Johnston, P. (1997) Older Scots phonology and its regional variants. In C. Jones, ed., 47-111.

Kaye, J. (1990) 'Coda' licensing. *Phonology* 7:301-330.

Kaye, J. (1995) Derivations and interfaces. In J. Durand and F. Katamba, eds., 289-332.

Kaye, J. (1996) Do you believe in magic? The story of s+C sequences. In *A Festschrift for Edmund Gussmann from his friends and colleagues*. H. Kardela and B. Szymanek, eds., 155-176. Lublin: Redakcja Wydawnictw KUL.

Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1985) The internal structure of phonological representations: a theory of charm and government. *Phonology Yearbook* 2:305-328.

Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1990) Constituent structure and government in phonology. *Phonology* 7:193-231.

Lass, R. (1984) *Phonology: an introduction to basic concepts*. Cambridge: Cambridge University Press.

McCawley, J. (1967) Sapir's phonologic representation. *International Journal of American Linguistics* 33:106-111. Reprinted in *Adverbs, vowels, and other objects of wonder*. J. McCawley, ed., 3-9. Chicago: The University of Chicago Press.

The Oxford English Dictionary, (1989) 2nd edition. Oxford: Oxford University Press.

Sadalska, G. (1976) Die Entwicklung des isländischen Konsonantismus als Ergebnis der Verstärkung–Lenierung. *Lingua Posnaniensis* 19:73-92.

Sapir, E. (1925) Sound patterns in language. *Language* 1:37-51. Reprinted in *Phonology. Selected readings*. E. Fudge, ed., 101-114. Harmondsworth: Penguin Books.

Spencer, A. (1991) *Morphological theory. An introduction to word structure in generative grammar*. Oxford: Blackwell.

Szigetvári, P. (1994) Coronality, velarity and why they are special. *The Even Yearbook* 1994: 185-224.

Wells, J. C. (1990) *Longman pronunciation dictionary*. London: Longman.

Yoshida, S. (1996) *Phonological government in Japanese*. Canberra: The Australian National University.

Zabrocki, L. (1951) *Usilnienie i lenicja w językach indoeuropejskich i ugrofińskim*. Poznań: Poznańskie Towarzystwo Przyjaciół Nauk.

Polish consonantal sequences: a phonological testing ground

Edmund Gussmann and Eugeniusz Cyran

1. Introduction

Polish consonantal sequences exert an almost magic fascination for the practising phonologist in that they appear to defy most of the assumptions (s)he has been accustomed to hold dear. Faced with initial sequences such as [vzgl]*ędny* 'relative', [bzd]*ura* 'nonsense', [dždž]*ownica* 'earthworm', [fskš]*eszenie* 'resurrection' or [źdźbw]*o* 'blade of grass' one can abandon hope of ever determining an underlying pattern which would conform to principles capable of being applied anywhere outside Polish. Indeed, part of the Polish linguistic tradition appears to have resigned itself to supplying more or less exhaustive lists of consonantal combinations. Thus Sawicka (1974) documents over three hundred two-consonant strings, well over a hundred three-consonant sequences, and about twenty four-consonant combinations.

A competing tradition attempts to devise ways to deal with the odd-looking combinations. Here Kuryłowicz's (1952) study occupies a special position as it approaches the issue in its totality and provides an explicit account. Kuryłowicz's main claim is that Polish initial consonant sequences may be complex structures, i.e. it is emphatically *not* the case that whatever appears word initially up to the first vowel is a permissible onset. Quite conversely, the initial position of the word may be occupied by a sequence of two independent onsets which must meet specified conditions. Using today's terminology we could say that a non-branching onset may contain practically any consonant while a branching onset must conform to sonority requirements of the familiar type (*Sonority Sequencing Generalisation*). A few additional provisos have to be made: the spirant [s] and its congeners may be appended to an onset to create some of the three-consonant clusters. Kuryłowicz's interpretation has to resort to a degree of abstractness so that the phonetic spirants [š/ž] in some positions are analysed as the phonological sonorant /r´/; the same holds for [f/v] which are derived from underlying /w/. By and large, however, the model is remarkably neat since initial sequences emerge as the mere mechanical result of combining totally unremarkable onsets. Thus the five examples above, which were intended to illustrate the unpredictable complexity of Polish initial onsets, turn out on this analysis to result from combinations of non-branching and branching onsets. [vzgl] results from the non-branching onset /w/ followed by the branching onset preceded by an s-type consonant /zgl/ (similarly [bzd] = /b+zd/, [fskš] = /w+skr/); the se-

quence [dždž] results from the mechanical combination of two non-branching onsets which happen to be identical, i.e. /dž+dž/, while [ždźbw] is formed by concatenating two branching onsets, i.e. /ždź+bł/. The predicted sequence of a branching and a non-branching onset is also attested, e.g. [krt]*ań* 'larynx', i.e. /kr+t/.

