

THE POLISH VOWEL DISPALATALIZATION AND ITS ENVIRONMENT

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The Polish dispalatalization of vowels was the change of nonhigh front vowels to back vowels when followed by a nonpalatalized dental consonant. This highly unusual environment has never been adequately explained. This paper proposes that the solution may be found in the transfer of synharmonic redundancy from syllabic initial to syllabic final in order to save incipient dental palatalization from extinction. This suggests a new relative chronology, according to which Polish dispalatalization of vowels occurred only after the dispalatalization of final labial consonants, which in turn followed jer-loss. The distinctive feature system of *Fundamentals of language*, together with a new synharmony feature, are shown to best represent this process in distinctive features.

1. Interpretations of Polish dispalatalization and its environment

The dispalatalization of Polish vowels, defined as the historic change of “*ě, ɛ, e* – long as well as short in the position preceding the hard dentals *t, d, n, r, l, s, z* ... to *a, ɔ, o*” (Stieber 1962:11), is puzzling mainly because of its highly restricted environment.¹ The purpose of this paper is to provide a phonological interpretation which can explain the precise logic

¹ Following generally accepted usage, we may define *soft* consonants as those that are either palatal or palatalized, while *hard* consonants are all others. The symbol *ě*, known as *jat*, is commonly employed without a precise phonetic reference. Therefore, we may often refer to the specific phonetic value of *ě* in a given environment or at a given time. We may give examples of the Polish dispalatalization as follows: (1) of *ě*: *st'ěna* ‘wall’ > *st'ana* > Modern Polish *ściana*; *d'ěd* ‘grandfather’ > *d'ad* > Mod. Pol. *dziad*; *l'ěto* ‘summer’ > *l'ato* > Mod. Pol. *lato*; *b'ěl-* ‘white’ > *b'al-* > Mod. Pol. *bial(y)*; (2) of *e*: *žena* ‘wife’ > *žona* > Mod. Pol. *żona*; *s'estra* ‘sister’ > *s'ostra* > Mod. Pol. *siostra*; *s'edm-* ‘seventh’ > *s'odm-* > Mod. Pol. *siódmy*; *v'esna* ‘spring’ > *v'osna* > Mod. Pol. *wiosna*; (3) examples of *ɛ* > *ɔ* are no longer reflected in Modern Polish, since there was a merger of nasal vowels following the dispalatalization, which itself was later followed by a split on quantitative lines. Modern Kashubian, however, does reflect the *ɛ* > *ɔ* change, as follows: *tr'ęsq(tɕ)* ‘they shake’ > *tr'ɔsq* > Modern Kashubian *třsq*; *t'el'ęta* ‘calves’ > *t'el'ɔta* > Modern Kashubian *celąta*.

of the limitation of this vowel change to occurrence before nonpalatalized dentals. In conjunction with our analysis, we shall discuss the choice of the proper distinctive feature mechanism for the description of the relevant facts. The evaluation will be made primarily through a comparison of the system of *Fundamentals of language* (Jakobson and Halle 1956) with that of *The sound pattern of English* (Chomsky and Halle 1968), though also taking into account certain criticisms of the two former systems such as those made by Campbell (1974).

There has been a variety of attempts to explain why Old Polish \acute{e} , \acute{e} , $e > a$, o , o only before hard dentals. Koneczna (1965:50) states that this vowel backing was a case of the assimilation of the vowel to the following consonant. As to why hard dentals in particular had this effect, we read that dentals (called 'coronals') "contrasted to the rise of the front and anterior portions of the tongue towards the prepalate", found in the front vowels, while labials and velars did not condition the same vowel backing since they are pronounced with the "front of the tongue in a slightly convex position". A similar explanation is found in Klemensiewicz, Lehr-Splawiński, and Urbańczyk (1964:78), where the authors state that "the vowel e , in palatalizing the preceding consonant, experiences a significant weakening of its basic articulatory motion of the front and apex of the tongue ... and when the consonant following e required the articulation of the apex and sides of the tongue with a simultaneous lowering of its other portions, the realization of the vowel's main formant encountered too much interference and the vowel o arose". Later (p. 82) the authors claim that this explanation applies not only to the $e > o$ change, but to all Polish dispalatalization. The above proposals, based on phonetic accommodation, are unconvincing in view of the fact that Polish's western neighbors, Upper and Lower Sorbian, experienced the $e > o$ change before *any* hard consonant, as did its eastern neighbors, Belorussian, Russian, and Ukrainian (cf. Koneczna 1965:59); for example, Upper Sorbian *ćoply* 'warm', *daloki* 'far', Russian *těplyj*, *dalėkij* in contrast to Polish *cieply*, *daleki*. Bernštejn (1961:277) clearly points out that, although Russian $e > o$ can be explained as a labialization, the lack of Polish $e > o$ before labial consonants means that a similar explanation for Polish is not possible and that, therefore, "a satisfactory answer to these questions cannot be obtained". Jakobson (1929:62) indicated that $e > o$ could only be realized when e was an exact front-vowel pair to o , and that in Polish this was true only "before a hard dental – a neutral category that exerts no influence on the preceding vowel". It remains unclear why Polish dentals

should have caused no allophonic or phonetic change in the preceding vowel in contrast to labials and velars, while in both Sorbian and East Slavic none of these consonants should have had this effect. Thus, we see that the phonetic explanations of the environment for the Polish dispalatalization run the gamut from an assertion that the hard dental articulation actively causes a vowel assimilation (Koneczna and Klemensiewicz, Lehr-Splawiński, and Urbańczyk) to the claim that hard dentals allowed the vowel change by having no phonetic influence on the preceding vowel (Jakobson). In view of these diametrically opposed explanations, one can well understand Bernštejn's pessimism about the possibility of obtaining the correct solution to the problem.

