

INTERNATIONAL
JOURNAL OF
SLAVIC LINGUISTICS
AND POETICS

XXVIII

1983

Slavica

POSITIONAL VARIATION OF NASALS IN
CONTEMPORARY STANDARD POLISH

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I.

The feature of nasality, in both its phonetic and phonemic manifestations, has been one of the most controversial problems of the phonology of Contemporary Standard Polish (henceforth CSP). After reviewing and evaluating some of the most significant studies in this area, we shall examine the behavior of those segments which possess the nasality feature as they vary in differing environments. This paper's primary goal will be to point out a series of symmetrical regularities affecting the phonetic shape of nasalized segments in internal, pre-consonantal position, as compared with word-final position.

The traditional and by now outdated approach towards Polish nasal vowels (Szober, 1967:12) recognized the phonetic values [õ], [ẽ] as symbolized by orthographic *q*, *ę* in such positions as pre-fricative and word-final. However, as recent investigations have made abundantly clear, the vowels traditionally known as Polish nasals phonetically consist of at least two components, meaning that Polish vowel nasality is asynchronous, extending over at least two segments, rather than synchronic and confined to a single vocalic segment (Brooks, 1968:17-9; Biedrzycki, 1963:36). Thus, the CSP pronunciation of the nasal vowel of the word *wąsy* 'mustache' could more accurately be represented as [õw̃] than simply [õ].

The diphthongal, or asynchronous nasal [õw̃] contains two elements which alternatively could be considered redundant in a phonemic interpretation of this sequence. On the one hand, one could consider the appearance of the entire segment [w̃] as automatically conditioned by the presence of a phonemic /õ/, in such cases as the word-final position of [xcõw̃] *chcą* 'they want', which would lead to a phonemic interpretation /xcõ/. Alternatively, the nasality of the vowel [õ] could be considered to be the automatic consequence of the nasality feature in the immediately following [w̃], in which case the phonemic interpretation would be /oõw̃/ (cf. Schenker 1954:469). We shall follow Schenker's system of transcription, indicating /xcoõw̃/ in the above case, which has also been the practice of Brooks (1968:16) and is close to the system employed by Biedrzycki (1963:44).

There seem to be no cogent reasons for preferring to eliminate the segment [w̃] from the phonemic transcription other than the traditional practice of considering the Polish nasals as single segments on the phonetic level, as found in CSP orthography. As Biedrzycki (1963:37) has clearly pointed out, nobody questions the biphonemic nature of [oʃ] in *koński* 'horse, adj.', although the parallel [oŵ] in *kąski* 'pieces' is often resolved as a single /ɔ/. The author rhetorically asks, "Can this be only because the [oʃ] is spelled with two letters, while the [oŵ] in this case is spelled with one?" The rule specifying the automatic nasalization of the vowel before nasalized [w̃] and [j] has further validity, since the distinctively non-nasalized phoneme /o/, when it occurs before a nasal consonant such as [m, n, ń], is realized with a redundant feature of nasality, as /ɔ̃/; e.g. *tom* [tɔ̃m] 'volume', *ton* [tɔ̃n] 'tone' (Biedrzycki, 1963:41). Thus, a vowel regressively assimilates the nasality of an immediately following segment, be it the non-consonantal [w̃, j] or the consonantal [m, n, ń]. In order to treat all these cases in the parallel manner they appear to require, we must recognize the phonemic sequence /oŵ/, rather than /ɔ̃/, much as this is done for the sequences /on/, /om/, /oń/. Another major argument for the biphonemic /oŵ/ over /ɔ̃/ is the colloquial Polish imperfectivization of such forms as *pogrążyć* /*pogroŵżyć*/ 'sink', *wydrążyć* /*widroŵżyć*/ 'hollow out' as [pogrãwżać, wydrãwżać] (Stieber, 1948:62), in which it is clear that the [ɔ̃] of [ɔ̃w̃] is functioning as the phoneme /o/ as seen in its change to /a/ in imperfective derivation. Interestingly enough, since CSP orthography is structured to recognize an /ɔ̃/ phoneme, it has no really appropriate means to render the above cited imperfectives, and Stieber observes that "only orthographic difficulties hinder the recognition of these forms as correct" (1948:62).

The maximally independent position for the distinction of phonemes with the feature of nasality is word-final (cf. Biedrzycki, 1963:41). In this environment four minimal entities occur, as follows: *tom* [tɔ̃m], *ton* [tɔ̃n], *ton* [tɔ̃ń], 'drown', *ta* [tɔ̃w̃], 'this, instr. sg.' (Stieber, 1948:57).¹ Based on this environment, we shall recognize four Polish nasal phonemes,² as

¹ According to Klemensiewicz (1962:38), word-final [ń] can be replaced by [j] in colloquial speech; [ń] and [j] are never in phonemic opposition and can be considered as members of the phoneme /ń/.