The model developed by Kuryłowicz can be characterised as essentially phonological in that it refuses to attach undue importance to phonetic detail. Thus, as noted above, what by phonetic criteria must be described as a spirant, say, [š] in [kše] *krze* 'ice floe, loc. sg.' is taken to be the sonorant /r'/ for purposes of syllable structure. What is even more remarkable is the fact that Kuryłowicz seems to see no particular need to justify such a departure from "phonetic facts", almost as if he were saying that phonological reality should be given priority over phonetic observations. Note further that a sequel such as [kš] could be interepreted within the model as a combination of the two non-branching onsets [k] and [š], a step that Kuryłowicz does not take. This is presumably due to the fact that there are alternations between [š] and [r]: side by side with [kše] *krze* we have the nom. sg. form [kra] *kra*. Although direct alternations of this type are found word-initially in a handful of cases only, Kuryłowicz would appear to see no problem in extending the generalisation to non-alternating cases, thus affirming the relevance of the phonological system in determining ambiguous cases. This position is reminiscent of the views developed in classical generative phonology which constrast sharply with the post-Bloomfieldian structural tradition and with some of the so-called concrete generative or post-generative approaches. Similarly striking is the special status alloted to initial, pre-consonantal [s], an issue that has been much debated in recent phonological studies (Selkirk 1982, Kaye 1996).

Another striking aspect of the phonological nature of Kuryłowicz's approach has been alluded to above: the presence of an initial phonetic sequence of consonants does not necessarily mean that those consonants form a syllabic constituent; as we have seen, a syllabic constituent – an onset – has to meet specific well-formedness criteria. This strong theoretical position leads Kuryłowicz to the conclusion that Polish initial consonant sequences can, in fact, be complexes of two independent onsets, an issue we return to below in the context of a Government Phonology proposal. As far as the complex onset suggestion is concerned, let us observe that it creates an ambiguity which is not clearly resolved in Kuryłowicz's study: given that any consonant can form an onset, whatever looks like a branching onset can in fact be a sequence of two non-branching onsets. To make things more concrete, the sequence [kr] in a word like [kra] *kra* 'ice floe' could be interepreted as a complex onset because of the alternation [k'er] *kier* 'gen. pl.' where the two consonants clearly do not belong to the same constituent. Kuryłowicz does not take an explicit stand here but since there are no alternations in most cases of initial [kr], e.g. [kr]*ata* 'bar', [kr]*aj* 'country', [kr]*oić* 'cut' etc., and [kr] forms a well-structured onset, it is reasonable to assume that morphophonemic considerations, i.e. alternations, would not influ-

ence the determination of syllable structure and that the equivalent of *onset maximisation* would apply. In other words, we believe that Kuryłowicz would adhere to a principle claiming that *once a well-formed onset, always a well-formed onset,* morphophonemics notwithstanding; this would mean, of course, that the syllabification of consonants in a word such as *kra* would be different from that of *kier.*