Lunt (1956:314) views the dispalatalization as a two-part process, with a different evolution of *ě* before hard dentals as compared to that of *e* (dispalatalization of *e* > *ɔ* is not discussed). The "pre-Polish *ě*", according to Lunt, was "a fronted *ä*", which was raised to *ɛ*, except in cases where a hard dental followed the vowel. Later, we may assume that this *ä* must have backed to *a*, the Modern Polish reflex. Thus, Lunt appears to be suggesting that the dispalatalization of *ě* came about first through a raising of *ä* > *ɛ* preceding all consonants other than hard dentals, followed by a general backing of *ä* > *a* (historically, this *ä* included allophones of /a/ preceded by Common Slavic palatal consonants as well as the non-raised variant of *ě*). The dispalatalization of *e* is said to also involve two stages, first a rounding (*e* > *ö*), then a backing (*ö* > *o*). Consequently, the dispalatalization of *ě* and *e*, according to Lunt, seems to be the result of two processes that are not similar to each other, each occurring in two stages. We are told that *ä* gets raised in precisely the opposite environment that has conditioned the rounding of *e*, but no explanation is forthcoming as to why hard dentals should have had this peculiar effect on the system. An important aspect of Lunt's two stages is the fact that synharmony (the rule that soft consonants are followed by front vowels and hard consonants by back vowels) is in effect during the first stage, when front vowels *ä* and *e* get raised and rounded, respectively, but stay fronted. Jer-loss intervenes, after which synharmony is no longer in effect and front vowels *ö* and *ä* are backed. Thus, in Lunt's proposal, the two changes that occur before jer-fall, in conformity with synharmony, are:

- (1) Raising of *ě* (*ä*) to *ɛ* when followed by a consonant other than a hard dental.
- (2) Rounding of *e* > *ö* when followed by a hard dental.

The change that comes after jer-fall, no longer in accordance with synharmony, is the backing of the *ä* and the *ö* that was produced in the previous period.

This proposal, just like those examined above, has several unacceptable points. In the first place, Lunt's suggested chronological evolution of *ě* is contradictory. It is stated that "pre-Polish *ě* was *ä*", not distinct from *ä* < *a* after palatals, in contrast to East Slavic. However, at a later period of time, only "before a hard dental ... *ě* was *ä*" with a "usual variant *ε*". If the original value of *ě* was *ä*, with later variants of *ä* before hard dentals and *ε* otherwise, we can only conclude that *ä* > *ε* when a consonant other than a hard dental followed. But the author fails to observe that such a raising never occurred when the *ä* in question came from an original *a* following a palatal consonant, e.g. Old Polish *žäba* 'frog', *žäl*'b 'pity', *čäsä* 'goblet' > Modern Polish *żaba*, *żał*, *czasza*. Therefore we can only interpret Lunt's remarks to mean that when *ä* is derived from *ě*, it was raised to *ε* if not followed by a hard dental, but when *ä* is derived from *a*, no such change took place, an obviously untenable assertion. In addition to the unacceptable evolution just indicated, it is very hard to accept the two rules that supposedly precede jer-fall, in which a raising of *ä* and a rounding of *e* supposedly take place in precisely opposite environments based on occurrence before hard dentals. No explanation has been offered as to why the restricted hard dental environment should condition a rounding, on the one hand, but turn out to be the only environment to resist the raising, on the other. Rather than assume that the combination of raising and rounding was uniquely affected by the hard dental environment, followed by a second stage of backing after jer-fall, it seems more natural to assume that a single-stage backing (*ä* > *a* and *e* > *o*) before hard dentals suffices to describe the process (along with a rule to round back mid vowels, accounting for the rounding of *o*). The question of removing the above indicated contradictions in the evolution of *ě* is dealt with in section 2.

A unique and unexpected interpretation of the Polish dispalatalization of "e and *ě* before hard dentals" was given by Trubetzkoy (1934). Trubetzkoy had been well aware of the problems inherent in a phonetic explanation of dispalatalization at least as early as his 1925 paper on Polabian, in which he wrote, "The depiction of the process of dispalatalization before hard dentals, accepted until now, seems highly improbable from the general phonetic point of view. In reality, according to this depiction it turns out that only hard dentals ... the physiologically most neutral consonants ... influenced the change of preceding vowels" (1925:237).

In order to improve upon the inadequate phonetic explanation, Trubetzkoy concluded that this process was an accident of morphological development. “Hard dentals”, according to the author, “occurred only in roots and suffixes, while the other phonemic classes (vowels, palatals, labials, velars, soft consonants) could also occur in desinences” (1934:135). In Trubetzkoy’s interpretation, two types of grammatical ending introduced the new phonemic oppositions /e/ vs. /o/ and /ě/ vs. /a/. Since hard dentals never appeared in grammatical endings, these new phonemic oppositions remained unrealized and nondistinctive in the position preceding hard dentals. The /e/ vs. /o/ opposition, which used to be accompanied by a difference in palatalization, now became possible due to the contraction of *oje* > *ē* after hard consonants, e.g. *dobrēgo* ‘good’ gen. sing., *dobrēmu* ‘good’ dat. sing. Similarly, the /ě/ vs. /a/ opposition occurred in the *ja*-stem, as opposed to the pronominal declension, e.g. *žemāxə* ‘land’ loc. plur. vs. *saměxə* ‘self’ loc. plur. Unfortunately, Trubetzkoy’s proposal raises numerous objections. First, a questionable lack of synharmonic syllables is being proposed for a period preceding jer-fall, e.g. *rē* (*dobrēgo*) and *ma* (*žemāxə*), which should have been alternatively represented as *rə*, *mā* (or *mjä*, assuming the absence of palatalized labials from original **mj* before jer-fall), cf. Lunt (1956:314–315). If the corresponding changes are made in conformity with syllabic synharmony, the above oppositions, first cited in Trubetzkoy (1934) are no longer minimal (e.g. *žemāxə* or *žemjäxə* vs. *saměxə* no longer proves that /ě/ is opposed to /a/, since Trubetzkoy states that the phonetic value of *ē* at this time is precisely *ā*). On the other hand even if we were to assume that Trubetzkoy’s violation of synharmony were acceptable, it is impossible to agree with his assertion that hard dentals cannot occur in grammatical endings, in view of the *-l* of the l-participle and the *-n* and *-t* of the past passive participle. The latter endings make it easy to show that the same oppositions could appear before hard dentals as well as before other classes of consonants, contrary to Trubetzkoy’s claim. Following Trubetzkoy’s questionable rendering of original labial + *j* + *a* as *ma*, etc., for purposes of comparison, we may cite the following cases of soft consonant + *ě* + hard dental vs. soft consonant + *ē* + hard dental: *mělb* ‘had’ masc. sing. vs. (*nakar*)*mālb* ‘fed’ masc. sing.; (*gru*)*b’ělə* ‘got fat’ masc. sing. vs. (*rozra*)*b’ālb* ‘diluted’ masc. sing.; (*ky*)*p’ělə* ‘boiled’ masc. sing. vs. (*sy*)*p’ālb* ‘used to sleep’ masc. sing. This list can be readily expanded to several hundred items, as one can easily see by looking at the appropriate pages of the reverse Polish dictionary (Grzegorzczkova et al. 1973:117–122, 186–190). Thus, we must conclude that Trubetzkoy was