² Some scholars recognize a palatalized nasal consonant phoneme /m̃/, on the basis of such pre-vocalic oppositions as *mała* 'small' vs. *miała* 'she had' (cf. Stankiewicz, 1956:520), although others have treated this sound as the sequence /mj/ (cf. Segal, 1972:105-9 for discussion). This question does not concern our immediate topic since we are focusing on the behavior of nasals in closed position — pre-consonantal and word-final — where the appearance of a distinctive /m̃/ is totally excluded. In pre-palatal position, the [m̃] that occurs is a predictable variant of /m/ under the assimilatory influence of the following consonant. As

follows: /m, n, ń, w̃/. We shall assume that these four phonemes are distinctively opposed to each other on the basis of the Jakobsonian features consonantal, grave, and diffuse (Jakobson and Halle, 1956:29-31), as follows:

	m	n	ń	w̃
consonantal	+	+	+	-
grave	+	-	-	+
diffuse	+	+	-	+

This scheme, which uses a single feature system to apply to both consonants and vowels, has been chosen in preference to those (e.g. Chomsky and Halle, 1968:306-8) which use separate features for each major class of sounds. As Jakobson and Waugh have recently observed (1979:105-7), the attempt to introduce separate consonantal and vocalic features has often been based on erroneous interpretations of data. It may be noted that our feature representation of /m, n, and ń/ is in accord with that of Stankiewicz (1956:520). Stankiewicz does not recognize the unit /w̃/ as we are doing, but his representation of non-nasal /w/ matches ours for /w̃/ except for the feature of nasality.

II.

Let us now briefly review the distribution of nasal segments in preconsonantal position in contrast to that of word-final. The two major types of preconsonantal position to be considered are the two varieties of pre-obstruent position: pre-continuant (pre-fricative) and pre-noncontinuant (pre-stop and pre-affricate). Generally speaking, non-consonantal nasals [w̃, j] occur before continuants, while consonantal nasals are more frequent before noncontinuants. Pre-sonorant position is notable for the fact that it conditions the loss of nasality in a preceding non-consonantal segment (e.g. *wzięła* [vźewa] 'she took', *wzięli* [vźel'i] 'they took' as compared to *wziąć* [vźońć] 'to take').

In the case of pre-fricative position, we could speak of a neutralization of at least two of the four nasal phonemes that are distinctive in word-final position. Before labial and palatal fricatives (e.g. [f, f', v, v', ś, ź]) there is a maximal neutralization of the four-way nasal opposition, resulting in a two-way distinction, meaning that three of the four potential nasal

to the final voiceless [m̃] as in *pism* [p'ism̃] 'periodical, gen. pl.', it is an allophone of /m/, conditioned by a preceding voiceless obstruent and following word-boundary (Wierzbowska, 1971:152).

phonemes are neutralized. Before dental, alveo-palatal, and velar fricatives ([s, z, ʃ, ʒ, x]) the potential four-way opposition is reduced to a three-way type. Thus, before labial fricatives the only two occurring nasal segments are [w̃, j], while before palatal fricatives the two are [m, j]. When three nasals are in opposition before fricatives (dental, alveo-palatal, and velar), they are [m, w̃, j]. Based on the criteria of phonetic feature content as well as the behavior of loan words,³ it is possible to determine the precise nature of the neutralizations in each environment. Thus, we see a neutralization of /m/, /n/, and /w̃/ as [w̃] before labio-dental fricatives (Stieber, 1966:109), which is opposed to the expected [j] realization of /ń/ (e.g. *tramwaj* [traw̃vaj] 'trolley', *konferencja* [koŋferencja] 'conference', *wąwóz* [voŋvʊs] 'canyon').⁴ Before dental, alveo-palatal, and velar fricatives, there is a distinctive [m], obviously realizing /m/ (*giera* [g'emza] 'chamois', *omszeć* [omšeć] 'get mossy', *czerecha* [čeremxa] 'bird cherry'), as well as the [j] realization of /ń/ (*pański* [paŋsk'i] 'your', *tańszy* [taŋʃy] 'cheaper'); the third entity [w̃] must then be viewed as the neutralized realization of both /w̃/ and /n/ (*kąski* [koŋsk'i] 'pieces', *chrząszcz* [xʃoŋʃč] 'beetle', *wąchać* [voŋxać] 'smell', *konsul* [koŋsul] 'consul', *rynштok* [ryŋʃtok] 'gutter', *koncha* [koŋxa] 'conch'), cf. Stieber (1948:60). It should be emphasized that we have not been attempting to determine the phonemic transcription in cases of neutralization. Rather, we are seeking to examine how the distribution of four word-final nasal phonemes is modified in a variety of other closed position environments. When two otherwise independent phonemes are neutralized in a given environment, the only non-arbitrary

³ This practice is similar to that of Stieber (1966:109), who states that the phoneme /m/ cannot occur before labio-dental fricatives and then goes on to state that 'before labio-dentals in place of the expected groups of the type AM we really have variants of nasal vowels', illustrated by such words as *tramwaj*, *komfort*, *symfonia*. An argument could be raised that the *m* of such words is purely orthographic and that the sound has no phonological basis here; however, the distributional fact of no [m] before any labio-dentals points to the occurrence of a neutralization of the phoneme /m/, as generally occurs when Polish nasals are found in closed position. Cf. also Šaumjan (1951:402), who states that 'before [f, v, f', v'] the vowel [a] is a variant of the sequence [am]'. As we see, the best evidence for the non-occurrence of expected [m, n] before consonants is the existence of loan words which originally had these sequences, but are regularly modified in CSP.

