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Phonology with interfaces
The morphophonology and post-lexical phonology of English and Polish

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List of contents

This document contains a *slightly revised* form of the doctoral thesis by the same title, submitted to the Council of the School of English, Adam Mickiewicz University, Poznań (Polish: *Rada Instytutu Filologii Angielskiej [Uniwersytetu im. Adama Mickiewicza]*), on 15 May 2009 in partial fulfilment of the requirements for the degree of doctor of philosophy. The original text, whose only complete draft dates back to 26 March 2009, was supervised by Prof. Katarzyna Dziubalska-Kołaczyk (Adam Mickiewicz University), and subsequently reviewed by Prof. Jerzy Rubach (Iowa, Warsaw), and Prof. Tobias Scheer (Nice Sophia Antipolis, CNRS UMR 6039). Both reviewers accepted the original thesis, which was subsequently defended during a public session at the School of English, Adam Mickiewicz University, Poznań, on 10 July 2009. At the end of the session, I was awarded the doctor's degree in linguistics. Unfortunately, since it is not required that a post-review revised version ever be submitted, the official version, two copies of which rest in the University's library, lacks all the corrections suggested by the reviewers or conceived by myself. Therefore, I decided to produce a slightly revised version of the text for public access. This document corrects a number of typographical and linguistic errors, and a few errors in the data and the analysis, some of them quite embarrassing. However, it does not rectify all the issues noted by the reviewers; to encompass them all would require that I produce a *substantially* revised form thereof. As it is now, it is nothing but a text finished in March 2009, revamped for LingBuzz in December of the same year.

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Foreword

This work began as my reaction to Gussmann's (2007) *The Phonology of Polish*. I had waited for quite a while for that book, hoping to learn how one can do Polish morphophonology in Government Phonology. That was in vain. Rather than showing a GP-based autosegmental treatment of Polish palatalisation, the book in question told me this: morphophonology is not phonology. Instead of providing a representational account of how to transform a [s] into [ɕ]—a great deal of ink will be spilled over this in Chapters 1–3—Gussmann (2007) escaped the question by saying this is morphophonology, and [s] is changed to [ɕ] by a palatalisation replacement pattern, triggered in certain morphological contexts. That was all.

It did not take long before I decided I wanted to have a representational, phonological account of Polish palatalisation despite Gussmann's rejection of it being in any way phonological (as opposed to morphophonological). This is where it all started.

The title of this work is an echo of an earlier project I had in mind for my doctoral dissertation. It dated back to 2006. It was supposed to expand on the idea of phonology as a module of grammar, loosely based on Fodor (1983), but effectively more related to what Tobias Scheer had been doing after the publication of his (2004) book on CVCV. I attended Tobias's classes at EGG'06 in Olomouc, and found myself trapped between Government Phonology, CVCV, and Lexical Phonology. Determined to take the best of each model, add something of my own, and distil something new, I began the lengthy process of ploughing available sources on English for inspiration. That took me a while, and when I thought I finally had a topic, I discovered *The Phonology of Polish* had just been published, so I rushed to read it. It was not quite what I had hoped it would be. Most of the acrobatic rules of Gussmann (1980) were no longer phonology, which was fine with me, but not much was offered instead. Then it occurred to me that if Gussmann (2007) had no answers to my questions on how Government Phonology could account for certain phenomena that I took to be part of Polish phonology, then I was in the awe-inspiring position to try finding the answers myself. Thus, instead of pursuing my earlier hybrid derivational–representational project on English, I began working on a representational account of Polish palatalisation (much of which forms Chapter 3), and the rest followed straightforwardly, including the part thereof devoted to English, which replaced what I had originally intended it to be.

It did not go without hurdles, though. When I decided to write my dissertation as a sort of reply to Gussmann (2007), I took Scheer's (2004) CVCV as the model of phonology in which I wanted to express my analysis. (The major differences between Standard Government Phonology—to which Gussmann (2007) relates—and CVCV are listed in Chapter 2.) There was one glitch, though. Scheer (2004) is the first volume of a literary diptych, the second volume of which was not available back in 2007. (It has not yet been published as of this writing either.) Left with the 2004 picture of CVCV—a bit incomplete—I managed to write a reasonable amount of this work, but it was not until October 2008—when I received a draft of Scheer (in prep.), which is the volume in question—when things sped up. As a result, this work is an effect of a study of English and Polish morphophonology done over a period of less than two years, which has an effect on the content. I wish it were better organised, and based on more interesting issues and data. Time constraints and my limitations as a writer, however, have compelled me to leave this work in its present state.

A few people deserve to be mentioned here. My supervisor, Professor Katarzyna Dziubalska-Kołaczyk provided numerous comments on my work in recent years, and on an early draft of this work, which has helped to improve the quality of this dissertation. I also profited from papers written, seminars conducted by, and discussions I had with Professors Edmund Gussmann, Jerzy Rubach, Tobias Scheer, and Jacek Witkoś. Naturally, none of them holds any direct responsibility for the content of this work. Numerous discussions with Bartosz Wiland sharpened my view on some of the issues I tackled here. Jarosław Weckwerth provided valuable help with literature, as did Tobias Scheer. My friends from the School of English, Adam Mickiewicz University added their enthusiasm for my struggle, while my family and friends from outside the university provided this and all other sorts of support. I wish to thank all those mentioned above, and all those unmentioned who feel they deserve it.

1. Preliminaries

1.1. Goals of this writing

This work has one major goal: to put morphophonology into flat, bracket-free, Government Phonology-based representations. All minor goals stem from the major one. One of the minor objectives is to start a new programme in the relation between morphophonology and low level (allophonic) phonology. Apart from that, this work targets a number of issues that might just as well have been left separate, but a combination of which appears very temping to try out. The reader is kindly asked to allow for more than slight signs of anarchy in the organisation of this work. It is not a deliberate move to confuse or mislead the reader. Quite the opposite; the scattering of data and chunks of analyses across the chapters to follow is meant to follow a plan. It consists of steadily uncovering various findings, providing (hopefully) sufficient and reliable data, resolving diverse theoretical problems that they pose, and giving convincing answers to the questions of *what*, *where*, and *how* takes place, occasionally also daring to speculate *why* it does so. The main issues dealt with herein are enumerated and elaborated upon in the following sections of this chapter. Below is just a brief list of issues over which this piece of work is meant to take scope, arranged in an order that does not necessarily reflect their hierarchy. Still, the first four in the list form the core of the programme.

Firstly, this work argues that in order to capture the broadly defined phonology of a language, two levels of phonological computation must be recognised, one capturing morphophonological generalisations, the other dealing with phonetic realisation thereof. In somewhat traditional terms, one is the morphophonemic, the other the phonetic level of the phonological system of language.[1] Each level is designed to be able to communicate with the other one, and to respond to a different set of external interface conditions; one is entwined with the grammar (morphology, syntax, semantics), the other with human articulatory–perceptual capacities.[2] The morphophonemic level is morpholexical in nature. It operates on phonological exponents of morphemes, and words. Each phonological word constitutes a workspace—the term is taken from computer science to reflect the area over which computation takes place—and several workspaces are computed in parallel as results of syntactic operations. The phonetic level is effectively a phonology–phonetics interface—these terms will be often used interchangeably—and its input on the generative side is provided by the morpholexical level feeding it with workspaces it has computed, arranged in linear order. This implies that the interface may be sensitive to word boundaries, which will be shown in data in due time, especially in Chapter 4. The two levels are viewed as the only intermediary between the grammar (in the sense of syntax, morphology, and semantics) and phonetic substance.

Secondly, a position is taken on the issues of abstractness and of so-called overgeneration of generative and post-generative phonological frameworks. It is argued that the number of mathematically possible and yet seldom or never attested temporal combinations of phonetic features is sharply decreased by the use of a small set of abstract features able to capture relevant generalisations, viz. those endorsed in Government Phonology (KLV 1985, 1990, Kaye 1990*a*,*b*, Kaye 1995) and its heir apparent CVCV (Scheer 2004, in prep.). Crucially, on the reading espoused here, these features are not phonetic in any physical sense; they are morphophonological, and only become phonetic when translated into phonetic matter. Phonetic variability is argued to stem from idiosyncratic properties of the phonetic level, where patterns of interpreting seemingly identical morphophonological structures differ across and within languages. The phonetic level takes into account limitations imposed by the human articulatory

[1] The model argued for herein follows the *SPE* (Chomsky — Halle 1968) division between morphophonemic and phonetic levels of description, disregarding the structuralist phoneme altogether.

[2] In a way, this level of phonology bears affinity with the A–P interface in the sense of the Minimalist Program (Chomsky 1993, 1995), although there is some confusion if the A–P interface might be the same as PF (Phonetic Form), known from the inverted-T model of Principles & Parameters grammar (Chomsky 1981). Under the view of this writing, the phonetic level is not fed by syntactic derivation directly, rather through the morpholexical level.

apparatus—this external interface is assumed identical for all languages—but is independent in choosing, preserving, or changing its sound patterns.

Thirdly, the split-component architecture and the translational mode of component interaction in phonology is argued to be able to cause a situation in which a feature of a morphophonological object may give arbitrarily different but systematic phonetic interpretations. These may depend on the position the object occupies in a chunk of morphophonological representation, and on the relations (or the lack thereof) that this object contracts with adjacent objects.

Fourthly, it is argued that Government Phonology in general, and CVCV in particular may well fit in the architecture postulated by this work on the condition that their representational apparatus only forms the morpholexical level of phonology, and that some tenets of the model are done away with. It is shown that one can analyse morphophonological phenomena using CVCV—presumably, (standard) GP would also qualify—if only one allows its machinery to account for morpholexically contrastive relations only, as opposed to taking care of lexically irrelevant phonetic detail.[3] For the sake of differentiating the use of GP and CVCV machinery in the original bits of analysis that this work is designed to present, the term 'Workspace Phonology' is proposed to label the specific reading of CVCV argued for herein, as opposed to analyses done in orthodox GP and CVCV by their respective proponents.

In order to show the plausibility of the split-component model of phonology, this work reanalyses selected issues in the phonologies of English and Polish. A side effect of using the two languages is a sort of typological comparison of phonetically traceable phenomena occurring at morphological and lexical boundaries in these languages.

As this is a report on the applicability of the tenets of the programme, an additional goal is to signal, where it appears prudent and harmless to the reader, the potential gain in explanatory power of Workspace Phonology when compared to other models. The remainder of this chapter expands on the above issues.

[3] The irrelevance of detailed phonetics in GP is by no means an original contribution of this paper. To express relations among speech sounds in terms of features that seldom have reflection in direct articulatory gestures has been customary in GP since the beginning of the theory. Still, the level of abstractness to which the current work pushes these relations may well be unusual.

1.2. Levels in phonology

Since *SPE*, the generative tradition in phonology has been to recognise two levels that deserve systematic description: the morphophonemic and the phonetic level, to the loss of the phonemic level, which may have enjoyed recognition in pre-generative days, but which fell into disgrace following Halle's (1959) work.[4] In those models of phonology that share this view with *SPE*, there is a distinction between underlying lexical, intermediate morphophonological, and surface phonetic structure, whatever the actual labels are given. Thus, Cyclic Phonology (Mascaró 1976), and Lexical Phonology in its many flavours (Pesetsky 1979, Mohanan 1982, 1986, Kiparsky 1982*a*,*b*, Booij — Rubach 1984, 1987, Halle — Mohanan 1985, Halle — Vergnaud 1987*a*,*b*) take underlying representations of morphological entities and transform them into surface representations over a number of intermediate representations, none of which is phonemic in the structuralist sense.[5,6] One of the issues over which these models differ is how many levels of computation must be present in phonology to account for linguistic data.

SPE is a flat type of phonology. One computational unit handles all phonologically relevant work on the output of grammar on its way from syntactic deep structure to speech substance. Articulatory features of structuralist speech segments are interspersed with morphological and lexical boundary markers in linear strings.[7] Rules

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[4] This conclusion is reached on the basis of Gussmann (2007: 15–18).

[5] The various flavours of the phonological application of Optimality Theory (Prince — Smolensky 1993 [2004], McCarthy 1999, 2007, Rubach 1997 et seq., Bermúdez-Otero in prep.) also fit in this category, although there is a major conjecture made in OT that the discrepancy between input and the output is regulated by so-called faithfulness constraints. This logically entails that the input and the output use the same code, presumably articulatory features. It is evident that in mainstream OT, so-called parallel OT (a fierce proponent of which is McCarthy's (1999 et seq.) work), such phenomena as English voiceless plosive aspiration need to be dealt with at the word level, as there are no more levels; Hammond's (1999) monograph on English phonology follows this logic. Rubach's (1997 et seq.)Derivational Optimality Theory and Bermúdez-Otero's (in prep.) Stratal Optimality Theory both postulate multiple levels, effectively using Lexical Phonology's architecture within a constraint-based system.

[6] The numerous versions of LP are not unanimous with respect to the role of the lexicon and the ordering of components in grammar. Except for Halle and Vergnaud's version, it is assumed that the lexical component is effectively the lexicon; its output is manipulated by syntax, and forms input to the post-lexical component. Halle and Vergnaud reinstate the *SPE* ordering: all syntax precedes phonology.

[7] Each concatenation brings about a boundary marker—Scheer (2004 et seq.) refers to such an object as 'diacritic', which it is, as Chomsky and Halle (1968: 364) define it as a [–segment] segment—which triggers a phonological rule. In *SPE*-type phonologies, word-level phonological computation applies a number of times, by ordered rules, which may form blocks of rules applying in a given order. For instance, Laskowski's (1975) analysis of Polish morphophonology divides rules of Polish word formation into pre-cyclic, cyclic, and post-cyclic blocks.

that transform elements in these strings, the core property of transformational–generative grammar, may use boundaries in their structural descriptions, so that morphological and lexical divisions, hardly giving any speech substance on their own, may act as triggers for transforming the phonic matter of morphemes and words they delimit.

Mascaró's (1976) work deals only with the phonological cycle—it does not extend beyond the word boundary—but does not negate there being phenomena whose scope reaches beyond the word. One may safely conclude Cyclic Phonology is *SPE*-type phonology with the notion of the phonological cycle brought into the spotlight.

Lexical Phonology gives (very) much prominence to the cycle, too, but is explicit on the handling of phenomena applying beyond the word level. All versions of Lexical Phonology recognise a lexical, and a post-lexical component in phonology. The former is essentially word-level phonology incorporating word formation; the latter is phrase-level phonology that accounts for phenomena whose occurrence is not bound to words in isolation. Thus, while word stress assignment and inflection in English is largely unaffected by adjacent words, and so computed in the lexical component, aspiration of voiceless plosives may apply to strings larger than lexical entities—this is a low-level process—and is dealt with in the post-lexical component.

It should be stressed that the split-component architecture of Lexical Phonology is not an effect of a sudden discovery that phonological regularity is sensitive to words as linguistic units; after all, *SPE* did have representational markers of word breaks more than 10 years before Pesetsky's 1979 paper. It is rather a consequence of taking (most of) word-level phenomenology to stem from the cyclic application of morphophonological rules in word formation, which forces rules unrelated to word formation into a separate computational unit.

To say there are certain properties or patterns of speech substance which correlate with morpholexical divisions in language is hardly a discovery. English, for that matter, is conspicuously devoid of morpheme-internal geminates, which does not preclude there being doubled consonants in English speech at all. For example, while no monomorphemic word in English is systematically pronounced with [nn] or [ss], such clusters may arise at (certain) morphological boundaries, as in *un-known* or *dis-satisfaction*, and at lexical boundaries, e.g. *seen nothing* or *this see*. Within morphemes, such clusters are absent, sometimes contrary to spelling, e.g. *manner* and *assassin*. This is a vivid indicator that English phonology is hierarchical in the sense that the phonetic substance it governs is not random, but reflects various relations that hold or do not hold between what is traditionally considered speech segments.

Of course, word boundary sensitivity is not limited to English. In Polish, the close-mid front-centralised vowel [ɨ] shows a peculiar distributional defect in that it never occurs word-initially. Still, it enjoys suffix-initial occurrences, e.g. the plural of *but* [but] 'shoe' is *but-y* [butɨ], and that of *dom* [dɔm] 'house' *domy* [dɔmɨ]. Were levels irrelevant, one would need to consider the lack of word-initial [ɨ] in Polish an accident, curious as it were.

One may find it hard to tell whether Government Phonology deals with phrases and whole utterances, or just with words. KLV 1985, the paper that effectively introduced GP to English-speaking audience deals with word-level phenomena only. Still, KLV 1990 makes it clear that the scope of GP reaches beyond the word, for instance when discussing Italian *raddoppiamento sintattico*. Harris's (1994) monograph on English phonology is also phrase- and utterance-oriented, most ostensibly in the analysis of the distribution of [ɹ]. This large scope notwithstanding, Gussmann's (1998) analysis of the distribution of [ŋ] and [ŋg] is explicit on phonological regularity being limited by the domain of word; word-finally, English does not display the [ŋg] cluster—this regularity holds for Received Pronunciation—while to find [ŋg] across a lexical division is not unusual, e.g. *lo<u>ng</u> <u>g</u>ame*. Nevertheless, lexical boundaries seem not to play any role in the analysis of regressive voice assimilation in Gussmann's (2007) monograph on Polish phonology.[8] Out of this body of confusing evidence, the present study aims at distilling a clear borderline between word-level and phrase-level phenomenology that can be dealt with using the theoretical apparatus of GP and CVCV, by relegating morphophonology and phrase phonology into distinct components, following the architecture of Lexical Phonology in this respect.[9]

Nothing has yet been said in this section about the distinction between morphophonological generalisations and phonetic realisation thereof. In short, all the models referred to so far agree in taking the output of their computation as fully pronounceable in articulatory terms. Differences stem from the representational

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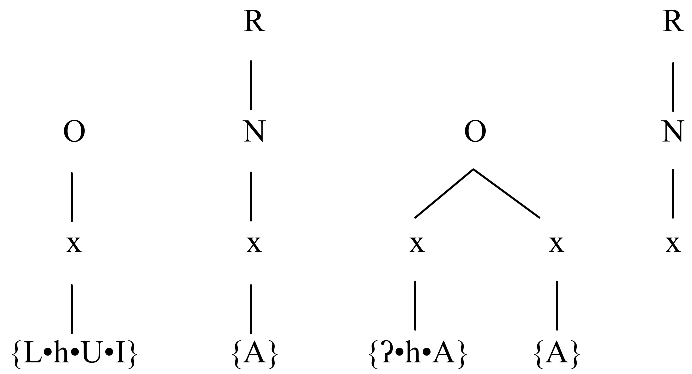
[8] This analysis is summarised and discussed in Chapter 4, where the constraint *Voice Adjustment* (to be shown in (233) herein) is placed under scrutiny. In short, Gussmann (2007: 298) allows for words to be concatenated in such a way that they form single phonological domains, even though his analysis of vowel~zero alternations in Polish (pp. 180–199) clearly shows the domain of the alternation is words, not phrases.

inventory of objects they use. *SPE* and its more or less related descendants, i.e. Cyclic Phonology, Lexical Phonology, and Optimality Theory, operate on so-called distinctive features—these have direct articulatory correlates—throughout the computation. These include, for instance, [dorsal], [back], and [nasal].[10] Standard GP and CVCV are largely uninterested in using the *SPE* matrix for capturing phonological generalisation. They use so-called elements or phonological primes to represent the most salient properties of autosegments, combinations of which are dubbed phonological expressions.[11] An illustration of these is provided in (1) below, showing the word *wiatr* [vʲatr̥] 'wind' in Polish, on a (standard) GP skeleton.

(1) *wiatr* [vʲatr̥] 'wind'



The x-slot skeleton and the named slots 'O', 'N', are 'R' are descendants of Autosegmental Phonology (Goldsmith 1976). The labels stand for onsets, nuclei, and rhymes, respectively. GP does not have any Syllable Structure Algorithm, in the sense of Lexical Phonology (see, for instance, Rubach — Booij 1990*b*), and it is assumed that labelled syllabic constituents are part of every representation in GP. The bottom tier holds the melody. Phonological expressions are created by the vertical relation between a syllabic label, an x-slot, and the melody underneath it. To see that the label plays a role in phonetic interpretation, notice that (1) shows two occurrences of the element

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[9] The major differences between Lexical Phonology and the reading of GP/CVCV adopted in the present work are enumerated in Chapter 2.

[10] See Chomsky — Halle (1968: 176–177) for the original *SPE* feature matrix. See also, for instance, Hall (2007) for a survey of what has become of some of the *SPE*–matrix features in present-day Optimality Theory.

[11] It should be noted that KLV 1985 actually use the elements {I}, {A}, and {U} as shorthand for *SPE* feature bundles, except that one feature of a given bundle is more prominent that the others; this is called a hot feature in the 1985 form of GP. The bundles and the hotness have since been replaced by the notion of headedness.

{A} in isolation. Its interpretation is different between the occurrences. The {A} associated with the skeleton below an N slot is a vowel, viz. [a], while the {A} linked below an O slot is phonetically a sonorant, viz. [r]. Elements may be combined into complex expression, e.g. {ʔ•h•A} in (1) gives [t], as its components specify occlusion, friction, and coronality, respectively.[12] The idea that every element is pronounceable, but is not itself a phonetic feature in the sense of the *SPE* matrix, is the major difference between GP and the other models upon which this discussion has touched. In addition, the alternation of onsets and rhymes—rhymes are often omitted from diagrams if their subordinate nuclei are non-branching—is entwined with the idea that some x-slots may be left without melody. In (1), the final nucleus is devoid of melody, and as such receives no phonetic interpretation.[13] Still, the syllabic slot is always present in the representation, making empty categories, and especially empty final nuclei a trademark of GP.

The variety of interpretations that GP primes may receive is a good argument for considering the model as presupposing two levels of phonological reality. The representations are pronounceable, but need phonetic interpretation first. Recall the element {A} shown in (1). If associated with an onset, it contributes coronality; if linked to a nuclear projection, it yields vowel openness. All the other models mentioned in this section have more specific features; coronality and openness are reflected, for instance, in *SPE*'s [+coronal] and [+low], respectively. This is nowhere near the complexity of, say, (2) below.

[12] A detailed account of which element corresponds to which phonetic property in GP is postponed until Chapter 2.

[13] In *SPE* and its relatives only [–segment] segments enjoy unpronounceability. In Lexical Phonology, unpronounced (auto)segments are those left unparsed into syllabic hierarchy. In *SPE* proper, there are no syllabic slots and no autosegmental skeleton in the first place.

$$
(2) \quad \begin{bmatrix} -\text{vocalic} \\ +\text{consonantal} \\ -\text{high} \\ -\text{back} \\ -\text{low} \\ +\text{anterior} \\ +\text{coronal} \\ -\text{voice} \\ -\text{nasal} \\ -\text{strident} \end{bmatrix}
$$

The content of (2) seems to fit [t] in the *SPE* matrix.[14] The phonetic complexity that is captured by GP primes requires computational power on the part of language faculty in order to be a viable tool for capturing phonologically relevant bits and pieces of phonetic substance. This brings about the concept of modularity, in the sense of Fodor's (1983) book, which is the basis for treating such branches of grammar as syntax, semantics, and phonology as separate modules, which are domain-specific in that they only encode and decode information that they are designed to process. With respect to the present work, modularity in phonology is mandated by a very simple observation. Speakers of different languages use the same articulatory–perceptual interface, i.e. their vocal tracts and auditory sense are the same, minor physical differences notwithstanding. Still, when hearing a language they do not know, they may recognise sounds similar to those present in their own language, perhaps even catch lexical boundaries, but they may not decode the information that is being transmitted. Conversely, when hearing somebody speak the same language as they do, people are very likely to decode the message even if the transmission of the phonic matter is distorted.[15] For speech recognition to work, one needs to map the acoustic signal onto

[14] Contrary to the later use of [±back] in (post-)generative tradition, the *SPE* use of [–back] is not equivalent to [+front], and does not presuppose palatalisation. See Laskowski (1975) for the use of "[+przedn]" (=[+front]) for palatalised consonants in Polish, where the presence of [+front] does not preclude the co-occurrence of [+back]. In present-day phonology, *SPE*'s [+back] would roughly correspond to [dorsal] on contoids, and [+back] on vocoids. [–tense] on Polish vowels is not an invention found in Laskowski's analysis. The distinction in [±tense] features most prominently in Gussmann's (1980) work, where it helps discriminate stable vowels from those alternating with zero.

[15] Consider telephone conversations. Telephone bandwidth is limited to 3.4 kHz, a frequency well below the upper limit of the auditory system in humans without hearing loss, which varies between 16 and 20 kHz. It is also known that the distinctive acoustic spectrum of speech sounds may exceed the 3.4 kHz boundary, most prominently in fricatives. For instance, when discussing acoustic properties of English

grammatical structures one is able to generate. Should no structure match, which is the case with unknown languages, the signal remains undecoded. This implies that the A–P interface and that part of phonology that relates to language-specific morpholexical structures cannot form a single module.