wrong in stating that the dispalatalized front vowels of Polish were not phonemically opposed to back vowels before hard dentals, within the framework of his transcription system. If one can accept Trubetzkoy's notion of *-máxǔ* vs. *-měxǔ*, as cited above, it is necessary to admit that this very same opposition could occur before the hard dental / in particular, where imperfectivized *a*-suffix verbs, derived from *i*-suffix perfectives, were opposed to *ě*-suffix intransitive verbs, assuming with Trubetzkoy that labial + *j* + vowel had merged with labial + front vowel. Since these oppositions before hard dentals did exist on a par with other pre-consonantal positions, Trubetzkoy's suggestion must be rejected and an explanation must still be sought as to why vowels behaved differently before hard dentals in contrast to positions before all other sounds.

As we have seen, all of the attempted explanations have failed to capture the essence of the Polish dispalatalization. In the cases of *e* > *o* and *ɛ* > *ɔ*, one would especially expect a following labial, rather than a hard dental to evoke the change, in view of the 'natural class' formed by rounded vowels and labial consonants (Campbell 1974:58). If, on the other hand, the *e* > *o* and *ɛ* > *ɔ* changes were viewed as a dissimilation, with *et* > *ot*, but no change in either *ep* or *ek*, the fact that soft dentals and palatals also block the change could not be understood (i.e. no change occurred in *et'*, *eč*). It should also be noted that the correct solution must somehow explain why the similar East Slavic and Sorbian vowel dispalatalizations take place before all hard consonants.

2. Questions and assumptions of relative chronology

We have observed earlier that Lunt (1956:314) suggested a somewhat contradictory evolution of *ě*, supposedly equivalent to *ǎ* (< *a* after palatals) in pre-Polish. Since *ǎ* (< *ě*) is eventually raised to *e* in Modern Polish, e.g. *mieć* 'to have', when not followed by a hard dental, while *ǎ* (< *a*) is backed to *a* in all environments (e.g. *żaba*, *żal*, *czasza*) and *ǎ* (< *ě*) is backed to *a* only before hard dentals (e.g. *miał* 'had'), it seems clear that *ě* and *ǎ* (< *a* after palatals) never chronologically coincided as *ǎ*. Let us assume that pre-Polish *ě* was equivalent to *ɛ* until the time of jer-fall. Coincident with, or slightly after jer-fall, the three front-vowel allophones conditioned exclusively by coming after a palatal (*ǎ*, *ü*, *ǐ*) experienced a backing which left *ɛ* (*ě*) without an exact back-vowel correlate, and *a* without such a front-vowel pair, whereupon *ɛ* and *a* were reevaluated as both being distinctively low and *ɛ* > *ǎ*. At this moment *ǎ* became the

exclusive representative of \check{e} . Dispalatalization then backs all nonhigh front vowels ($e > o$, $\epsilon > \varphi$, $\check{a} > a$) in the position before hard dentals. In the subsequent evolution of Polish, both \check{a} and ϑ (which we interpret as the early reflex of strong jers in Polish) were merged with e , generalizing all nonhigh unrounded mid and front vowels as mid and front (e). This explanation permits us to view the Polish dispalatalization as a single change of vowel backing (with automatic rounding of mid back vowels) that follows jer-fall.²

We may note that several traditional explanations of dispalatalization manage to establish a pre-Polish \check{a} for \check{e} by totally ignoring the synharmonic fronting of a after palatals that was so convincingly demonstrated by Jakobson (1929:20). Thus, Klemensiewicz, Lehr-Splawiński, and Urbanczyk (1964:81,145) set up original \check{e} as \check{a} , but recognize only a back variant of a after palatals, such as $\check{c}as\check{b}$ 'time'. The solution advanced by Lunt, on the other hand, shows an awareness of the need to combine the notions of a low-front \check{e} (\check{a}) as well as a fronted \check{a} after palatals. By recognizing both concepts, while keeping them chronologically distinct, we have attempted to solve this problem in a chronology, compared to that of Lunt (table 1).

Table 1

Comparison of two chronologies relating Polish dispalatalization to the evolution of \check{e} .

Lunt's chronology	Present proposal
1. a) \check{a} ($< \check{e}$) $> \epsilon$, except before hard dentals b) $e > \check{o}$, only before hard dentals	1. Jer-fall
2. Jer-fall	2. Backing of $\check{a} > a$
3. Backing of $\check{a} > a$, $\check{o} > o$	3. ϵ (\check{e}) $> \check{a}$
4. $\epsilon > e$	4. Dispalatalization; $e > o$, $\check{a} > a$ before hard dentals
	5. $\check{a} > e$

The advantages of our suggestion are its unified treatment of dispalatalization as backing in a single-stage process and its placement of dispalatalization after jer-fall, which allows older \check{a} to change to a as a natural consequence of jer-fall's introduction of consonant palatalization as a phonemic entity which began to predominate over the front-back vowel opposition.

² The backing of fronted or palatalized syllabic liquids \check{r} and \check{l} is a significant related issue. The backing of these syllabic liquids took place in the same environment as the other cases of vowel backing of the same process. The differences chiefly come about as a result of the subsequent Polish loss of the new backed syllabic liquids \check{r} and \check{l} through the substitution of support vowels and nonsyllabic liquids for the syllabic liquids as well as a dialectal loss of consonant palatalization that had occurred before the new backed syllabic liquids.