⁴ Examples of [j] preceding labio-dental and velar fricatives are apparently lacking in the word stock of CSP. This, however, does not mean that such combinations are excluded on the basis of the phonological rules. The fact that /ń/ is realized as [j] before all fricatives has often been mentioned by scholars, cf. Biedrzycki (1963:44), Stieber (1966:113), Klemensiewicz (1962:38); thus, we are assuming the realization of potential /ńv, ńf, ńx/ as [jv, jf, jx], which shall be considered as an accidental gap in the Polish lexicon. As Koneczna (1965:176) states, 'the labial closure of *m* is not lost before fricatives *s, ś, ź, ʒ*... however *n* in this environment is vocalized to *j*'.

solution as to which of the two phonemes really appears is within the morphological paradigm or as an identification of the neutralized value with that of one of the phonemes which occurs in a non-neutralized environment, based on phonetic similarity. For example, in the case of Polish *wód* [vut] 'water, gen. pl.', one may conclude that the final phoneme is /d/ on the basis of nominative singular *woda* [voda], or, alternatively, opt for the solution as /t/ because of the phonetic identity of neutralized word-final [t] with distinctive /t/. In the case of the pre-consonantal nasal segments of Polish, we seldom can appeal to morphological paradigms for the answer, since the nasals often do not occur on morpheme boundaries. Therefore, one is left with the choice of either identifying the neutralized value on the basis of its phonetic value alone (e.g. always classifying pre-dental [w̃] as /w̃/ rather than /n/ based on phonetics, as done by Biedrzycki, 1963:44) or on making a somewhat arbitrary choice as to the more fundamental of the two neutralized phonemes (e.g. Stankiewicz, 1956: 523 transcribes CSP *książka* [kšoŋʃka] 'book' as /kšoŋʃka/, opting for /n/, which would have been rendered as /kšoŋʃka/ in a more phonetically oriented system, such as that of Biedrzycki).⁵ Since only word-final position presents the case of the /w̃/ vs. /n/ opposition, a neutralization of these two phonemes can be truly disambiguated only when a morphemic variant exists such that the segment can be observed in word-final position, an impossibility in the case of the nasal segment of *książka*. Therefore, our position is to attempt no arbitrary choice as to which neutralized phoneme is primary, but rather to concern ourselves with the change in distinctive features that is caused in each such instance of nasal segment neutralization. In this task we shall be guided by Jakobson's assertion that when 'the phonemes are approached as bundles of such features, all the complications resulting from the so-called neutralization of phonemes simply disappear' (1971:535).

We have already indicated the distribution of potential nasal oppositions before each class of fricatives, in terms of place of articulation. This information has been summarized in Table 1.

nasal + labio-dental (f, v)	nasal +	$\left\{ \begin{array}{l} \text{dental (s, z)} \\ \text{alveo-palatal (ʃ, ʒ)} \\ \text{velar (x)} \end{array} \right.$	nasal + palatal (ś, ź)
w̃ vs. j		m vs. w̃ vs. j	m' vs. j

TABLE 1. OPPOSITIONS OF NASALIZED SEGMENTS PRECEDING FRICATIVES

⁵ Although Biedrzycki considers [w̃] to be the major allophone (1963:44), he actually transcribes the phoneme as /ŋ/, 'since the symbol [w̃] possesses the diacritic [-]', a seemingly dubious justification.

Let us now observe how this reduction in the total number of nasal oppositions affects the distinctive features that oppose the nasals to each other. The four-way nasal opposition, as found in word-final position, relies on three distinctive features: consonantality, gravity, and diffuseness. The / \tilde{w} / is opposed to the other three nasals on the basis of its non-consonantal feature vs. the consonantal property of /m/, /n/, and / \acute{n} /. The three consonantal nasals are opposed on the basis of gravity and diffuseness, with /m/ the only grave and / \acute{n} / the only non-diffuse; the /n/ has an intermediate status, with no unique feature of its own, sharing its non-grave property with / \acute{n} / and its diffuse property with /m/.

In pre-labio-dental position (before [f, f', v, v']), the only possible nasal opposition is that of [\tilde{w}] vs. [j], where the phonemic opposition of /m/ vs. /n/ vs. / \tilde{w} / is neutralized as [\tilde{w}]. The [\tilde{w}] vs. [j] opposition is based strictly on the gravity feature, since both are non-consonantal and diffuse. If we compare the basic opposition of the phonemes /m/, /n/, / \acute{n} /, and / \tilde{w} / to that of [\tilde{w}] vs. [j] as found before labio-dental fricatives, we find that the original distribution of diffuseness can be said to have been transferred to the feature of gravity. Thus, the phonemes /m/, /n/, and / \tilde{w} / of word-final position are diffuse in opposition to the non-diffuse / \acute{n} /, while the two neutralized entities representing /m/, /n/, and / \tilde{w} /, on the one hand, vs. / \acute{n} /, on the other are opposed as grave [\tilde{w}] vs. non-grave [j], respectively. In this sense it can be said that a rule of the form α diffuse \rightarrow α grave⁶ could account for the difference between nasal opposition in word-final position and that of pre-labio-dental position. Therefore, the word-final phonemes /m/, /n/, and / \tilde{w} /, are all + diffuse and are neutralized to a + grave value before labiodentals; the / \acute{n} /, being - diffuse, is realized as - grave [j] before labio-dentals. Note that our use of the *alpha* symbol is different than its usual use in generative phonology. A generative treatment would express the relation we have called α diffuse \rightarrow α grave as only + diffuse \rightarrow + grave, since there is no actual change in the negatively specified grave features, and attention would be directed only to feature changes. Our justification for the use of the *alpha* symbol here is that it shows the entire systematic relationship of total agreement between the word-final diffuse specification and the pre-fricative gravity marking, a pattern which would be missed if only feature changes were indicated. Thus, we are more concerned with the

