a word boundary (unvoicing as before word boundaries when a sonorant follows), hence the case is parallel to those analysed by Chomsky and Halle (1968: 95).

<sup>10</sup> In this connection cf. L. G. Jones's experiment quoted by Jakobson et al. (1965: 38) and Shapiro's observations (1966: 193).

They compare *resolve* ("determine"), *reserve* ("withhold") with *re-solve* ("solve anew"), *re-serve* ("serve anew") and find that the lack of voicing of the medial obstruent in the last two examples is caused by the presence of a word boundary across which the rule of /s/ voicing between the prefix and the stem vowel does not apply. In our case further support can be gained from syntax: *my* may appear as a syntactically separate constituent while the English *re-* of *re-serve* and the Polish *-ny* of *biedny* (-ę of *robie*, sz of *robisz*) cannot. In this connection it is worth mentioning though not directly relevant for our discussion here that *-by* in *zaniósłby, zgniótłby, mógłby, zjadłby, poszedłby*, etc., is also separated by a word boundary. A similar syntactic proof can be given here (*zaniósłby* vs. *by zaniósł*), the phonological segmental proof being obliterated by the fact that the obstruent may be voiced by rule (5) (for the last three examples see below). The analysis of *-by* as a separate word is additionally supported by suprasegmental facts: *-by* does not change the position of stress (*mogłaby* and not *mog'łaby*) while morphemes do: *telewizor — telewi'zora, pra'cowal — pracu'jecie*.

Summing up the unvoicing of obstruents in the above five groups can be formally expressed by a rule having the shape:

$$(9) \quad [+obstr] \rightarrow [-\text{voice}] \begin{array}{l} \# \# \\ \left( \begin{array}{l} \# [+sonor] \\ \# [+obstr] \\ \# [-\text{voice}] \end{array} \right) \end{array} \quad \begin{array}{l} (a) \\ (b) \\ (c) \end{array}$$

Rule (9), as one might naturally expect, is functionally parallel to our earlier voice assimilation rules of Polish (to (5) with a reverse value). It can be noticed immediately that the "pause" generalization formulated on the basis of unvoicing in English should be extended to Polish. Now it seems to be an appropriate moment to see how the voicing and unvoicing rules apply to clusters of consonants.

Voicing:

*tekst był* (the style in which the whole cluster is voiced)

	tekst	błw
rule (5)	teksd	b-
rule (5)	tekd	
rule (5)	tegd	

Unvoicing:

	<i>różka, wróżb</i>
rule (9)	ruźdźka vruźb
rule (9)	ruźčka vružp
rule (9)	ruščka vrušp

An important general conclusion can be drawn from these derivations: at the low phonetic level the same rule may apply sequentially (at least with voice assimilations). Lightner (1971: 551-2) is worried about the application of voicing and unvoicing rules and describes the problem as unsolved. He basically asks the question if the voicing or unvoicing is done in steps or whether it applies to the whole cluster directly. As can be seen above, our analysis is done in steps. We believe that this is preferable and better in view of the fact that (5) and (9) are regarded as assimilation rules. Since by assimilation we understand a change of a segment (more exactly feature(s) in the feature matrix which the segment represents) under the influence of another segment (feature matrix) the derivation has to be done in steps, the procedure stemming from the nature of assimilation processes. Our "pause" generalization describes the unvoicing of /b/ in *wrózb* and the like.

It is interesting to mention, though only marginally, that the separation of the features [voice] and [tense] in obstruents may occur in Polish (Biedrzycki, forthcoming). Obviously, this cannot be analysed on a par with other unvoicing rules as its ranking is much lower (it is a stylistic detail). Such separation of the two otherwise concomitant features may occur only in one style of speech (and not with all speakers), namely, when word final sonorants are unvoiced<sup>11</sup>. Thus in part VII in the Polish TV serial about the life of Balzac, for instance, one could notice whole voiceless endings in: *pieniędzy, srebra, wyjadę*, etc. From this we can formulate a stylistic rule (10):

$$(10) \quad \left[ \begin{array}{c} +\text{obstr} \\ -\text{tense} \end{array} \right] \rightarrow \left[ \begin{array}{c} -\text{voice} \\ -\text{voice} \end{array} \right] / \left[ \begin{array}{c} +\text{sonor} \\ -\text{voice} \end{array} \right]$$