It has been generally recognized that a major phonological consequence of Polish dispalatalization, as of the Russian $e > o$ change, was a significant increase in the oppositions based on consonant palatalization (cf. Stieber 1962:61). The increase in distinctive palatalization arises due to such changes as hypothetical $t'et, t'ět, t'et > t'ot, t'at, t'ot$, which now can be opposed to original tot, tat, tot on the basis of palatalization alone. However, we should note that both Jakobson (1929:48) and Lunt (1956) have convincingly demonstrated that it was the loss of jers that brought about the independence of consonant palatalization in the first place, as seen in such examples as $dan'b$ vs. $danb > dan'$ 'tribute' vs. dan 'given'. Dispalatalization should then be treated as the logical consequence of extending the already accomplished fact of distinctive palatalization, wherein the phonemic weight had shifted from the front vs. back vowel opposition to the soft vs. hard consonant opposition.

Concerning the case of Russian, where there has been a dispalatalization of $e > o$ before all hard consonants, which produced the above-mentioned new oppositions based on consonant palatalization, Sidorov (1966:3) has succinctly characterized the chronological relation of this sound change to that of jer-loss, as follows: "In Old Russian the principle of syllabic synharmony was carried out with great consistency, which did not provide the conditions for the $e > o$ change, which created many syllables that contradicted the synharmonic syllabic model ... Since ... the destruction of the syllabic model was linked to jer-loss, it is natural to assign the $e > o$ change to a period following the loss of jer vowels". Thus, vowel dispalatalization could only add new oppositions based on consonant palatalization once jer-fall had already created the opposition in the first place, so that the presence of the $t'ot$ vs. tot opposition would imply that the vowel backing followed jer-loss.

The facts of Polish seem to represent another obvious case of dispalatalization taking place after jer-fall, in the light of the numerous instances of minimal palatalization oppositions it created, as well as its violation of syllabic synharmony. However, there has been a widespread tendency to interpret Polish dispalatalization as having ceased to function before the time of jer-fall. This relative chronology is usually suggested on the basis of the fact that the Polish front jer (b), which eventually became e , failed to undergo dispalatalization (cf. Stieber 1962:14; Filin 1972:185; Rospond 1971:78). For example, the Old Polish words $pbsb$ 'dog', $lbnb$ 'linen' became Modern Polish $pies, len$, rather than $*pios, *lon$, as they did in Russian ($pēs, lēn$, phonetically [p'os], [l'on]).

However, if we accept Lunt's proposal that in Polish "the strong jers ... fell together into a mid-vowel which was unrounded ... ə" (Lunt 1956:314), we can then claim that the Polish dispalatalization took place after jer-fall (in conformity with the logic of the phonological system), but before the later fronting of ə.³ This controversy actually goes back to the beginning of this century, at which time Ułaszyn (1905:81) rejected Małecki's use of Modern Polish *pies* as proof that dispalatalization preceded jer-loss, as follows: "Obviously this is not a satisfactory proof, since one does not know if the vocalized *ɨ* was phonetically identical to the Polish reflex of Proto-Slavic *e*". We shall accept this early observation of Ułaszyn and represent the two differing chronologies in table 2. It may be added that

Table 2

Two chronologies relating Polish dispalatalization to jer-fall.

Usual chronology	Present proposal
1. Dispalatalization (<i>e</i> > <i>o</i> , etc.)	1. ɨ, ɣ > ə (after Lunt)
2. ɨ, ɣ > <i>e</i> (in strong position)	2. <i>e</i> > <i>o</i> , etc.
	3. ə > <i>e</i>

Van Wijk cited Old Polish textual evidence to the effect that dispalatalization (at least of *ɛ* and *e*) began "only in the twelfth century" (Van Wijk 1929:482), i.e. at a time that must have followed jer-loss.

If we combine our two suggested chronologies as represented above in tables 1 and 2, we get the following result:

- (1) jer fall (*ɨ, ɣ* > *ə*)
- (2) *ä* > *a*
- (3) *ě* > *ä*
- (4) Dispalatalization (*ä* > *a*, *e* > *o*, *ɛ* > *o*)
- (5) *ä, ə* > *e* (nonhigh unrounded mid and front > mid-front *e*)

³ Since we are assuming the coexistence of *e*, *ə*, and *o* at the time of Polish dispalatalization, our rule for the backing (and automatic rounding) of *e* would prove unworkable if *ə* from strong jers were on the same vowel height. Trubetzkoy's scheme for the treatment of Old Church Slavonic treats *ə* as a high-mid vowel ('mässig eng'), contrasted to mid vowel *e* (Trubetzkoy 1954:60), reflecting the fact that the jers were originally short high vowels but were eventually reflected as nonhigh, usually mid vowels. We are attempting to depict a period of time before the eventual merger in Polish of *ə* and *e*. Since the high vowels *i, y, u* did not participate in the Polish dispalatalization and the reflexes of strong jers were similarly exempt, we deem it expedient to assume that the strong jer vowel was still distinctively a short high vowel at this time, whose complete description is irrelevant for our purposes. It might be said, in passing, that the loss of weak jer allophones did not necessarily coincide with the lowering of the strong allophones of jers.

The change of $\ddot{a} > a$ in number 2 can be expressed as the backing of all front-vowel allophones that occurred exclusively after palatal consonants, i.e. $\ddot{a} > a$, $\ddot{u} > u$, $\ddot{o} > o$ (cf. Ivanov 1964:129 for the Common Slavic background of this situation). The front vowels i , e , \acute{e} did not undergo this change, since they had a more independent status inherited from the period preceding jer-fall, i.e. they were used after allophonically palatalized as well as after phonemically soft consonants. For this reason, it is possible to suggest that change number 2 might even have been simultaneous with jer-loss, representing the first loss of syllabic synharmony in those cases where original palatal softness had made the fronted vowels predictable. With the occurrence of jer-loss and the development of independent palatalized (in addition to the already palatal) softness, the motivation grew for a backing of even those vowels that once were preceded by a previously redundant palatalization, but now were preceded by the very same palatalization which was starting to be evaluated as independent. In other words, the change that we have been referring to as dispalatalization is analogous to the backing of \ddot{a} , \ddot{u} , $\ddot{o} > a$, u , o , but differs both chronologically and in terms of the environment for the change.