A much more serious problem with Kuryłowicz's proposal is its predictive power. While it succeeds remarkably well in covering the existing forms by reducing the heavy consonant groups to simple one- or two-member sequences, it does so at the expense of predicting a massive number of forms which do not and can not exist. If a Polish initial sequence can be made up of any two well-formed onsets, this means in the first place that any two consonants should be possible word-initally since, of course, any single consonant can be an onset. As a by-product of this possibility, any existing initial sequence resulting from onset combination should allow its mirror image to exist as well. There are cases where such possibilities are attested: [tk, xm, bz, fč], for example, exist side by side with [kt, mx, zb, čf], e.g. [tk]*ać* 'weave' – [kt]*o* 'who', [xm]*ura* 'cloud' – [mx]*u* 'moss, gen. sg.', [bz]*y* 'lilac, nom. pl.' – [zb]*ój* 'thug', [fč]*oraj* 'yesterday' – [čf]*artek* 'Thursday'. However, it is easy to think of numerous cases where the mirror-image situation is not possible: although we find [kr, pr, gn, tn], e.g. [kr]*ew* 'blood', [pr]*osty* 'straight', [gn]*uśny* 'slothful', [tn]*ą* 'they cut', no reversing of elements is possible *[rk, rp, ng, nt]. More generally, [r] cannot be followed by a sonorant, while [j] and [n] cannot be followed by any consonant at all. This directly contradicts the spirit of Kuryłowicz's proposal, whereby any complex of two simple onsets should be possible. Even more damning for his proposal are the possible combinations of two branching onsets – recall that [drgn]*ąć* 'shudder' was a case of two such well-formed branching onsets being placed together. If the complex onset hypothesis is correct we again expect that any two well-formed onsets can be placed at the beginning of a word, which would mean that both the mirror image of the onsets making up [drgn] and two identical branching onsets are possible. Not only are forms like *[gndr], *[grgr], *[gngn] totally ungrammatical but, in fact, most of conceivable combinations must be so marked: *[blgl], *[blgr], *[fltr], *[trpl], *[grkl] etc. Given the existing well-formed onsets, we would expect the number of combinations to run into the thousands, while what we find is a mere two dozen, as documented by Sawicka using the mechanical addition technique mentioned at the outset. Thus Kuryłowicz's hypothesis, although adequate for handling existing forms, fails spectacularly when it comes to potential words. Its predictive power allows huge numbers of combinations not attested in the language and clearly ruled out by speakers. It thus appears that many of the claims made by the double onset hypothesis stand up well to the test of time, but the hypothesis needs to be tightened up in order to restrict its predictive power and bring it into line with the facts of the language, both recorded and intuitive.

In what follows we would like to look at some familiar facts within the framework of Government Phonology (GP). As the model is well-established by now (see for example Kaye, Lowenstamm, and Vergnaud 1985, 1990, Kaye 1995, 1996, Harris 1990, 1994, Harris and Lindsey 1995, Charette 1991, Gussmann and Kaye 1993, Brockhaus 1995a, 1995b, Cyran 1996) we will not review its basic tenets but will rather concentrate on what is directly relevant to our main concern, i.e. nuclei which are not pronounced. GP – just like Kuryłowicz – recognises at most binary branching onsets, with the two consonants in an onset conforming to strict complexity requirements; thus, for example, [tr] is a well-formed onset while [rt] is categorically ruled out. Another point of similarity between GP and Kuryłowicz is the special position of [s] and its congeners: Kuryłowicz takes the [s] of three-member sequences to constitute a class of its own while GP goes a step further and maintains (Kaye 1996) that [s] can never be the first (or governing) member of an onset. It can either occur in the preceding rhyme as its consonantal "coda", e.g. [mˊasto] *miasto* 'town', or else it forms an onset of its own, e.g. [sto] *sto* 'hundred' – cf. [set] *set* 'gen. pl.'. The basic difference between Kuryłowicz and GP is that the latter takes an unambiguous stand with respect to onsets: every onset must be (prosodically) licensed by a nucleus. In view of this Kuryłowicz's double onset hypothesis is not acceptable as it stands. However, the fact that a nucleus has to follow an onset does not mean that it has to be realised as a vowel phonetically. Quite conversely, there are contexts where nuclei are empty and have no phonetic content, in which case they are said to be licensed. A major task of phonlogical theory is to specify the conditions under which empty nuclei can remain phonetically silent, in other words to identify the sources of phonological licensing.

Translating Kuryłowicz's hypothesis into GP terms we can say that a Polish onset is either branching, e.g. [kr]*owa* 'cow', or non-branching, e.g. [k]*osa* 'scythe'. In either case the onset is prosodically licensed by a following nucleus; what seems to be specifically Polish is that the nucleus may be empty and if licensed can produce sequences of as many as four consonants. One much-discussed aspect of the licensing of empty nuclei in Polish are yer alternations, i.e. cases where the vowel [e] alternates with zero in related forms of a morpheme, e.g. [se]*n* 'dream' – [sn]*y* 'id. nom. pl.' – [śń]*ić* 'to dream', *pe*[we]*n* 'full, masc.' – *pe*[wn]*a* 'id. fem.' – *nape*[wń]*ić* 'fill'. The yer alternations have been extensively studied in different frameworks; the alternations in terms of GP have been interpreted (Gussmann and Kaye 1993) as instances of empty nuclei which are licensed and hence phonetically silent, or not licensed and pronounced as [e]. Within the framework of GP, however, it is not only cases of direct vowel-zero alternations that require the presence of empty nuclei. Minimally, they are also needed to license domain-final onsets (Kaye 1990) and they also constitute the nuclei of rhymes which contain an [s] type of consonant as a complement. Below we will look at all these instances of empty nuclei with reference to initial consonant sequences; this will give us a chance to illustrate the licensing mechanisms and discuss their implications, and also to see whether the currently available

theoretical machinery is sufficient to handle the data in an explanatory fashion. We will start with what is known as the domain-final parameter.