Marking the feature [-tense] in the left side specification signifies (as in rule (8)) that the change in the feature [voice] is not accompanied by an automatic change in the feature [tense]. (10) is, as we have remarked, a stylistic rule and that is why the range of its application varies considerably. If we take *lubi*, for example, we may hear [lub'i] (the rule of unvoicing sonorants has not applied), [lub'j] (the sonorant unvoicing has applied but (10) has not), [lub'j̥] (rule (10)). In fact still two other pronunciations are possible [lub'j̥] or more often with a palatal friction after [p] — [lup<sup>h</sup>]. Thus there is still one

context in which we may have a  $\left[ \begin{array}{c} +\text{obstr} \\ -\text{voice} \\ -\text{tense} \end{array} \right]$  segment and this is the output

of rule (11) when the voiceless vowel is deleted:

<sup>11</sup> A phenomenon described by Biedrzycki and noticed by me independently. As it turned out Biedrzycki had worked it out earlier in detail and formulated in his forthcoming article "Samogłoski bezdźwięczne w języku polskim".

$$(11) \quad \left[ \begin{array}{c} V \\ -\text{voice} \end{array} \right] \rightarrow \emptyset / - \# \#$$

(11) is not a fully specified rule — intonation should be included in the environment (Biedrzycki, forthcoming) and in our opinion also another context — before a voiceless obstruent but then it seems to me the change of [tense] is concomitant with the change of [voice] in the obstruent *ona robi to* [-p' # to]<sup>12</sup>. Furthermore, the output of rule (11) [rob'j̥] is rather unstable since then the obstruent appears before a pause and consequently [-tense] tends to become [-+tense] giving a form like [rop'j̥] or [rop<sup>h</sup>]. Therefore we would like to suggest that (11) is ordered after (10) as only after the application of (11) is the variation [b'j̥] ~ [p'j̥] possible.

In this way we may have a low phonetic stylistic derivation along the following lines:

[lub'i] — a possible output, no unvoicing rule has applied

[lub'j̥] — a possible output, a sonorant unvoicing rule (not formulated in this paper) has applied

[lub'j̥] — a possible output, rule (10)

[lub'j̥] — a possible output, rule (11)

[lup<sup>h</sup>] — a possible output, rule (10)

[lup<sup>h</sup>] — a possible output, palatal affrication rule (not formulated here).

Some difficulty may apparently arise with forms like [dobš] *dobrze* (quoted by Biedrzycki, forthcoming) and [pž] *przecież* (Jassem and Łobacz 1972: 12). In these forms the regressive unvoicing rule (in the former) and the regressive voicing rule (in the latter) have not applied. One can notice immediately, however, that both forms are stylistic variants (occasional) brought out by stylistic deletions.

Consequently, rules (10) and (5) should be given a descriptive restriction that they may not be obligatory with some stylistic variants which are outputs of stylistic deletion rules.

Now let us examine whether the situation of *mógłby* is analogical to that of *zaniósłby*. Consider the following groups of words:

A. a) *mógł, zjadł, biegł, ansambl, módl (się), żubr, kadr, mechanizm, blizn, przyjaźń*

b) *zdziebełko, mędrca, bieglszy*

B. a) *mógł to, zjadł tyle, biegł szybko, módl się, żubr ten, kadr takich, mechanizm starodawny, etc.*

b) *mógł radzić, zjadł łakomie, biegł ostrożnie, żubr oswojony, kadr naszych, mechanizm nowoczesny, etc.*

C. *mógłby, zjadłby, biegłby, żubr darowany, kadr doborowych, mechanizm wynaleziony, etc.*

<sup>12</sup> Only a laboratory experiment can give a final answer here.

In all the groups a phonologically voiced obstruent is followed by a sonorant. Furthermore, in A and B it is followed in turn by a devoicing context: A.a — a pause, A.b — a voiceless obstruent, B — a voiceless obstruent (a), or a sonorant (b) across word boundaries. In C the following environment is voiced but invariably there is an intervening word boundary (where *mógłby* is as argued above, *mógł* ≠ *by*). Our observations point to the fact that in all the groups the obstruent under discussion can be phonetically either voiced or voiceless<sup>13</sup>. Thus taking the first word in the list, *mógł* can always have two pronunciations [mugw] and [mukw]: *mógł*, *mógł to*, *mógł radzić*, *mógłby*<sup>14</sup>. It is not comparable to *rosł*, *rosłby* as here the variation [zw] ~ [sw] is not independent of context ([ruzw] in a nonvoicing environment is impossible, which stems from the fact that /s/ is phonologically [–voice]).