We have indicated that the primary motivation for the Polish dispalatalization was the loss of jers and institution of distinctive consonant palatalization, since a major result of the dispalatalization was the extension of oppositions based strictly on palatalization. In this sense we can certainly agree with Lunt that the backing of vowels before hard dentals occurred after jer-loss. However, it is unnecessary to suggest that a rounding of $e > \ddot{o}$ and a raising of $a > \epsilon$, based on the presence or absence of a hard dental environment, took place even before jer-fall. Such an event would have no particular phonological motivation. A rounding of $e > \ddot{o}$ would have changed nothing phonemically and raises doubt as to why such a rounding would be limited to pre-dental position. Likewise, a raising of $\ddot{a} > \epsilon$ in all positions other than before hard dentals does not particularly fit in with the pattern of events. Our alternatives, all of which are conditioned by the radical phonological changes brought about by the fall of the jers, are motivated by the phonological system in each case. First, the loss of the only vowel allophones conditioned exclusively by post-palatal position (\ddot{a} , \ddot{u} , \ddot{o}); second, the filling of the hole in the system by the change $\acute{e} > \ddot{a}$ to balance the system of vowel heights; and third, the backing of \ddot{a} , e , ϵ , which furthered the palatalization opposition begun by jer-loss.

Either at or shortly after the time of jer-loss, as we have mentioned,

there occurred the loss of the three front-vowel allophones that had been conditioned by coming after a palatal consonant. These vowels, along with *i* and *y*, were the only vowel pairs in which the front-back difference was found without redundant rounding. In the three cases where the back-vowel variant was the least marked, and the well-instituted palatal phonemes always preceded the fronted variants, the latter were eliminated in favor of the back-vowel allophones (*a*, *u*, *ɔ*) and the opposition of palatal vs. nonpalatal/nonpalatalized (hard) consonants attained a hitherto unknown independence (e.g. *čä*, *šä* vs. *ta*, *ka* > *ča*, *ša* vs. *ta*, *ka*). This first full independence of palatals prefigured the emerging independence of palatalized consonants. Palatal and palatalized soon began to be treated as a single *soft* category, in opposition to *hard*, which led to the merger of all consonants that would have been opposed on the basis of palatal vs. palatalized, e.g. palatal sonants *rj*, *lj*, *nj* merge with palatalized *r'*, *l'*, *n'* (cf. Jakobson 1929:61). In West Slavic, where the original labial + jot groups had positionally remained as such, these groups similarly could not be opposed to simple palatalized labials, so that *pj*, *bj*, *mj*, *vj* merge with *p'*, *b'*, *m'*, *v'*.⁴

As to the fourth pair of vowels opposed only on the basis of front vs. back, without rounding, */i/* vs. */y/*, here there was a functional merger without the phonetic loss of either sound. In contrast to *ä*, *ü*, *ø*, which occurred only after palatals and were in an allophonic relationship with the corresponding back vowels *a*, *u*, *ɔ*, the */i/* vs. */y/* distinction had been phonemic, and the new allophonic relationship was based on the occurrence of [i] after all soft consonants, palatal and palatalized alike. The necessity to maintain the redundant signal in the vowel after the new category of phonemically palatalized consonants began to emerge, led to the retention of two separate unrounded high-vowel allophones. Besides, the groups *C'i* and *Cy* (where *C* represents any consonant) were clusters of *marked consonant + unmarked vowel* and *unmarked consonant + marked vowel*,

⁴ It is difficult to determine which of these sonants and labials merged in the palatalized variant and which generalized the palatal articulation. Among the sonants, Modern Polish has palatal reflexes of soft *r* (> *ř* > *ẓ*, written *rz*) and soft *n* (written *ń*), but positionally palatalized reflexes of soft *l* (e.g. *łi*, written *li*). Soft labials are all palatalized in the standard language, but often appear as labial + jot, labial + *ś*, and labial + *š* in dialects. Thus, we may conclude that there may well have been free variation among palatal and palatalized sonants and labials as a prelude to the generalization of one or the other in a given Polish dialect. We therefore must reject Jakobson's statement that in Russian, Ukrainian, Polish, Lower Sorbian, and East Bulgarian "palatal sonants changed to palatalized consonants" (1929:61).

respectively, making a generalization of one type unlikely, unless palatalization were to be abolished, permitting totally unmarked clusters of non-palatalized consonant + *i* to generalize, as in Czechoslovak and South Slavic. As noted by Jakobson (1929:61), “languages that did not adopt the hard-soft consonant opposition show the absence of front-back vowel oppositions as such [and] ... only those oppositions are maintained that were characterized by a redundant mark of rounding”.

3. Final labial hardening, dental softness, and vowel dispalatalization

The loss of jers and the merger of palatal and palatalized varieties of sonorants and labials created the necessity for the system to either absorb the new hard-soft consonant opposition or to abolish it. This process has been aptly termed a ‘conflict’ of consonantal vs. vocalic tonality (Jakobson 1929:66). The most significant position for the independence of the new hard-soft opposition was word-final (cf. Lunt 1956:310), where no difference in the following vowel (such as *i* vs. *y*) could come into play.

Since velars had long since become palatals before front vowels, the two major categories that were suddenly left as palatalized in word-final position after the loss of weak jers were the following two types of anterior consonants:

- (1) dentals, including obstruents *t*, *d*, *s*, *z*, and sonants *r*, *l*, *n*.
- (2) labials, including obstruents *p*, *b*, *v*, and sonant *m*.

The dentals, which had a higher inherent tonality than labials, were more able to maintain this word-final palatalization. Lower tonality labials reacted to the conflict by hardening in word-final position and in all other closed positions, i.e. where a weak jer had dropped and made palatalization autonomous.