Against this truism, notice that empty categories in GP representations cannot be phonetically real. Neither English nor Polish has systematic pauses in word-final positions that would betray the existence of an unpronounced vocalic slot, as in (1). Words pronounced in isolation end in a pause, but that need not be reflected in any systematic representation. Similarly, words in isolation are preceded by silence, but that is not reflected in any way in the representation shown in (1). It must be concluded that GP representational machinery is abstract, and that it would be desirable to formalise the connection between the abstractness of representation and the phonetic substance to which it relates. Thus, the current study will use GP-type phonological representations for capturing lexically relevant generalisations, and will insist that the phonetic realisation thereof—speech perception and parsing is left beyond the scope of this work—is done by a phonology–phonetics interface, which translates abstract GP-like representations into articulatory cues. The two ontological entities are necessarily two separate components of phonology.

Further formalisation of the relation between the two components of phonology is postponed until Chapter 2, whereas the following section will concentrate on the main reason for which the present work is based on GP-type abstract phonology, instead of postulating a new model built from scratch, or adapted from another existing theory, viz. the degree of abstractness and the curtailment of overgeneration.

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sounds, Ladefoged (2001: 183) notes “[the] noise in [s] is centered at a high frequency, between 5,000 and 6,000 Hz,” while “in [ʃ] it is lower, extending down to about 2,500 Hz.” Logically, the distinctive noiseband of [s] is not heard over the phone, as it lies above the cut-off frequency of the medium. Still, speakers of English (and presumably other languages, too) are able to communicate over telephone.

1.3. Abstractness and overgeneration

1.3.1. *SPE*

In his often-quoted 1968/1973 paper, Kiparsky distinguishes between three views on morphophonemic representations.

> (1) At the concrete end, we find the view that the morphophonemic representation should provide a direct record of all the actual forms in which the morpheme appears. The underlying form of a morpheme is nothing but a set of its allomorphs, or some representation from which that set can be immediately constructed. Examples are the item-and-arrangement model developed by American linguists in the forties, and the approach initially taken by the pioneers of the Prague school.
> (2) The diametrically opposed view that morphophonemic representations have a purely classificatory view has been defeated by Lamb (1966), Fudge (1967), and, apparently, Householder (1965). Morphophonemes here are 'completety abstract' elements; they have 'absolutely no properties which are even remotely phonic' (Fudge). They are represented by 'completely neutral labels' (Fudge) which should be 'constructed ad hoc for each language' (Householder) …
> (3) The third alternative, taken by linguists such as Sapir, Jakobson (1948), and Chomsky and Halle (1968), in a sense combines the ideas underlying fully concrete morphophonemics and fully abstract morphophonemics. Adopting a term used by Lamb, we can call this general approach process morphophonemics. … At present I am concerned with what is common to process theories: they regard morphophonemic representations as *abstract entities* (as do the theories of Fudge and Lamb) but ascribe to them an *intrinsic interpretation on the phonetic level* (as does item-and-arrangement theory of Trubetzkoy's 'morphonologie'). This conception of morphophonemics incorporates the main virtues of both of the others without the main faults of either. Like fully abstract morphophonemics, it recognises that there is an underlying phonological pattern which is not necessarily identical to the phonetic pattern (e.g. the superficial [η] may function like /ng/), which fully concrete morphophonemics is forced to deny. On the other hand, it recognizes that this pattern, while abstract, is not arbitrary, but in general related to the phonetic level ([η] is hardly likely to function as /ö/ or /p/ or /l/), a relationship which fully abstract morphophonemics throws overboard. (Kiparsky 1973 [1982]: 119–120)

The position held in the present study is essentially that of the third alternative in Kiparsky's list, although in some respect it is slightly skewed towards the second one. Namely, while it does not endorse completely abstract, ad hoc labelling of morphophonemic units for each language, it does account for languages differing in what constitutes the defining set of their respective distinctive features. For instance, Polish will be shown, in Chapter 3, to be sensitive to the morphophonemic distinction between palatalised (and palatalising) building blocks of phonological representation, and those that are not palatalised (and non-palatalising). This distinction will be disregarded for English, not because the language in question should not display palatalisation—Chomsky and Halle (1968: 230–231, 244) are clear that English phonology does have such a phenomenon—but rather because the palatalised vs. non-palatalised distinction is not a defining property of English morphophonemics or phonetics.[16] Still, some abstractness is necessary to capture relevant morphophonological generalisations about language. The aforementioned Chapter 3 will show that if morphophonemic representations are allowed to veer away from phonetic substance to the level that, say, what is phonetically a palatal fricative and a close front vowel is representationally a combination of a palatalised coronal fricative and a front vowel unspecified for openness, then Polish palatalisation stands a chance of being described and, hopefully, explained not by a series of ordered rules, but rather by a single operation on abstract morphophonemic blocks and a deterministic translation into articulatory phonetics.[17] This cannot be accomplished in *SPE* and those of its descendant models in which (too) much attention is paid to the phonetic reality of morphophonemic representations. In particular, the quantal (or discrete) approach to morphophonemes and, to a lesser extent, to speech is a hurdle over which one can no longer jump. An indirect effect of speech segmentation and, more importantly, granting phonetic features the status of morpholexically distinctive units is the abundance of phenomena that *SPE*'s formalism could describe but whose actual non-existence it could never explain in a satisfactory manner. This is because all morphophonemic matter in *SPE* is computed over such representations that, at any point in the derivation, they could potentially be shipped to the A–P interface for actualisation; they are built from phonetically-grounded features. On the other hand, the underlying assumption of *SPE* is that the derivation does not finish until all the syntactic structure that enters the phonological component of grammar is translated and computed in phonetic terms. There is no escape hatch in *SPE* that would cater for representations whose computation has been interrupted, for whatever reason. Thus, an excessive number of ordered rules are forced to transform those representations, so that by the time these are sent for

[16] Phonetic studies on English, for instance Cruttenden (2008: 177), show that even when followed by the close front vowel [iː], English velar plosives [k] and [g] do not become the palatals [c] and [ɟ], respectively; rather, they are fronted, possibly reaching the hard palate, but the active articulator is the back, not the front of the tongue.

[17] The example in question concerns the word-level palatalisation of //s// by //i// in Polish, whereby the output is [ɕi]. See, for example, section 3.5 for an analysis.

phonetic actualisation, their content yields exactly the desired (and attested) phonetic shape. In such a system, one may describe virtually all morphophonological phenomena of a language—Chomsky and Halle (1968) have the enormous feat of having taken up almost every if not all morpholexically relevant aspects of English phonology—but this comes at a high price.

While the descriptive power of *SPE* appears largely accepted—the way word stress is handled in *SPE* is perhaps an exception to this—its formal apparatus has occasionally been subject to criticism.[18] In his review of Chomsky and Halle's (1968) book, McCawley (1974: 50) is kind to notice "*SPE* is remarkable for how little in the formulation of the rules is arbitrary: some justification is provided for virtually every detail of every rule." Then, however, the review turns critical when reaching Chapter 3 of the book, the one "concerned primarily with rules for the placement of stress in English words and phrases … amply supplied with digressions on "notational conventions" and their relation to rule ordering and evaluation measures. It is the longest and by far the most difficult to read of the nine chapters" (p. 51). The criticism concerns the specificity of rules postulated in *SPE*. Two rules on which McCawley (pp. 51–52) comments are given in (3), and (4) below.[19]

(3) $$\mathrm{V} \rightarrow [1\mathrm{stress}]/\_\_\mathrm{C}_0\left(\begin{bmatrix} -\,\mathrm{tense} \\ \mathrm{V} \end{bmatrix}\mathrm{C}_0^1\right)\ \Big]$$

(4) $$\mathrm{V} \rightarrow [1\mathrm{stress}]/\_\_\mathrm{C}_0\begin{bmatrix} -\,\mathrm{tense} \\ \mathrm{V} \end{bmatrix}\mathrm{C}_0^1\ \Big];$$

$$\mathrm{V} \rightarrow [1\mathrm{stress}]/\_\_\mathrm{C}_0\ \big]$$

McCawley (p. 52) notes that (3) is "said to abbreviate the sequence of rules" in (4), "which must be disjunctively ordered, so that /kænsel/ will become kæ¹nsel by the first subrule but will not then become *kæ²nse¹l by the second subrule." This statement is followed by the following: "The second subrule is only applicable in those words which

[18] See, for instance, Scheer (2004: 371–375) and references therein for discussion.
[19] In *SPE* notation, the forward slash means "in the context of," while the underscore marks the position of the segment or the feature that the rule in question is sensitive to within a string of segments or features. The rightmost closing square bracket in rules (3) and (4) denotes "end of constituent" (McCawley 1974: 52), not a segment.

do not meet the conditions for the first subrule, for example, *maintai*^{1}*n* (which has a tense vowel in its final syllable) and *colla*^{1}*pse* (which ends in more than one consonant)” (p. 52). This, in turn, is followed by McCawley’s major argument against the way rules are formulated in *SPE*.

> The fact that the ordering of the subrules of rules with parentheses or sub- and superscripts is not the same kind of ordering that otherwise occurs between rules, casts some doubt on the appropriateness of considering them to be “abbreviations” at all. This doubt is strengthened by the observation that the subrules which they supposedly abbreviate in many cases are not really possible rules. To make clear the nature of my objection, I emphasize that I am talking about what rules are possible, not about what effects it is possible for a rule to have. I claim that the first rule of [(4)] is not a possible rule, meaning not that there are no languages in which all words ending in a lax vowel plus at most one consonant get penultimate stress, but rather that in all such languages, the assignment of penultimate stress to those words is a special case of a more general rule, such as [(3)], rather than, say, the stress on other words being inserted by a totally unrelated rule, such as a rule putting stress on the second vowel from the beginning. There are even clearer cases of “impossible rules” supposedly abbreviated by sub- and superscripts, for example, the first rule of [(4)], which supposedly has one subrule for each number of consonants that could appear between the two vowels. I venture to guess that a rule putting stress on a vowel which is followed by three consonants, a lax vowel, and one consonant is not a possible rule in the sense that, if all words of some language that are of that shape get penultimate stress, that stress is inserted by a rule that applies to a broader class of words, rather than, say, words which end in vowel, two consonants, lax vowel, consonant being stressed by a separate rule that calls for antepenultimate stress. (McCawley 1974: 52)

McCawley’s reservations towards the excessive generative power of the *SPE* system fit into a broader discussion on what generative phonology might describe with but what is not attested.[20] To bring the discussion closer to the data that this study will use in later chapters, consider Polish. Its well-known property is palatalisation, which in its most phonetic type is the effect that the close front vowel [i] and the front approximant [j] have on preceding consonants, viz. they force an otherwise non-palatalised consonant to have a palatal secondary place of articulation. Consider phrases in (5) below.

(5) *pies i kot* [sʲi] ‘a dog and a cat’
kot i pies [tʲi] ‘a cat and a dog’

[20] Interestingly enough, Lightner (1976) finds McCawley’s review of *SPE* to be “laudatory” (p. 75) and follows with what reads as if it were his own review of *SPE*. The text is so focused on derivational morphology, an issue Chomsky and Halle (1968) apparently missed, that it falls short of commenting on those issues that actually do appear in the book. The venom-filled note ends with the following advice: “I think the best thing we can do now is to forget about *SPE* and [McCawley] and get back to finding out about sound and meaning” (p. 82).

pies̱ J̱ana [s^jj] 'Jan's dog'
koṯ J̱ana [t^jj] 'Jan's cat'

This type of palatalisation may be captured by an *SPE*-like rule, for instance the one in (6).

(6) *Palatalization* (Gussmann 1980: 20; his rule (33))
[+cons] → [–back]/ __ [–back]

The descriptive power of rule (6) is terrific. It accounts for all instances of non-palatalised consonants being followed by [i] or [j] across lexical boundaries (and in other contexts, too). (Some of the other types of palatalisation in Polish are properly discussed in Chapter 3.) The problem is that in a rule-based system, one may find it tempting to postulate a rule whose effect on consonants would be quite the opposite, i.e. consonants would become [+back] when followed by [–back] segments. Such a hypothetical rule is formulated in (7).

(7) *Hypothetical depalatalisation* (travesty of rule (6))
[+cons] → [+back]/ __ [–back]

While the structural description of rule (7) appears as elegant as that of rule (6), the rule is counterfactual, as such sequences as *[si] or *[ti], i.e. with non-palatalised consonants before [i], are not found in Polish. The common sense feeling of rule (7) being counterintuitive is not reflectible in distinctive features and structural descriptions of *SPE* rules.

The problem of *SPE*'s occasional lack of explanatory power, as opposed to descriptive power, is noticed by Chomsky and Halle themselves:

> The entire discussion of phonology in this book suffers from a fundamental theoretical inadequacy. Although we do not know how to remedy it fully, we feel that the outlines of a solution can be sketched, at least in part. The problem is that our approach to features, to rules, and to evaluation has been overly formal. Suppose, for example, that we were systematically to interchange or to replace [αF] by [–αF] (where α = +, and F is a feature) throughout our description of English structure. There is nothing in our account of linguistic theory to indicate that the result would be the description of a system that violates certain principles governing human languages. To the extent that this is true, we have failed to formulate the principles of linguistic theory, of universal grammar, in a satisfactory manner. In particular, we have not made any use of the fact that the features

> have intrinsic content. By taking this intrinsic content into account, we can, so it appears, achieve a deeper and more satisfying solution to some of the problems of lexical redundancy as well as to may other problems that we have skirted in the exposition. (*SPE*: 400)

This statement is then followed by a theory of markedness.[21] What really follows is an early generative theory of underspecification, whereby features are divided into marked and unmarked, and a conjecture is made that "[since] unmarked features do not add to the complexity of a grammar, there is no point in allowing unspecified features in the lexicon" (p. 403). Next, interpretive conventions are given for those features that are unspecified in lexical entries. For instance, a rather obvious convention adds [–high] to vowels specified for [+low] (p. 405; convention VII). Conversely, [+high] vowels are augmented with [–low] by convention IX. These "marking conventions," as Chomsky and Halle (p. 403) call them, reflect a common sense feeling that [high] and [low] are contradictory features, and while a combination of [–high] and [–low] might denote a mid state—this is indeed what it does in *SPE*—a combination of [+high] and [+low] is unpronounceable. As regards markedness, convention XXI (p. 406) captures the prototypical property of obstruents being voiceless by setting [–voice] on obstruents unspecified for that feature. In sum, there are thirty-nine such conventions.

While the idea of leaving unmarked features out in lexical entries and filling them on the way to the surface structure is among the high points of *SPE*, not all of the marking conventions are self-evident. Consider conventions XXIIIb, XXVIa, and XXVIIc (pp. 406–407), shown in (8), (9), and (10), respectively.[22]

(8) $$[u\text{cor}] \rightarrow [\alpha\text{cor}] / \begin{bmatrix} \overline{} \\ -\alpha\text{back} \\ -\text{ant} \end{bmatrix}$$

(9) $$[u\text{delayed release}] \rightarrow [+\text{del rel}] / \begin{bmatrix} \overline{} \\ -\text{ant} \\ +\text{cor} \end{bmatrix}$$

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[21] Chomsky and Halle (1968: 402ff) put the term *markedness* in parentheses.

[22] The italicised "u" stands for "unmarked"—unmarked features are supposed to be absent from lexical entries—while Greek small letters are variables in *SPE* notation; all values of a single variable in a rule's structural description are identical, e.g. if one instance of "α" is to be "+" in a description, all the other "α's" are "+," too, unless given the opposite value by means of "–".

$$(10) \qquad [u\text{strid}] \rightarrow [\alpha\text{strid}] / \begin{bmatrix} \underline{\qquad} \\ \alpha\text{del rel} \\ \begin{Bmatrix} [+\text{ant}] \\ [+\text{cor}] \end{Bmatrix} \end{bmatrix}$$

Conventions (8), (9), and (10) play their role in a brief analysis of so-called First Velar Palatalisation in Slavic that Chomsky and Halle (pp. 421–424) put forward to show the aforementioned "intrinsic content" of features. As shown (on p. 421), First Velar Palatalisation turns underlying //k//, //g// and //x// into [ʧ], [ʤ], and [ʃ], respectively.[23] The rule formulated to account for this phenomenon is given in (11) below, after *SPE* (p. 422).

$$(11) \qquad [-\text{ant}] \rightarrow \begin{bmatrix} -\text{back} \\ +\text{cor} \\ +\text{del rel} \\ +\text{strid} \end{bmatrix} / \underline{\qquad} \begin{bmatrix} -\text{cons} \\ -\text{back} \end{bmatrix}$$

The rule, numbered (25) in the relevant section of *SPE*, is commented upon in what reveals the outlandish side of the system.

> It is easy to understand why a velar would be fronted … before a front glide or vowel; it is not so easy to see why the other features should also change. Recall that … the palato-alveolar [[ʧ]] is less marked than either the palato-alveolar plosive [/t̠/] or the palatal plosive [/c/]. The less-marked status of [/ʧ/], as well as the marking conventions … reflects the fact that in consonant systems with four points of articulation, the fourth point (in addition to labial, dental, and velar) is commonly occupied by the palato-alveolar affricate [/ʧ/] rather than by [/t̠/] or [/c/]. As noted on page 420, the marking conventions affect not only lexical representation but also the interpretation of phonological rules to which they are linked. An examination of conventions … immediately reveals that several are linked to the phonological rule [(11)], namely, one case of [(8)], [(9)], and one case of [(10)]. These conventions, then, functioning successively in linkage, provide the desired values for these three features. They tell us that when velar obstruents are fronted, it is simpler for them also to become strident palato-alveolars with delayed release. (*SPE*: 422–423)

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[23] The phonetic values given here are coded in IPA. Chomsky and Halle (1968) use Americanist (structuralist) phonetic symbols, viz. [č], [ǰ], and [š], in the same order. In addition, the intermediate [ʤ] (from the underlying //g//) surfaces as [ʒ] in Polish (West Slavic). See, for instance, Rubach (1984: 110ff) for discussion on First Velar Palatalisation in Polish. See also Rubach (1993: 101ff) for discussion on First Velar Palatalisation in Slovak (West Slavic).

Indeed, for a velar to become fronted before a front glide or vowel is intuitively a plausible event. This is found in Polish—the language may safely act as an exponent of West Slavic in *SPE*—at word boundaries. Consider examples in (12).

(12) *ro<u>k</u> <u>i</u> kilka miesięcy* [ci] 'a year and a few months'
bra<u>k</u> <u>j</u>edzenia [cj] 'lack of food'

The palatal plosive, logically equivalent to a "fronted" velar in *SPE* (p. 422), is also found word-internally, most ostensibly in words of foreign origin, such as *<u>ki</u>no* [ci] 'cinema,' *<u>ki</u>netyka* [ci] 'kinetics,' or *<u>ki</u>er* [cɛ] 'hearts (card)'. Chomsky and Halle are thus very correct in stating, "it is not so easy to see why the other features should also change" (p. 422). That they do is beyond doubt; consider examples of word-internal First Velar Palatalisation in Polish provided in (13) below.[24]

(13)	*wal<u>k</u>–a* [k] 'fight, n.'	*wal<u>cz</u>–yć* [ʧ] 'fight, v.'
	zna<u>k</u> [k] 'sign, n.'	*zna<u>cz</u>–yć* [ʧ] 'sign, v.; leave trace'

The statement on the "consonant systems with four points of articulation" where "the fourth point (in addition to labial, dental, and velar) is commonly occupied by the palato-alveolar affricate [/ʧ/] rather than by [/<u>t</u>/] or [/c/]" (p. 423) is simply not true for Polish.

The discrepancy between the two effects that [i] and [j] have on the preceding velar is not captured by *SPE*'s recourse to markedness. In fact, one may find that the excess of rules handling First Velar Palatalisation in *SPE* is in grave defiance of what an unmarked structure should be. In particular, the final two statements of the block quote above—"These conventions, then, functioning successively in linkage, provide the desired values for these three features. They tell us that when velar obstruents are fronted, it is simpler for them also to become strident palato-alveolars with delayed release." (p. 423)—say it all. First, the conventions and the rules are formulated to give the attested results. Second, it appears that to turn velars into strident palato-alveolars is

[24] The underlying vowel of the verbalising suffix in both examples in (13) is the close front //i//; it surfaces phonetically as the close-mid front-centralised [ɨ]. In post-*SPE* tradition, the [i]→[ɨ] switch is handled, for instance, by a rule called *Retraction* (see Rubach 1984: 33). A more general rule, covering

only found "simpler" because the surface forms of words in which an underlying velar is subject to the triggering factor in the flesh of [i] or [j] simply have an alveolar obstruent in the same position within the word.[25] The notion of 'word' is crucial here. *SPE* is a model of word formation built from a phonetically well-informed vantage point of words pronounced in isolation.[26] What is called word-level phonology in *SPE* is simply a stage in the morphophonological derivation when the transformational cycle is over and the system has reached the word as a whole. What properties speech sounds have across word boundaries is not much of interest to *SPE*. Had Chomsky and Halle considered velars in Polish word junctures and in borrowings, they might have found that for a velar followed by [i] or [j] it is indeed "simpler" to front than to undergo no fewer than three successive rules—this is what marking conventions are, after all—and that forcing a velar to switch its dorsal place of articulation from back to front is more of an unmarked effect that front glides and vowels should have if frontness is indeed an "intrinsic feature" of these.[27]

What *SPE* misses is that intrinsic features of segments of underlying representations are not really features of speech sounds. No bit of underlying representation needs to have any phonetic property—indeed; the conjecture on which the present study is based is that underlying representations are devoid of any strictly phonetic features—until actualised. This is not a new discovery, and definitely not one made in Government Phonology. An early hint of the categorical discrepancy between underlying and pronounced phonetic features in generative tradition dates back to *SPE* as such.

> Our use of the concept "distinctive feature" differs from that of many others in a number of ways. On the one hand, we have made fairly extensive revisions on the catalog of

both the [i]→[ɨ] switch but also the reverse [ɨ]→[i] switch, is discussed as *Vowel Adjustment* in Gussmann (1980: 22).

[25] The "palato-alveolars" are in fact (plain) alveolars in Polish; see section 3.1 for phonetic data.

[26] This statement is hardly falsified by *SPE*'s handling of stress assignment in phrases, such as the difference in the stressing of "*black board-eraser* ("board eraser that is black"), *blackboard eraser* ("eraser for a blackboard"), and *black board eraser* ("eraser of a black board"), with the stress contour 213, 132, and 312, respectively" (*SPE*: 20). Phonological phrases are meaningfully discussed only in the context of stress patterns, not in the context of segmental processes found across the word boundary.

[27] A further argument against the way "intrinsic features" and their alleged effects are viewed in *SPE* appears to come from Russian (East Slavic), whose First Velar Palatalisation is the same as Polish, i.e. in turns underlying //k//, //g// and //x// into [ʧ], [ʤ], and [ʃ], respectively (*SPE*: 421). Contrary to Polish, when //i// follows a non-palatalised velar, or any other [+back] consonant, across the word boundary, the consonant does not palatalise at all; rather, the vowel retracts to [ɨ]. See, for instance, Rubach (2007: 123) for data and discussion.

> features as well as in the terminology utilized in previous work. … In addition, we distinguish sharply between the classificatory and the phonetic function of distinctive features. It is only in their classificatory function that all features are strictly binary, and only in their phonetic function that they receive a physical interpretation. As classificatory devices, the distinctive features play a role in the full specification of a lexical entry (along with syntactic and semantic features and idiosyncratic classifications of various sorts that determine the behavior of a lexical entry with respect to the rules of the grammar). As phonetic parameters, the distinctive features provide a representation of an utterance which can be interpreted as a set of instructions to the physical articulatory system, or as refined level of perceptual representation. The major function of the phonological component is to derive the phonetic representation of an utterance from the surface structure assigned to it by the syntactic component, that is, from its representation in terms of classificatory features of the lexical items it contains, its other nonlexical formatives, and its analysis in terms of immediate constituents, all of this material having been modified in an appropriate way by readjustment rules.
>
> As classificatory devices, features are binary. As a first approximation, we may assume that they are provided with a coefficient that can take one of the values: + (plus) or – (minus). On the other hand, since phonetic features are generally multivalued, we may think of them as having positive integers as coefficients. Thus, in the representations that constitute the surface structure (the output of the syntactic rules), specified features will be marked as plus or minus; but the phonological rules, as they apply to those representations, will gradually convert these specifications to integers. (*SPE*: 65)

In principle, there is no reason for which the features found in underlying and surface representations should not be vectors for the A–P interface, on the condition that such an interface is present in the system and that it is capable of translating surface representation into speech, and the other way round. (As much as sound to structure translation might be interesting, this issue is not covered in the present work.) The idea of distinctive features functioning as “instructions to the physical articulatory system” (p. 65) forms one of the bases of the model in which morphophonological and phonological–phonetic phenomena are treated from Chapter 2 of this work onwards.

