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One significant fact about Polish phonotactics is that no vocalic clusters are permitted within a single native morpheme -- either at the underlying or phonetic levels of representation. Borrowed morphemes, on the other hand, commonly contain sequences of two vowels: *teatr* 'theatre', *oaza* 'oasis', *jubileusz* 'anniversary', *aorta* 'aorta'. Both phonological and phonetic vowel sequences occur at prefixal boundaries in words of all categories (e.g. *pootwierac* 'open', *nieostrzy* 'blurred', *nauszniak* 'earmuff'), but at suffixal boundaries the occurrence of vocalic clusters is heavily restricted and limited almost entirely to words formed from foreign lexical material (both stems and suffixes).

In this paper, I attempt to analyze and explain the constraints on the occurrence of vocalic clusters as well as the strategies that the language employs to prohibit the violation of these constraints by loanwords.

The existing analyses of the morpho-phonological system of Polish convincingly argue that vowel sequences can appear in the underlying representations of complex words of all major lexical categories as a result of morpheme concatenation [3,4]. Rubach [4] claims that Polish permits, on the level of phonetic representation, the occurrence of vowel clusters in nouns but not in verbs; in his analysis, any underlying sequence of vowels in a verb (except those in the prefixal position) is reduced to a single vowel by means of Vowel Deletion Rule, which reads as follows:

(1) [+syll] → ∅ / \_\_\_\_ [+syll]]v

The above rule explains how a surface form such as [xrapjō] 'they snore' derives from the underlying /xrap-a-om/, but it fails to explain why the vocalic clusters are not simplified in verbs such as:

(2)	<i>ewakuowac</i>	'evacuate'
	<i>sytuowac</i>	'situate'
	<i>konstituowac</i>	'constitute'
	<i>substytuowac</i>	'substitute'
	<i>instruowac</i>	'instruct'
	<i>tatuowac</i>	'tattoo'

and a handful of others. In a footnote, Rubach suggests that these verbs contain the labiovelar glide /w/ in their underlying representations and that the glide also appears in pronunciation, e.g. *ewak[uwo]wac*, *syt[uwo]wac*. This solution is not workable because it fails to explain why the glide does not appear in some of the corresponding derived nouns: there are no forms such as \**konstyt[uw]cja*, \**substut[uw]cja*. A subsequent rule of glide deletion before consonants cannot be postulated in the presence of forms such as [bawvan] 'snowman', [kawtsja] 'deposit', [kuwko] 'wheel', [awktsja] 'auction', etc.

Since all the verbs listed in (2) are obviously loanwords supplied with verbalizing and inflectional morphemes in order to adapt to the native morphological system of Polish, it seems simpler to restrict the application of the Vowel Deletion rule to etymologically native verbs. The labiovelar glide that breaks up the vowel cluster in the verbs of (2) in some pronunciation styles (but not all) has then to be treated as inserted by an optional rule formulated as follows:

(3) ∅ →  $\left[ \begin{array}{l} -\text{cons} \\ -\text{voc} \\ +\text{round} \end{array} \right] / \left\{ \begin{array}{l} \left[ \begin{array}{l} \text{V} \\ +\text{high} \\ +\text{back} \\ +\text{round} \end{array} \right] \text{---} \text{V} \\ \text{V} \text{---} \left[ \begin{array}{l} \text{V} \\ +\text{high} \\ +\text{back} \\ +\text{round} \end{array} \right] \end{array} \right.$

i.e., the labiovelar glide is inserted between two vowels if at least one of them is /u/. Rule (3) is responsible for labialization not only in verbs such as those in (2) but also in nouns and adjectives, for example: *jubil[ewulsz]* 'anniversary', *akt[uwallny]* 'current', *seks[uwo]log* 'sexuologist'. Note that the above rule also explains why the glide does not break up the vocalic cluster in *kreowac* 'create'.

Etymologically native nouns and adjectives never exhibit vowel sequences on

the level of phonetic representation in what is considered 'Standard Polish'. This is due to the interaction of several morphological and phonological factors:

- (a) all nominal stems in Polish are consonant-final
- (b) all nominal and adjectival suffixes are vowel-initial
- (c) any sequences of vowels that appear in the process of morphological derivation are eliminated by the independently motivated phonological rules (Gliding and yer-Deletion [3]).