We have portrayed the hardening of final Polish labials as a direct consequence of jer-loss. However, a number of scholars feel that this hardening was much later, occurring in the sixteenth century or even after that (cf. Stieber 1962:74; Rospond 1971:113). Stieber’s reason for accepting such a late hardening of final labials is the fact that the “sixteenth century writing system indicates the softness of these consonants” (e.g. *rób* ‘do’, *kup* ‘buy’, *krew* ‘blood’, etc.) and the recommendation of the sixteenth-century Stojeński that such sounds be pronounced different from hard consonants. On the other hand, Klemensiewicz et al. (1964:130–131) state

that although final soft labials were written as late as the nineteenth century, their hardening certainly took place before that time, since the seventeenth-century grammarian Roter decried the fact that Poles failed to pronounce any final labials as soft.

Rozwadowski (1959:195) stated that the late retention of labial softness was "surely based on the influence of dependent cases *krwi(e)* 'blood' gen. sing., *krwią* instr. sing., *gołębia* 'dove' gen. sing.". Vaillant (1950:61) wrote that "it was analogy to other inflected cases that has preserved or restored the softness ... in Polish". This leads to our suggestion that final soft labials were phonetically lost soon after jer-fall, but were restored sporadically, where supported by other paradigmatic forms, from which they were eventually eliminated. Interestingly, no Polish dialect of today retains palatalized labials in final position, although they are quite common in other positions. In final position they have either hardened totally or have been replaced by the groups labial + *ś* or labial + *ć* in a morphologically restricted category (excluding verbs) in Northern Polish (cf. Urbańczyk 1968:34). Thus, the Polish hardening of final labials fits in with all the other cases of similar hardening in Slavic that have been termed 'early' by Bräuer (1961:208).

The loss of the independent opposition of consonant palatalization within labial consonants, in contrast to the retention of this opposition in the dental category, established the incipient phonemic palatalization only for the dentals at first, according to the pattern in table 3. The most viable category for the hard-soft consonant opposition was the coronal dental class. This group had resisted the hardening that had affected labials, but the threat still existed that this hardening would spread to the final dentals as well.

Table 3

Independent palatalization in labial, dental, and velar classes after hardening of final labials.

p	t	k	m	n
	t'			n' ~ nj
b	d	g		r
	d'			r' ~ rj
	s	x		l
	s'			l' ~ lj
v	z			
	z'			

The Polish reaction was to strengthen the dental palatalization opposition in final position by introducing redundancy into the vowel preceding final dentals on the basis of whether they were hard or soft. This effect was achieved precisely by the backing (and rounding, if nonlow) of all nonhigh vowels.⁵ Since the phoneme containing the high unrounded allophones [i] and [y] was distinctively neither back nor front, it did not change from front > back as part of this process, in which all the distinctively front vowels *ä*, *e*, *ę* changed to back *a*, *o*, *ɔ*. Thus, our comments on the effect of dispalatalization apply only to nonhigh vowel sequences.

Since labials and velars were already hard in final position, no redundancy could restore a distinction that did not exist. Similarly, palatals were uniformly soft, so that no hard-soft opposition occurred within this class of consonants either. Herein lies the solution to the long-debated issue of why vowel backing took place only before hard dentals.

Before the institution of dispalatalization, a consequence of the former rule of the open syllable was to be found, dating back to the time before jer-fall; namely, there was no redundancy link between a vowel and the synharmony of the following consonant, which belonged to a different syllable. The following groups illustrate the situation (*C* represents any consonant, *e* and *o* represent front and back vowels): *C'eC'*, *C'eC*, *CoC'*, *CoC*. In each case, the palatalization or lack of it is completely predictable in the first consonant, while this feature is not at all predictable in the last consonant (since its corresponding following vowel had been a weak jer that dropped). This lack of redundancy in newly arisen final consonants had led to the elimination of labial palatalization. The rule of vowel dispalatalization then came into being as a means of saving final dental palatalization through a shift in redundancy from prevocalic (as inherited from Common Slavic) to postvocalic. The above four groups were altered as follows, in those instances where the final consonant was a dental:

- (1) *C'eC'* (no change)
- (2) *C'eC* > *C'oC*
- (3) *CoC'* (no change)
- (4) *CoC* (no change)

While in each of the four original cases the palatalized or nonpalatalized nature of the first consonant was redundantly signaled by the vowel, now a very different situation came into existence, although on the surface only

⁵ See footnote 3.

one form appears to have changed. In case one, both palatalized consonants are now predictable due to the use of the front vowel *e*. In case two it is the *final* consonant's nonpalatalized nature that is predictable based on preceding *C'o-*. Case three remains the only instance of the four in which only the first consonant's status is predictable, since *-oC'* can only follow a hard consonant. In case four, neither of the consonants has a predictable status, since *Co-* can precede either hard or soft dentals. The basic difference is the transformation of four clear cases of predictable consonant to a balanced pattern of two cases of predictable first consonant (numbers 1 and 3), two cases of predictable final consonant (numbers 1 and 2), and one totally unpredictable case (number 4). Significantly, when labials, palatals, or velars were in final position as a result of jer-loss, all the redundancy was retained by the first consonant, since the latter categories were no longer differentiated in final position, or never were in the first place (velars and palatals).

We have represented the case of a monosyllabic word which arose from an original two-syllable sequence after jer-fall. This is the basic pattern of a nonderived word which eventually led to the institution of the identical rules of dispalatalization, regardless of whether the syllables in question were actually word-final or not, on the very same basis of redundantly signaling the palatalization or nonpalatalization of postvocalic dentals.

The shift in redundancy from prevocalic to postvocalic consonants obviously had the effect of extending numerous new oppositions to prevocalic position. However, the maximum number of unpredictable palatalized dentals in successive syllables (lacking high vowels) was held to one, represented by the cases *C'oC* and *CoC'*. Whenever two successive palatalized dentals bounded the same vowel, the nonhigh front vowel indicated that it was the palatalized variety of dental on both sides (*C'eC'*). The unpredictability of both dentals on either side of a given vowel occurred only when both were unpalatalized (*CoC*), i.e. unmarked for palatalization.