The possibility of formulating outlandish rules in *SPE*, shown not only by quoting McCawley (1974) but also in the discussion on First Velar Palatalisation earlier in this section, are just two examples of abstractness, as understood in Kiparsky’s 1968/1973 paper. Its main issue is how far removed from phonetic reality morphophonemic distinctive features may or should be. Kiparsky has introduced the term “absolute neutralisation” into phonological vocabulary. “Absolute neutralization is a consequence of setting up underlying distinctions for the sole purpose of classifying segments into those that do and those that do not meet the structural analysis of a rule” (Kiparsky 1973 [1982]: 128). A good example of such neutralisation is the distinction between stable and deleting vowels in Slavic languages, commonly called yers. In the now classic analysis of Polish morphophonology, Gussmann (1980: 39ff) uses the phonetically untrue, in the case of Polish, distinction between [+tense] and [–tense] vowels. Stable vowels are analysed as [+tense]. The alternating, [–tense] vowels are subject to a rule dubbed *Lower*, which either transforms them into [+tense] or deletes them, depending on the context. The [±tense] distinction between vowels is neutralised in the course of the derivation, and is not found phonetically, something against which Kiparsky (1973) argues. In fact, two of the four chapters of Gussmann's book are devoted to providing evidence for absolute neutralisation, contra Kiparsky.

The position taken by the present study with respect to absolute neutralisation is the following. The building blocks of morphophonemic representations *may* display contrastive properties that are neutralised in an absolute, i.e. non-contextual, fashion in the phonic substance. Unlike in *SPE*-type analyses, to which Kiparsky's criticism may apply, the morphophonemic level of the architecture endorsed from Chapter 2 onwards uses features that only receive phonetic reality at the phonology–phonetics interface; the rules (and constraints) that apply to morphophonemic representations govern, evaluate and convert abstract, not phonetic features. This reason alone is sufficient to allow for absolute neutralisation. Given that the interface may display idiosyncratic behaviour in the handling of representations, one simply cannot a priori rule absolute neutralisation out. (The distinction between distinctive features—these operate in morphophonemic terms only—and their phonetic actualisation is enough to save absolute neutralisation from being expelled from *SPE*; strangely, neither Kiparsky nor Gussmann make much use of this argument.)

1.3.2. Post–*SPE*

Methods of curtailing overgeneration have moved in two directions. One is to postulate limitations on the application of rules, for instance by restricting the ability to look back into previous stages in the derivation. The other is to limit the locality of rule application.

The serious restriction on look-back is first found in the adoption of the principle of strict cyclicity—first formulated for syntax in Chomsky (1971)—in phonology by

Kean (1974).[28] The transformational (now, phonological) cycle is enriched with the "constraint that on any cycle A no cyclic rule may apply to material within a previous cycle B without making crucial use of material uniquely in A" (Kean 1974: 179). This is what Scheer (in prep.: §162) calls a no look-back device. The Strict Cycle limits the number of applications of cyclic rules in that such rules apply iff their structural description is (a) first met at a given cycle and (b) not bled by the application of an earlier rule on that cycle. The essence of Kean's formulation is echoed in Mascaró's (1976) work. "For a cyclic rule to apply properly in any given cycle j, it must make specific use of information proper to (i.e. introduced by virtue of) cycle j" (p. 7). (It appears that Mascaró's work is the first to give the aforementioned constraint the name of the Strict Cycle Condition (SCC).) Mascaró enumerates three cases in which a cyclic rule may properly apply in a cycle, thus meeting SCC.

> A cyclic rule R applies pro[p]erly on cycle j if either a, b or c is met:
> a. R makes specific use of information uniquely in cycle j. That is, it refers specifically to some A in $[_j XAY[_{j-1}\ldots]Z]$ or $[_j Z[_{j-1}\ldots]XAY]$.
> b. R makes specific use of information within different constituents of the previous cycle which cannot be referred to simultaneously until cycle j. R refers thus to some A, B in $[_j X[_{j-1}\ldots A\ldots]\ Y\ [_{j-1}\ldots B\ldots]Z_j]$.
> c. R makes specific use of information assigned on cycle j by a rule applying before R. (Mascaró 1976: 9).

What Mascaró (p. 9) correctly points out, his condition (a) is "Strict Cyclicity as it appears in Kean (1974)," and notices that her version is stronger than his in that it blocks a cyclic rule from applying if only condition (b) or (c) but not (a) is met.

As it stands in Kean's and Mascaró's formulations, the Strict Cycle says nothing about prohibiting cyclic rules from applying on the first cycle, unless one takes Kean's wording of the principle, containing the phrase "a previous cycle B" (p. 179), as presupposing that there is always at least one cycle on which cyclic rules are not bound to Strict Cyclicity. However, a brief look at the derivations for Klamath and Welsh that she gives makes it clear that in her approach a cyclic rule may well apply on the very first cycle. (Mascaró's work gives the same impression of his system.)

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[28] Kean (1974: 179) notes: "Since the writing of the original version several other instances of the principle of strict cyclicity have been brought to my attention, namely Halle (1973*a*), Halle (1973*b*), and Wilkinson (1974)." These in turn, i.e. Halle (1973*a*: 319), Halle (1973*b*: 464), and Wilkinson (1974: 261), point to Kean's (1971) unpublished MIT paper, to which Kean (1974) makes no reference. Having being unable to find Kean's (1971) paper, I am compelled to assume Kean (1974) is a revised form thereof.

As obvious as the first-cycle applicability of rules under SCC is to a careful reader of Mascaró's (1976) dissertation, Kiparsky (1982*a*), when introducing his version of Lexical Phonology, mixes SCC with phenomena whose occurrence is barred exactly from the first cycle by virtue of so-called Derived Environment, a term coined by Kiparsky himself (p. 152). "An environment E is *derived* with respect to a rule R if E satisfies the structural description of R crucially by virtue of a combination of morphemes or the application of a rule" (p. 152). As for a "combination of morphemes," 'derived environment' is an apt name for Kean's cycle A if it has been preceded by a cycle B, or for Mascaró's cycle j if there has been a cycle j–1. As for the "application of a rule," it is not; neither Kean's nor Mascaró's formulation does require any rule to precede a cyclic rule. Logically, the Strict Cycle and Derived Environment are two unrelated entities, whose territory happens to partially overlap. This fact notwithstanding, Kiparsky puts forward the following.

> Mascaró proposed that the class of rules which exhibits the "derived-environment-only" behavior is the class of cyclic rules, and that this behavior follows form the definition of "proper application of a cyclic rule". With some simplification, his proposal was:
> … *Strict Cycle Condition* (SCC):
> a. Cyclic rules apply to derived representations.
> b. Def.: A representation ϕ is derived w.r.t. rule R in cycle j iff ϕ meets the structural analysis of R by virtue of a combination of morphemes introduced in cycle j or the application of a phonological rule in cycle j. (Kiparsky 1982*a*: 153–154)

Given that for "the application of a phonological rule in cycle j" to be possible, such a rule would have to be cyclic—the idea behind Kiparsky's version of LP is that *all* the rules in the lexical component are cyclic (p. 131)—this formulation of SCC prohibits all cyclic rules from applying on the first cycle, unless there is more than one morpheme introduced at the same time. This is a step too far, and in his (1993) paper, Kiparsky admits his version of SCC blocks cyclic rules from non-Derived Environments "in ways which are not at all borne out by the evidence" (p. 278).

The relevance of both the Strict Cycle and Derived Environment for the present study is not trivial. There is exactly one good reason to consider if Kiparsky's (1982*a*) version of SCC is not that bad after all. Imagine that a language tolerates words whose morphophonemic representation, even though well-formed in some sense, is somewhat defective in that its building blocks do not contract the expected mutual relations. To be more precise, consider Polish, in the native (Slavic) vocabulary of which if an underlying //s// is followed by //i//, the mutual relations between the morphophonemic reflections of //s// and //i// are actualised as [ɕi] rather than, perhaps, the more phonetically obvious [sʲi]. The latter sequence is also found in Polish, but either across the word boundary or in foreign words. Among such words one finds *sinus* [sʲinus] 'sine,' a diminutive of which is *sinus+ik* → *sinusik* [sʲinuɕik], where one //s// does indeed palatalise to [ɕ] as in native vocabulary, but the other //s// does not change with respect to *sinus*. Assuming, for the sake of argument, that this type of palatalisation has something to do with cyclicity—this relation is a major point of Rubach's (1984) analysis—one may feel compelled to conclude that Kiparsky's SCC is right. Given that a cycle on which *sinus* is introduced should precede that on which the diminutive suffix appears, it would appear as if the cyclic rule of palatalisation worked only in derived environments.

There is, however, an alternative approach. The argument is in three parts. First, it makes sense to suspect that phonology does not 'correct' or 'repair' defective structures found in the lexicon, provided they meet some criteria of well-formedness. That *sinus* and *sinusik* are well formed is confirmed by the very fact that they are pronounceable the way they are; the A–P interface does not crash upon actualisation thereof, which is a phonological reflex of what well-formedness is commonly considered to mean in generative syntax. Second, whenever morphophonological exponents of two morphemes, or other chunks of morphosyntactic structure, are joined in phonology, a new structure is built at the inner, with respect to the joint, edges of these exponents, to form a new, seamless output representation. Third, whatever is built in phonology, as opposed to being taken straight from the lexicon, should not only be well-formed, but there is no a priori reason for which it should be defective. If these three arguments are true, then Kiparsky's version of SCC is false, the reason for it being the formulation of subcondition (b). Recall that a representation is derived with respect to a rule, here palatalisation, if a combination of morphemes is introduced on a given cycle or if some rule has already applied on that cycle. Now, notice that of the two underlying //s//'s in *sinusik* both are carried over from a previous cycle, but only the base-final //s// meets the structural description of cyclic palatalisation, because the triggering factor, viz. the //i// in the diminutive suffix, is introduced on the current cycle.

Two scenarios are possible. First, palatalisation applies to the newly introduced //si// sequence first, making it possible for itself to apply to the dormant //si// sequence by virtue of having just created a derived representation on this cycle.[29] Second, any cyclic rule whatsoever applies on the current cycle before palatalisation is run for the first (and, possibly, the only) time, thus creating a derived representation to which the rule should apply.[30] In either case, palatalisation fails to change the first //si// sequence into [ɕi], contrary to expectation.

There is yet a third, purely hypothetical option. Imagine cyclic palatalisation is allowed to apply to phonologically-derived environment, i.e. such environment as considered in the previous scenario, but is restricted to keeping its firing range within the material produced by an earlier cyclic rule. Thus, if any cyclic rule applies to //sinusik// before palatalisation does, the latter is still bound to the locality of the newly introduced //si//, and cannot scan the remainder of the representation for input. Reasonable as it seems, this presupposes that phonology keeps a record of what has already been processed by a cyclic rule, for instance by adding a feature [+"rule X has applied here"] to those segments to which a rule X has applied earlier on a given cycle. Since such a feature has no phonetic translation, one can hardly consider it to fit in the realm of distinctive features in the generative tradition.

What would perhaps rescue Kiparsky's SCC with respect to *sinusik* would be getting rid of the "application of a phonological rule in cycle j" bit in the formulation of Derived Environment or allowing for boundaries, those unwelcome diacritics that Kiparsky (1973) argued against, to re-enter structural descriptions of rules. The latter is not possible in LP, on principled grounds. The stratal architecture thereof is designed the way it is precisely to avoid using boundary markers—the *SPE* diacritics '+,' '#,' and '=' are expelled from LP—in rule formulation.[31] The former solution would only add to

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[29] This argument is falsified if a cyclic rule may apply only once in a given cycle. On orthodox reading of *SPE*, a rule scans the whole representation for as many instances of segments or strings that meet its structural description as available in a given cycle and applies to *all* of them in parallel. This is because *SPE* has no intrinsic directionality of rule application. Rules are not specified for scanning the representation rightwards or leftwards. Whether parallel application of a cyclic rule might cause the derivation to crash if one instance of a rule should bleed the input to another instance of the same rule while that instance is running—logically, this is a possible situation—is not a question to be answered on the spot. Still, it adds to the reservations on the explanatory power of *SPE*.

[30] In Rubach's (1984) analysis, which complies with Kiparsky's (1982*a*) version of SCC, *Coronal Palatalization*, the rule responsible for //s//→[ɕ]/_//i//, is ordered as the eleventh cyclic rule (p. 241ff).

[31] This is the reason Rubach's (1984) *Coronal Palatalization* (his rule (160)) cannot make explicit recourse to morphological boundaries.

the feeling that cyclic rules are all about sewing up morphological boundaries, whichever of the numerous flavours of Lexical Phonology is considered. [32]

The issue of locality, so far kept aside in this section, is not essential to Strict Cyclicity; rather it is related to abbreviated rules in *SPE*, McCawley's (1974) critique of which is given in section 1.3.1. Reconsider rule (3), repeated for convenience as (14) below.

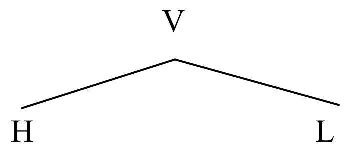
(14) $$V \rightarrow [1\text{stress}]/\_\_C_0\left(\begin{bmatrix}-\text{tense}\\ V\end{bmatrix}C_0^1\right)\ \Big]$$

The subscripts and superscripts in *SPE* notation denote the minimal and the maximal number of occurrences of the object to which they are indices. Hence, "C_0" denotes any non-negative number of consonants, from null to infinity. While one can hardly imagine a word in English in which two vowels would be separated by, say, ten consonants, the linear approach to morphophonemic representation in *SPE* did not give Chomsky and Halle much choice. A breakthrough in the perception of so-called suprasegmental features, essentially tone and stress, came in the mid 1970's with Goldsmith's (1976) dissertation, aptly titled *Autosegmental Phonology*. Goldsmith came up with a simple notation that could capture the fact that in some languages, a single vowel could carry

[32] Kiparsky's (1982*a*,*b*) and Mohanan's (1982, 1986) formulations of LP differ in that the latter allows brackets to appear in structural description of rules. The former does not, thus analyses that follow this flavour of LP have neither boundary markers (*SPE*'s '+', '#' or '=') nor brackets in their rule formulation. Recall note 31; Rubach's (1984) rules use Kiparsky's sort of LP formalism. Both Kiparsky (1982) and Mohanan (1982) are adamant that all rules in the lexical component are cyclic. Booij and Rubach (1984, 1987) include a single post-cyclic stratum in the lexical component, ordered after all the cyclic strata. Mohanan then has a dramatic change of mind, when he and Halle touch English; Halle — Mohanan (1985), referred to as a 1983 manuscript in Mohanan — Mohanan (1984), assume both cyclic and non-cyclic strata, but are clear on the possibility of sandwiching both types within the lexical component, as opposed to having all cyclic rules precede all non-cyclic/post-cyclic rules. Gussmann's (1985) review of Rubach (1984) levels heavy criticism on the a priori ordering of cyclic and non-cyclic rules in Rubach's system. Interestingly, Mohanan's (1986) book, where cyclic and non-cyclic strata are intertwined, does not receive a laudatory review either; Gussmann's (1988) review calls the loop between stratum 3 and stratum 2 "a noose for Lexical Phonology" (p. 237), and ends with the following statement: "If the critical assessment of lexicalism presented here and elsewhere were to be accepted, then Mohanan's book would very likely come to stand as a requiem for Lexical Phonology" (p. 239). Halle and Vergnaud (1987*a*) follow Halle and Mohanan's (1985) division into sandwiched, cyclic and non-cyclic strata, but reinstate morphology as a separate component of grammar, weakening the 1982(–1986) LP insistence on morphology and phonology working in tandem. Later, Halle and Vergnaud (1987*b*) go on in veering away from the 1982 standpoint in adding an allomorphy component between morphology and the first cyclic stratum in phonology. Scheer (in prep.: Part One, Chapters 7, 8) offers a detailed overview of LP(M) and Halle and Vergnaud's model from the perspective of referring to morphosyntactic information in phonology.

two tones, something “inexpressible … in segmental terms” (p. 1). The notation is given in (15) below.

(15) A falling toned vowel (Goldsmith 1976: 1)



From that moment on, it was a matter of time for other, non-suprasegmental features to break away from *SPE* matrices, sit on tiers, and attach to a skeleton via association lines. Such option was actually considered by Goldsmith (1976) himself. It was not until Clements’s (1985) paper, however, that “a consensus has emerged among many investigators that the complexes of features that make up the phonemes of a language do not form a simple list, but possess a hierarchical structure represented geometrically” (Halle 1995: 1). The advent of autosegmental tiers helped solve some of the outlandish parts of *SPE*, especially stress assignment (see, for instance, Halle 1998 for discussion and further references). Concerning rules, the idea of autosegments has shed new light on what Chomsky and Halle (1968: 400) called intrinsic content of features. If an autosegmental (or non-linear) perspective is taken, it is easier to see why rule (6) is more plausible than rule (7); these are repeated for convenience as (16), and (17), respectively.

(16) *Palatalization* (Gussmann 1980: 20; his rule (33))
[+cons] → [–back]/ __ [–back]

(17) *Hypothetical depalatalisation* (travesty of rule (6) (=(16)))
[+cons] → [+back]/ __ [–back]

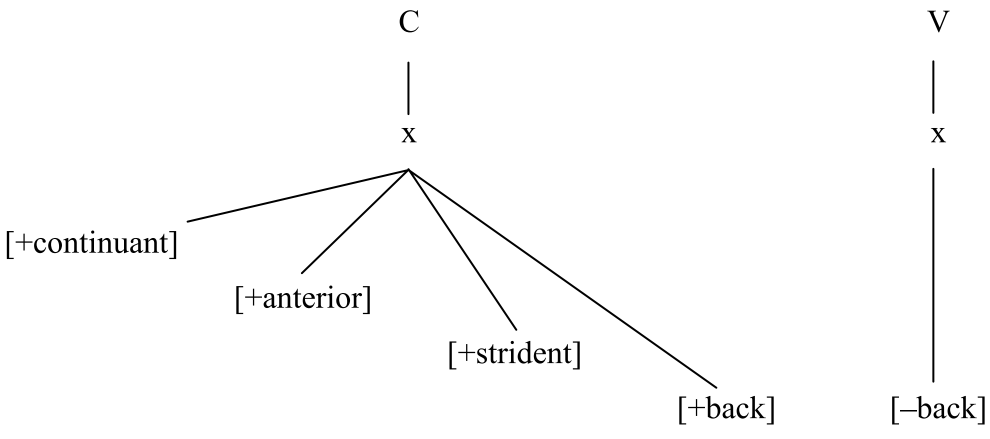
The descriptive power of both rules is equal. The intuitive, and empirically true, advantage of rule (16) over rule (17) is not expressible in *SPE* formalism, but can be reflected in non-linear terms. Consider (18) below.

(18)

The left-hand piece of the representation shows two autosegments, one of which is specified for being [consonantal], the other for being [–back]. As *SPE* derivations are supposed to fill unmarked features, so that the A–P interface is able to grant them phonetic interpretation, the question of which value of [±back] the consonant should receive is best answered as the value which it can acquire from an adjacent autosegment via feature spread, in this case [–back], as shown in the right-hand example.

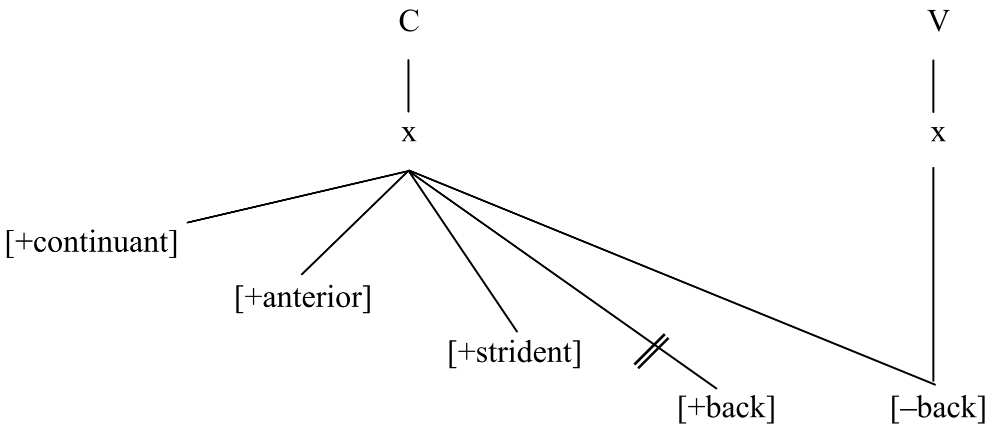
The superficial simplicity of treating phonology as consisting merely of autosegments influencing one another with their features is somewhat complicated by cases in which feature spread as such does not give the answer to how, let alone why, an alternation surfaces the way it does. Reconsider the *sinus* ~ *sinusik* case. An underlying //s// in both words may be specified for being {[+continuant]; [+anterior]; [+strident]; [+back]}; this is the specification used in Rubach (2003: 603). An underlying //i// is crucially specified for [–back]. When neighbouring on one another, the underlying segments //s// and //i// may be represented as in (19) below.

(19) //si//



Assuming that all distinctive features of //s// and //i// are present in (19)—voice on //s// may be taken to be unspecified, to be filled with [–voice] by a rule—one is faced with the phonetic reality of Polish, viz. [si] is unpronounceable. For a coronal consonant to be followed by [i], it requires a secondary, palatal articulation. This articulation may be specified as [–back], which reflects the articulatory relation between the vowel space and the setting of the body of the tongue; front vowels require the front of the tongue to be raised. Thus, a representation close to phonetic reality would be that in (20) below.

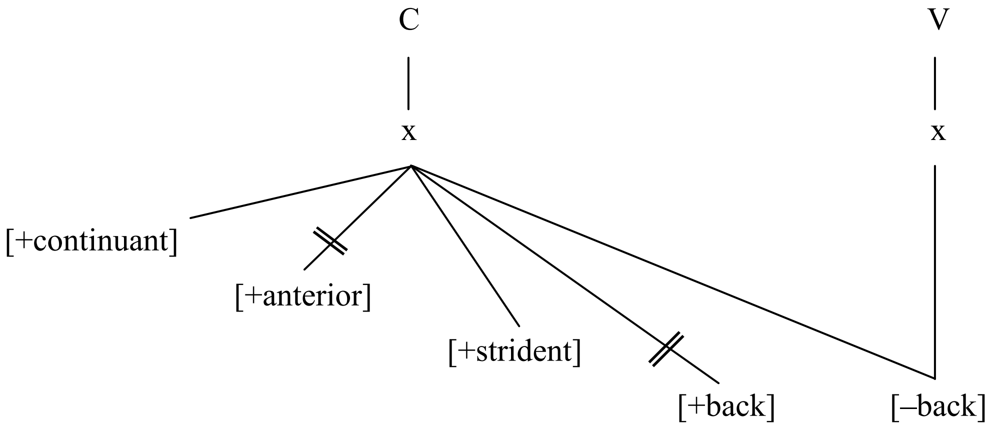
(20) [s^ji]



When [–back] of the vowel is spread onto the consonant, its previous backness specification has to go; [+back] and [–back] being represented on a single tier, they cannot attach to a single x-slot both at a time. The feature geometry of (20) reflects the fact that for //si// to be pronounced, the consonant and the vowel must agree in [±back]. It also reflects the causality of agreement; namely, the frontness of the vowel forces the palatalisation of the consonant. A non-linear representation makes it clear that of the two *SPE*-type rules, (16), and (17), only the former is motivated by an intrinsic property of segments. What is expected in an autosegmental setting is that if a feature spreads, it spreads with its actual, not opposite value. For [–back] to spread as [+back] would be simply against autosegmentalism.

With respect to the *sinus* ~ *sinusik* case, representation (20) fits the leftmost //si// sequence, viz. [s^ji]. As for the word-final //s// of *sinus* and the base-final //s// of *sinus+ik*, these are not [–back] until followed by a [–back] vocoid. (Pre-pausal [s^j] is not attested in Polish.) Thus, their feature geometry is that of the //s// in (19). Problems arise when such a //s// forms a morphophonological joint with //i//, the intrinsic property of which is to spread [–back] leftwards. If the //si// sequence formed at the morphological boundary in *sinus+ik* should account for the spreading of [–back] from the vowel onto the consonant, its geometric representation should be the same as in (20). This, however, cannot account for the fact that in *sinusik*, the CV sequence found at the morphological boundary is pronounced [ɕi], not [s^ji]; the latter is the pronunciation of the morpheme-initial sequence found in both *sinus* and *sinusik*. A phonetically true representation of the [ɕi] sequence would be that in (21) below.

(21) [ɕi]



The feature specification of the consonant in (21) meets that used in Rubach (2003: 603); it is attested as the phonetic value of //s// followed by //i// across the base–suffix boundary in Polish. Phonetically correct as it is, it is not obvious, from an autosegmental perspective, why the spreading of [–back] from a vowel onto a consonant should deprive the latter of its [+anterior] specification, the more so since vowels are indifferent to [±anterior], all of them being [dorsal].[33] The //s//→[ɕ] palatalisation, as opposed to the //s//→[sʲ] palatalisation, cannot be accounted for in autosegmental terms if representations are to reflect phonetically true generalisations. One could surely argue that //s//→[ɕ] is a morphophonemic rule of Polish and that it has nothing to do with phonology proper. This argument would be backed up by the observation that word-final [s]'s are not [ɕ]'s if followed by [i] across the word boundary. In the phrase *sinus i cosinus* 'a sine and a cosine' the sequence in question is [sʲi], not [ɕi]. Still, the fact that word-internally, [sʲi] is restricted to foreign words and that in native Polish (Slavic) vocabulary, [ɕi] is the attested sequence cannot be overlooked.