2. Domain-final parameter

To appreciate the importance of the domain-final parameter in the context of word-initial consonant sequences it is necessary to see very clearly that the domains in which phonological regularities apply cannot be identified with orthographic or phonetic words. Furthermore, they cannot be determined in advance of the regularities themselves. Consider the English words *kingdom, kingfisher, kinglet, kingmaker* which constitute not only orthographic and phonetic but also lexical entities and whose semantics is to varying degrees unpredictable; phonetically they contain the velar nasal followed by another consonant: [ŋd, ŋf, ŋl, ŋm]. If these phonetic or orthographic shapes were to constitute the domain of phonological regularities, important generalisations would remain not only unexpressed but, in fact, inexpressible. Fundamentally, of course, the velar nasal in English appears either before a velar plosive, e.g. *angry, anchor,* or finally, e.g. *hang, long,* while its appearance elsewhere is a mechanical consequence of morpheme or word concatenation, e.g. *hanging, hanged, hangman, hangs, hang the* ... etc. Despite the orthographic and phonetic unity *hangs* must be analysed as *hang* plus *s* where *hang* constitutes one domain on its own and another domain in conjunction with the following inflectional ending. Similarly in *kingdom* etc. we need to distinguish two domains: the inner one containing just [king] and the complete one embracing [[king]dom] (details of domain structure need not concern us here (see Kaye 1995)). Languages parameterise the way they treat their domain-final empty nuclei: some license them whereas others do not. English – just like Polish – licenses domain-final empty nuclei, which means that domains (hence also words) can end in a consonant. What needs to be stressed is the fact that the domains we posit need not or perhaps cannot be justified on purely morphological grounds (with noncompositional semantics this might be a difficult task), but are posited precisely because of the phonological regularities whose existence we can justify independently by considering the behaviour of the velar nasal in morphologically unambiguous cases.

Bearing these remarks in mind consider now some examples of verbs with the prefixes *w-* and *z-*. We disregard assimilations in voicing and palatality as irrelevant to the discussion.

(1)

	z-	*v-*
[m]ówić 'speak'	[zm]ówić 'say'	[vm]ówić 'talk into'
[vˊ]ieźć 'carry'	[zvˊ]ieźć 'id.'	[vvˊ]ieźć 'carry into'
[x]odzić 'go'	[sx]odzić 'id.'	[fx]odzić 'enter'
[ś]iąść 'sit'	[śś]iąść 'get off'	[fś]iąść 'get on'

If we assign domain structure to the prefixes and thus supply them with a final nucleus, the domain-final parameter can be held responsible for the licensing of the nucleus and thus for the initial sequences of [v, z] plus any consonant. The domain structure we invoke makes the prediction that the two consonants of the prefix can be followed by practically any consonant at the start of the following domain, in very much the same way as the final consonant of one word can come before the initial consonant of the following word. In the same way some of the three- and four-member consonant sequences can be shown as resulting from the combination of a prefix and a branching onset or an initial three-consonant sequence.

(2)

	z-	*v-*
[pr]osić 'ask'	[spr]osić 'invite'	[fpr]osic 'invite
[kl]eić 'stick'	[skl]eić 'stick together'	[fkl]eić 'paste in'
[krf]awić 'bleed'	[skrf]awić 'stain with blood'	[fkr]oczyć 'march in'
[stš]elić 'shoot'		[fstš]elić 'adjust a gun'

The domain-final parameter, when judiciously applied to combinations involving prefixes, accounts for a number of initial consonantal sequences that defy universally accepted conditions on acceptable onsets.

3. 'Magic' Licensing

We alluded earlier to the special status of consonant sequences starting with [s]. GP claims that such sequences are universally impossible as onsets and suggests a structure where the consonant [s] appears as the rhymal complement; if the preceding nucleus is empty, it can be licensed although the licensing mechanism is still poorly understood. For this reason the licensing of an empty nucleus involving a rhymal [s] has been called *magic licensing* (Kaye 1996). Despite the lack of a deeper theoretical principle which would account for this process, this mechanism does a lot of work in covering sequences of [s] plus one or two consonants, where the [s] itself can be preceded by a consonant. These options are illustrated in (3) below.