Therefore we would like to suggest that in cases such as *rosłby* we have a non-obligatory application of rules in some contexts while words like *mógł*, etc., have true low phonetic variant pronunciations<sup>15</sup> with respect to the voicing of the nonfinal obstruent (cases such as *trwać* could also be discussed under this heading). We call them variant pronunciations as they appear with any environment. Note, however, that their origin can be accounted for by a rule which is basically an expanded and slightly modified version of (9c). The unvoicing environment here is that of a word boundary or a voiceless obstruent:

$$(12) \quad [+obstr] \rightarrow [-voice] / \begin{matrix} \left[ \begin{matrix} +sonor \\ -syll \end{matrix} \right] \\ \left[ \begin{matrix} +obstr \\ -voice \\ \# \end{matrix} \right] \end{matrix} \quad (a) \quad (b)$$

The environment specification groups liquids and nasals where [w] is, as mentioned previously, a phonological liquid. Rule (12) brings up an interesting point. In words such as *medrca* the two pronunciations one with [t] and the other with [d] originate from the context of a voiceless obstruent (12a), in *padł* or *padłby* — from a word boundary (12b).

It seems then that Lass's suggestion for German (1971: 26-7, cf. my footnote 5) applies also to Polish but the difference is that in Polish we must obligatorily have an intervening  $\left[ \begin{matrix} +sonor \\ -syll \end{matrix} \right]$  segment. It seems worthwhile in this connection to come back to our "pause" generalization and extend

<sup>13</sup> Attention should be drawn to the fact in the South-West accent of Polish this may not be the case. Presumably, there will not be such variation in the example quoted in B.b and C.

<sup>14</sup> As previously we take this style of speech where the final sonorant in *mógł*, *padł*, *zjadł* is not deleted. Once it is deleted the words fall together with the examples given for the obligatory application of the voicing rule (5) in the case of *mógłby*, etc., or the unvoicing rule (9) in the case of *mógł*, *mógł powiedzieć*, *mógł radzić*.

<sup>15</sup> Notice that the possibility of the deletion of [w] in *mógł* and the like produces another low phonetic variant pronunciation.

it to the case discussed above:

pauses function as voiceless obstruents if the word begins (only English) or ends (both English and Polish) in a phonologically voiced obstruent, additionally in Polish word boundaries can have this function if a phonologically voiced obstruent is followed by a sonorant.

Finally let us consider a group of exceptional prepositions: *w*, *z*, *bez*, *od*, *nad*, *pod*, *przez*, *przed*. Unlike other prepositions (cf. *według*, *wzdłuż*, etc.) they are phonetically realized with a final voiced consonant not only before voiced obstruents but also before all sonorants. In other words *bez* has a phonetic [z] not only in *bez długu* but also in *bez rady*, *bez loterii*, *bez matki*, *bez notatek*, *bez niani*, *bez osłony*, *bez łyżki*, *bez jabłek*. Although these prepositions have in WPK the status of exceptions they need not be marked individually in the lexicon. They form a certain group distinct from other prepositions: they have a final phonologically voiced obstruent (this distinguishes them from e.g., *zamiast*, *oprócz*) and they contain not more than four segments (this distinguishes them from e.g. *wzdłuż*, also redundantly from *zamiast* etc). This group of prepositions has phonetically unvoiced final obstruents only before a pause or a voiceless obstruent. Thus only the (9a) and (9c) environments are met. Consequently the unvoicing assimilation rule (clearly a subrule of (9)) will take the shape:

$$(13) \quad [+obstr] \rightarrow [-voice] / \begin{matrix} \# \left[ \begin{matrix} +obstr \\ -voice \end{matrix} \right] \\ \# \# \end{matrix}$$

In view of Lightner's theory (1968: 70ff.) (13) should be regarded as a minor rule.

In conclusion let us review briefly what has been postulated. The examined material enables us to make statements not only referring to the contrastive analysis of Polish and English but also some of a more general nature bearing on the theory of generative phonology.