The basis for our conclusions regarding the new redundancy of postvocalic dentals has been the assumption that the hardening of final labials chronologically preceded the Polish dispalatalization of vowels. If these events did indeed take place in the order we are suggesting, distinctive palatalization in labials, in contrast to dentals, should have been absent or very limited by the time of vowel dispalatalization, since the only independent use of this distinction was eliminated. As to the original labial + jot groups in such cases as **kupjɔ* 'I will buy' or **rozrabjat'i* 'to dilute', we

might assume that having existed as such until the time of jer-fall, they had not as yet completely merged with the palatalized labials that came after front vowels and never contained a jot, e.g. *p'ivo* 'beer', *p'ęt* 'five'. Therefore, *pj*, *bj*, etc. might have been only optionally (or stylistically) realizable as *p'*, *b'*, etc., which would have made their palatalization potentially distinctive. In other words, while dental palatalization was already obligatory in word-final position and supported by redundancy through vowel dispalatalization, the same distinction was in a state of conflict as far as labials are concerned.

If the dispalatalization of *ä* > *a*, *e* > *o*, and *ę* > *o* were to apply after labials in such cases as *p'* + *e* + hard dental, a new independent use of distinctive palatalization for labials would emerge. In view of the conflict between the presence and absence of phonemic labial palatalization that we have just sketched, the fate of labials that came before nonhigh front vowels becomes quite significant. Interestingly, we find a varied picture here, in which many cases of blocked dispalatalization involve just such instances of prevocalic labials, testifying to the ambiguous phonological identity of once redundantly palatalized labials. Stieber (1934:19) cites the case of Polish dialects, exemplified by that near Łódź, which have only sporadic presence and absence of dispalatalization after labials, e.g. *p'erun* 'lightning', *b'edra* 'hips', *P'ečkuf* 'Piotrków, place-name', *z'v'esna* 'spring'; but *m'ut* (< *m'od*) 'honey', *pop'ul* (< *pop'ol*) 'ashes'. Rozwadowski (1959:159) refers to the same phenomenon as a "lack of dispalatalization" possibly due to "the primarily post-labial position".

If we consider the fact that, on the one hand, dispalatalization never takes place before a final labial (or one occurring in the next syllable), and on the other, that it only sporadically occurs after a labial in a number of dialects, we obtain a confirmation of the state we have reconstructed, in which word-final labial palatalization no longer existed, while before front vowels labial palatalization was either optional or redundant. Eventually, the conflict was resolved in favor of labial palatalization, as reflected in Modern Standard Polish, with the important restriction that such palatalization is only distinctive in prevocalic position. This situation came about partly as a result of the merger of *pj* and *p'* as *p'* and partly as a result of the eventual predominance of those cases where dispalatalization did go through after labials, e.g. *p'asek* < **p'asək* 'sand', *v'ara* < *v'ära* 'faith', *m'otla* < *m'etla* 'broom'. On the other hand, "a number of Polish dialects, are ... deprived of the opposition between palatalized and non-palatalized labials" (Stankiewicz 1956:522).

4. Dispalatalization in a distinctive feature framework

Having provided an answer to the question of why Polish dispalatalization occurred only before hard dentals, in terms of both relative chronology and the entire phonemic system, rather than on the basis of the special syntagmatic features that caused this change, let us now address the question of syntagmatic contrast as represented in a distinctive feature system. If our phonological conclusions reached above can be corroborated in the feature representation, this will be regarded as confirmation of the correctness of the feature selection.

Using the features found in *The sound pattern of English* (Chomsky and Halle 1968), we obtain the following rule for dispalatalization:

$$(1) \left[\begin{array}{c} \text{V} \\ - \text{high} \end{array} \right] \rightarrow [+ \text{back}] / \text{---} \left[\begin{array}{c} \text{C} \\ + \text{anterior} \\ + \text{coronal} \\ - \text{high} \end{array} \right]$$

As we see, the consonant and vowel features overlap only in the height feature. Given $[- \text{high}]$ in both a vowel and the following consonant, the indicated vowel backing will take place. This representation, however, fails to capture two sorts of properties that seem necessary to a correct description.

In the first place, front vowels and nonpalatalized consonants differed in their basic 'syllabic synharmony' according to which palatalized and palatal consonants are classed together with front vowels of all heights in defining the soft variety of the 'two-syllable types, soft and hard' (Jakobson 1929:20). However, according to the 1968 system (as we shall refer to that of *The sound pattern of English*), both nonhigh front vowels (*e*, *ä*, etc.) and nonpalatalized anterior consonants are specified as being $[- \text{high}]$ and $[- \text{back}]$. This inadequacy was clearly pointed out by Campbell (1964:58), who stated that in the 1968 system "there is no natural explanation why $[- \text{high}]$ *e* should palatalize consonants to $[+ \text{high}]$ ". In rule 1, for Polish dispalatalization, based on the 1968 feature system, it appears as though the contiguous segments (such as *et*) agree in their synharmony due to the $[- \text{high}]$ feature. However, in reality, they represent the two polar opposite types of segment called 'soft and hard' by Jakobson. Therefore, it seems obvious that to approach an adequate description of this phenomenon of Slavic we must endow all segments with a feature that indicates their

synharmonic class. This could be called [+soft] or '[+palatalness]' to use Campbell's term (1974:58). Front vowels, palatalized and palatal consonants would all be [+soft] in opposition to nonfront vowels and nonpalatalized labial, dental, and velar consonants.

Thus, the first difficulty in using rule 1 is that there is no way to specify the all-important binary division connected to syllabic synharmony, so that an apparently identical feature ([−high]) really represents two very different things. The second difficulty stems from the use of completely different features for the specification of vowels and consonants. The features of rule 1 only repeat the articulatory facts well known for decades, i.e. that a low or mid front vowel backs before a hard dental consonant. In order to determine if there are any regularities hidden beneath the surface, it seems expedient to consider those features in the *CVC* sequence that apply to both consonant and vowel alike. In order to do this it will be necessary to operate with the Jakobsonian features 'diffuse' and 'acute' (Jakobson and Halle 1956:29–31), which are designed for the mutual application to consonant and vowel.