⁶ The rule can be read as follows: a nasal's plus or minus specification for diffuseness in word-final position will be the same as the gravity specification for that nasal's neutralized realization in pre-labio-dental position. E.g. in word-final position /m/, /n/, and / \tilde{w} / are + diffuse, so their neutralized realization before labio-dentals will be + grave, while / \acute{n} / is - diffuse word finally and, therefore, has a pre-labio-dental value of - grave.

interrelationship of feature representation in non-neutralized compared to neutralized position, rather than in a mere cataloguing of feature changes.

As we continue our comparison of the features characterizing the independent word-final nasals with those in the more predictable pre-consonantal environment, a highly structured system of feature relations will become apparent. For clarity of illustration, these relations can continue to be expressed in terms of changes in the features of the word-final /m/, /n/, / \tilde{w} /, and / \acute{n} /, in order to yield the correct realizations in the given pre-consonantal environment. In the case of nasals which immediately precede dental, alveo-palatal, and velar fricatives [s, z, š, ž, x], the word-final phonemes /n/ and / \tilde{w} / are neutralized to [\tilde{w}], while /m/ is unchanged and / \acute{n} / is realized as [j]. Thus, in the pre-consonantal environment before dental, alveo-palatal, and velar fricatives, gravity opposes [m] and [\tilde{w}] to [j], while consonantal [m] is opposed to non-consonantal [\tilde{w}] and [j]. These changes can be accounted for by two rules. One is the same rule which was established previously in pre-labio-dental position, i.e. α diffuse \rightarrow α grave. The second rule involves the consonantal feature of nasals. Notice that all + consonantal nasals of word-final position assume a consonantal feature, either plus or minus, equivalent to their word-final gravity feature, when they precede dental, alveo-palatal, and velar fricatives; i.e. + grave /m/ remains + consonantal [m], while - grave /n/ and / \acute{n} / are realized as - consonantal [\tilde{w}] and [j], respectively, in this position. The only basically non-consonantal phoneme of word-final position, / \tilde{w} /, remains unchanged in this respect. This relationship can be expressed as follows:

- a. $\left[\begin{array}{l} + \text{consonantal} \\ \alpha \text{ grave} \end{array} \right] \rightarrow \alpha \text{ consonantal}$
- b. - consonantal undergoes no change in its consonantal feature.

Thus far we have seen that in some pre-consonantal environments (before dental, alveo-palatal, and velar fricatives) two feature changing rules can be applied, while in another environment (pre-labio-dental) only the first of these two rules applies. In the remaining pre-fricative environment, i.e. the pre-palatal position (before [š, ž]), /m/ remains opposed to the other nasals as in word-final position, taking on the redundant feature of palatalization (sharpness), as [m']. The other three phonemes, /n/, / \tilde{w} /, and / \acute{n} /, are all neutralized as [j]. This is a consonantal vs. non-consonantal opposition, which can be accounted for by the very same rule as we have already introduced as our second rule, which also applies in pre-dental, pre-alveo-palatal, and pre-velar positions, i.e.

a. $\left[\begin{array}{l} + \text{ consonantal} \\ \alpha \text{ grave} \end{array} \right] \rightarrow \alpha \text{ consonantal}$

b. -consonantal undergoes no change in its consonantal feature.

Summarizing the neutralization of Polish nasals before fricatives, we can say that there are two major processes which transfer feature relationships from word-final position to that of pre-fricative, or pre-continuant obstruent. Before dentals, alveo-palatals, and velars both of these processes are at work; however, before labio-dentals only one of them functions, while before palatals only the other of these processes is present, as follows:

Before labio-dentals: $\alpha \text{ diffuse} \rightarrow \alpha \text{ grave}$

Before palatals: a. $\left[\begin{array}{l} + \text{ consonantal} \\ \alpha \text{ grave} \end{array} \right] \rightarrow \alpha \text{ consonantal}$

b. -consonantal undergoes no change in its consonantal feature.

Before dentals, alveo-palatals, and velars: both above processes apply.

III.

The behavior of nasals in word-final position as compared to the various pre-fricative environments, which we have been examining, has been summarized in Table 2 (next page), in terms of the three binary features consonantal, grave, and diffuse.