Low phonetic voicing and unvoicing in Polish and English should be regarded as a process of assimilation. This reasoning seems to be correct in every detail on the acceptance of what we have called a "pause" generalization extended to word boundaries in some cases in Polish. Although some rules have not been collapsed it is clear that in all cases we are dealing with basically the same type of assimilatory adjustments of segments. These adjustments can sometimes take different forms (as, for instance, occasionally otherwise concomitant change of the features [voice] and [tense] may be separated). Styles of speech have a considerable bearing on the application of certain rules. Thus in a few cases rules, generally taken as obligatory, turn out to apply optionally. There are words in Polish having low phonetic variant pronunciations with respect to the voicing or unvoicing of obstruents. Such pronuncia-

tions occur in different styles and are independent of the segmental context which follows. Progressive assimilation of unvoicing in Polish seems to be a productive process necessary for the discovery of the nature of underlying segments. Orthographic words cannot be always equated with phonological ones as is the case with *móglby* and *róbmy*. Voice assimilation in English is generally obligatory while in Polish it may be optional depending primarily on the style of speech and occasionally on the number of obstruents to be assimilated.

As far as theoretical considerations are concerned three points should be stressed: (a) low phonetic rules are ordered (at least some of them), which contradicts McCawley's statement (1968: 14); (b) voice assimilation rules apply in steps and (c) sometimes the same rule may apply sequentially.

## REFERENCES

- Abercrombie, B. 1965. *Elements of general phonetics*. Edinburgh: Edinburgh University Press.
- Bach, E. 1968. "Two proposals concerning the simplicity metric in phonology". *Glossa* 2. 128 - 149.
- Biedrzycki, L. (forthcoming). "Samogłoski bezdźwięczne w języku polskim".
- Chomsky, N. and Halle, M. 1968. *The sound pattern of English*. New York: Harper and Row.
- Dingwall, W. O. (ed). 1971. *A survey of linguistic science*. Maryland: Linguistic Program.
- Fisiak, J. (ed.). 1975. *Papers and studies in contrastive linguistics* 3. Poznań: A. Mickiewicz University.
- Gimson, A. C. 1966<sup>1</sup>. *An introduction to the pronunciation of English*. London: Edward Arnold.
- Gussmann, E. (forthcoming). "Palatalisations in Polish and English".
- Harris, J. 1969. *Spanish phonology*. Cambridge, Mass.: The MIT Press.
- Harms, R. 1968. *Introduction to phonological theory*. Englewood Cliffs: Prentice Hall.
- Hoard, J. E. 1971. "Aspiration, tenseness and syllabification in English". *Language* 43. 133 - 141.
- Hultz, L. S. 1962. "Voiceless lenis stops in prevocalic clusters". *Word* 18. 307 - 313.
- Hyman, L. 1970. "How concrete is phonology". *Language* 46. 58 - 76.
- Jakobson, R., Fant, C. G. and Halle, M. 1965. *Preliminaries to speech analysis*. Cambridge, Mass.: The MIT Press.
- Jassem, W. 1971<sup>2</sup>. *Podręcznik wymowy angielskiej*. Warszawa: PWN.
- Jassem, W. and P. Łobacz. 1972. *Analiza fonotaktyczna tekstu polskiego*. Warszawa: IPPT 63.
- Kim, Ch. W. 1965. "On the autonomy of the tensivity feature in stop classification". *Word* 21. 339 - 360.
- Lass, R. 1971. "Boundaries as obstruents: Old English voicing assimilation and universal strength hierarchy". *JL* 7. 15 - 31.
- Lightner, Th. 1968. "On the use of minor rules in Russian phonology". *JL* 4. 69 - 72. — 1971. "Generative phonology". In Dingwall, W. O. 1971. 557 - 649.
- Malone, J. L. 1970. "In defence of non-uniqueness of phonological representations". *Language* 46. 328 - 336.
- McCawley, J. D. 1968. *The phonological component of a grammar of Japanese*. The Hague: Mouton.
- Postal, P. M. 1968. *Aspects of phonological theory*. New York: Harper and Row.
- Rubach, J. 1975. "On contextual modifications of plosives". In Fisiak, J. (present volume). 141 - 157.
- Shapiro, M. 1966. "On non-distinctive voicing in Russian". *JL* 2. 189 - 195.
- Wierzbowska, B. 1971<sup>2</sup>. *Wymowa polska*. Warszawa: PZWS.
- Zimmer, K. E. 1969. "Markedness and the problem of indeterminacy of lexical representations". *IJAL* 35. 264 - 266.