(3)

a. *s+C*	b. *s+CC*	c. *Cs+C(C)*
[st]ół 'table'	[str]ona 'page'	[fšč]ąć 'initiate'
[šč]ęście 'happiness'	[sxl]udny 'spruce'	[pstr]y 'gaudy'
[śc]iana 'wall'	[ščf]any 'cunning'	[bzd]ura 'nonsense'
[zd]anie 'sentence'	[zbr]oja 'arms'	[fstr]ęt 'repulsion'
[źdź]ira 'scrubber'	[zgr]oza 'terror'	[fskr]oś 'throughout'

In (3a) and (3b) the words must be assumed to start with an empty nucleus whose onset contains no consonantal segments; in (3c) the initial (non-branch-

ing) onset is followed by a rhyme comprising an empty nucleus and a rhymal complement. In (4) we have representations for the words *ściana* 'wall' and *bzdura* 'nonsense'.

(4)

The empty nuclei are magically licensed, which results in a structure consisting of two, or more consonants in word-initial position.

4. Proper Government

The major mechanism licensing empty nuclei in GP is Proper Government: it is a relation between a nucleus dominating a melody and an empty nucleus. The directionality of the relation seems to be open to parametric variation, although in most cases studied so far it proceeds from right to left. An important restriction imposed upon PG is that it cannot hold across a governing domain, thus it cannot hold between nuclei separated by a branching onset or by a rhyme-onset sequence. If an empty nucleus is not properly governed either because there is no nuclear governor or because of an intervening governing domain, then it remains unlicensed and has to receive phonetic content; as we noted above, an unlicensed empty nucleus is pronounced [e] in Polish. Given the fact that a morpheme containing an empty nucleus can be followed by a full vowel or by another empty nucleus, we would expect vowel-zero alternations to occur; in terms of GP such alternations are instantiations of a relation between an empty nucleus and the following vowel. Examples of such alternations are offered below.

(5)

[mx]u 'moss, gen.'	−	[mex] 'nom.'
[ln]u 'flax, gen.'	−	[len] 'nom.'
[wb]a 'head, gen.'	−	[web] 'nom.'

The regularities found in instances of direct alternations can be naturally extended to cover cases of non-alternation: if an initial empty nucleus is *always* followed by one with phonetic content, then PG will be contracted and the empty nucleus will be licensed. This mechanism can be used to cover a number of initial consonantal sequences which cannot form branching onsets, as illustrated in (6).

(6)

[wg]ać 'lie'	[dzb]an 'jug'
[rt]ęć 'mercury'	[db]ać 'care'
[rdz]a 'rust'	[čč]y 'futile'
[pt]ak 'bird'	[dždž]ownica 'earthworm'
[kt]o 'who'	[mž]awka 'drizzle'

Some triconsonantal sequences can be handled in a similar fashion if an empty nucleus follows a branching and precedes a non-branching onset. The initial sequences of three consonants in (7) consist invariably of a potential branching onset followed by a single consonant; if they are broken by an unlicensed nucleus, this results in direct alternations (7a). Otherwise the sequences of three consonants will be inalterable but the first two form a branching onset, as in (7b).

(7)   a.   b.
    [pwć]i 'sex, gen.' – [pweć] 'nom.'   [brn]ąć 'plod'
    [brv‸]i 'brow, gen.' – [bref] 'nom.'   [drv]al 'wood-cutter'
    [krf‸]i 'blood, gen.' – [kref] 'nom.'   [krt]ań 'larynx'

The absence of a non-branching onset followed by a branching one, i.e. the impossibility of sequences such as for example *[ćpw, dbr, gdr] has a systematic cause within this account: recall that one of the conditions on PG is that it cannot hold over a governing domain. In the case of sequences such as these, PG would have to violate this condition as branching onsets are obviously governing domains. The same regularity explains the absence of sequences of branching onsets, either identical or different. Discussing the inadequacies of Kuryłowicz's model above, we noted that given the complex onset hypothesis we would expect any two well-formed onsets to appear in a sequence word-initially, something which clearly does not happen: *[gldr], *[grgr], *[glgl] are totally ungrammatical as are, in fact, the majority of other imaginable combinations: *[blgl], *[blgr], *[fltr], *[trpl], *[grkl] etc. GP supplies a straightfoward account of the impossibility of such sequences in that it disallows PG to be contracted across a governing domain. This means then that whatever four-consonant sequences we find they must be due to magic licensing, domain structure or some other principle.