The Polish lexicon contains a number of loanwords which violate the constraint requiring that all nominal stems be consonant-final, e.g.:

(4)	(a)		(b)
	<i>kakao</i>	'cocoa'	<i>boa</i>
	<i>makao</i>	'card game'	<i>rodeo</i>
	<i>kamea</i>	'cameo'	<i>video</i>
	<i>idea</i>	'idea'	<i>stereo</i>
	<i>orchidea</i>	'orchid'	<i>Mao</i>
	<i>gwinea</i>	'guinea'	<i>'Mao'</i>
	<i>statua</i>	'statue'	

The nouns in column (a) are pronounced with or without the glide between the two vowels, but there seems to be no such option for the words in (b), in which the vowels are always pronounced as a sequence. The examples in (b) are also undeclinable, as opposed to those in (a), which do take appropriate case endings, at least in informal speech styles. These differences point to a greater degree of nativization of the words in the (a) group. The words in (b) behave as genuinely foreign words, both from the phonological and morphological points of view. They still have the status of monomorphemic words and therefore their vocalic clusters remain intact (cf. *teatr* 'theatre', *Beata* (personal name), *toast* 'toast'). Words in column (a), however, have been reanalyzed as bimorphemic with the final vowel fulfilling the function of inflection. This operation leaves the stems with a final vowel, thus creating impermissible (from the point of view of the native vocabulary) sequences of vowels across the stem-suffix boundary. The glide that appears, at least in some pronunciation styles, at the end of the stems, makes these stems conform to the phonotactic constraints of the language. The nature of the glide seems to be determined by the quality of the stem-final vowel: the labiovelar glide [w] occurs after back vowels ([kakawo], [statuwa]) and the palatal glide [j] after front vowels ([kameja], [ideja]).

The above reasoning inevitably leads to the conclusion that the glides in focus are not inserted by a phonological rule, but are present in the stems in their underlying representations, i.e., stems are

consonant-final on both the underlying and phonetic levels. Consider further the data below, which offer support for this claim:

(5)	<i>kakao</i>	-	<i>kaka[w]ko</i>	(dim.)
	<i>'cocoa'</i>		<i>kaka[w]jek</i>	(dim. gen.pl.)
	<i>kamea</i>	-	<i>kame[j]ka</i>	(dim.)
	<i>'cameo'</i>		<i>kame[j]jek</i>	(dim.gen.pl.)
	<i>statua</i>	-	<i>statu[w]ka</i>	(dim.)
	<i>'statue'</i>		<i>stat[w]jek</i>	(dim.gen.pl.)
	<i>orchidea</i>	-	<i>orchide[j]ka</i>	(dim.)
	<i>'orchid'</i>		<i>orchide[j]jek</i>	(dim.gen.pl.)

as well as the word *kafejka* - *kafejek* 'coffee shop', which is a nativized form of French *café*. The suffix employed in these derivations is the diminutive morpheme *-ek*, represented as /-ɛk/ on the underlying level. Note that the glide occurs not only in intervocalic position but also pre-consonantly. If the glide were inserted by a phonological rule to break up a vocalic cluster, then it would have no reason to be before consonants as well. Obviously, sequences such as *-ak-*, *-uk-*, *-ek-*, are permissible in Polish, as is demonstrated by such words as *brakowac* 'to lack', *stukac* 'to knock' and those data in (5) as well.

The glide following vowel-final stems appears also in adjectives formed with the suffix *-ski* (phonologically /-isk-i/, as the examples below demonstrate:

(6)	<i>Dante</i>	<i>dantejski</i>
	<i>Galileo</i>	<i>galilejski</i>
	<i>Prometeusz</i>	<i>prometejski</i>
	<i>Gwinea</i>	<i>gwinejski</i>

and the name of the famous street in Paris, the Champs Elysées, is translated into Polish as *Pola Elizejskie*.

Yet another piece of evidence comes from the case forms of some of the words under discussion. The locative case of the words *kakao*, *statua* is [kakale], [statule], respectively: the segment that appears intervocalically is the lateral [l] rather than the labiovelar glide. The alternation between [w] and [l] is regular in Polish phonology and is considered part of the anterior palatalization process; the alternation *kakao* - *kakale*, *statua* - *statule* parallels that of *szkolo* - *szkole* 'school', *koło* - *kole* 'wheel'. It has been argued [2,4] that the segment underlying the [w] - [l] alternation is the velarized lateral /ɫ/; it changes to [l] when followed by a front non-low vowel, and otherwise it surfaces as the labiovelar glide [w]. Thus, the stem-final consonant (the velarized lateral) has to be present in the underlying representations of loanwords discussed here. The underlying representations of the words *kaka[w]ko*, *statu[w]ka*, *ide[j]ka* are /kakaɫ-ɛk-o/,

/statu-ik-a/, /idej-ik-a/, respectively.