We shall now re-examine the Polish dispalatalization using the 1956 feature system just indicated, along with an additional feature of *softness* for synharmonic properties that apply to both consonant and vowel. This procedure will prove justified if more significant generalizations about the sound change under consideration can be extracted than was possible with the use of the 1968 feature system. With the corresponding changes made, our rule is now of the following form:

$$(2) \left[\begin{array}{c} \text{V} \\ -\text{diffuse} \\ +\text{soft} \end{array} \right] \rightarrow \left[\begin{array}{c} -\text{acute} \\ -\text{soft} \end{array} \right] / \left[\begin{array}{c} \text{C} \\ +\text{acute} \\ +\text{diffuse} \\ -\text{soft} \end{array} \right]$$

In rule 2 we may observe that a differing synharmony of two segments has been made the same. At the same time we see that the tonality, as expressed by the feature 'acute', comes to differ in the very same two segments by the action of this rule, while the environment requires differing specifications for sonority, defined by the feature 'diffuse'.

In order to see the operation of this rule in a wider context, let us consider the features within the entire *CVC* group under discussion, first where the final consonant is a hard dental and fits the environmental restriction of the rule, and second, in the other cases that do not meet the

rule's conditions, i.e. when the second consonant is a soft or hard labial, hard velar, soft palatal, or soft palatalized dental. The only feature of concern within the first consonant of the *CVC* group is that it is soft, under the influence of the front vowel. Although we have observed earlier that in final position labials and velars were exclusively hard when this rule applied, we now consider both hard and soft cases of labials, in order to account for nonfinal position; velars were uniformly hard at this time. The rule for hard dentals, compared to the other unchanged groups is shown in table 4 (the segments *CVC* are referred to as 1, 2, and 3).

Table 4
Feature representation of *CVC* groups with nonhigh front vowels.

	1	2	3	
1. Hard dental	$\begin{bmatrix} C \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} V \\ +\text{acute} \\ -\text{diffuse} \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} C \\ +\text{acute} \\ +\text{diffuse} \\ -\text{soft} \end{bmatrix}$	
	\rightarrow	$\begin{bmatrix} C \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} V \\ -\text{acute} \\ -\text{diffuse} \\ -\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} C \\ +\text{acute} \\ +\text{diffuse} \\ -\text{soft} \end{bmatrix}$
2. (Soft or hard) labial	$\begin{bmatrix} C \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} V \\ +\text{acute} \\ -\text{diffuse} \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} C \\ -\text{acute} \\ +\text{diffuse} \\ \pm\text{soft} \end{bmatrix}$	
3. Velar	$\begin{bmatrix} C \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} V \\ +\text{acute} \\ -\text{diffuse} \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} C \\ -\text{acute} \\ -\text{diffuse} \\ -\text{soft} \end{bmatrix}$	
4. Palatal	$\begin{bmatrix} C \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} V \\ +\text{acute} \\ -\text{diffuse} \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} C \\ +\text{acute} \\ -\text{diffuse} \\ +\text{soft} \end{bmatrix}$	
5. Soft dental	$\begin{bmatrix} C \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} V \\ +\text{acute} \\ -\text{diffuse} \\ +\text{soft} \end{bmatrix}$	$+$ $\begin{bmatrix} C \\ +\text{acute} \\ +\text{diffuse} \\ +\text{soft} \end{bmatrix}$	

On the basis of the data in table 4, we can see that a change occurred only when segments 2 and 3 originally agreed in their tonality feature (acute), but disagreed in the other sort of tonality we have been referring to as synharmony (softness). The change involved a switch that made

segments 2 and 3 come to disagree in the acute tonality feature, but agree in synharmony. Consequently, to provide an answer at the feature level as to why Polish dispalatalization took place only before hard dentals, we may state that when a vowel of nonminimal sonority (nondiffuse) shared high tonality ([+acute]) with the following consonant, but differed from it in synharmony, the tonality of the vowel became different from that of the consonant, but the synharmony became the same. In reference to the consonant that preceded the vowel and was soft, we can conclude that the syllabic synharmony agreement was transferred from segments 1 and 2 to segments 2 and 3, with a compensatory differentiation in the tonality (acuteness) of the final two segments. It is important to realize that two sorts of tonality, one expressed as acuteness, and the other as synharmony, are involved in a complex interplay in our rule.

5. Conclusion

Our phonological observations have led to the conclusion that the long sought-after explanation for the motivating forces behind the Polish dispalatalization lay in the newly emerging opposition of consonant palatalization within the category of dental consonants. This has led us to propose a relative chronology that departs from the one usually found in studies of Polish historical phonology. Specifically, we have suggested that a logical explanation of Polish dispalatalization is possible only if it is assumed that this sound change followed the hardening of final labial consonants, which, in turn, followed the loss of weak final jer-vowels. The new redundancy that appeared was a progressively shifted variety of syllabic synharmony which functioned to prop up the novel consonant palatalization in final closed position. Finally, we have seen that a significant generalization of this process at the feature level appears possible only with the introduction of a new feature to capture syllabic synharmony, as well as a return to the Jakobsonian concepts of tonality and sonority features.

Certain conclusions may also be drawn with regard to similar dispalatalizations occurring outside Polish. The principle herein established leads to the assumption that where dispalatalization occurs only before hard dentals, the loss of final labial softness had to precede the vowel backing in question. Where, on the other hand, dispalatalization occurs before any nonpalatalized or hard consonant, it may be inferred that the hardening of

final labials either followed the vowel backing or never occurred at all. Therefore, dispalatalization before hard dentals implies a system lacking final palatalized labials, but dispalatalization before all hard consonants does not necessarily imply the hardening of final soft labials or their retention. Thus, Lekhitic, exemplified by Polish, Kashubian, and Polabian, experienced backing before hard dentals and lacks palatalized labials in closed position (including final), while languages with backing before any hard consonant include Sorbian, Belorussian, Ukrainian, and Russian, the former three of which have lost final labial softness in most of their dialects (cf. Kalnyn' 1967:138 for the existence of Sorbian dialects with final soft labials), but the latter of which has retained it consistently in its eastern dialects (Filin 1972:330).⁶

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⁶ This suggests an intriguing set of isoglosses for final labial hardening that takes in West Slavic and East Slavic including Ukrainian, Belorussian, and the Western dialects of Russian, but includes neither the eastern portion of Russian dialects nor the Russian literary language.

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