A solution is to be sought in the fact that while [sʲi] and [ɕi] are both found phonetically, such sequences as *[si] or *[sʲɨ], where the vowel is phonetically front retracted (near central), let alone *[ɕɨ], are not found at all in native Polish speech. That

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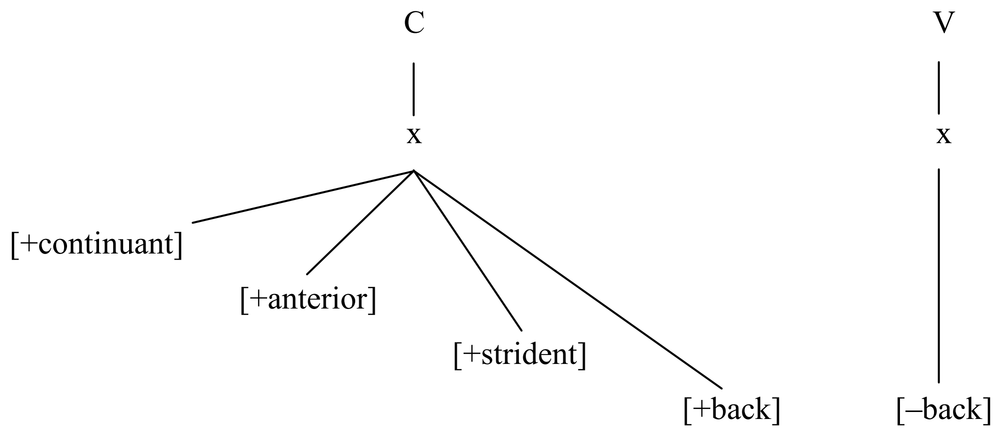
[33] These features are true for Sagey's (1986) geometry, which Rubach (2003: 603) uses. If one took *SPE*'s matrices, then all vowels would be [–anterior] (see *SPE*: 176–177). That would save representation (21), but destroy (20), in which a hypothetically [–anterior] vowel does not spread its non-anteriority onto the consonant; recall that the consonant in (20) is [–back] but [+anterior].

points to the full predictability of the secondary palatal articulation of //s// if followed by [i]. This, in turn, means that a morphophonemic representation can do without any reflex thereof by virtue of *[si] never contrasting morpholexically with [s^ji]. The secondary palatal articulation in [s^ji] is handled by the phonology–phonetics interface; it is a low-level, automatic rule.

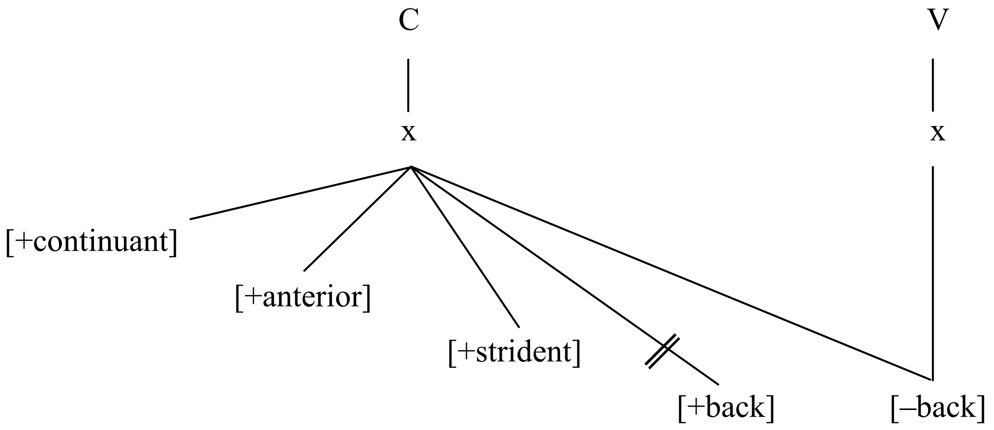
If predictable and morpholexically non-contrastive feature combinations are shoved out of phonological representations, then the role of diagrams (19), (20), and (21) changes radically. Representation (19), repeated for convenience as (22) below, is reinstated as correctly representing the underlying //si// in *sinus*, which is actualised as [s^ji] at the interface.

(22) //si// → [s^ji]



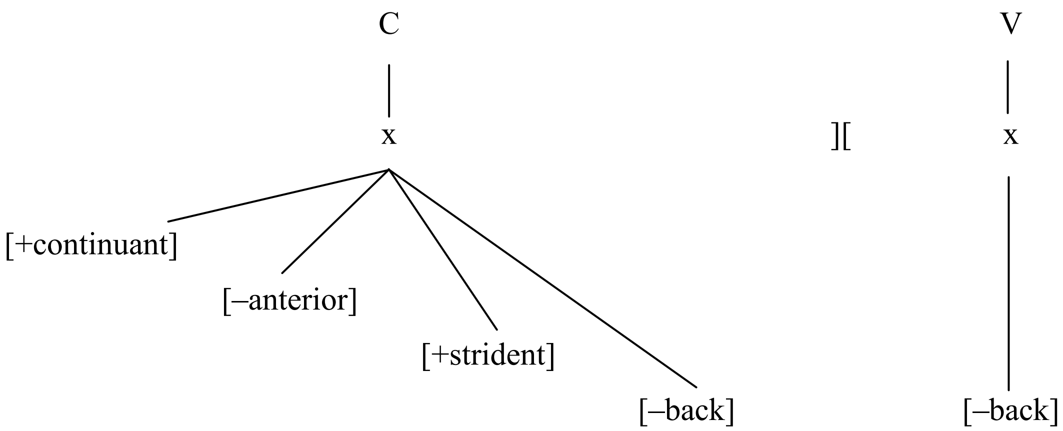
Representation (20), repeated for convenience as (23) below, is reinstated as correctly representing the underlying intermorphemic //s//+//i// in *sinusik*, which is actualised as [ɕi] at the interface.

(23) //s//+//i// → /sʲi/ → [ɕi]



Finally, representation (21) is redundant, as the delinking of [+anterior] on //s// does not happen when //i// appears in a morphophonemic representation. This does not preclude [ɕ] from appearing without a following [i] at all. Word-finally, the consonant in question is attested, for instance, in *ryś* [rɨɕ] 'lynx,' or *ktoś* [ktɔɕ] 'somebody.' When followed by [i] across the word boundary, however, its adjacency to the vowel need not be reflected in a morpholexical representation. The simplest reason for this is that the neighbouring of [ɕ] and [i] across word edges is phonologically accidental. It is an effect of phrasal syntax, not word formation or *morpho*-phonology. Thus, in the phrase *ktoś inny* 'somebody else,' the word break sequence [ɕi] comes from phonetic actualisation of two separate representations, perhaps those in (24) below.

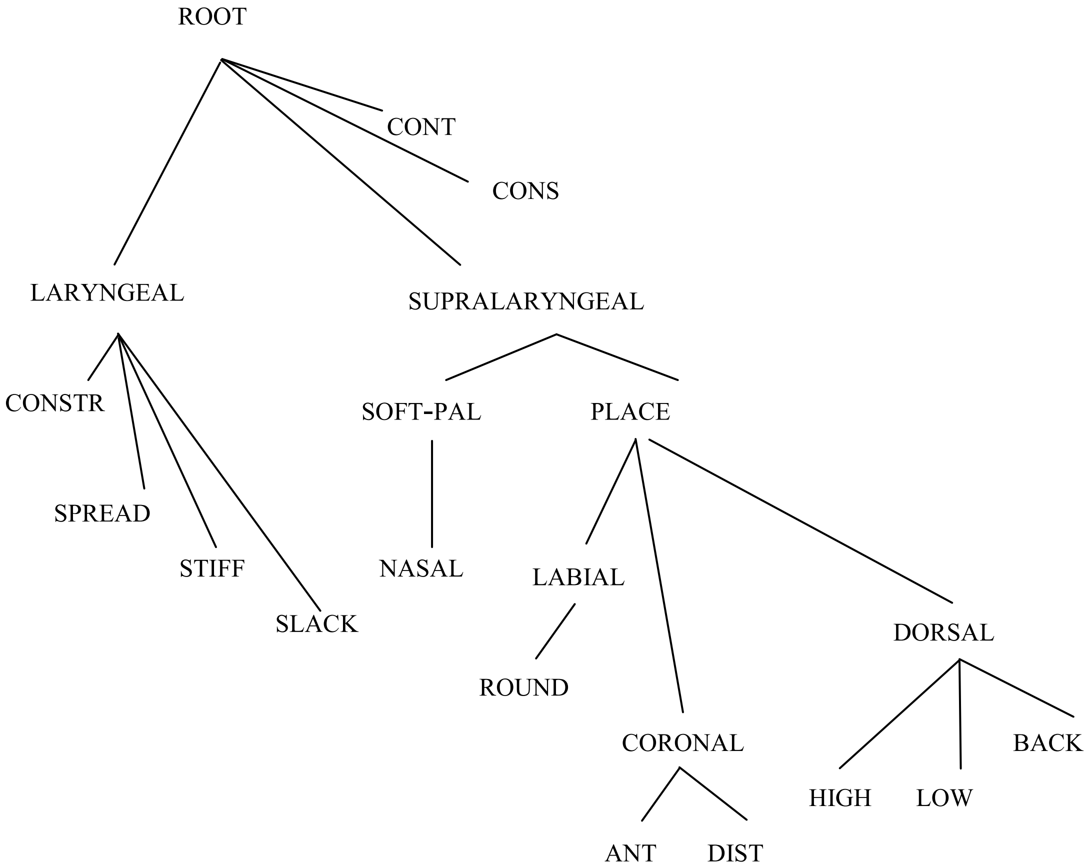
(24) [ɕi] across a word break



The present study endorses the morphophonemic mode of using non-linear representations; low-level, automatic, and predictable features are not part of these representations.

The advent of non-linear phonology as such did not curtail all overgeneration. Sagey's (1986: 273) geometry has thirteen terminal features. This is exactly the number of features found in the *SPE* matrix (*SPE*: 176–177). What is an improvement over a matrix is the grouping of terminal features into classes. Consider the geometry shown in (25) below.

(25) Feature geometry (Sagey 1986: 273)



For instance, the features [anterior] and [distributed] are dependants of [coronal]. The feature [back], on the other hand, is subordinate to [dorsal], and it is only at the level of [place] that [anterior] and [back] have anything in common. Such geometry allows for predictions concerning what is expected to happen when a front vowel follows a consonant. Vowel quality being defined by the setting of the dorsum and the rounding of the lips, the feature [coronal] is not a vocalic property. Thus, if the Polish case of palatalisation in *sinus* and *sinusik* is considered one more time, it is clear that the loss of [+anterior] that supposedly takes place when the stem-final //s// is followed by //i//, and which is also found morpheme-internally in native words, cannot be a purely phonological phenomenon if feature geometry is designed for phonology, not phonetics.

A vowel cannot remove [+anterior] from a consonant via lateral relation, for it is devoid of any [coronal] specification, a superordinate of [anterior], in the first place.

One could take a different perspective on feature geometry. Perhaps, when //s// is palatalised via [–back] spreading onto it from //i//, the feature [+anterior] is not affected at all. Only after palatalisation has applied does phonology assess the features that make up the palatalised /sʲ/ and delinks [+anterior] by a rule, presumably because [–back] coronal fricatives should not be [+anterior], or that [sʲi] is banned via some constraint, say, *[sʲi] (="Don't be [sʲi]"), and what have you. This assumption is immediately countered by the fact that Polish does have [sʲi] both word-internally and across lexical divisions. One can hardly argue that [sʲi] is an illicit sequence, at least from the point of phonetically motivated morphophonemics.

On the other hand, given the defective distribution of such sequences as [sʲi] in Polish and the abundance of [ɕi] found where underlying //s// is joined by //i// across a morphological division, one is tempted to conclude the following. Whatever the distinctive features of //s// and //i// are, the combination of these found in native morpheme-internal and across native intermorphemic combinations of //s// and //i// is interpreted as [ɕi], not [sʲi]. Hence, the morphophonemic structure of such combinations cannot be merely a feature geometric puzzle performed on articulatory features. Phonetically true features are unable to capture the relevant generalisation regarding palatalisation in native and non-native morphophonemics of Polish. Therefore, the approach taken in the study of Polish (and English) morphophonology performed in subsequent chapters does not use such features as distinctive in the relevant sense.

1.3.3. Government Phonology

Non-linear phonology and feature geometry may be an improvement over *SPE* feature bundles. Still, as shown on the example of the duality of palatalisation in Polish, the use of features that have direct correspondence to articulatory phonetics does not allow for capturing such generalisations that are real in morphophonological but outlandish in phonetic sense, and the other way round. Since the present study is inclined towards morphophonemic generalisation, rather than towards phonetic detail, the choice has to be made with respect to the formalism that is best suited at the former. Some hope of capturing relevant morphophonemic distinctions is found in a different type of abstract representations, one whose building blocks do not have *direct* correspondence to phonetics.

Among models in which the building blocks of phonological representations have *indirect* correspondence to phonetics, one finds Government Phonology.[34] The model as such is not monolithic, and the discrepancy between the mechanics of various GP analyses is, subjectively, no smaller than that of Lexical Phonology (see footnote 32). The starting point is arguably KLV (1985).[35] While dealing with vocalic systems only—consonants had yet to be (re-)discovered in GP—the paper sets out the agenda.

> The theory of segmental representations to be presented here differs from other such theories in a number of significant ways. To begin with, the ultimate constituent of this theory is not the phonological feature. In fact, phonological features may not be accessed directly or manipulated in any way within this approach. Their role is rather a secondary one serving as an instrument of phonetic interpretation of phonological segments. The primary unit of segment constitution is the ELEMENT, which is a *fully specified matrix*, phonetically interpretable as in *SPE* theory or some equivalent formulation. All phonological segments are either elements themselves or combinations of elements. The elements, along with their definition in terms of features, constitute the primitives of phonological systems. Put another way, the ultimate constituents of phonological segments are themselves autonomous, independently pronounceable units. (KLV 1985: 306)

The elements and the matrices alluded to in the block quote above are exemplified in (26) below.

(26) Some elements (KLV 1985: 306)

$$\mathrm{I}=\begin{bmatrix} -\mathrm{ROUND} \\ \underline{-\mathrm{BACK}} \\ +\mathrm{HIGH} \\ -\mathrm{ATR} \\ -\mathrm{low} \end{bmatrix} \quad \mathrm{U}=\begin{bmatrix} \underline{+\mathrm{ROUND}} \\ +\mathrm{BACK} \\ +\mathrm{HIGH} \\ -\mathrm{ATR} \\ -\mathrm{low} \end{bmatrix} \quad \mathrm{A}=\begin{bmatrix} -\mathrm{ROUND} \\ +\mathrm{BACK} \\ \underline{-\mathrm{HIGH}} \\ -\mathrm{ATR} \\ +\mathrm{low} \end{bmatrix}$$

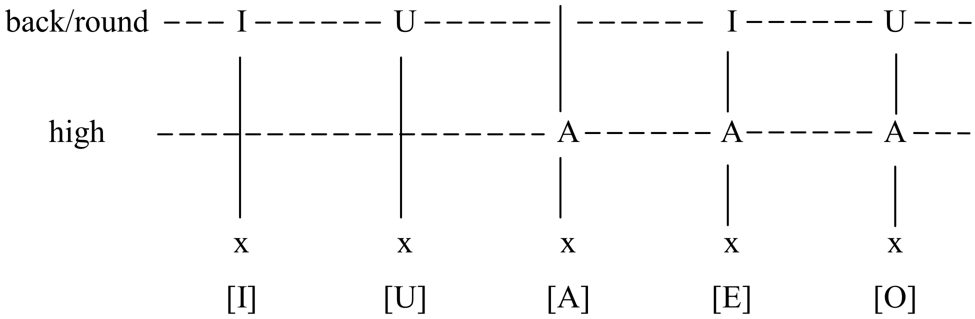
The underlined features are so-called hot features of elements. Each element has exactly one hot feature. At this stage of the theory's development, segments are viewed as two-dimensional grids, composed of lines on which elements reside, and of x-slots with

[34] Other models include Dependency Phonology (see Anderson — Jones 1974, and Anderson 2002 for references) and Particle Phonology (Schane 1984).

[35] See KLV (1985: 305) for references to earlier, (then yet) unpublished work. In addition, at that point in history, the theory is referred to as "Charm Theory" rather than "Government Phonology."

respect to which the elements form given segments. Consider the example in (27) below.

(27) Some segments shown in KLV (1985: 308)



Despite being defined by nothing else but *SPE* matrices, the elements are supposed to be autosegments.

> We assume that elements are normally found on separate tiers or LINES. These lines are labelled. A line label is the name of the hot feature of its element. Thus, I is found on the BACK line, U on the ROUND line, etc. Elements on lines display properties of an autosegmental nature. Successive elements on a given line either define separate domains or else trigger OCP (obligatory contour principle) effects (cf. Leben 1973). The presence of a line in a given system indicates that the feature which is the line label is active in the system. The absence of a line labelled, say, GLOTTAL SUCTION, indicates that this feature is inactive in the system in question. For a feature to be active in a system, its marked value must be borne by some element. All elements reposing on a line other than that of the feature in question by definition bear the unmarked value for the feature.
>
> In certain systems lines may be FUSED. In such cases two lines combine to form a single line. This possibility has a number of empirical consequences. A fused line must contain more than one element, since each individual line contains the element whose hot feature is the line label. Fusions of this sort create a situation where two elements reside on the same line. This has implications for possibilities of spreading and for the manner in which OCP effects are triggered. Most importantly, elements on the same line cannot combine to form a compound segment. This is trivially true in the case of non-fused lines, since such a case would imply the association of two identical elements to the same skeletal position. This is always interpreted as a single element attached to a single point. The results of line fusion partially define impossible element combinations. Fusion of the BACK and ROUND lines, an unmarked option of vowel systems, renders combinations of I and U impossible. This effectively excludes a front rounded vowel series in the systems in question. (KLV 1985: 307–308)

Compound segments are an effect of two elements undergoing fusion. The elements undergoing fusion are necessarily assigned the role of the head and the operator. “Fusion consists of substituting the value of the hot feature of the operator for that of the corresponding feature of the head. Otherwise all the remaining feature values are those of the head" (KLV 1985: 309). Fusion is represented in (28), where the dot is the fusion operator, followed by the head.

(28) Fusion (KLV 1985: 309)

$$X.Y \rightarrow Z$$

An example of fusion is given in the form of the A.I operation in (29) below.

(29) A.I (KLV 1985: 309)

$$\begin{array}{ccccc}
\begin{bmatrix} -\text{ROUND} \\ +\text{BACK} \\ \underline{-\text{HIGH}} \\ -\text{ATR} \\ +\text{low} \end{bmatrix} & \cdot & \begin{bmatrix} -\text{ROUND} \\ \underline{-\text{BACK}} \\ +\text{HIGH} \\ -\text{ATR} \\ -\text{low} \end{bmatrix} & \rightarrow & \begin{bmatrix} -\text{ROUND} \\ -\text{BACK} \\ -\text{HIGH} \\ -\text{ATR} \\ -\text{low} \end{bmatrix} \\
\textit{operator} & & \textit{head} & & \\
\text{A} & \cdot & \text{I} & \rightarrow & [\varepsilon]
\end{array}$$

As it appears, the output of fusion is devoid of any hot features.[36] This precludes a compound segment from any meaningful participation in further fusions as an operator; it may still undergo fusion as the head. Theoretically, if all compound segments derived via fusion of all elements—KLV (1985) list five elements in total, and a "cold vowel", a segment devoid of any hot features—are fused once more with all available operators, the system allows for many more vowels than *SPE* did.[37] Fusion is asymmetrical. The output of A.I is not the same as that of I.A. Consider (30) below.

---

[36] This is evident from illustrations given in KLV (1985)—there are no underlined features in fused segments—but on which no explicit remark is made in the text. To the contrary, a paragraph in the text implies that compound segments may have more than one hot feature:

> It will be noticed that each element has one and only one feature with a marked value, in other words only one hot feature. This is the defining property of an element. I is thus distinguished from, say, [ɛ] in that it contains one marked feature value, [–BACK], whereas the latter segment contains two: [–BACK] and [–HIGH]. *In sum, elements are feature matrices containing precisely one marked feature value*. (KLV 1985: 307; emphasis original)

If "a marked feature" is logically "one hot feature", then the paragraph and the illustrations of fused segments with no underlined features are mutually exclusive.

[37] Coleman (1990*a*) notes the serious overgeneration of KLV's (1985) system, albeit without using the term 'overgeneration' as such. In an ensuing exchange with Kaye, Coleman is first corrected on having

(30) I.A (KLV 1985: 309)

$$
\begin{array}{ccccc}
\begin{bmatrix} -\text{ROUND} \\ \underline{-\text{BACK}} \\ +\text{HIGH} \\ -\text{ATR} \\ -\text{low} \end{bmatrix} & \cdot & \begin{bmatrix} -\text{ROUND} \\ +\text{BACK} \\ \underline{-\text{HIGH}} \\ -\text{ATR} \\ +\text{low} \end{bmatrix} & \rightarrow & \begin{bmatrix} -\text{ROUND} \\ -\text{BACK} \\ -\text{HIGH} \\ -\text{ATR} \\ +\text{low} \end{bmatrix} \\
\textit{operator} & & \textit{head} & & \\
\text{I} & \cdot & \text{A} & \rightarrow & [\text{æ}]
\end{array}
$$

The reverse ordering of the elements acting as the head and the operator changes the role of the unmarked features they have. This time, it is [+low] that surfaces in the fused segment.

To counteract overgeneration, KLV (1985) propose that the combinatorial possibility of elements is curtailed by "charm."

> Let us assume that there are charmed elements (indicated as positive [+]) and charmless elements (indicated as negative [–]). We further assume that elements with like charm are repelled and that there is an attraction between elements of unlike charm. The elements may now be grouped according to charm as shown in the following table:
>
> | *charmed* | | *charmless* |
> |---|---|---|
> | A+ | (oral) | I– |
> | Ɨ+ | (pharyngeal) | U– |
> | N+ | (nasal) | v– |
>
> Intuitively, charm may be related to the property of 'voweliness'. Positively charmed elements have this property, while negatively charmed ones lack it. A vocalic articulation is characterised by the presence of a resonating cavity. There are three principal resonating cavities in the human vocal apparatus and to each is associated a positively charmed element. Thus A+ is related to the oral cavity. The ATR element, Ɨ+, is related to the pharyngeal cavity; recall that the interior wall of this cavity is formed by the root of the tongue. Advancing this organ enlarges (activates) this cavity… The N+ element is of course related to the nasal cavity. The charmed elements may be thought of as switches which activate the resonating cavity in question. We assume then that the archetypal

---

misread the assumptions on the generative potential of FUSION (Kaye 1990*c)*, to which Coleman (1990*b*) replies that Kaye's "responses are either contradictory to published principles of Charm Theory or problematic for other reasons" (p. 183). In the same note, Coleman (p. 184) calculates that Kaye and the others' theory allows for combining 13 features—the growing literature on Charm theory apparently recognised that number of elements at that time—into 2^{13}, i.e. 8192 segments. Whether Coleman's notes are well grounded or not—one needs to carefully examine the discussion themself—8192 segments generated from contrastive features is more than overgeneration; it is a disaster. Notice that this is exactly the number of hypothetical segments in *SPE*, which also has 13 binary features. However, some of them, e.g. [voice], [continuant], [nasal], and [strident], are only found on consonants, which makes *SPE* appear more restrictive than Charm Theory in the light of Coleman's reservations.