The view that initial consonant sequences are the result of constituents, i.e. onsets, coming together due to the intervening empty nucleus being licensed explains the absence of a number of other imaginable combinations such as *[ptk] or *[mnl] for example. These gaps are simply the result of the first two consonants not being possible branching onsets: */pt+k/ or */mn+l/; the last two consonants in each group are also impossible onsets */p+tk/, */m+nl/ but even if they were admissible, */p+tr/, */n+pl/ PG could not apply across them. Thus the conditions that constituents must meet combined with conditions on the application of PG jointly exclude a large number of theoretically imaginable consonant combinations. What is more, this exclusion is not formulated ad hoc, but
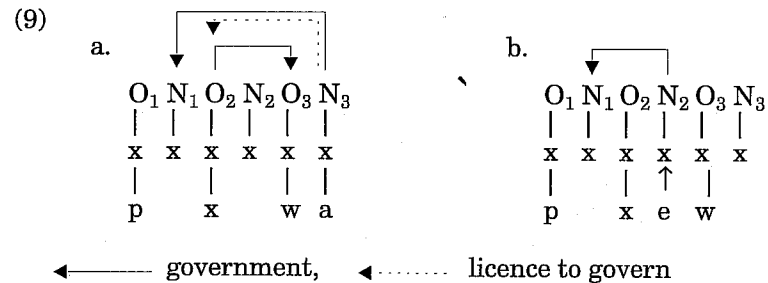
follows from independently established principles. This obviously qualifies the approach adopted here as superior to the complex onset hypothesis developed by Kuryłowicz. It does, however, share some of the inadequacies of its predecessor, the most important of them being the absence and, indeed, the impossibility of a number of both bi- and tri-segmental sequences. Note that PG should make it possible for any two consonants to come together given a governor in the form of a following unlicensed, i.e. phonetically realised, nucleus. In criticising Kuryłowicz's proposal we observed that it predicts the presence of a mirror image for every bi-consonantal sequence, which is not the case; thus we find [kr, pr, gn, tn] but not *[rk, rp, ng, nt]. In fact [r] can only be followed by some obstruents and never by sonorants, while [n] cannot be followed by anything. Likewise [m] can be followed but not preceded by a sonorant, as documented in (8).

(8)   *m+sonorant*
    a.   b.
    [mw]ody 'young'   *[wm]ody
    [ml]eko 'milk'   *[lm]eko
    [mr]ówka 'ant'   *[rm]ówka
    [mn]ogi 'plural'   *[nm]ogi
    [mń]ie 'me'   *[ńm]ie

Regularities of this sort fail to result from the licensing mechanism called PG. They appear to involve considerations of melodic adjacency, but also, because the restricted availability of segments in different positions of the structure, they derive from the depletion of the licensing charge (see Harris 1992). These complex issues are not fully understood at present, and space prevents us from presenting some of the options involved (see Cyran and Gussmann, in press, Cyran, Gussmann and Kaye, in prep.). In the final section of this paper we would like to explore yet another type of licensing of empty nuclei where the relevant relation is between consonants in flanking onsets, i.e. *Interonset Government.*
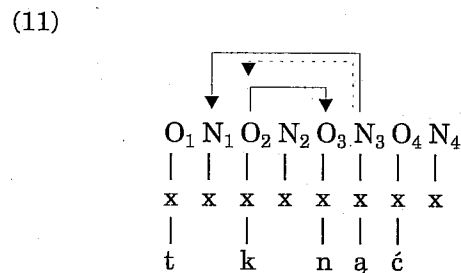
5. Interonset Government

Consider the initial consonantal sequence in the word [pxwa] *pchła* 'flea'. At first blush it might appear that we have here a non-branching onset [p] followed by a branching one [xw] with an intervening empty nucleus licensed through Proper Government. This would violate the condition on PG which bars it from applying across a governing domain, i.e. the alleged branching onset [xw]. A closer look reveals that the condition is not violated but the phonological situation is more complex than appears at first sight. Note that [w] is not a governed member of a branching onset, but rather constitutes a third (non-branching) onset as shown by the gen. pl. of the noun, viz. [pxew] *pcheł*, which means that each consonant is separated from the others by an empty nucleus. Representations of *pchła* and *pcheł* are supplied below.