Until now we have not been examining the pre-fricative environments themselves in terms of feature representation, but have simply referred to them by their traditional articulatory terms which specify place of articulation. Let us now confront the question of what the two rules we have introduced mean, especially in terms of their environmental restrictions. Specifically, why do nasals before labio-dental and palatal fricatives observe only one of our two rules each and have a two-way opposition ($[\tilde{w}]$ vs. $[\tilde{j}]$ and $[m']$ vs. $[\tilde{j}]$, respectively), while nasals before dentals, alveo-palatals, and velars observe both of our rules and have a three-way opposition ($[m]$ vs. $[\tilde{w}]$ vs. $[\tilde{j}]$)? The articulatory opposition of labio-dental and palatal vs. other fricatives does not seem to explain much in this regard. The answer may well be found in the concept of marked vs. unmarked, as interpreted by Jakobson. As our starting point let us consider Jakobson's statement that 'the optimal and correspondingly unmarked consonants are the maximally diffuse ones' (Jakobson and Waugh, 1979:109). If we take this to mean that the fundamental division of

I. Word-final nasal phonemes.

	m	n	\tilde{w}	\tilde{j}
consonantal	+	+	-	+
grave	+	-	+	-
diffuse	+	+	+	-

II. Products of neutralization.

A. Pre-labio-dental.

	\tilde{w}	\tilde{w}	\tilde{w}	\tilde{j}
consonantal	-	-	-	-
grave	+	+	+	-
diffuse	+	+	+	+

B. Pre-dental.

	m	\tilde{w}	\tilde{w}	\tilde{j}
consonantal	+	-	-	-
grave	+	+	+	-
diffuse	+	+	+	+

C. Pre-alveo-palatal.

	m	\tilde{w}	\tilde{w}	\tilde{j}
consonantal	+	-	-	-
grave	+	+	+	-
diffuse	+	+	+	+

D. Pre-palatal.

	m'	\tilde{j}	\tilde{j}	\tilde{j}
consonantal	+	-	-	-
grave	+	-	-	-
diffuse	+	+	+	+

E. Pre-velar

	m	\tilde{w}	\tilde{w}	\tilde{j}
consonantal	+	-	-	-
grave	+	+	+	-
diffuse	+	+	+	+

TABLE 2. WORD-FINAL NASAL FEATURES
COMPARED TO THOSE IN PRE-FRICATIVE POSITION.

consonants into marked vs. unmarked is on the basis of non-diffuse vs. diffuse, the Polish fricatives are divided into marked /š, ž, ś, ź, x/ vs. unmarked /f, f', v, v', s, z/. Within each of these two basic groups we may further separate the marked from the unmarked. Among non-diffuse fricatives, the grave /x/ is unmarked in relation to non-grave /š, ś/ (Jakobson and Waugh, 1979:117). Further, /ś/ is obviously more marked than /š/, whether one chooses to represent this opposition as that of strident /š/ vs. non-strident /ś/ (cf. Stankiewicz, 1956:520 and Ivić, 1957:161),⁷ as 'low-tone: high-tone' (Jassem, 1966:98), or as 'sharp vs. non-sharp' (Segal, 1972:115-6). Therefore, among the non-diffuse fricatives, the hierarchy of marking, from unmarked to marked, is /x, š, ś/. Within the class of diffuse fricatives, labio-dental /f/ is marked in relation to dental /s/ (Jakobson

⁷ The view that Polish /š/ vs. /ś/ is based on stridency carries the necessary implications that CSP /š/ vs. /ś/ differs on the basis of the same feature (cf. Stankiewicz, 1956:520), conflicting with Jakobson's considerable evidence of 'the indisputable stridency of all known affricates from thousands of languages' (Jakobson and Waugh, 1979:142).

and Waugh, 1979:117). Therefore, we may attempt to explain the similar structural behavior of Polish nasals before labio-dental and palatal fricatives by noting that these two classes are the most marked within the polar classes of diffuse and non-diffuse consonants, respectively. This has had the apparent effect of reducing the number of nasal oppositions before the more marked classes of both diffuse and non-diffuse fricatives.

IV.

A strikingly similar pattern presents itself when the behavior of Polish nasals before non-continuant obstruents, i.e. stops and affricates, is considered. Again, we see two rules that specify the nature of nasal phoneme neutralization, taking word-final position as an example of non-neutralized. Remarkably, just as in the case of fricatives, both rules apply before the dental (/t, d, c, dz/), alveo-palatal (/č, dž/), and velar (/k, g/) classes, while one rule apiece applies to the bilabial (/p, b/) and palatal (/ć, dź/) environments.

Before providing all the details, let us first review the behavior of Polish nasals before non-continuants. In the pre-bilabial environment, the four potential nasal segments are reduced to two; /m/, /n/, and /Ń/ are neutralized as [m], while /ń/ is realized as [j̃m] (e.g. *lampa* [lamp̃a] 'lamp', *pan Bóg* [pambuk]⁸ 'Lord God', *ząb* [zomp] 'tooth', *hańba* [xãjmba] 'shame'). Before dentals and alveo-palatal non-continuants the four-way nasal opposition is reduced to a three-way contrast, where /m/ is realized as a distinct [m], /n/ and /Ń/ are [n, ñ⁹], respectively, i.e. homorganic with respect to the following stop, and /ń/ is realized as [j̃] plus a homorganic nasal consonant; e.g. *niemca* [ńemca] 'German, gen. sg.', *wietnamczyk* [v'etnamčyk] 'Vietnamese', *kontrakt* [kontrakt] 'contract', *garnczyk* [gar̃nčyk] 'pot, dim.', *porządek* [poż̃ondek] 'order', *rączka* [rončka] 'handle', *wieńce* [v'ẽjce] 'wreaths', *kończę* [kõj̃nč] 'I finish'. The nasal opposition is again a two-way type before palatals, with /m/ realized as palatalized [m'], and /n/, /Ń/, and /ń/ all neutralized as [ń]; e.g. *mamcia* [mam'ca] 'Mom', *studenci* [studeńci] 'students', *pięć* [p'eńć] 'five', *kawuńcia* [kavuńca] 'coffee, dim.' In the case of pre-velar non-continuant position, the opposition has been treated as both three-way and four-way, since there is some instability in the precise realization of /n/. While /m/ is

⁸ This two-word example is used since there seems to be no identifiable /n/ before any bilabial stop within a word.