> vowel has a positive charm. Negatively charmed vowels exist, but only in special circumstances. (KLV 1985: 311–312)

The notion of Charm is then employed to extend relations among elements from paradigmatic, i.e. infrasegmental, to syntagmatic, and to introduce the (phonological version of the) notion of Government.[38]

> If positive charm is a property of vowels, or more properly a property of syllable heads, it would be natural to express a number of phonological phenomena in terms of this trait. For example, we could express the force that binds syllable onset and rhyme in terms of charm. We have already noted that in a subsegmental domain opposite charms attract. Suppose we extend this idea to the suprasegmental level. In this sense the rhyme, which can be considered a projection of the nucleus in the familiar sense, contains a positive charm which governs the negatively charmed onset. The fundamental opposition of onset and nucleus is then expressed in terms of charm. The positive and negative units cancel each other, leaving us with a neutral syllable. Neutrality with respect to charm can be viewed as a sort of phonological autonomy. This picture is far from complete. A phonological sequence is not merely a string of autonomous syllables. Numerous phonological processes serve to bind syllables of a given domain (word, clause, sentence) together. Stress, tone, harmony, assimilation, etc., may all be viewed as serving this function in one way or another. What these phenomena have in common is the presence of a dominant unit of some form in relation with one or more subordinate units. We call this relation GOVERNMENT. It is our view that charm is the agent through which government is expressed. (KLV 1985: 314)

The 1985 article is an early hint at the preoccupation with syllabic constituency and governing relations among segments, which culminated around 1990 with a series of papers on the issues in question; Charette (1989, 1990, 1991), Harris (1990), Kaye (1990*a*,*b*), and KLV (1990) form a near-exhaustive list of publications on matters governmental at that time. Of these, KLV (1990) are informative on what they call 'ground rules' of their research programme (p. 194): privativeness, universality, and non-arbitrariness. These are defined as follows, in the respective order. "Phonological oppositions that are privative at the level of lexical representation remain privative *at all levels*." "The set of available phonological processes behaves like a function mapping

[38] Government Phonology bears conspicuous affinity to Government-and-Binding syntax (Chomsky 1981), including the *Barriers* system (Chomsky 1986). Apart from Government (including Proper Government; KLV 1990), such syntax-related analogies in phonology as the Empty Category Principle (ECP; KLV 1990), the Projection Principle (KLV 1990) or the Minimality Condition (Charette 1989) have been postulated. (Exceptionally, Charm is not a syntactic notion.) Strangely, the notion of Binding has only recently appeared in GP, in the flesh of Kaye — Pöchtrager (2009). This is despite c-command, a central notion in syntactic Binding, making phonological appearances in GP literature much earlier (see Charette 1989 or Kaye 1990*a* for references on its origin in GP). It is with some irony, then, that the Government Phonology movement did not collapse when generative syntax started moving away from GB syntax in the quest of minimalism, following Chomsky's (1993, 1995) and subsequent work. See Carr (2006) for an overview and some discussion on the alleged analogies between syntax and phonology.

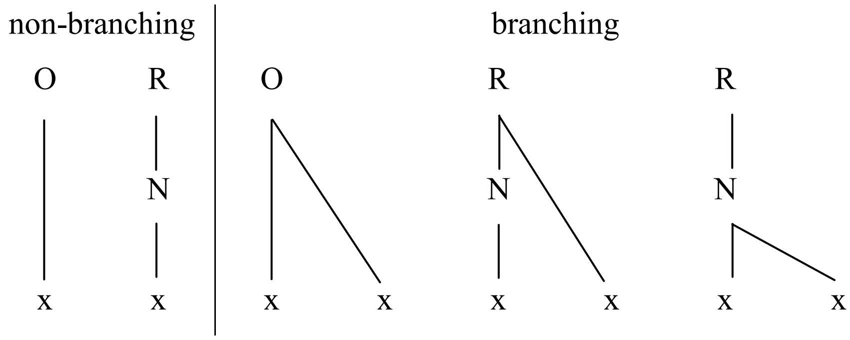
initial representations onto final representations." "There is a direct relation between a phonological process and the context in which it occurs" (all citations: p. 194).[39,40] In particular, the insistence on the privativeness of oppositions gives a hint at a quiet departure from defining elements as *SPE*-type feature matrices.[41] The theory has since evolved into two main areas: syllabic constituency and elements. Some light on the latter is shed in Harris (1994), Harris and Lindsey (1995), and Pöchtrager (2006), who provides (pp. 12–16) an informed overview of who proposed what and when in the realm of GP elements. (The elements will be revisited in Chapter 2.) The former area is more important to this section. KLV (1990: 199) only allow for the constituent structures shown in (31) below.

[39] KLV (1990) also expand on the notion of Charm. It is amended by recognising a third value. "We now propose three values for the charm property: σ^{+}, σ^{-} and σ^{o}. Segments may be positively or negatively charmed or they may be neutral (charmless). What was positively charmed in KLV [1985] remains as such. The negatively charmed segments of KLV [1985] are now considered neutral. We add a third category of segment: the negatively charmed segment" (p. 202). This is followed by new principles. "Charmed segments may govern; charmless segments may be governed… Positively charmed segments may not occur in non-nuclear positions; negatively charmed segments may not occur in nuclear positions" (p. 202). As the present study makes no practical use of Charm, this note is intended to show that within Charm and Government literature, there never was a single publication encompassing all properties of the theory in a working state. Unlike *SPE*, the theory of Charm and Government did not yield a comparable monograph on English phonology; Harris's (1994) book is not a study of English word formation or morphophonemics.

[40] On a related matter: Charm has been gradually superseded by the notion of complexity, first brought to Government Phonology by Harris (1990). In his (1994) monograph, the term 'Charm' is relegated to but two footnotes. Thus, even around 1990, where a plethora of publications on the model appeared, they did not all endorse a unified theory of phonology. On an explanatory note: KLV 1990 is developed from a 1987 conference paper, as a careful study of the reference section in Kaye (1990*b*) reveals. The lengthy production cycle of KLV's article might explain the discrepancy between Harris's and KLV's take on combinatorial restrictions of segments; Harris (1990) manages to make an unreturned direct reference to KLV (1990), both papers being published in the same volume of *Phonology*.

[41] The word "matrix" does not make a single appearance in Charette (1990), Kaye (1990*a*), or KLV (1990); it still does in Charette (1989), or Harris (1990). A few years later, however, Harris (1994: 97ff) clearly defines elements without recourse to matrices and argues elements have acoustic correlates (p. 139ff). This position is strengthened in Harris — Lindsey (1995). Finally, Kaye (2000) concludes the following. "Each element is a monovalent, (potentially) interpretable phonological expression. Its actual interpretation depends on i. what phonological constituent … dominates it and ii. whether it occupies a head or operator position within a phonological expression" (p. 1). Thus, the binary world of *SPE* features has been totally abandoned in GP.

(31) Constituents in KLV (1990: 199)



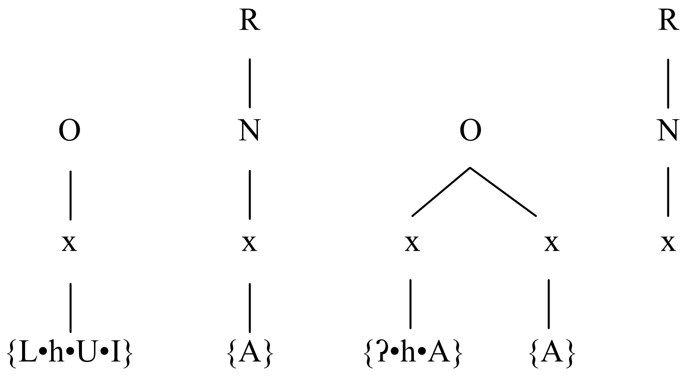
The configurations given in (31) are all the permissible combinations of syllabic slots in the 1990 theory. Coupled with a fixed set of syllabic objects is a major conjecture made in Government Phonology, one that appears to have withstood various refinements of the theory as such. It is the Projection Principle, formulated in (32) below.

(32) The Projection Principle (KLV 1990: 221)
"Governing relations are defined at the level of lexical representation and remain constant throughout a phonological derivation"

Two things are implied by the Principle. First, Government Phonology has no syllabification algorithm; syllabic arboreality is lexical, not derived via rules.[42] Second, once a segment is lexically stored under a syllabic constituent, it must not move to another one. This gives the Polish example (1) the chance is repeating itself for convenience as (33).

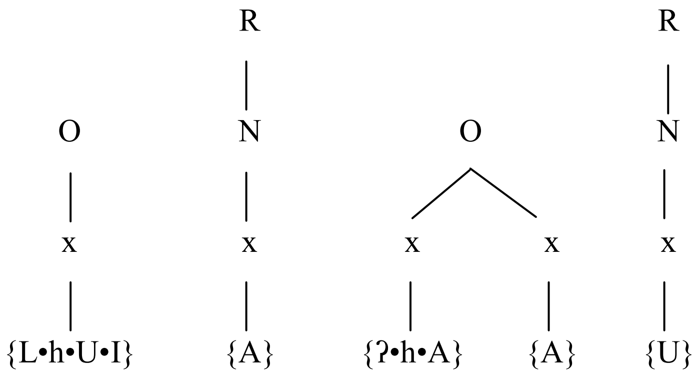
[42] This has no bearing on the anti-*SPE* character of mainstream GP; *SPE* does not recognise syllables as phonological entities at all. Other post-generative models, however, usually do include various rules or constraints for computing syllabic constituency from syllable-free underlying structures. See, for instance, Scheer (2004: 415–435) and Zec (2007) for an overview of syllable-related issues and further references.

(33) *wiatr* [vʲatr̥] ‘wind’[43]



Against (33), compare (34) below.

(34) *wiatr–u* [vʲatru] ‘wind (gen.sg.)’



The rightmost rhyme in (33) is devoid of melody, and yet it forms a lateral relation with the preceding onset; in KLV’s (1990) terms, it licenses the onset. Surprising as it may seem, the cluster [tr̥] is lexically an onset, not a coda, and [r̥] as such is crucially not an extrametrical consonant. A good reason for this is the alternation between the nominative of *wiatr* and its genitive, viz. *wiatr–u* [vʲatru], whose representation in standard GP terms is given in (34). The genitive form has a non-null inflectional suffix, which takes the position of the final nucleus. The position of [tr̥] in an onset, rather than in a coda, is now fully motivated. All word forms of *wiatr* are pre-syllabified in their lexical entries in the sense that the stem-final consonants form an onset whose related nucleus, and hence rhyme, is empty. The principles governing empty categories in GP are not relevant to this section. Rather, they show that no matter how phonetically true

[43] The discrepancy between the elements used in this example and those used in KLV (1985, 1990), paired with the lack of any Charm here, is not relevant for the discussion.

some proponents of the theory would wish it to be, its building blocks are abstract. In fact, they are more abstract than the representations in *SPE*, except maybe for [–segment] segments.

Notice the following properties of GP. First, all GP elements and phonological expressions they form are pronounceable, but they are not complete articulatory feature specifications themselves; this statements assumes elements are no longer shorthand for *SPE* matrices. Second, empty categories have no phonetic reality; pauses in phonetic substance may, but need not correlate with empty nuclei. This implies that GP should have a phonology–phonetics interface, but such an entity appears not to have been formalised yet. On the contrary, Kaye (1995: 289) is adamant that "there is no phonological-phonetic interface for the simple reason that there is no linguistically significant level of phonetics as distinct from phonology." Here comes the basic misunderstanding of what phonology is. On Kaye's money, phonology and phonetics appears to be one. In mainstream GP, all processes that take place between lexical representations and phonetic substance are handled by one computational unit. This is more than even *SPE* could handle. Recall that Chomsky and Halle's (1968) system of distinctive features is not a system of direct articulatory cues.[44] Hence, such a phenomenon as T-voicing (a.k.a. tapping/flapping) is outside the scope of their book; this is an utterance-level process, whose distribution is not related to word formation rules. In mainstream GP, however, every element in a phonological expression has an independent phonetic interpretation, thus the difference between [t] and [ɾ] (or even [t̚] and [ʔ], provided these are actualisations of //t//) is captured by changing the incriminated expression in a representation by getting rid of elements responsible for particular places and manners of articulation (see Harris 1994: 194–225). Cultivated in this manner, GP is not much of an improvement over *SPE*, for one needs to assume there are some lexical representations which are computed over and over again before their phonetic actualisation takes place. Even worse, those lexical representations are

[44] The relevant bit of *SPE* reads as follows.

> As classificatory devices, the distinctive features play a role in the full specification of a lexical entry (along with syntactic and semantic features and idiosyncratic classifications of various sorts that determine the behavior of a lexical entry with respect to the rules of the grammar). As phonetic parameters, the distinctive features provide *a representation of an utterance which can be interpreted as a set of instructions to the physical articulatory system*, or as refined level of perceptual representation. (*SPE*: 65; emphasis mine)

pre-syllabified and contain empty categories. *SPE* representations have no empty categories, although [–segment] segments have no articulatory correlates. Still, some of the [–segment] segments may be removed during derivation by appropriate conventions, before the A–P interface is given phonological representations for interpretation.[45] In Lexical Phonology, on the other hand, all word-internal bracketing is removed before representations enter the post-lexical component. If viewed from a reverse perspective, empty categories are not reflected articulatorily—under some provisions, empty categories receive no interpretation—so they are also undetectable from acoustic signal in speech recognition. One wonders on what grounds a speaker of Polish could detect the empty final nucleus in *wiatr* (33) if not by matching the acoustic input with the content of an entry in their lexicon. If all other theory-internal assumptions are suppressed, the pre-syllabification of [tr̥] into an onset only makes sense if there are word forms of *wiatr* in which a vowel follows the alledged onset. Indeed, such forms exist in Polish, and *wiatr–u* in (34) is just one of these. The relation between (33) and (34) is not due to phonetically misperceived phonology as such; rather, this is the effect of inflectional morphology. If such component of grammar as morphology is recognised as having any bearing on phonology, the relation of (33) to (34) is morphophonological. Consequently, even though proponents of the theory might downplay this fact, GP representations are abstract in the sense of the third type of morphophonemics enumerated in Kiparsky (1973; see section 1.3.1). What remains to be done is to push the abstractness of GP to a reasonable limit, which is at what the present work points.

What is needed is a switch of attention from phonetically motivated phonological processes to the relation between underspecified, reasonably non-redundant morphophonemic representations and their phonetic actualisation. In the subsequent chapters, GP-based representations are argued to capture morpholexical contrasts and be devoid of information that is predictable by rules governing the phonology–phonetics interface. Such processes as T-voicing (mainly American English) or glottal reinforcement and replacement (mainly British English) may have good phonetic motivation and their application may lead at times to contextual neutralisation of morpholexical oppositions, but they have no bearing on morphophonemic representations. Whether *writer* and *rider* appear homophonous in casual speech

[45] See *SPE* (p. 367) for an early hint of word boundary erasure, and Selkirk (1972: 12; 1974: 578) for concrete formulations.

(['ɹaɪɾɚ] in rhotic accents), it does not change the careful speech situation, in which *writer* has an intervocalic [t], while *rider* has a [d]. In Polish, *kot* 'cat' and *kod* 'code' may be homophonous ([kɔt]) in isolation, but their plural nominatives are not; they are [kɔtɨ] and [kɔdɨ], respectively. On a naive reading, one might assume that word-finally, all obstruents are voiceless in Polish.[46] Thus, a phonetically based GP analysis would say that word-final obstruents are deprived of an element responsible for voicedness, and thus devoiced.[47] Nevertheless, there is hardly any phonetic motivation in devoicing word-final obstruents followed by word-initial sonorants or vowels in fast speech, and yet in the phrase *kod Anny* 'Anna's code' the word-final //d// and the vowel //a// give the sequence [ta]. Phonetically, the intra- and the inter-lexical context in which the consonant appears, viz. before a vowel, are identical. Take a different issue. Consider the desinence patterns in (35) below.

(35)

(35a)	*bram–a* [brama] 'gate'	*bram–y* [bramɨ] '(gen.sg.)'
	traw–a [trava] 'grass'	*traw–y* [travɨ] '(gen.sg.)'
	rop–a [rɔpa] 'crude oil'	*rop–y* [rɔpɨ] '(gen.sg.)'
(35b)	*nut–a* [nuta] 'note' (music)	*nut–y* [nutɨ] '(gen.sg.)'
	bluz–a [bluza] 'sweatshirt'	*bluz–y* [bluzɨ] '(gen.sg.)'
	żon–a [ʒɔna] 'wife'	*żon–y* [ʒɔnɨ] '(gen.sg.)'

The desinence surfacing in genitive singular forms in (35) is the same for stems terminating in labials (35a) and coronals (35b). Against that, consider forms where the stem terminates in a velar plosive, in (36) below.

(36)	*ręk–a* [rɛŋka] 'hand'	*ręk–i* [rɛɲci] '(gen.sg.)'
	szczęk–a [ʃʧɛŋka] 'jaw'	*szczęk–i* [ʃʧɛɲci] '(gen.sg.)'
	nog–a [nɔga] 'leg'	*nog–i* [nɔɟi] '(gen.sg.)'
	drog–a [drɔga] 'road'	*drog–i* [drɔɟi] '(gen.sg.)'

[46] To what extent this is true is discussed in Chapter 4.

[47] With some simplification, this is a conclusion of Gussmann's (2007) analysis, to which Chapter 4 refers.

If one assumes the forms in (35) all to have the same morpheme as their desinence, it begs the question of what the genitive morpheme of words in (36) is. One could take velar stems to be exceptional and take //i// to be the underlying vowel of the desinence. This is at odds with so-called First Velar Palatalisation, to which section 1.3.1 has referred. Recall that //i// is supposed to cause underlying //k// and //g// to surface as [ʧ] and [ʒ], respectively. Perhaps, nominal inflection is free from First Velar Palatalisation. However, phonology alone could not tell nominal from verbal or adjectival inflection, because morphological labels are not interpretable as phonological features.[48] Conversely, the vowel of the desinence could be something else than //i//. The first candidate is obviously //ɨ//, as it is found next to labials and coronals.[49] The immediate question is what makes //kɨ// and //gɨ// appear as [ci] and [ɟi], respectively. On post-*SPE* accounts, there must be a rule that converts these sequences before the representation reaches phonetic actualisation.[50] The relation between the underlying and the phonetic features is then obscured by arbitrary rules; it appears non-statable in GP terms, at least in its phonetically obsessed forms.

There is an alternative, however. Imagine the morphophonemic representation of the stem–desinence bit of genitive forms in (36) points to an abstract //kɨ// or //gɨ//, and that the phonology–phonetics interface, on its own, interprets these abstract blocks as [ci] and [ɟi]. This statement has a powerful implication that there should be no //kɨ// and //gɨ// blocks in morphophonemic representations for which the interface returns [kɨ] and [gɨ] as phonetic actualisations. This appears to be true. In standard spoken Polish, no single word native to the language has either of these sequences. They do appear word-internally, but only in borrowings; *kynolog* 'cynologist' or *gyros* 'gyros' are indeed pronounced [kɨnɔlɔk] and [gɨrɔs], respectively, and their spelling is not without guilt. Borrowings, however, need not conform to all patterns of Polish morphophonemics. The abstract representations that hold the surface [kɨ] and [gɨ] of these words may deviate from certain constraints that native vocabulary obeys. This does not mean they are ill-formed; ill-formedness presupposes unpronounceability. (This is a GP parallel to GB syntax; in syntax, ill-formedness causes structures to crash at interpretive interfaces.) The misbehaving borrowings are simply defective, in that they are stored in the lexicon, and they are interpretable, but they are not productive; native

[48] This statement is made from a modular perspective, not from the *SPE* or LP perspective.
[49] See Gussmann (1980: Chapter 1) for a possible origin of this idea.
[50] Gussmann's (1980: 23) *Vowel Adjustment* does it in an *SPE*-type setting.

morphophonology will not compute any such structure on its own. (This notion repeats a few times in subsequent chapters.)

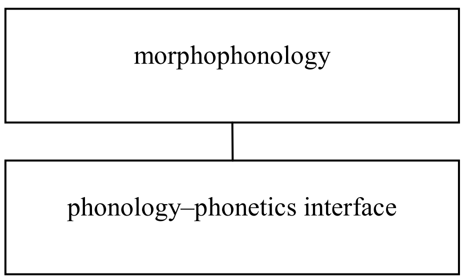
The above discussion, although far from being exhaustive in terms of the number of issues it encompasses, has provided background for the attempt at formalisation of what may be referred to as Workspace Phonology, provided one needs the label. As this is not a brand new, revolutionary theory of phonology, rather a different perspective on what already exists in GP and CVCV, it is often referred to as a 'workspace-oriented phonology' henceforth.

2. Architecture of workspace-oriented phonology

2.1. Split-component phonology

This study endorses the view that the term phonology denotes two components of language faculty. One of these handles abstract morphophonemics, the other is responsible for phonetic actualisation of abstract morphophonemic representations. A simplified diagram of this model is presented in (37) below.

(37) Simplified diagram of split-component phonology



To avoid excessive repetition of terms, the components are given alternative names. In the context of the architecture shown in (37), *morphophonology* is also referred to as *phonology proper*, *high-level phonology*, or *high phonology*. In the same context, *phonology–phonetics interface* is used interchangeably with *A–P interface*, *low-level phonology*, or *low phonology*.[51]

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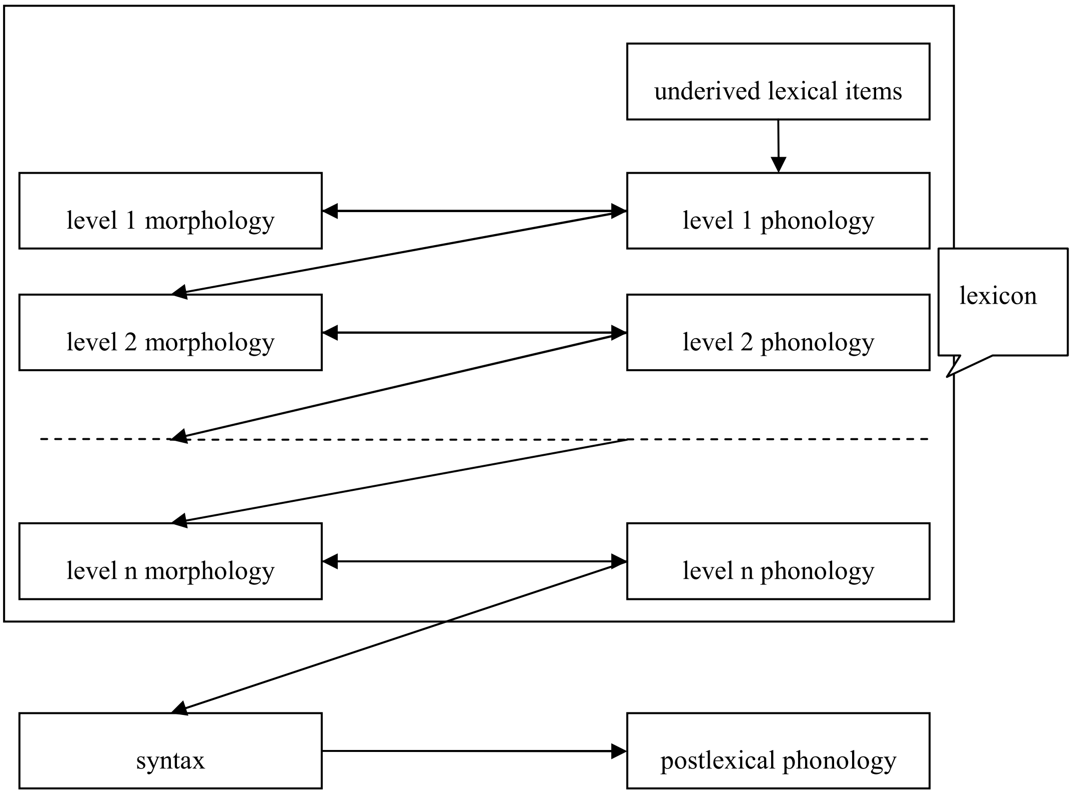
[51] Other aspects of the 'A–P interface,' such as visual perception, are not pondered upon in this work. However, Scheer (in prep.) refers to the so-called McGurk effect (see McGurk — MacDonald 1976) in his modular argumentation for diacritic-free phonology.

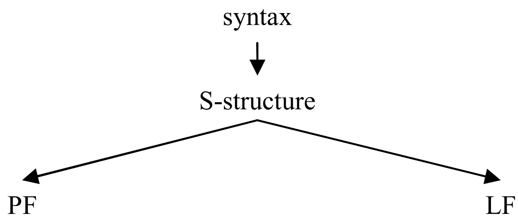
The architecture bears resemblance to that of Lexical Phonology (and Morphology), as sketched in Kiparsky (1982*a*: 132), whose architecture is reproduced in (38).

(38) Lexical Phonology (adopted from Kiparsky 1982*a*: 132)



Unlike LP, the split-component architecture argued for herein is not divided along the lexicon vs. post-syntactic phonology line. The specific status of morphology in LP, i.e. it being interspersed with phonology in a word building component, is not adhered to in this study. The stance taken here is that syntax precedes phonology in the formation of utterances, and that if words are built bottom-up from roots via morphological operations such as affixation or compounding, phonology is only responsible for filling morphosyntactic structures with phonetically interpretable content. The location of phonology is thus not that of *postlexical phonology* as in (38), but rather that of *PF* in the so-called (inverted) T-model in (39) below.

(39) T-model of Universal Grammar (adopted from Chomsky 1981 [1982]: 17)



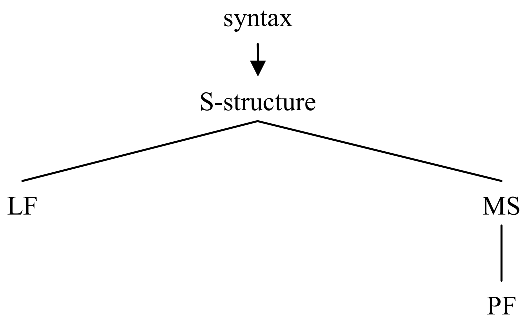
This assertion notwithstanding, the present work stays neutral on the issue of the exact location of morphology within grammar. At this point in the discussion, theoretic neutrality is specifically taken with respect to the following:

a. whether lexical items selected from the numeration in syntax are words, morphemes or primitive features; in other words: whether syntactic terminals of syntactic structures sent to PF are (a) words and inflectional morphemes, (b) roots with lexical categorising affixes and inflectional affixes, or (c) syntactic primitives whose spell-out may take sub-morphemic, morphemic, or supra-morphemic size,
b. whether morphology is part of syntax or a separate module; in other words: whether morphology is what may be called *word syntax* (leaving traditional syntax to be dubbed *phrasal syntax*) and is an inherent part of phrasal syntactic structure formation, or it is only a system governing the lexicon, which then is an entity separate from (phrasal) syntax,
c. whether morphology is one computational entity or it is distributed over multiple components, for instance, word building morphology being followed by a separate inflectional morphology; in other words: whether such traditionally distinguished areas of morphology as compounding, derivation, and inflection are computed by one system, with accordance to one or three sets of principles, or they are the domain of different modules of grammar, for instance, compounding and derivation preceding phrasal syntax, and inflection following phrasal syntax.[52]

Hence, this is in no way intended to give evidence for or push any particular model of syntax–morphology relations. Thus, phonology, as viewed in this work, could be part of (39) just as well as part of (40) below.