(9)

a.

```
  O₁ N₁ O₂ N₂ O₃ N₃          O₁ N₁ O₂ N₂ O₃ N₃
  |  |  |  |  |  |            |  |  |  |  |  |
  x  x  x  x  x  x            x  x  x  x  x  x
  |     |     |  |            |        |     |
  p     x     w  a            p        x  e  w
```

b.

←——— government, ◄······· licence to govern

The consonants in O_2 and O_3 in (9a) contract a governing relation where O_2 is the governor; an additional condition on Interonset Government (IG) is the presence of a following nucleus with phonetic content as the necessary licenser of the relation. The empty nucleus separating the consonants in IG is licensed, hence mute. For the representations to correspond to recorded facts we need to assume further that the first nucleus is licensed by PG from the licenser of the interonset relation. In (9b) IG is not possible since there is no licenser and for this reason the empty nucleus separating O_2 and O_3 is not licensed and has to be pronounced. Being pronounced it properly governs the first nucleus making it inaudible. Under this account, the muting of the first nucleus is due to different causes in (9a) and (9b): PG from N_3 in the former and from N_2 in the latter. Since the representations in (9) are partly different, there is nothing inherently implausible in such an interpretation, but a major complication emerges once we look at more examples.

(10)

[tkn]ąć 'touch'	(cf. [tyk]ać 'id.')
[mgw]a 'mist'	(cf. [mg´ew] 'gen. pl.')
[mkn]ąć 'speed'	(cf. po[myk]ać 'id.')
[lgn]ąć 'stick'	(cf. przy[leg]ać 'id.')
[txn]ąć 'breathe'	(cf. [tx]u 'breath, gen. sg.' – [dex] 'nom. sg.')

To make the issue clear let us consider the representation of *tknąć* in (11).