⁹ [n] represents an alveo-palatal nasal.

realized as [m] (*domku* [domku] 'house, dim., loc. sg.') and /ń/ is realized as [j̃ŋ] (*bańka* [bãj̃ŋka] 'bubble'); there are two more pre-velar nasals, [n] and [ŋ], in Warsaw CSP, whose occurrence is based on whether a morpheme boundary runs between the nasal and /k/ (cf. Stieber, 1948:63), e.g. *bank* [baŋk] 'bank', *pekać* [peŋkać] 'burst', but *panienka* [pańenka] 'young lady', where the morpheme division is *bank-ø*, *pek-a-ć*, *pani-en-k-a*. If a morpheme boundary symbol is not permitted in the phonemic transcription then there is a potential four-way opposition of nasals before velar stops, with [m, j̃, n, ŋ] all occurring in the same environment.¹⁰

We have seen that the phoneme /ń/ is realized as two nasal segments before all non-continuants except the palatal variety. These two segments are [j̃] plus a homorganic nasal consonant which matches the place of articulation of the following bilabial, dental, alveo-palatal, or velar. We will follow Biedrzycki (1963:35) in considering that the [j̃] is the realization of /ń/ in these contexts; the homorganic nasal segment plays no distinctive role other than redundantly signalling the preceding segment's distinctive nasality and the following consonant's place of articulation. The homorganic nasal will be considered as an inserted consonant, belonging neither to the /ń/ phoneme nor to the following consonant.

As we have shown in the case of nasal behavior before continuant obstruents (fricatives), there are two basic rules of neutralization; both apply before dentals, alveo-palatals, and velars, while one of the two applies before labials (labio-dentals in the specific case of fricatives), and the other applies before palatals. Let us now consider the parallel series of rules which determine the distribution of nasals before non-continuant obstruents (stops and affricates). The set of two rules which apply before dentals, alveo-palatals, and velars is as follows:

1. α diffuse → α consonantal
2. a. – consonantal → α grave / ___ α grave
b. + consonantal undergoes no change in its gravity feature.

The first rule simply means that the pattern of opposition in word-final position on the basis of the feature diffuse vs. non-diffuse is transferred to the consonantal feature in certain pre-consonantal positions (namely, before labial, dental, alveo-palatal, and velar stops). Thus, for example, in word-final position /m/, /n/, and /Ń/ are all diffuse in opposition to /ń/. Before bilabial, dental, alveo-palatal, and velar non-continuants the reali-

¹⁰ Stieber (1948:63) opts for the use of the morpheme boundary in his phonemic transcription, while Biedrzycki (1963)41-2, 44) and Jassem (1966:87) do not.

zation of neutralized /m/, /n/, and /w̃/ is likewise opposed to that of the realization of /ń/, but now on the basis of the consonantal feature, since /m/, /n/, and /w̃/ are realized by nasal consonants before non-continuants, while /ń/ is realized by [j] plus an inserted homorganic nasal consonant before all non-continuants except palatals, where its realization is [ń] without a preceding [j]. In comparison to the situation of nasals before continuant obstruents, we see that before non-continuants the basic feature of diffuseness is overtaken by the consonantal feature, while before continuants the very same diffuse feature is overtaken by that of gravity in analogous environments.

The second rule refers to a feature change which applies only to non-consonantal segments, based on word-final position; i.e. only /w̃/, specifying that such segments assimilate the gravity of the following non-continuant obstruents. This is in contrast to the behavior of consonantal segments /m/, /n/, and /ń/, which maintain their own gravity features, as found in word-final position. Thus, before non-grave dentals, alveo-palatals, and palatals /w̃/ is realized as similarly non-grave [n, ń, ń], while before grave velars /w̃/ is realized as grave [ŋ]. At the same time, the + consonantal /m/, /n/, /ń/ maintain their basic gravity feature specifications before dentals (realizations [m, n, j]), alveo-palatals ([m, ń, j]), palatals ([m', ń, ń]), and velars ([m, n, j]). The latter realization of /n/, as [n], before velar stops, raises a very interesting point concerning the phonemic composition of words where Warsaw speech is said to realize /n/ as sometimes [n] and sometimes [ŋ]. As we have noted above, the [n] realization (e.g. *Irenka, panienska*) is found in native Slavic words which originally contained the sequence -nɔ-. The use of [ŋ] is typically found in loan words such as *bank*. Interestingly, the only violation of our established pattern of rules is in the case of loan words with an original *n* before velars. If such cases were treated as neutralizations of the phoneme /n/, they would violate our rule number two, which specifies that consonantal nasals are not supposed to modify their gravity feature before velar stops. Since this instance is the only case of non-observance of these two rules, covering the use of nasals before all obstruents, it suggests that in cases of borrowed *n* before velars we are really dealing with a non-neutralized phoneme /w̃/ which simply has the allophone [ŋ] before velar stops, conforming to our rule two that non-consonantal nasals assume the gravity of the following consonant, in this case a velar stop. Thus, one should phonemicize /pańenka/, /irenka/, but /baŋk/.¹¹ In comparison with the second rule

¹¹ Biedrzycki (1963:41-2, 44) arrives at exactly the same phonemic conclusion as has been borne out independently by our established rules.

that applies to nasals before fricatives, the second rule as applied to pre-stop and pre-affricate position is similar in its reference to a change in nasals based on their consonantal or non-consonantal status. However, while the consonantal nasals experience a change in their consonantal feature, based on the gravity feature, before continuants, and non-consonantal nasals undergo no such change, before non-continuants the roles are reversed, with a modification in non-consonantal nasals, which alter their gravity feature, but no change in the consonantal nasals.