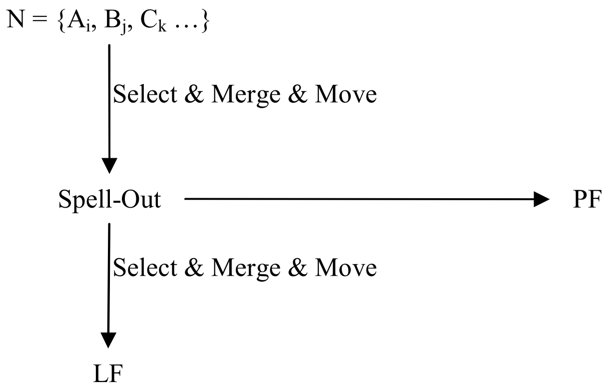
[52] See, for instance, Ackema — Neeleman (2004) for discussion and further references.

(40) T-model of Universal Grammar in Distributed Morphology (adopted from Halle — Marantz 1993: 114)[53]



What needs to be stressed is that neither component shown (37) nor their sum is to be considered PF as such. Rather, PF is taken to be the input channel to phonology proper. Moreover, as this work is neutral as to what type of (phrasal) syntax feeds it, the location of PF can just as well take a minimalist perspective. Thus, phonology may be fed through PF in yet another T-model, shown in (41) below.

(41) A minimalist T-model of the grammar (adopted from Hornstein — Nunes — Grohmann 2005: 73)[54]

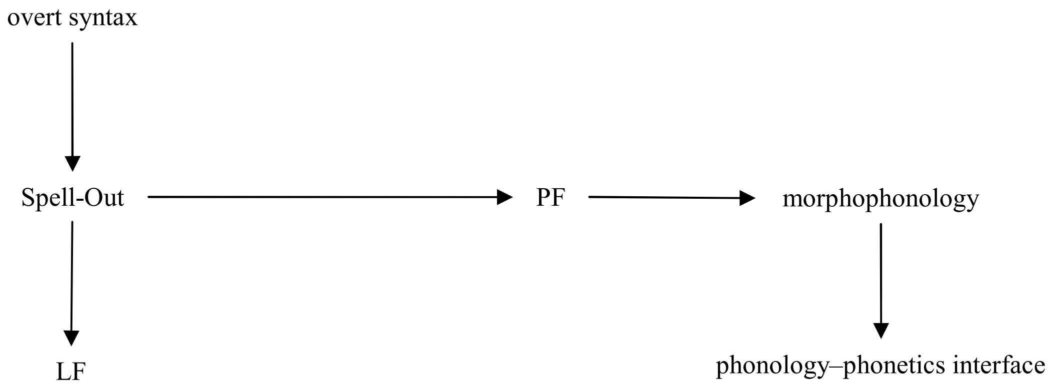


If viewed from the minimalist perspective, especially if Spell-Out is taken to apply in chunks *during* the derivation, not *after* the derivation, high-level phonology is given

[53] The exact labels for syntax, S-Structure, LF, MS, and PF in Halle — Marantz (1993: 114) are DS (D-Structure), SS (S-Structure), (Logical Form) LF, MS (Morphological Structure), and PF (Phonological Form), respectively.
[54] In the diagram, *N* denotes *numeration*, where *A*, *B*, and *C* are lexical items with indices for the number of their occurrences. *Select*, *Merge*, and *Move* are core minimalist syntax operations.

material bit by bit, not as full sentences.[55] Therefore, morphophonological derivations may run in parallel to syntax, as in (42) below.

(42) Parallel derivation in syntax and phonology



If the assumption that Spell-Out may proceed in chunks, rather than sentences, is correct, then phonology is faced with the problem of providing phonetically interpretable representations for an indeterminate number of lexical entries per phrase or utterance. Phonology cannot make assumptions if the next sentence to be pronounced consists of one, two, or ten words, let alone morphs. One thing is taken for granted, viz. that phonology does not deal with linear order of items transmitted through PF; broadly-defined word order is taken to be the sole domain of syntax. This does not alleviate all order-related problems, though. Assume, for the sake of argument, that syntactic derivation has produced the sentence in (43).

(43) *This is* [*the cat that caught* [*the rat that stole* [*the cheese*]]] (*SPE*: 372)

The bracketing given in (43) corresponds to syntactic constituency, where the leftmost bracket coincides with S (Sentence), and subsequent left brackets coincide with the left edges of NP's (Noun Phrases) in pre-GB transformational–generative grammar. The problem is that when the sentence is actualised phonetically, the syntactic bracketing does not match the prosodic structure, which is approximated in (44) below.

[55] This perspective is radically different to that of *SPE* days, where phonology was assumed to receive phrases headed by the S (sentence) marker; see Chomsky — Halle (1968: 8).

(44) /ðɪs ɪz ðə ˈkæt | ðət kɔːt ðə ˈræt | ðət stəʊl ðə ˈʧiːz/

In brief, pauses coincide with the beginning of complementizer phrases (CP's) rather than NP's. In *SPE*, there are so-called readjustment rules, postulated as responsible for re-writing embedded, hierarchical structures of (43) into a flat structure that phonology can handle (see *SPE*: 372). Now, assume that phonology has no means of translating syntactic constituency into phonetic material, i.e. it does not speak syntactic code, and that PF provides it with the content of (43) chopped into small chunks, from which high phonology can build word-size representations. Bigger chunks are out of question, since the word acts as the basic domain of morphophonological processing. There appears to be a general agreement on this in phonological theories couched in generative tradition; not only *SPE*, but also Cyclic Phonology and all flavours of Lexical Phonology restrict cyclic application or rules to the domain of word, not phrase or sentence. Now if PF were to send the incriminated, linearly-ordered chunks in exactly the same order as that in which they surface, things might be easy for phonology. First, it would receive lexical identifiers for *this* and *is*, then for *the* and *cat*, and so on.[56] Apart for such an issue as identifying which word is stressed, and acts a host for clitics—the stressed *this* hosts the unstressed *is*; *cat* hosts *the*—phonological derivation might potentially proceed left-to-right.[57] If this were true, then high phonology could start sending morpholexical representation to low phonology before receiving the whole sentence. There is a major glitch, however. Phonology is designed to work on phonetic and phonetically-interpretable material only. At the heart of modular argumentation that this work adopts from Scheer (in prep.) is the conjecture that phonology cannot refer to syntactic code, e.g. it cannot have a rule triggered by the mere presence of a VP or CP label. First, it does not know it; this can be safely derived from the observation that morphosyntactic categories do not have correlates in phonological features, and the other way round. For instance, nouns do not have to begin with labials, and adjectives have no correlation with velars. Second, if phonology had direct access to morphosyntactic categories and structures, it would be a super-module, capable of not only caring for its own domain, but also peeking into those of other components. By

[56] For the clarity of exposition, the current argument does not go into details on how lexical access is realised. Whether syntax sends to PF some abstract identifiers of lexical entries, or information is passed on in a different manner, is not crucial here.

presupposition, one would expect other modules to do the same with respect to phonology, and the whole idea of modularity would collapse. Hence, if modular argumentation is on the right track, one may wonder what would happen if, for whatever reason, PF sent the items that build sentence (43) in the reverse order, starting with *chese* and ending with *this*. (Perhaps, the starting point would be *the* followed by *cheese*, as it reflects syntactic constituency; this question is irrelevant here.) If syntax and phonology are separate modules, neither should have any expectations as to what is transmitted in which order. If they use different codes, or ciphers, neither may make a request to another to be given, say, nouns first, verbs second, or trisyllabic roots before cyclic prefixes. Thus, if the order in which material is sent to phonology proper is not the same as the order in which that material is actualised, then phonology as a whole acts as a buffer. It first computes (the phonological exponents of) words, and then submits them, in a linear order, to the interface for interpretation.

The issue of how phonology is informed on the linear order of items at PF is left unresolved. The working assumption is that references to lexical entries are accompanied by a few basic instructions that tell phonology if a given pair of entries is to form one morpholexical entity, i.e. a word, or not, in which case the two enter concurrent entities.[58] Now is the time to provide illustration to the newly introduced concept. Consider (45) below.

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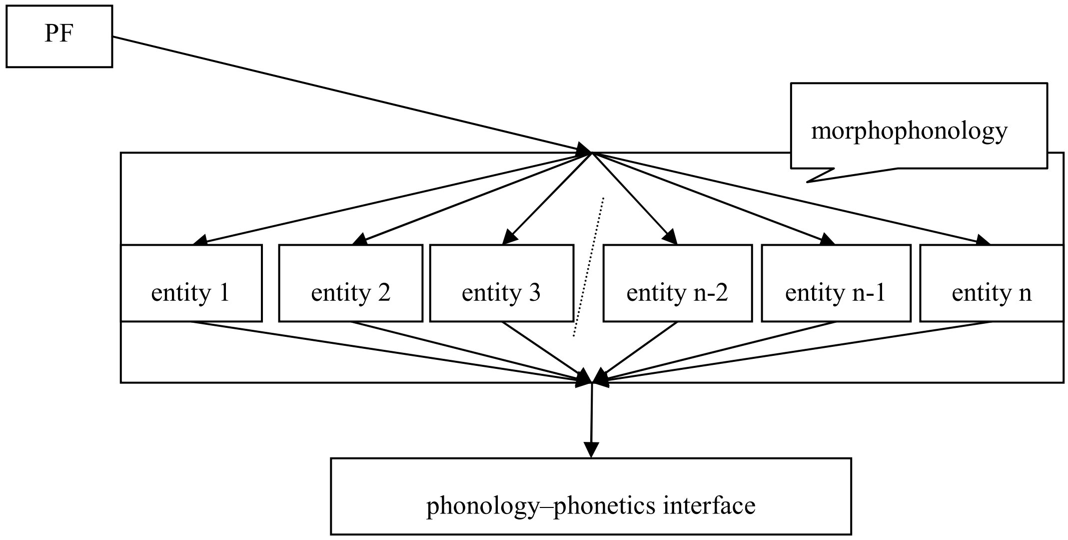
[57] It is assumed that sentence stress is computed from syntactic structure, and that it is separate from the issue of word stress. Sentence stress is not the domain of morphophonology.

[58] The reference to *pairs* of entries is not theory-free. It follows a long standing conjecture in generative grammar that a non-terminal node dominates no more than two nodes; similarly, a single operation takes no more than two arguments. For derivational phonology, this implies that each concatenation takes no more than two arguments. If there are, say, three phonological exponents of lexical entries to concatenate, it requires no fewer than two cycles to do it.

(45) PF and split-component architecture with parallel morpholexical entities



As illustrated in (45), morphophonology holds a potentially unlimited number of morpholexical entities. These are independent from one another. They may be computed in parallel or in series, depending on what and when is sent through PF. The present work makes no a priori assumption as to the order, or lack thereof, in which words are computed. As with *SPE*, the domain of morphophonology is word. Words are encapsulated in morphophonological entities. Morphophonological computation is performed for each entity separately. There is no a priori ban on fusing two entities. For instance, *black* and *board* may be first computed on their own, and then form the compound *blackboard*, in which both roots have a stressed vowel, which presupposes word stress is first calculated on *black* and *board*, then on the compound.[59] In addition, no a priori limits hold for the number of lexical items that may join an entity without having first formed an entity on their own. Thus, an entity holding *happy* may be joined by the morphophonemic exponent of the comparative suffix *–er*, and yield *happier*, *–er* having been present in no entity prior to joining *happy*. One event that is banned without further consideration is fission of workspaces; no workspace may be split in two or more. That would be blatant counter-cyclicity, an issue unknown in *SPE* or LP, let alone GP.

[59] The particular example is inspired by Kaye (1995: 302), where a GP derivation for *blackboard* is suggested. The mechanism that Kaye uses, viz. the functions ϕ and *concat*, will be revisited in section 2.7.3.

Once the necessary number of entities is computed, they are sent to the phonology–phonetics interface for interpretation. The next section will provide some formalisation of this architecture.

2.2. Workspaces vs. domains

Each entity over which morphophonology applies is dubbed a workspace. The giving of a name to what is otherwise a word has two functions. Firstly, it helps formalise workspaces as maximal domains for application of morphophonology. Workspaces are not any morphosyntactic or lexical entities, but only those that have morphophonemic content or, at least, they can have a morphophonemic representation that is free from diacritics, i.e. objects that are non-native to phonology proper under modularity. Secondly, it makes possible the distinction between the notion of phonological domain as the smallest chunk over which phonological generalisations may hold—this is the minimal domain—and structures in which two or more domains are nested, the outermost of which is the workspace itself.

The notion of a domain roughly corresponds to morphological bracketing used in Lexical Phonology. Consider the bracketing in (46) below (taken from Booij — Rubach 1984: 12; italicisation mine).

(46) [[*un*[*grammatical*]$_{A}$]$_{A}$*ity*]$_{N}$

The word in (46) is composed of three domains.[60] The innermost domain bracketed in (46) is [*grammatical*], over which an intermediate domain [*un*[*grammatical*]] is built, and topped by the outermost domain, i.e. (46) as such. (Lexical categories are not relevant here.) The outermost domain is the one to which word-level phonology may apply in *SPE* terms, which logically equals words with workspaces. In LP terms, this domain is the one that may not be crossed by lexical rules. To see this, consider the word stress of (46), viz. [ˌʌngrəmætɪˈkælɪti]. It is computed with respect to *–ity*, not just [*grammatical*] or [*un*[*grammatical*]], but not with respect to adjacent words, as in

[60] A more careful chopping of *ungrammaticality* would reveal *grammatical* can be decomposed into [[[*grammar*]$_{\surd}$*ic*]$_{A}$*al*]$_{A}$, where [*grammar*]$_{\surd}$ is a root, i.e. it is without a lexical category, such as N (noun), or A (adjective). This is not crucial for the present argument.

ungraˈmmatical ˈsentences. Yet, inner domains may obey certain generalisations that hold for English morphophonemics that are lost with respect to outer domains. In (46), such a relation is lost when [*grammatical*] is nested within [*un*[*grammatical*]]. Morpheme-internally, English requires that nasal + plosive sequences share their place of articulation.[61] Thus, if *ungrammatical* were an innermost morphological domain, the nasal preceding the velar plosive //ɡ// would have to be velar, too, viz. [ŋɡ], contrary to fact.[62]

Against *ungrammaticality*, with its [nɡ] cluster, consider underlying //n// and //ɡ// neighbouring on one another across a lexical boundary, i.e. across word edges. In a phrase like *in Greece*, the morpholexical entities are pronounced together as [ɪnˈɡriːs].[63] The parallel between *in Greece* and *ungrammaticality* is not inconspicuous. The problem is that the bracketing of the phrase is not similar to that of the word. Indeed, there is no morphological bracketing for *in Greece* at all, since the words that build the phrase are put together not by morphology (or word syntax), but by phrasal syntax. *Greece* could just as well be preceded by *of*, *on*, *and* or any other word; it would make no difference. In case the word preceding *Greece* terminates in a nasal, the place sharing relation of the nasal and the initial plosive is optional, and only occurs if the words are pronounced without a pause in between.

Unlike *ungrammaticality* and *in Greece*, such prefixed words as *impossible*, whose bracketing is arguably [*in*[*possible*]$_A$]$_A$, do not have an option of sharing or not sharing the place of articulation in nasal + plosive clusters. The relation is obligatory, viz. [ɪmˈpɒsəbl̩]. The nesting of domains appears to have no influence on English nasal + plosive generalisation. The outer domain of the word acts as if it carried no morphological break between the prefix and the base.[64]

Workspaces are the outermost domains of morpholexical representation. They hold no bracketing information. (Brackets merely encode morphological information, which a modularity-concerned analysis must not use.) Consequently, a workspace has no means of representing internal domains. Domain nesting is inexpressible within a workspace. Even if it were, it would not change much with respect to the place-sharing

[61] This assertion is based on no word in English breaking this generalisation in its innermost domain.
[62] An alternative pronunciation of *ungrammaticality* exists in the form of [ˌʌŋɡrəmætɪˈkælɪti], where the nasal and the plosive do share the place of articulation. This pronunciation is optional. That of morpheme-internal //ŋɡ// in *fi<u>ng</u>er* is obligatory.
[63] The variant [ɪŋˈɡriːs] is optional in fast speech.

of nasals and plosives. Domain structure (or bracketing) gives no answer as to whether the relation is present or not. Workspace-oriented morphophonology must express the dichotomy in a different way. The next section elaborates on the monostratal organisation of workspaces.

2.3. Monostratality of workspaces

Unlike the architecture adopted in various flavours of Lexical Phonology, the approach endorsed here has just one level of morpholexical representation and computation. This is for principled reasons.

First, the core argument for postulating three (Kiparsky 1982*a*,*b*) or four (Halle — Mohanan 1985, Mohanan 1986) levels (or strata) in the lexical component of LP is the assumed interplay between morphology and phonology within the lexicon during word formation. As certain morphological operations have different effects on words, this assumption is well-motivated. At the heart thereof lies the distinction between two classes of affixes in English, originally due to Siegel (1974), where the relevant observations are made with respect to *SPE*'s boundary system. Take suffixes, for that matter. In Siegel's division, the noun-forming *–y*, as well as *–ation*, and *–ity* are classified as Class 1 suffixes due to their partaking in cyclic stress assignment (p. 111–112). In her examples, the suffixes in question are responsible for the stress shifts in the following alternations: *ˈteleˌgraph* ~ *teˈlegraphy*, *eˈlicit* ~ *eˌliciˈtation*, and *reˈcoverable* ~ *recoˌveraˈbility*. Against these, Class 2 suffixes, such as the adjective-forming *–y*, as well as *–ness*, and *–less* are stress-neutral. Hence, there is no stress shift in *ˈglass* ~ *ˈglassy*, *ˈempty* ~ *ˈemptiness*, or *ˈbottom* ~ *ˈbottomless*. That much is true, and to account for affix-triggered stress placement one may indeed postulate two levels. This is strengthened by the observation that Class 1 affixes attach to stems and words, while Class 2 affixes, with a few exceptions, attach to words only (Siegel 1974: 151). This is followed by what is now commonly referred to as the Affix Ordering Generalisation, given in (47) below.

[64] The prefixes *un–* and *in–* are discussed at length in Chapter 6, where reference is made to the handling of nasal–plosive place-sharing in LP, too.

(47) (Affix Ordering Generalisation (unnamed as such); Siegel 174: 152)[65]

"A. In English, Class I affixation precedes Class II affixation.

B. The cyclic stress assignment rules follow Class I affixation and precede Class II affixation."

This is all there is, viz. the disjunction: either an affix bears on stress assignment or it does not. The same appears to apply to so-called segmental phonology. The addition of an affix either results in a seamless string of segments, e.g. *im–possible*, or not, e.g. *un–grammaticality*. There is no option of, say, a 'partially seamless' string, or 'partial bearing' on a rule. Yet, in LP, the lexicon is enriched by a third or a third and a fourth level, where morphological operations not covered by Siegel's generalisation take place. The extra level on which Kiparsky's (1982*a*,*b*; 1985), Halle and Mohanan's (1985) and Mohanan's (1986) systems agree is regular inflection. (Kiparsky's model does not grant yet another level to compounding.) The beauty of English regular inflection is that nothing ever happens to the stem, both in segmental and suprasegmental terms. However, in the case of the plural suffix *–s* and the past tense suffix *–ed*, there is so-called allomorphy, viz. the suffix surfaces in more than one phonetic shape, i.e. morph. As Class 2 affixes in general do not display such variability, and proponents of LP in the 1980's insisted on phonology and morphology contracting intimate relations, there was not much other choice but to recognise as many levels as there were (apparently) different patterns of morphophonological behaviour. This approach largely ignores the fact that regular inflection, and indeed any inflection, is a syntactic matter, and that words only surface in inflected forms due to morphosyntactic activity. Even citation forms have inflection. Take the forms: *phonology, cyclicity, lexicon,* and *derived environment* for that matter. They are all intended as nominative singulars, but they could just as well be datives, accusatives, or locatives if only English provided overt case markers for these categories. In Polish, the citation form of nouns is usually the nominative singular, while that of verbs is the infinitive; neither of these is a bare stem, let alone the root. Notice that *SPE* is conspicuously silent on phonological realisation of inflectional morphology, as if inflection had nothing to do with word formation. Chomsky and Halle (1968) did not ponder on the intricacies of the relation of

[65] Just for the record: Siegel's (1974) work is consistent in using Roman numerals for affix classes; Arabic numerals are used herein for visual effect.

–ed to the stem, i.e. whether it should surface as [d], [t], or [ɪd]. It was assumed that in the case of $[_V[_V$*mend*$]_V$*past*$]_V$ a readjustment rule, converting syntactic derivation into a phonologically-processable representation, would replace *past* with *d*, and that was it (p. 11). *SPE* as such was correct in capturing the fact that when speakers of English pronounce a well-formed sentence, their speech consists of sounds, not roots, stems, and affixes. Roots never surface on their own, unless manipulated by linguists.[66] Thus, LP (and any other model in which lexical activity precedes phrasal syntax) is inherently extravagant in assuming all word forms are generated in the lexicon through morphology–phonology interaction. English may not feel the burden. For the three major categories (nouns, verbs, and adjectives), English has one overt case for nouns (the Saxon genitive), one overt number on nouns (the plural), one overt person marker on verbs (the third person), and one overt tense marker (the past).[67] Polish, however, should collapse. It has seven overt cases on nouns, as well as three genders in the singular, and two in the plural. (The dual number is no longer productive, but one might assume dual forms are still computed in the lexicon.) Verbs overtly inflect for tense, aspect, gender, and number. Adjectives overtly inflect for gender, and number. If all the required forms are computed *prior* to the derivation in phrasal syntax, it takes a very powerful brain to do the job. If, on the other hand, they are computed *after* syntax does its work, there comes the sneaky suspicion that syntax can do the word building by itself. All that morphophonology is needed for in such a system is to put together all the PF-visible morphemes in a phonetically interpretable form.

Given Siegel's (1974) observation on affixes, combined with conjecture that all morphophonology is preceded by syntax, workspaces may be limited to a single level, rather than three or more. The disjunction between Class 1 and Class 2 affixation is expressible as an exclusive disjunction, i.e. either—or. The next section expands on the binarity of affixation, both in the sense of classes, and in the sense of arguments that workspaces take at a time.

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[66] Interjections of the sort *oh* or *uh-uh* in English, and *aha*, or *no* in Polish are kindly ejected from word formation.

[67] In addition, there is the subjective vs. objective case distinction on pronouns.

2.4. Concatenation

Workspaces are devoid of arboreal hierarchy, hence flat. C-command, m-command, binding, governing relations and what have you are inexpressible in flat morphophonology. Such relations are needed in syntax to allow for semantic interpretation (LF) and to derive the linear order of chunks that constitute the input to phonology (PF). Phonology as such has no say on the ordering of morphemes and words. Modularity requires that phonology make no direct reference to morphosyntactic labelling, so that phonology by itself cannot tell a root from a prefix, or a Class 1 affix from a Class 2 affix, at least not the sense of dictating their ordering with respect to roots. The generalisation that a Class 2 affix may not be closer to the root than a Class 1 affix applies to morphology, i.e. word syntax, not phonology.[68] Modularity-concerned, separationist phonology neither bans nor encourages the distribution of certain morphemes and morpheme classes within different lexical categories. For instance, diminutives are only applicable to nouns.[69] This is a morphological restriction. Phonology by itself has no bearing on the fact that a root must first be merged with a nominalising affix, and then, a diminutive affix may merge with what is a noun by now. Were it otherwise, one would expect phonology to interfere with the phonetic content of lexical categories, for instance, verbs would be prohibited from sounding like nouns. A cursory look at English noun–verb homophones, such as *cook*, *look*, *love*, *plot*, *take*, or *shout*, to list just a few, shows this is not the case. Similarly, in Polish, *drog–i* [drɔɟi] may be the plural nominative (as well as the singular genitive) of the noun 'road,' but also the masculine singular nominative of the adjective 'dear.' Assuming the roots for the noun and the adjective, as well as the affixes in all word forms are morphosyntactically distinct, one needs to conclude phonology cannot counter the blurring of inflectional (and categorical) identity.[70]

In a category-blind morphophonological workspace, there is no tool to establish beyond doubt which morpheme is the first to enter, and which morphemes follow. The

[68] Siegel's (1974) work predates any LP-spawning piece of writing, where Pesetsky's (1979) MIT phonology generals paper is considered the starting point. In pre-LP times, Kean's (1974) and Mascaró's (1976) works are oblivious to Siegel's dissertation; Strict Cyclicity in phonology is first derived from Klamath and Welsh by Kean and Catalan by Mascaró—English is absent—and has nothing to do with affix ordering or lexical strata.