(11)

```
  O₁ N₁ O₂ N₂ O₃ N₃ O₄ N₄
  |  |  |  |  |  |  |  |
  x  x  x  x  x  x  x  x
  |     |     |  |  |
  t     k     n  ą  ć
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The interpretation which (11) calls for seems to be the same as in the case of the word *pchła* in (9a), with IG between O_2 and O_3 licensing the intervening nucleus

N_2, and PG between N_3 and N_1 licensing N_1; in this way both empty nuclei are inaudible. While this is a possible way of approaching the interpretation of the structure, it surreptitiously assumes that it is necessary to order the two licensing principles, viz. PG and IG. Note that there is nothing to enforce PG in the interpretation of (11) since N_3 is clearly in a position where it can properly govern N_2, which would result in N_1 being unlicensed and the ungrammatical **teknąć* emerging. If the line of reasoning we have been following is on the right track, we need to order – or rank – the principles by saying something like *Given a choice, apply Interonset Government* or *Wherever possible, apply Interonset Government*. This would ensure that the ambiguity entailed by the presence of two principles which partly produce the same results can be eliminated. It would be desirable if the ordering of the principles – rather than remaining an ad hoc pronouncement – could be reduced to a more general principle of grammar: for an attempt in that direction see Cyran and Gussmann (in press).

6. Conclusion

Polish consonant sequences have been the object of studies both in the structural and generative traditions. As we have seen, some of these studies have made a valuable contribution to our understanding of the problem, but their solutions can hardly be described as adequate. Possibly part of the reason for the failure was the prevalent assumption that a given framework should be able to handle the data; different investigators then tried to prove this assumption. This was possible if the investigator was sufficiently ingenious and was not averse to "adjusting" the theoretical machinery here and there. In our attempt above we adopted a different line, namely we tried to ask the question what the attested consonant sequences tell us about problem areas for phonological theory and what direction the investigation of this question should proceed in. By following this path we have discovered facts unnoticed by previous researchers, especially the existence of an "anticorpus" of data, i.e. the numerous imaginable consonant sequences which are not found and which native speakers regard as impossible. We have offered specific proposals, cast in a well-defined framework, for dealing with these facts. It may turn out that these proposals may have to be substantially revised and extended, but any future investigations which aim at contributing to a better understanding of the specific facts will have to take into account this anticorpus and the questions it raises.

References

Brockhaus, W. (1995a) *Final devoicing in the phonology of German*. Tübingen: Max Niemeyer Verlag.

Brockhaus, W. (1995b) Skeletal and suprasegmental structure within government phonology. In J. Durand and F. Katamba, eds., 180-221.

Charette, M. (1991) *Conditions on phonological government*. Cambridge: Cambridge University Press.

Cyran, E. (1996) Licensing properties of nuclei and principle ranking in Irish. *The Linguistic Review* 13:1-31.

Cyran, E. and E. Gussmann (in press) Consonantal clusters and governing relations: Polish initial consonant sequences. In *The syllable: views and facts.* H. van der Hulst and N. A. Ritter, eds. Berlin and New York: Mouton de Gruyter.

Cyran, E., E. Gussmann, and J. Kaye (in prep.) *Polish phonology: principles and parameters.*

Durand, J. and F. Katamba, eds.(1995) *Frontiers of phonology: atoms, structures, derivations.* London: Longman.

Gussmann, E. and J. Kaye (1993) Polish notes from a Dubrovnik café. I: the yers. *SOAS Working Papers in Linguistics and Phonetics* 3:427-462.

Harris, J. (1990) Segmental complexity and phonological government. *Phonology* 7:255-300.

Harris, J. (1992) Licensing inheritance. *UCL Working Papers in Linguistics* 4:359-406.

Harris, J. (1994) *English sound structure.* Oxford: Blackwell.

Harris, J. and G. Lindsey (1995) The elements of phonological representation. In J. Durand and F. Katamba, eds., 34-79.

Kaye, J. (1990) 'Coda' licensing. *Phonology* 7:301-330.

Kaye, J. (1995) Derivations and interfaces. In J. Durand and F. Katamba, eds., 289-332.

Kaye, J. (1996) Do you believe in magic? The story of s+C sequences. In *A Festschrift for Edmund Gussmann from his friends and colleagues.* H. Kardela and B. Szymanek, eds., 155-176. Lublin: Redakcja Wydawnictw KUL.

Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1985) The internal structure of phonological elements: a theory of charm and government. *Phonology Yearbook* 2:305-328.

Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1990) Constitutent structure and government in phonology. *Phonology* 7:193-231.

Kuryłowicz, J. (1952) Uwagi o polskich grupach spółgłoskowych [Remarks on Polish consonantal groups].*Biuletyn Polskiego Towarzystwa Językoznawczego* 11:54-69.

Sawicka, I. (1974)*Struktura grup spółgłoskowych w językach słowiańskich* [The structure of consonantal combinations in Slavic languages]. Wrocław: Ossolineum.

Selkirk, E. O. (1982) The syllable. In *The structure of phonological representations* (part II). H. van der Hulst and N. Smith, eds., 337-383. Dordrecht: Foris Publications.

Final codas: why the west was wrong[*]

John Harris and Edmund Gussmann

It is commonly supposed that any consonant at the end of a word occupies a syllable coda. Although typically held to be self-evidently true, the assumption is almost certainly wrong. In this paper, we review the main reasons for rejecting it in favour of a rather older view according to which a final consonant occupies the onset of a syllable containing a silent nucleus.

Section 1 sets up the competition between the two views. 2 explains why a final consonant cannot be a coda, 3 why it must be an onset, and 4 why this onset must be followed by an empty nucleus.

1. Final consonants: the eastern and western prospects

Neutrally construed, the term *syllabification* refers to the relation between segment strings and syllabic constituents. In practice, most work in phonology treats the link as a unidirectional relation in which syllable structure is read off segment strings. This essentially phoneme-centred view finds clearest expression in the assumption that syllabic structure is largely absent from lexical representations and is either constructed or mapped by rule (e.g. Vennemann 1972, Kahn 1976, Levin 1985, Itô 1986) or supplied by a phonological generator (e.g. Prince and Smolensky 1993).

In the usual implementation of this view, syllabification hugs the sonority contours of phoneme strings. In a given sequence of segments, each sonority peak assumes the status of the core or nuclear portion of a syllable, while any flanking sonority troughs form the margins of the nucleus. From this it follows that "[e]ach sonority peak define[s] a unique syllable" (Blevins 1995:207). In any given word, there are thus as many nuclei, hence syllables, as there are sonority peaks, and conversely there are no nuclei or syllables without sonority peaks.

A direct consequence of this view is the identification of consonantal word edges with syllable margins: given a word containing just one sonority peak, it seems natural to assume that whatever precedes the peak must be an onset and whatever follows it must be a coda. Thus in the English word*blank*, [bl] and [ŋk] are the consonantal margins of the peak formed by [æ] and are therefore projected as an onset and a coda respectively. Proponents of this view generally take its validity for granted: "[i]n all languages, syllable edges correspond with word/ utterance edges", as Blevins puts it (1995:209).

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