Before labial non-continuants only the first above rule applies, i.e. the basic properties of diffuseness are transferred to the consonantal feature. Thus, diffuse /m/, /n/, and /w̃/ are all realized as + consonantal [m], while non-diffuse /ń/ is realized as non-consonantal [j]. Before palatals, as indicated above, only rule two applies, so that non-consonantal /w̃/ changes its gravity to match that of the following palatal consonant, becoming [ń], while the consonantal nasals maintain their basic gravity as [m', ń, ń] in the case of /m/, /n/, /ń/. Table 3 summarizes the extent of nasal opposition before non-continuants. See Table 4 for a representation of feature behavior in word-final position as compared with that found before non-continuants.

nasal + bilabial (p, b)	nasal + dental (t, d, c, dz) alveo-palatal (č, dž)
m vs. jm	m vs. n vs. jn
nasal + palatal (ć, dź)	nasal + velar
m' vs. ń	m vs. n vs. jŋ vs. ŋ

TABLE 3. OPPOSITIONS OF NASALIZED SEGMENTS
PRECEDING STOPS AND AFFRICATES

I. Word-final nasal phonemes.		m	n	\tilde{w}	\acute{n}
consonantal		+	+	-	+
grave		+	-	+	-
diffuse		+	+	+	-
II. Products of neutralization.					
A. Pre-bilabial.		m	m	m	$\tilde{j}(m)$
consonantal		+	+	+	-
grave		+	+	+	-
diffuse		+	+	+	+
B. Pre-dental.		m	n	n	$\tilde{j}(n)$
consonantal		+	+	+	-
grave		+	-	-	-
diffuse		+	+	+	+
C. Pre-alveo-palatal.		m	η	η	$\tilde{j}(\eta)$
consonantal		+	+	+	-
grave		+	-	-	-
diffuse		+	-	-	+
D. Pre-palatal.		m'	\acute{n}	\acute{n}	\acute{n}
consonantal		+	+	+	+
grave		+	-	-	-
diffuse		+	-	-	-
E. Pre-velar		m	n	η	$\tilde{j}(\eta)$
consonantal		+	+	+	-
grave		+	-	+	-
diffuse		+	+	-	+

TABLE 4. WORD-FINAL NASAL FEATURES
COMPARED TO THOSE IN PRE-STOP AND PRE-AFFRICATE POSITION.

Our survey has shown that there are two sets of two rules each, which apply to nasal behavior in pre-obstruent position, such that in each case two rules apply before dentals, alveo-palatals, and velars, only one applies before labials, and the other rule applies before palatals. See Table 5 for a juxtaposition of pre-continuant vs. pre-non-continuant obstruent positions.

Environment	Before + continuant	Before - continuant
1. Before all obstruents except palatals.	α diffuse \rightarrow α grave	α diffuse \rightarrow α consonantal
2. Before all obstruents except labials.	a. $\left[\begin{array}{l} + \text{ consonantal} \\ \alpha \text{ grave} \end{array} \right] \rightarrow \alpha \text{ cons.}$	a. $-\text{cons.} \rightarrow \alpha \text{ grave} / - \alpha \text{ grave}$
	b. $-\text{cons.}$ has no change in consonantal feature.	b. $+\text{cons.}$ has no change in grave feature.

TABLE 5. JUXTAPOSITION OF RULES APPLYING TO NASALS BEFORE CONTINUANTS AS COMPARED TO THOSE BEFORE NON-CONTINUANTS.

One can see that pre-obstruent nasal neutralization involves an interplay of the features consonantal, grave, and diffuse. While all three features serve to differentiate nasals in word-final position, only a subset of these three is distinctive in mostly all cases of pre-obstruent position. Thus, something less than a four-way nasal opposition is the rule before obstruents, except for velar stops, due to a complication involving a morpheme boundary as noted above. Minimal, two-way oppositions occur before labial and palatal obstruents, which correlates with our observation that only one of the two rules of nasal neutralization can be applied in these two environments. We have attempted to explain this by appealing to the maximal markedness of labials and palatals within the diffuse and compact classes, respectively.

V.

Let us conclude by comparing the behavior of nasals before obstruents, sonorants, and vowels. In terms of sonority features, we can speak of four classes, listed as follows on a descending scale of sonority, including features for sonority, consonantality, and continuant:

	sonorant	consonantal	continuant
1. vowels	+	-	+
2. sonorants	+	+	+
3. fricatives	-	+	+
4. stops/affricates	-	+	-

The apparently anomalous behavior of nasals before these classes of consonants lies in the fact that only nasal consonants can occur before vowels, sonorants, stops, and affricates, but both nasal consonants and nasal semi-vowels (traditionally known as nasal vowels) can occur before fricatives. One may ask why the nasal consonants should predominate before both the most and least sonorous categories of sounds, while the so-called nasal vowels should occur exclusively before a somewhat intermediate class in terms of sonority, i.e. fricatives. The problem grows more complex when one considers that in word-final position both sonority classes of nasals are permitted, just as in the case of pre-fricative position. The question could then be formulated as follows: what do fricatives and word-final position share in contrast to vowels, sonorants, stops, and affricates? Let us now attempt to provide an answer to this question.