[69] My thanks go to Bartosz Wiland (p.c.) for pointing that universal generalisation to me.

[70] With respect to inflectional identity, see Cameron-Faulkner — Carstairs-McCarthy (2001) on "Blur" in Polish, and a cold reaction to that paper in the flesh of Halle — Marantz (2008).

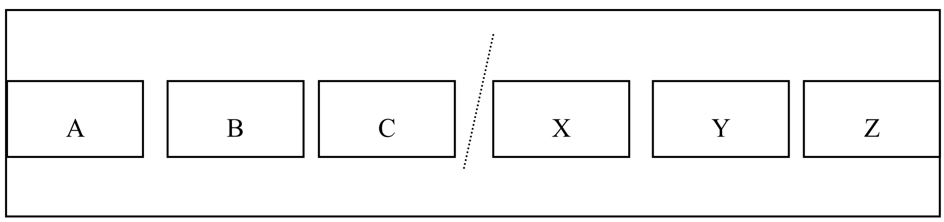
standard assumption in lexicon-oriented models of phonology is that word formation starts with the root, and then affixes are stacked on both edges of the root and of one another.[71] On the purely morphophonological side of modularised grammar, this need not be true. If syntax were to send a prefix or two before sending the root, phonology should concatenate them without objection. This is not, however, without an implication. If it is assumed phonology by itself cannot impose any ordering restriction on the input, then it needs to receive precise commands on the ordering, and on the method of concatenation. Enter the operation *Join*.

(48) *Join* (first formulation)

The operation *Join*(x,y), takes the phonological exponents of *x* and *y*, inserts them into the workspace in the order (x,y), and computes them with respect to one another, returning a single well-formed representation.

As defined in (48), *Join* is a strictly binary operation, which may imply that if *x* and *y* are phonological exponents of morphemes, the operation disqualifies any insertions of singletons. This is not the case. Either of the arguments may be null. In case both arguments are null, the operation is vacuous. Furthermore, as workspaces have no a priori limit on the number of exponents they host, *Join* must allow for the insertion of subsequent exponents to a workspace that is already filled. This is accounted for if *x* or *y* may refer to the current content of a workspace as such. Consider the diagram in (49) below.

(49) Labelled workspaces



[71] For languages with transfixing non-concatenative morphology (Semitic), one would stipulate that the root and the binyan are parallel melodic tiers joined at the skeleton, rather than stacked serially. Non-concatenative morphology is outside the scope of the present work, but see McCarthy (1979 et seq.) for analysis and further references.

The diagram in (49) shows a refined version of the content of the "morphophonology" block shown earlier in (45). What is called *entities* in the earlier illustration are the parallel workspaces for morphophonological computation. Instead of carrying bland labels of the sort *entity 1*, those in (49) are labelled by single Roman capital letters. The labels are shorthand for any abstract code that morphophonology has at its disposal. They could just as well be {☞,☜,☹,✰,❁,💣}, {₣,₧,€,₤,$,₪}, binary or hexadecimal codes, and what have you.[72] On the practical side, consider a situation in which derivation is performed in workspace A. A code for accessing a lexical element is given at PF, and, for whatever reason, there is no pointer to a second element in the lexicon. As *Join* is supposed to take two arguments, this gives two possibilities. The arguments to *Join* are either (x,A), or (A,y), where A is the label of the workspace, and *x* or *y* is the new lexical element given at PF, depending on its ordering with respect to A. Now, phonology by itself is incapable of deciding which alternative is the one requested by syntax, so the order must be given externally. If workspace A has any content at this moment, the distinction between (x,A) and (A,y) roughly corresponds to that between prefixation and suffixation. Some examples are at hand.

Assume workspace A contains the base [*grammatical*]. This is shorthand for workspace A containing the phonological content of *grammatical*, not its lexical category of adjective. Now, let *x* or *y* be the phonological content of *un–* or *–ity*. The affixes cannot be added both at a time; that would require *Join* taking three arguments. If one of the affixes is to be added, four possibilities arise on the phonological side. Consider (50)–(53) below.

(50) *Join*(*un*,A)
(51) *Join*(A,*un*)
(52) *Join*(*ity*,A)
(53) *Join*(A,*ity*)

In all the examples in range (50)–(53), *Join* concatenates new material with what is the content of workspace *A* prior to the operation. What is evident from a post hoc perspective, (51) and (52) are counterfactual; they would return *[*grammaticalun*] and *[*itygrammatical*], respectively. What is attested is the form possibly returned to

[72] The credit for inspiration spawning the first set of symbols goes to McMahon (2000*a*: 50).

workspace A through application of (50) or (53). Here comes the most conspicuous glitch. Recall that the relation of *un–* and *grammatical* is one in which the nasal of the prefix and the initial plosive of the base do not contract the native English place-sharing relation. This lack of interaction is not reflected in the mnemonic *Join*(*un*,A). Phonology does not tell Class 1 from Class 2 affixes using diacritic marking, which leaves it with two options. Either the morphophonological content of *un–* is such that it is immune to modification, or the otherwise applicable place-sharing relation is blocked externally.

First, consider the former option. For whatever reason, *un–* as such is immune to modification. Should that be true, it begs the question how phonology 'knows' it. Perhaps, there is a feature [±immune] that tells phonology that the content of [+immune] lexical entries must not change. This option trips on two hurdles. The feature [±immune] is nothing but a diacritic, in the same way as [±Latinate] is in *SPE*; modular phonology cannot use features that never have phonetic translation. What is worse, [±immune] would only be used to restate, in the guise of a feature, the observation already known as the Strict Cycle. That *un–* fails to get along with *grammatical*—recall *in–* finds no trouble adapting to *possible*—is the effect of the two chunks being concatenated in a non-cyclic manner, not of either of them being 'immune.' (If *graˈmmatical* were [+immune], for instance, it would never become *grammatiˈcality* when *–ity* were adjoined; rather, it would become **graˈmmaticality*, as the main stress would be [+immune] with respect to moving towards *–ity*.) This leads to the consideration of the latter option.

Unless blocked from doing so, phonology joins the exponents to get a seamless, bracket-free representation. An unblocked joint of *un–* and *grammatical* is *[ˌʌŋgrəmætɪˈkælɪti], unexceptionally. The non-assimilated form [ˌʌngrəmætɪˈkælɪti] is not formed. Conversely, a blocked joint of *in–* and *possible* is *[ɪnˈpɒsəbl̩], where [ɪmˈpɒsəbl̩] is the attested form. This is due to phonology not distinguishing the cohering vs. non-cohering nature of Class 1 vs. Class 2 affixes. To account for the different behaviour of the joint, the operation *Join*(x,y) is enriched with argument blocking. Again, binary logic run over two arguments gives four alternatives, enumerated in (54)–(57) below, where a bracket is shorthand for modification blocking.

(54) *Join*(x,y)

(55) *Join*(x],y)

(56) *Join*(*x*,[y)

(57) *Join*(x],[*y*)

As is the case with the (50)–(53), a post hoc look on the possibilities given in (54)–(57) triggers the sneaky suspicion that (55) and (56) are not on empirical record; concatenated exponents either interact, or they do not, but there is doubt as to whether one exponent may adapt to the other unilaterally. Nevertheless, this possibility cannot be excluded a priori, and this work will consider it when coming across blocked concatenations in English and Polish. A second formulation of *Join* is called for.

(58) *Join* (second formulation)

The operation *Join*(x,y) takes the phonological exponents of *x* and *y*, inserts them into the workspace in the order (x, y), and computes them with respect to one another, returning a single well-formed representation. Should either of the arguments be marked as blocked, viz. (x],y), (x,[y) or (x],[y), that argument is exempt from modification during the run of *Join*.

The second formulation of *Join* contains the blocking clause that is absent from the previous formulation, viz. (48). The exemption that an argument may be subject to is binary, just like the empirical bite of Siegel's generalisation. Either an exponent is open to modification through phonological computation, or it is closed, without any intermediate option.

The crux of *Join* is the conjecture that the output of the operation is a single, seamless morphonological chunk that conforms to all well-formedness conditions that hold for minimal domains, unless this seamlessness is externally blocked for both arguments. If one argument is under blocking, phonology should make the other argument fit the blocked one, so that the output is seamless despite the limitations. Thus, *in–* joined with *possible* is an example of a free joint, triggered by *Join*(*x,y*). Conversely, *un–* and *grammatical* are concatenated via *Join*(x],[y). That neither of the half-blocked variants applies here is evident from the way in which /n/ and /ɡ/ behave. Neither /n/ nor /ɡ/ assimilate to one another; the forms *[ʌŋɡɹəˈmætɪkl̩] or *[ʌntɹəˈmætɪkl̩] are not formed in the workspace, although the former but not the latter is optionally found in phonetic actualisation, which is handled solely by the phonology–phonetics interface.

The (lack of) mutual relation of *un–* and *grammaticality* is measured only with respect to their edge consonants, which brings the notion of locality, discussed in the next section.

2.5. Locality

This study is preoccupied with what may be called intersegmental relations between concatenated exponents of morpholexical structure of language. Stress is largely omitted for three reasons. First, it appears that Siegel's (1974) generalisation on English affixes extends beyond main stress assignment onto segmental relations (see section 2.3). Second, one of the languages analysed in subsequent chapters, viz. Polish, has a rather predictable penultimate main word stress; exceptions hold for a small number of nouns of foreign origin, and for words hosting clitics.[73] Crucially, Polish appears to be devoid of the Class 1 vs. Class 2 distinction in suffixes—this does not hold for suffixes vs. prefixes—which slashes any English–Polish comparison based on affix classes vs. stress placement. Third, it suffices to analyse segmental phonology to distinguish two affix classes in both languages.

It is assumed that *Join*(x,y) returns a single, seamless representation. The seamlessness is subject to locality restrictions. Consider *ungrammatical* and *impossible* once more. The latter does, the former does not conform to the requirement of nasal + plosive clusters to share the place of articulation. Apart from assimilating the underlying //n// to [m], the latter shows no signs of either of its input exponents, viz. *in–* and *possible*, being modified during the concatenation. The assumption behind *Join*(x,y) is that if at least one of its arguments is open to modification, then the output form behaves as if it were a minimal domain. Under this assumption, one is forced to take *impossible* as phonologically undistinguishable from simplex words in English, despite there being smaller domains revealed by morphological analysis. This move is potentially undermined by the fact that English has few words whose pronunciation

[73] See Gussmann (2007: 8–10) for data and further references.

starts with [ɪmˈpɒ]. What is worse, *impolicy*, *impolitic*, *imponderable*, *imposter*, *imposture*, and *impoverish* are all complex words in which *im–* is a prefix, not part of the root. If English lacks *impo* roots, where roots are the locus of minimal domains, then the claim about *Join*(x,y) returning minimal domain-like representations cannot be proved. There are two ways of going about it: either to forget about the seamlessness and return to rule-based transformations in the *SPE* tradition, or to narrow down the area over which phonology assesses the minimal domain likeness.

If the first way were chosen, this work would be pointless, as it would only restate *SPE*-type and LP analyses of segmental phonology of English and Polish, with all their limitations on explanatory power. Take the notorious [ŋg] cluster of English again. In Halle and Mohanan's (1985) analysis, underlying /n/ assimilates to /ŋ/ when followed by /g/, and /g/ is deleted when following a nasal at the end of a domain (p. 62). Rules responsible for both transformations are taken to operate in the second stratum of the four that Halle and Mohanan's system enumerates in the lexical component. The particular stratum is for Class 2 derivation. In addition, the idea of Halle and Mohanan's reading of LP is that every derivation passes through all lexical strata before being available to phrasal syntax. Thus, whatever morphophonological domain present at stratum 1 makes it to stratum 2 unscathed, the rule of /g/-deletion ensures that any offending domain-final /ŋg/ is reduced to /ŋ/. Thus, such words as *thing* or *bring*, neither of which undergoes Class 1 or Class 2 affixation (in the sense practiced in the lexicalist approach to grammar), can enter the derivation in the first stratum and lose their final /g/ before reaching the third and the fourth stratum. On the other hand, if *long* undergoes suffixation with *–er* or *–est* at stratum 1, its /ŋg/ sequence is not transformed into /ŋ/ because when *longer* and *longest* reach stratum 2, the incriminated sequence is no longer domain-final. This does not apply to *longing*, as *–ing* is added at stratum 2, where the relevant rule changes /ŋg/ to /ŋ/ before the suffix is actually concatenated with the base (p. 63). This is descriptively correct, as it matches the data on standard spoken English. This is not adequate in terms of explanatory power, though. Halle and Mohanan have two more strata above stratum 2, and the rule of /g/-deletion is not operative there. Stratum 3 is for compounding, and as such is not relevant to the discussion; one can easily assume that any words about to form compounds are first dragged through strata 1 and 2, where they lose any domain-final /ŋg/. Stratum 4 is of interest. It is taken to be responsible for regular inflection. Halle and Mohanan are in the comfortable situation of knowing *a piori* that English does not have any inflectional suffix that ends in /ŋg/. Should it be otherwise, their analysis would not work without doubling /g/-deletion onto stratum 4. Imagine English has a plural suffix *–eng* //əŋg//, which is a regular alternative to *–s*, and that it is concatenated at stratum 4. Now, take the plural of *thing* to be formed with *–eng*. In Halle and Mohanan's analysis, such a hypothetical plural would be pronounced *[ˈθɪŋəŋg]. The domain-final /g/ of *thing* would be correctly slashed at stratum 2, but the /g/ of the putative suffix would not, because the suffix is only introduced at stratum 4. If it were introduced at an earlier stratum, the whole idea of stratality in LP would be void. Of course, if *–eng* ever existed in the catalogue of English suffixes, Halle and Mohanan's analysis would surely look different; the relevant rule would be reformulated to account for the strange affix. This is not the point. Any speaker of Southern British English or American English may judge for themself, and find that *[ˈθɪŋəŋg] does not sound like a possible English word at all. The cluster [ŋg] is simply unpronounced word-finally, and this has nothing to do with stratal morphology–phonology interaction or rule ordering; recall /ŋg/ has to be reduced to /ŋ/ via /g/-deletion *before* a suffix is attached at stratum 2, otherwise the cluster would not be domain-final when the rule applies.

The other way to go is to have *Join*(x,y) result in phonology assessing the seamlessness of the output over a narrow strip of the joined representation. Recall this study is only concerned with the concatenative type of morphology. Locality restrictions are not formulated for non-concatenative morphology. For a change, consider an example from Polish, the celebrated case of *sinus* ~ *sinusik*, signalled in section 1.3.2. The word *sinus* [sʲinus] 'sine' is of foreign origin, and from a morphophonological perspective, its foreignness manifests through the sequence [sʲi], which is absent from native minimal domains. Moreover, [sʲi] is never found across a base–suffix boundary in native vocabulary, where [ɕi] is found instead. This implies the sequence is defective. Crucially, the sequence is tolerated despite its defectiveness, which is best evidenced by the fact that word-internal [sʲi]'s are pronounced; there is no rule that would convert [sʲinus] to *[ɕinus], even on an optional basis, which means the phonology–phonetics interface does not intervene. The domain-final [s] of *sinus* undergoes native intralexical palatalisation to [ɕ] when followed by //i// across a base–suffix (or stem–suffix) boundary. Thus, the diminutive *sinusik* is [sʲinuɕik]. If this palatalisation is a result of *sinus* and *–ik* being concatenated via *Join*(x,y), it becomes evident that phonology fails to assess the whole of the output string, as the domain-initial [sʲi] is not transformed into [ɕi]. In Chapter 1, this fact has helped formulate an argument against Kiparsky's version of the Strict Cycle Condition (see section 1.3.2.). Now, it can do it again, albeit from a different angle. In post–*SPE* terms, the concatenation of *sinus* and *–ik* creates a derived environment. In Kiparsky's SCC, a derived environment is the only one for application of cyclic rules. As argued for in Rubach's (1984) analysis, which follows Kiparsky's take on SCC and on Lexical Phonology (as opposed to Mohanan's), *Coronal Palatalization* is the cyclic rule that turns //s// into /ɕ/ (p. 70–75). Its structural description is given in (59) below.

(59) *Coronal Palatalization* (Rubach 1984: 70; his rule (103))

$$\begin{bmatrix} +\text{anter} \\ +\text{coron} \\ -\text{del rel} \\ \alpha\,\text{obstr} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{back} \\ +\text{distr} \\ +\text{high} \\ -\text{anter} \\ \alpha\,\text{strid} \end{bmatrix} / \_ \begin{bmatrix} -\text{cons} \\ -\text{back} \end{bmatrix}$$

Rule (59) has a very restricted locality of application. In segment-oriented systems, i.e. those that use *SPE*–like linear representations and those that do not split segments into autosegmental tiers, let alone adopt a feature geometry, rule (59) has a locality span of two segments. One is the trigger, the other the target. In fact, of all the eighteen rules considered cyclic in Rubach (1984), only five have a wider span. Among these, *Derived Imperfective Tensing* (Rubach's rule (44)) and *j-Insertion* (his rule (114)) make crucial reference to extra-phonological categories; the former requires a derived imperfective, the latter a verb—both terms are morphological, with no direct translation into phonetic matter—in order to apply. This leaves three rules, two of which, viz. *Iotation* (his rule (111)) and *Vowel Shift* (his rule (199)) have a span of three segments, leaving *Lower* (his rule (263)) as the only cyclic rule with a potentially unlimited span. However, this is so only hypothetically. *Lower* is formulated as in (60) below.

(60) *Lower* (Rubach 1984: 185; his rule (263))

$$\begin{bmatrix} +\text{syll} \\ +\text{high} \\ -\text{tense} \end{bmatrix} \rightarrow [-\text{high}] / \_ C_0 \begin{bmatrix} +\text{syll} \\ +\text{high} \\ -\text{tense} \end{bmatrix}$$

Following *SPE* notation, C_0 stands for any number of consonants, while the feature bundle to the right of it is nothing but a vowel, more specifically a vowel that alternates with zero. *Lower* is responsible for converting one of such vowels if the next syllable contains another such vowel. If only phonology can distinguish between vowels and consonants on the basis of their skeletal position—this is done in non-linear phonology, to which GP, CVCV, and this work appeals—then the span of *Lower* is radically limited, viz. it only concerns adjacent syllabic nuclei, intervening consonants playing no role whatsoever.[74]

When *Lower* is reviewed from a non-linear perspective, the remaining cyclic rules of Rubach (1984) are most elegant in that each of them requires the trigger to be adjacent to the target. Except for *Lower* and *Derived Imperfective Tensing*, no cyclic rule in Rubach's analysis takes the form "change *x* to *y* when followed by *z* any number of segments away."

The point of referring to cyclic rules postulated in Rubach's (1984) analysis is to show that the Strict Cyclicity Condition bundled with a Derived Environment clause does not govern morphophonological transformations; rather, the very locality of phonological rules that apply to segments does. What forces a base-final //s// to become interpretable as [ɕ] when an //i//-starting suffix appears in the same workspace is not a rule tailored to transform the //s// itself (or any other coronal), but a rule tailored to make the inner edges of both exponents of morphological structure disappear. The only way in which it can work is to take //s// and //i//, and make them behave the way well-behaved native segments do when neighbouring on another, viz. make them pronounceable as [ɕi]. This finding allows for the formulation of a locality clause for *Join* in (61) below.[75]

(61) *Locality* (first formulation)
Locality only holds for segments whose position makes them eligible for mutual relations.

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[74] Vowel ~ zero alternations in Polish are discussed in detail in Chapter 5. See also Spencer (1986) and Rubach (1986) for early non-linear analyses of alternating vowels.

[75] A rare example of locality formulation in GP literature has appeared in Harris (1994: 12): "In phonology, the locality principle requires that the target and trigger of a process be adjacent."

At this point, the discussion must cease its relative neutrality with respect to what phonological engine operates within workspaces. The more so since condition (61) presupposes intersegmental relations that must be defined with respect to a particular model of phonology. The next section discusses those tenets of CVCV and (Standard) Government Phonology that form the core of further analysis.

2.6. CVCV: first exposure

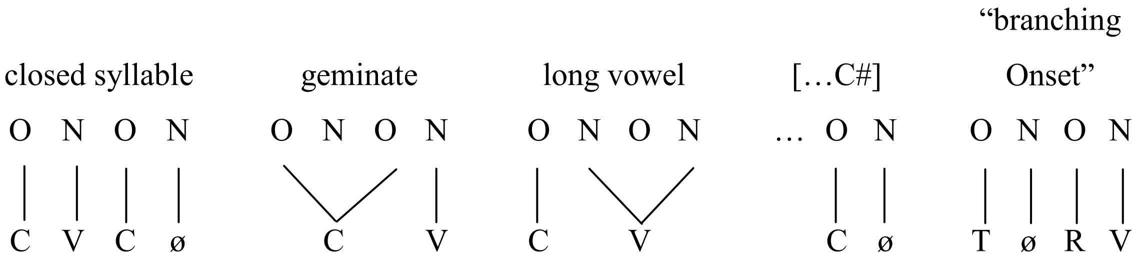
This section provides an introduction to the skeleton and to the lateral relations in CVCV (Scheer 2004 et seq.). Notice that CVCV as such has not been designed to operate in workspaces; nothing in Scheer (2004) or in Scheer (in prep.) presupposes, let alone endorses, a workspace-oriented approach to morphophonology. CVCV as such is “a Lateral Theory of Phonology”, as the title of Scheer (2004) says. CVCV will be revisited in section 2.7, where a specific reading of *morpho*-phonology is introduced, couched in CVCV phonology. Below is an introduction to CVCV as it stands in Tobias Scheer’s work.

2.6.1. Introduction to Scheer (2004)

This section summarises the introductory section of Scheer (2004), whose formulation of CVCV is the core of intersegmental relations through which the present work perceives segmental interaction (or lack thereof) between phonological exponents of morphosyntactic structure. As the relevant part of Scheer (2004) is short and condensed, there is little space for playing with paraphrases.

> CVCV holds that syllabic constituency boils down to a strict consecution of non-branching Onsets and non-branching Nuclei in all languages. There are no Codas and no Rhymes, and the minimal syllabic unit that may by manipulated is an Onset followed by a Nucleus: the existence of the former implies the latter and *vice versa*. For the sake of clarity, the constituent structure of some basic phonological objects appears under [(62)] below. (Scheer 2004: 1; emphasis original)

(62) Some basic phonological objects (Scheer 2004: 1)



As Scheer puts it, "[t]his is the core of the research programme laid out in Lowenstamm (1996)" (p. 1).[76]

> The structures under [(62)] are the ultimate consequence of the line of thought that was initiated by [KLV 1990] and Kaye [1990*a*], which is known as Government Phonology. [KLV 1990] have severely restricted syllabic arborescence in claiming that all constituents are maximally binary, except the Coda that can only dominate one skeletal slot… At the same time, they have given theoretical status to empty Nuclei (which were formally introduced by Anderson 1982), whose existence is systematically supposed in word-final position and in locations where vowels alternate with zero. Moreover, phonological processing is supposed to be structure-preserving, which means that nothing can ever be resyllabified. Strings are fully syllabified in the lexicon, and hence there is no such thing as a syllabification algorithm.
>
> In order to be pronounced, a segment must pertain to a syllabic constituent, on which the usual restrictions regarding sonority rely… Ordered rules (but not serialism as such) are declared undesirable: phonological processes apply whenever (and only when) their environment is met (Kaye 1992[*b*]:141, 1995:291)… The two latter statements exclude all versions of extrasyllabicity: nothing may have a phonetic existence without belonging to a syllabic constituent, a segment may not be attached to anything else (such as the phonological word and the like) than a skeletal slot, all skeletal slots are dominated by a syllabic constituent, nothing can be underparsed because there is no such thing as a syllabification algorithm, and "late" incorporation into syllable structure is outlawed by the absence of rule ordering. …
>
> A crucial property of the syllabic model initiated by [KLV 1990] is the fact that co-occurrence restrictions among neighbouring segments do not stem from the arboreal structure itself. Rather, the syllabic arborescence is demoted to a derived status. It follows from lateral relations that hold among segments. In traditional syllabification the fact that a sequence such as, say, [pr], but not [rp], qualifies as a branching Onset is ascribed to a constraint on this constituent: "within branching Onsets, sonority must increase"… [S]onority is not a primary phonological category (there is no [±son] feature or the like) but follows from the number of primes that participate in the definition of a segment (complexity). Based on complexity, segments contract disbalanced lateral relations where one member governs the other. Governing abilities depend on the complexity (or Charm) value of each item. In this view, [pr], but not [rp], qualifies as a branching Onset because [p] is more complex than [r] and may therefore govern it; the reverse governing relation is excluded. Arboreal syllable structure is only a secondary effect of this kind of governing relation: the head of a branching constituent must be able to govern its dependent, and constituents are head-initial. This disbalanced head–dependent interaction holds also true for relations among segments that belong to different constituents … (Scheer 2004: 1–3)

[76] See Scheer (2004: 1: footnote 3) for references to works that have followed Lowenstamm's idea.