It has been demonstrated that the stems which came into Polish as vowel-final have adjusted to the native phonotactic constraints by adding a non-vocalic segment at the end, which segment appears on the surface of some derivatives and some case forms. There are also, however, complex words containing the stems in focus which fail to show the glide in the crucial environment on the surface, or where the glide appears in some pronunciation styles but not all (no such alternative exists for the forms in (5) and (6)). Some of these derivatives are:

(7)	kakaowy	'cocoa' (adj.)
	ideowy	'ideological'
	ideologia	'ideology'
	kameowy	'of a cameo'
	prometeizm	'Prometeism'
	prometeiczny	'Prometeic'

The comparison of the data in (5) and (6) with (7) points to a morphological factor in the distribution of the intervocalic glides: some suffixes (the diminutive *-ek* /-ik/, the adjectivizing *-ski* /-isk-i/, and the inflectional endings) do not attach to vowel-final stems that end in a vowel, and etymologically foreign stems ending in a vowel must adjust phonologically to comply with the constraint. What these suffixes have in common, and what distinguishes them from the suffixes used in the formation of the items in (7) is that they are all etymologically native. It comes as no surprise then that etymologically native suffixes attach only to bases whose shape does not violate the phonotactic constraints of the language. The suffixes represented in (7) are all etymologically foreign except for *-owy*, which nevertheless functions with the others and attaches freely to foreign bases (cf. *zakardowy* 'made on a Jacquard loom', *finansowy* 'financial', etc.). It can thus be concluded that the class of foreign suffixes (and *-owy*) do not require consonant-final bases, and so they can attach to stems ending in a vowel.

To account for the variation in the shape of the stem exhibited by the forms in (5) and (6) as opposed to (7), one is forced to consider an allomorphy rule that adds a consonantal extension to etymologically foreign stems when these stems are followed by etymologically native suffixes. Such a rule, even though phonological in form, is actually morphological in nature and applies prior to phonological rules. (The exact status, form, and function of allomorphy rules are extensively discussed in [1].)

As expected, the process of adaptation of borrowings to the native phonomorphological system is not uniform for all items, the time of borrowing and the frequency of usage being the most crucial

variables: Another important fact that appears to influence the rate of nativization of the loanwords in focus is the level of education of speakers. The nativizations (phonological and grammatical adaptation) are usually met with long and bitter opposition from the dedicated linguistic prescriptivists who insist on preserving the foreign status of loanwords by adhering to their original pronunciations (which are frequently simply spelling pronunciations) and prohibiting their declension. The here much-discussed example *kakao*, for example, is still considered undeclinable by *Słownik Poprawnej Polszczyzny* [5] and the pronunciation with the labiovelar glide breaking up the final cluster is banned [6]. The diminutive form *kakaiko* is not even listed in any of the Polish dictionaries, perhaps because, as one of the prescriptive informants pointed out, "one would not even know how to spell it". However, since *kakao* has a relatively high frequency of usage, the diminutive form *kakaiko* is gaining popularity among those speakers who do not necessarily consult a dictionary before uttering a word.

The word *kakao* is probably the most interesting of the loanwords discussed here because it displays the greatest amount of variation in its forms and pronunciations. This variation correlates with the extent to which the word is perceived as "foreign" or "native" by speakers. On the one end of the spectrum, there is the prescriptive pronunciation that does not permit an intervocalic glide in any form; speakers with this pronunciation do not generally decline or diminutivize the word. This pattern predominates among educated, language-conscious speakers who have an awareness of the foreign source of the word, but it is not representative of the majority of Polish speakers. At the other end, there are speakers who have the glide (or, necessarily, [l] in some inflectional forms) throughout the whole pattern: [kakawo], [kakawko], [kakawovɨ], [kakawem], etc. This pronunciation style occurs among speakers with little education and it is considered nonstandard by prescriptivists. At the same time, this pattern shows full nativization to the phono-morphological system; for these speakers, *kakao* has the same status as *koło* 'wheel', which is a native word. In the intermediate group are mixed-pattern pronunciations: with the glide in diminutive and inflectional forms, but without the glide in the citation form and the adjective *kakaowy*. The reverse distribution (with the glide in citation and adjective forms, but absent in inflectional and diminutive forms) does not occur. Such distribution is predicted by the analysis presented earlier: if the glide occurs, it is only in forms with native suffixes immediately following the stem. Prescriptive speakers do not exhibit

the allomorphy rule mentioned above, and they have vowel-final representations in their lexicons, which makes diminutives and any inflectional forms impossible. "Nonstandard" speakers do not have the allomorphy rule either, but their representations for the stems under discussion are consonant-final. It thus appears that the allomorphy rule which adjusts foreign stems so that they comply with the demands of the native system is a transitional device in the process of loanword nativization.

The analysis presented in this paper suggests the following conclusions:

- (1) restrictions on the occurrence of vocalic clusters in Polish are of phonological, morphological, and lexical natures. Crucial factors include the native/foreign status of stems and suffixes, and phonotactic constraints on the phonological shape of morphemes,
- (2) although Polish permits vocalic clusters across prefixal junctures, it tends not to permit them across suffixal boundaries,
- (3) there is a correlation between the degree of loanword integration and the occurrence of vocalic clusters; words which are more fully nativized will exhibit fewer vocalic clusters in their various derivational and inflectional formations.

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