We can shed some light on this problem by directing our attention to the features **sonorant** and **continuant** in the segment following the nasal. Let us observe that when these two features agree with each other in the post-nasal segment, this implies that an immediately preceding nasal must be

consonantal (i.e. [m, m', n, ŋ, ñ, ŋ], not [w̃, j̃]). However, when the two features of sonority and continuity display no such agreement in the post-nasal segment, there is then no restriction on the consonantal or non-consonantal value of the preceding nasal. Thus, we see that vowels and sonorants have agreement in their positive sonority and continuity features, implying that an immediately preceding nasal must be consonantal. The stops and affricates also have agreement, where non-sonorant matches non-continuant, which also requires a positive consonantal specification in the preceding nasal. On the other hand, fricatives do not agree in their sonority and continuity feature marking, being non-sonorant, but continuant, which then is the unmarked situation, implying nothing about the consonantal feature of a preceding nasal. Thus, nasals before fricatives may be either consonantal (e.g. *damski* 'ladies, adj.', *pomścić, czeremcha*) or non-consonantal (e.g. *konsul, pański*; [w̃s, j̃s], respectively). This principle also explains why both nasal consonants and the so-called nasal vowels can occur in word-final position; the absence of a following segment causes the lack of restriction in the positive or negative specification of the consonantal feature in the word-final nasal.

Tolstaja (1966:131) has stated that 'the non-continuity/continuity of the following consonant should be considered the strongest and most universal operator regulating the distribution of internal nasal units throughout the Polish dialect area'. We have attempted to show that the determining factor, at least for CSP, is not simply the continuity factor, but an interrelation of both continuity and sonority features. This has permitted a solution of the problem not only of nasals preceding consonants, but also of those in pre-vocalic and word-final position as well, where we see a consistent restriction on the consonantal specification of nasals before all non-nasal segments manifesting sonority/continuity agreement.

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REFERENCES

- Biedrzycki, Leszek
1963 "Fonologiczna interpretacja polskich głosek nosowych", *Biuletyn Polskiego Towarzystwa Językoznawczego* XXII.25-45.
- Brooks, Maria Zagórska
1968 *Nasal vowels in contemporary standard Polish*. The Hague: Mouton.

- Chomsky, Noam and Morris Halle
1968 *The sound pattern of English*. New York: Harper and Row.
- Ivić, Pavle
1957 "Dva glavna pravca razvoja konsonantizma u srpskohrvatskom jeziku". *Godišnjak Filozofskog Fakulteta u Novom Sadu* II.159-84.
- Jakobson, Roman
1971 *Selected writings*. 2nd ed., vol. 1. The Hague: Mouton.
- Jakobson, Roman and Morris Halle
1956 *Fundamentals of language*. The Hague: Mouton.
- Jakobson, Roman and Linda Waugh
1979 *The sound shape of language*. Bloomington: Indiana University Press.
- Jassem, Wiktor
1966 "The distinctive features and the entropy of the Polish phoneme system", *Biuletyn Polskiego Towarzystwa Językoznawczego* XXIV.87-108.
- Klemensiewicz, Zenon
1962 *Podstawowe wiadomości z gramatyki języka polskiego*. 7th ed. Warsaw: PWN.
- Koneczna, Halina
1965 *Charakterystyka fonetyczna języka polskiego*. Warsaw: PWN.
- Šaumjan, Sebast'jan K.
1951 "Sistema gласnyx fonem sovremennogo poľskiego literaturnogo jazyka", *Učenyje zapiski Instituta Slavjanovedenija* III.394-406.
- Schenker, Alexander
1954 "Polish conjugation", *Word* IV.469-81.
- Segal, Dmitrij M.
1972 *Osnovy fonologičeskoj statistiki (na materiale poľskiego jazyka)*. Moscow: Nauka.
- Stankiewicz, Edward
1956 "The phonemic patterns of the Polish dialects", *For Roman Jakobson*, ed. by Morris Halle et al, 518-29. The Hague: Mouton.
- Stieber, Zdzisław
1948 "Dwa problemy z polskiej fonologii", *Biuletyn Polskiego Towarzystwa Językoznawczego* VIII.56-65.
- 1966 *Historyczna i współczesna fonologia języka polskiego*. Warsaw: PWN.
- Szober, Stanisław
1967 *Gramatyka języka polskiego*. 8th ed. Warsaw: PWN.
- Tolstaja, S. M.
1966 "K tipologičeskoj interpretacii poľskiego rinezma", *Lingvističeskie issledovanija po obščej i slavjanskoj tipologii*, ed. by T. M. Nikolaeva, 124-40. Moscow: Nauka.
- Wierzchowska, Bożena
1971 *Wymowa polska*. Warsaw: Państwowe Zakłady Wydawnictw Szkolnych.