That part of Scheer's introduction to CVCV provides the (Standard) Government Phonology background for the reader. The following presents CVCV's main line of attack.

> The philosophy of CVCV is to take this conception to its logical end: if syllabic arborescence is not primary, if it can be read off the lateral relations that hold among segments, and if all effects that are usually understood as a consequence of arboreal syllable structure (Closed Syllable Shortening etc.) may be described in terms of lateral relations, then it must be concluded that there is no syllabic arborescence at all: what would it be good for? It is self-evident that no theory can afford to host two parallel structures with identical scope and function. In case one is primary and other derived, the consequence is clear: the derived one is to be done away with …
>
> …
>
> The resulting picture is also a fairly accurate description of the research programme that is laid out here: CVCV attempts at expressing all syllabic and syllable-related processes in terms of lateral relations, rather than with appeal to any kind of syllabic arborescence. …[T]his research programme is actually identified on the first page of [KLV 1990], but Standard Government Phonology ran out of breath half way when implementing it… (Scheer 2004: 3–4)

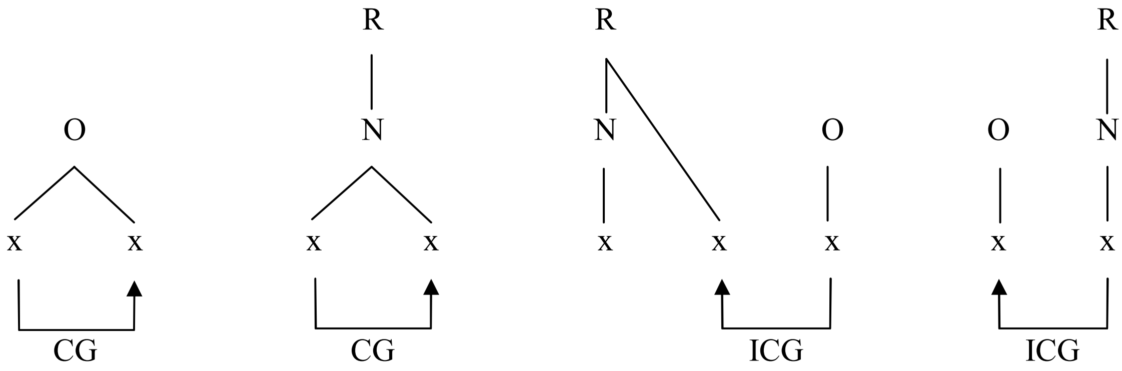
To see what relations are meant in CVCV, and how they differ from SGP, Scheer (2004) provides an appendix, a guide to the 1990 GP. The following subsection concentrates on intersegmental relations in (S)GP.

2.6.2. Lateral relations in (Standard) Government Phonology

Examples in (63) below illustrate intersegmental relations within and across syllabic constituents in GP.

(63) Possible constituents in Standard Government Phonology (repeated after Scheer 2004: 769)

Constituent Government (CG) relates two members of the same constituent		Interconstituent Government (ICG) relates two segments that pertain to different constituents	
a. branching Onset	b. branching Nucleus	c. Coda–Onset	d. Onset–Nucleus

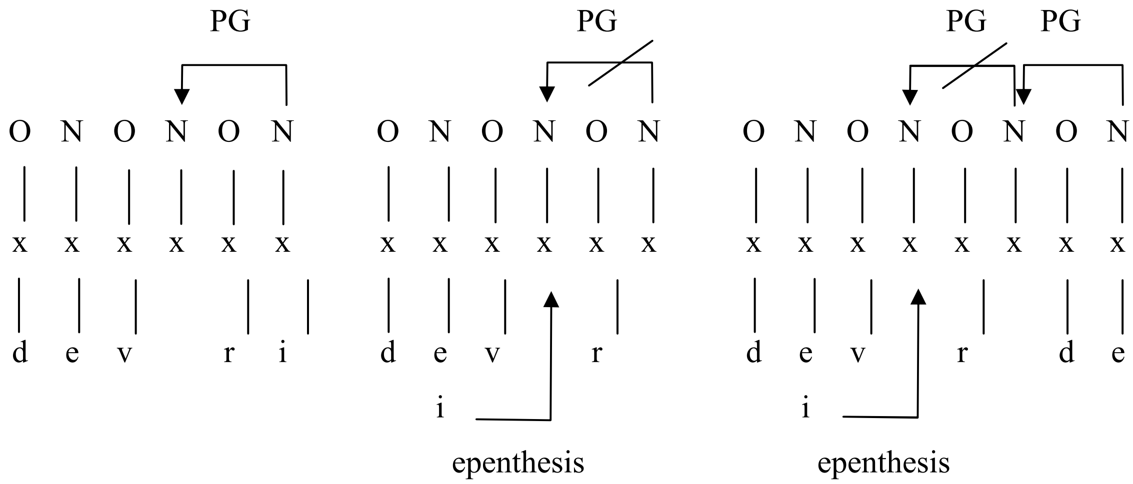


As shown in (63), governing relations within constituents are left-to-right (head-initial), while those between segments belonging to different constituents are right-to-left (head-final). The number of possibilities on what types of segments are governors and governees is restricted by infrasegmental complexity, expressed through elements that build segments (see section 1.3.3).[77] In short, sonorants have fewer elements in their composition than obstruents do, therefore the former qualify as governees, the latter as governors in branching onsets and in coda–onset relations. Thus, [pr] qualifies as a branching onset, but not as a coda–onset sequence, while the reverse is true for [rp]. The relations within branching nuclei are not relevant to the present work; Polish has no long vowels, while the subsequent analysis of English morphophonology is not contingent on vowel length. Besides, the present work does not endorse the syllabic constituency practised in SGP, and a number of SGP representations that appear here do so predominantly with reference to SGP analyses, such as Gussmann's (2007) book. One more SGP relation needs to mentioned, however: Proper Government. Consider (64) below.

[77] This is the post-1990 picture, when Harris's (1990, 1994) notion of Complexity superseded the earlier notion of Charm, signalled in section 1.3.3.

(64) Representation of basic vowel ~ zero alternations in Standard Government Phonology; Turkish “transfer” (adapted from Scheer 2004: 776)

(64a) devr–i ACC (64b) devir NOM (64c) devir–den ABL



“The Nucleus where [i] sometimes appears is lexically empty. It must acquire phonetic content under [(64b), (64c)] (via epenthesis) because the following Nucleus is empty. When the following Nucleus is filled as under [(64a)], however, it remains phonetically unexpressed” (Scheer 2004: 776).

The above mechanism is the standard way of accounting for vowel ~ zero alternations in GP. Scheer (2004) first considers a CVCV-ised version of Proper Government as responsible for the alternations, before admitting a different solution, viz. floating melody (p. 81–93), which is also the backbone of Gussmann’s (2007) non-orthodox GP analysis of vowel ~ zero alternations, to which this work refers in Chapter 5.

The next subsection lists intersegmental relations available in CVCV, towards which this work is inclined.

2.6.3. Lateral relations in CVCV

Scheer (2004: 176) provides a breakdown of intersegmental relations recognised in CVCV, reproduced in (65) below.

(65) Lateral relations that structure the segmental chain in CVCV (after Scheer 2004: 176)

			empirical illustration	usually called
a.	source:	Nucleus		
	Gvt	V → V	vowel~zero alternations	Proper Government
	Lic	V → V	alternations in vowel length	—
	Gvt	V → C	intervocalic lenition	—
	Lic	V → C	e.g. *#RT, Strong Position[78]	Gvt Licensing, Licensing
b.	source:	Onset		
	Gvt	C → C	} e.g. *#RT …	Infrasegmental Government
	Lic	C → C		
	Gvt	C → V	impossible	—
	Lic	C → V	impossible	—

A note is necessary: the previous section has omitted the notion of Licensing, occasionally present in SGP literature, for principled reasons. There are a number of mechanisms in GP dubbed Governments and Licensings of all sorts, whose effects are mixed up. "… [T]here is no hope to tell Government and Licensing from each other on the grounds of their effect. Both have variants that support phonetic absence (Proper Government and Interonset Government as well as Licensing of final empty Nuclei, Magic Licensing and p-Licensing), while others lend a helping hand so that the target is able to enjoy phonetic presence (Constituent and Interconstituent Government as well as Government Licensing and Coda Licensing)" (Scheer 2004: 155).[79] In fact, this state of affairs is openly admitted in Kaye (1990*a*: 306): "Government is one form of licensing." To say this is a bit confusing would be an understatement.

The elegance of CVCV is that the names "Government" and "Licensing" are supposedly granted to lateral relations based on their effects. "… Government inhibits

[78] The mnemonic *#RT denotes the lack of sonorant + obstruent word-initial clusters in some languages; Strong Position denotes position insusceptible to lenition; see Scheer (2004) for discussion.

the segmental expression of its target", while "Licensing enhances the segmental expression of its target" (Scheer 2004: 139).[80] This calls for some clarification. In the 2004 CVCV—this means: as shown in the first volume of what is augmented by Scheer (in prep.)—Government and Licensing may but do not have to apply in tandem when originating in a nuclear position and targeting an onset. If an onset is under the spell of both, it is neither "inhibited" nor "enhanced"; the relations cancel the effects of one another. (Whether this should have the same effect as having neither Government nor Licensing apply to an onset is a different matter; see Cyran's (2006) review for well-informed discussion on theoretical implications of Scheer (2004).)

A nucleus may also contract a single lateral relation with the preceding nucleus, i.e. either Government or Licensing, in which case the relation in question cannot be dispensed for the intermediate onset. Each segment has only one instance of Government and Licensing at its disposal. Nuclei are in a privileged position in that they can distribute lateral force onto onsets and nuclei alike, while onsets may only act on other onsets. The disjunctiveness of lateral relations between nuclei—internuclear Government and internuclear Licensing cannot apply together—is argued for a number of times in Scheer (2004: e.g. 173–175; 595–596). The main argument is the opposing effect that these forces are supposed to have on nuclear positions, more specifically on vowels. The classification of the effects of lateral forces provided in (65) is somewhat refined in (66) below.

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[79] For the background of Coda Licensing see Kaye (1990*b*), for p-Licensing and Magic Licensing see Kaye (1992*a*), for Government Licensing see Charette (1990, 1991), and KLV 1990 for remaining relations in the list.

[80] The actual quote from p. 139 should read "Proper Government …"; however, in subsequent discussion, Scheer gets rid of the "Proper Government" moniker in CVCV, so that the relation in question is simply "Government." In addition, a similar quote on Government and Licensing is to be found on p. 162, albeit with the word "comforts" instead of "enhances."

(66) Vowel-headed lateral relations in CVCV (adopted from Scheer 2004: 596)

		empirical illustration	
		if the target	
	event	is hit by	escapes
a. internuclear V → V			
Government	V ~ zero	zero	V
Licensing	V ~ VV	VV	V
b. vowel-to-consonant V → C			
Government	Lenition &	weakness	strength
Licensing	Fortition	strength	weakness

Since internuclear relations of Government and Licensing are supposed to have opposite effects, Scheer concludes they cannot apply together. The answer to why vowels cannot but consonants can be governed and licensed at the same time is promised to appear with the introduction of Locality in the second volume of Scheer (2004); p. 596 provides a very concrete reference, viz. "Vol.2,I.3", which is to be read "Chapter I, section 3 of the second volume". However, at this writing, "Vol.2" is circulating in the flesh of a draft version of Scheer (in prep.), which is a book on extra-phonological information in phonology, not "On Locality, Morphology and Phonology in Phonology" as promised earlier by the subtitle.[81] (In Scheer (in prep.), the referenced section is on juncture phonemes in American structuralism, not on Locality.)

The state of confusion is neutralised by a scrapped bit of what was supposed to appear in Volume 2, but which has been expelled from the draft of Scheer (in prep.) that is known at this writing. In (67) below is a working definition of Locality for CVCV.

[81] The title of Volume 2 is not given in Volume 1 as such, but it appears in Cyran's (2006) review thereof. Even not knowing Volume 2 would be a radically different book, Cyran notices "the continual and frustrating promise of volume two …, in which a number of crucial theoretical points, which we may have already grown to accept, are to be more or less substantially revised, while some crucial answers are simply delayed till then" (p. 506). Some discussion on Locality in CVCV is only offered in Scheer's (2000) Habilitationsschrift, which is written entirely in French; Volume 1 and Volume 2 were originally conceived as a rewrite of Scheer (2000) for a non-French-speaking audience. As Volume 2 has become a different work during its preparation, there is no published work written by Scheer in English to which the present writing may refer for the definition of Locality in CVCV. A manuscript not included in (the present version of) Scheer (in prep.) is used instead.

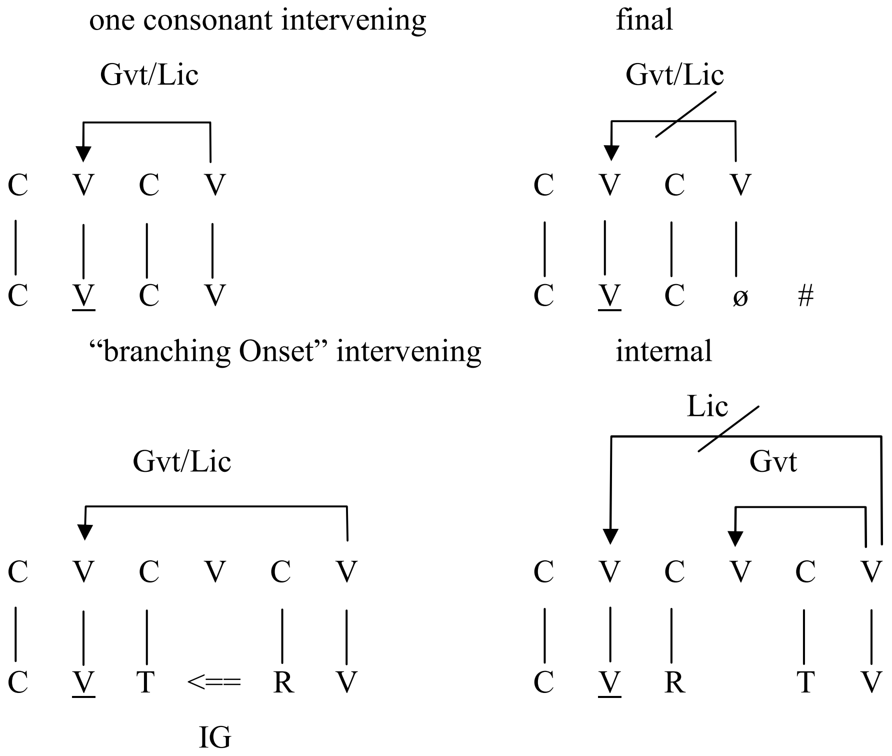
(67) Locality in CVCV

> All relations between phonological constituents are strictly local.
> That is,
> a. a Nucleus may not communicate with any other constituent over another Nucleus.
> i.e. given the sequence …O_{-1} N_{-1} O_0 N_0 O_1 N_1 O_2 N_2…, N_0 may contract a lateral relation only with N_{-1}, O_0, O_1 and N_1, to the exclusion of all other constituents. In the following sequence, square brackets indicate the domain that is local for N_0: …O_{-1} [N_{-1} O_0 N_0 O_1 N_1] O_2 N_2…
> b. an Onset may not communicate with any other constituent over another Onset.
> i.e. given the sequence …O_{-2} N_{-2} O_{-1} N_{-1} O_0 N_0 O_1 N_1…, O_0 may contract a lateral relation only with O_{-1}, N_{-1}, N_0 and O_1, to the exclusion of all other constituents. In the following sequence, square brackets indicate the domain that is local for O_0: …O_{-2} N_{-2} [O_{-1} N_{-1} O_0 N_0 O_1] N_1…(Scheer, ms.)

The locality of lateral relations is illustrated on the example of CVCV counterparts to open and closed syllables, given in (68) below.

(68) Open vs. closed syllable in the 2004 CVCV (adapted from Scheer 2004: 178; his "third definition"; unlike in the original source, here the vowel in question is underlined)[82]

(68a) vowel in an "open syllable" (68b) vowel in a "closed syllable"



"[A] vowel stands in an open syllable iff it is the target of either Government or Licensing", while "a vowel stands in a closed syllable iff it is the target of neither Government nor Licensing" (Scheer 2004: 177). Thus, the forward slash in "Gvt/Lic" in (68) is to be read as an exclusive disjunction, i.e. either—or. If the vowel in the final "closed syllable" (upper right example in (68)) is subject to neither lateral relation, one must conclude that CVCV allows vowels to retain they pronounceability when they lack Licensing. This entails, one is compelled to conclude, that CVCV, unlike GB syntax and GB syntax-infatuated SGP, allows unlicensed objects to be interpreted.[83]

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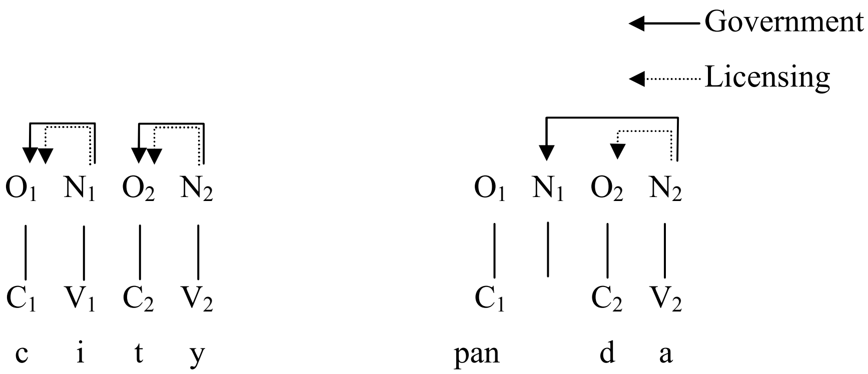
[82] The label 'IG' in (68) stands for Infrasegmental Government, a relation holding between members of so-called branching onsets, a term not applicable in CVCV due to the unary nature of syllabic constituents. Essentially, IG holds between a sonorant and an obstruent and circumscribes an empty nucleus. In Scheer (2004), an empty nucleus flanked by IG is deprived of any lateral force. Furthermore, it does not require any lateral force from the following nucleus to stay silent. (On Standard GP account, an ungoverned non-domain-final empty nucleus should vocalise, as shown earlier in (64).)

[83] In his review of Scheer (2004), Cyran (2006) notes CVCV "is very different from Standard GP, in which every position is stipulated to be licensed, even if the licenser is an empty nucleus" (p. 513); see, for instance, Harris (1994: 154–225) for well-formedness conditions in SGP with respect to Licensing.

The lateral relations shown in (68) are somewhat problematic when confronted with the assumption that “the minimal syllabic unit that may by manipulated is an Onset followed by a Nucleus: the existence of the former implies the latter and *vice versa*” (Scheer 2004: 1; emphasis original). Notice that no relations whatsoever are shown for onsets in (68). One would expect that if CV is a unit in phonology, then a nucleus would first cater for its onset, and only dispense its lateral force onto another nucleus when such a nucleus is in need of ‘enhancement’ or ‘inhibition,’ i.e. Licensing or Government, respectively.

Cyran (2006) is arguably the first to notice in public that something is wrong in the version of CVCV given in Scheer (2004). Reading CVCV in his own way, Cyran produces the following representations in (69) below.

(69) The words *city* and *panda* in the 2004 CVCV on Cyran’s (2006: 512) reading[84]



The examples in (69) are arguably the most direct interpretation of the assumption that CV’s are minimal syllable units. The left-hand example has two CV’s on all accounts. All governing and licensing relations in CVCV, unlike in SGP, are right-to-left, thus N_2 in *city* is only concerned with what precedes it. Given the CVCV definition of Locality in (67), N_2 may only dispense its lateral power on O_2 and N_1. This is the domain of V_2’s Government and Licensing. Cyran assumes N_2 to take care of its onset (O_2) first, and draws two arrows between these constituents. The content of N_1, a possible target for N_2’s force, has a stable, full vowel, as opposed to being empty, which Cyran takes to mean N_1 needs no lateral relation from N_2. A relation is needed for N_1 in *panda*. This

The essence of his discussion is that only heads of a domain may be left unlicensed, where heads are supposed to be the domain-final nuclei in SGP.

[84] Cyran (2006) uses an extranumerary tier in his representations, viz. the O–N tier, which not used in Scheer (2004) for CVCV representations; the C–V tier is the only non-melodic tier therein.

nucleus hosts no vowel, which in SGP (and, in Cyran's understanding, CVCV) terms means it requires Government to be silent (compare (64)). As N_2 has only one instance of each of its powers at its disposal, it first caters for N_1 in need, and can only provide Licensing to its lawful onset, viz. O_2.

When compared against (69), (68) looks as if it represented a different theory of phonology. The left-hand examples in (68) show a lateral force—it is irrelevant which force, Government or Licensing, is considered—extending from one nucleus onto another. This is despite the target being contentful, i.e. having melody. Furthermore, if internuclear relations are supposed to either inhibit or enhance the melody of the target, and the word *city* is rather stable with respect to its first vowel—it neither lengthens to give *[ˈsiːti] nor alternates with zero to give *[sti]—then the definition of "open" and "closed" syllables illustrated in (68) must be wrong.

Noticing the confusion brought by the 2004 published version of CVCV, Scheer (in prep.) amends the laws of the game, and formulates a hierarchy of lateral relations, given in (70) below.

(70) *Government over Licensing*

"[N]o constituent can be governed and licensed at the same time. In case a constituent can potentially be subject to both lateral forces, it will be governed" (Scheer, in prep.: §899).

As the statement in (70) does not give immediate answers as to which constituent in (68) and (69), a nucleus or an onset, should be the first to receive a lateral force from the following nucleus, a definite statement is made with respect to which constituent in the local domain of a nucleus (see (67)) is to receive which force, given in (71) below.

(71) Origin and application of lateral relations

a. nuclei exhaust their lateral potential; nuclei which are enabled to govern do govern, nuclei which are enabled to license do license …
b. by default, nuclei target their own onset, i.e. "choose" the shortest move.
c. they target other nuclei in two situations:
 1. when they are called to either govern or license a preceding empty nucleus.
 2. when they govern their onset and hence cannot license it simultaneously.
(Scheer in prep.: §902)

Given (71), the relations shown earlier in (68) are due for refinement in (72) below.

(72) Open vs. closed syllables in the 2008 CVCV, a "final version" (interpretation based on Scheer, ms.; arrow typology from (69) applies)

vowel in an "open syllable"	vowel in a "closed syllable"
(72a) one consonant intervening	(72b) final
C V C V | | | | C <u>V</u> C V	C V C V | | | | C <u>V</u> C ø #
(72c) "branching Onset" intervening Gvt/Lic	(72d) internal
C V C V C V | | | | | C <u>V</u> T <== R V IG	C V C V C V | | | | | C <u>V</u> R T V

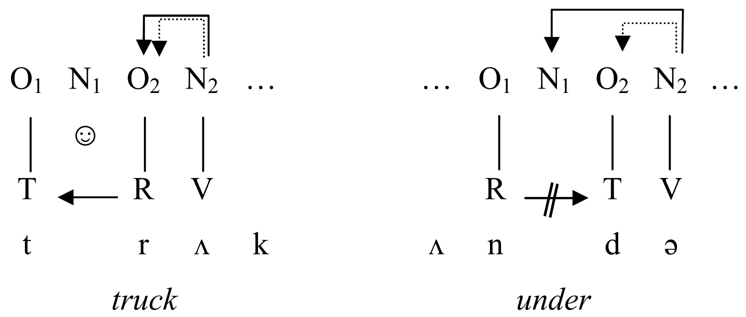
In (72), the ability of nuclei to dispense lateral forces coincides with a different definition of what makes an open or a closed syllable. "A vowel stands in an open syllable iff the following Nucleus enjoys full lateral actorship", while "a vowel stands in a closed syllable iff the following Nucleus is laterally disabled" (Scheer, ms.). An alternative, equivalent definition is included in Scheer (in prep.): "[V]owels in open syllables are licensed. [V]owels in closed syllables are unlicensed" (§718). In (72), the final nuclei in the left-hand examples (72a) and (72c) have full lateral actorship, and so does the mysterious empty vowel circumscribed by IG (on which more in the next paragraph). The final vowel in the upper right example (72b) is a final empty nucleus (FEN), which is subject to language-specific parameterisation: in Scheer (in prep.), a FEN is either able to distribute two lateral relations, or it can dispense neither relation (§908).[85] The particular FEN in (72b) is laterally disabled, hence it does not govern its

[85] In the earlier, published source of CVCV, Scheer (2004) assumes FEN's have a four-way parameterisation: their ability to [±] govern is orthogonal to their [±] licensing ability. This has prompted Cyran (2006) to question the validity of this division. Specifically, Cyran's doubts concern a hypothetical

onset, and may not licence the preceding nucleus, i.e. V is in a "closed syllable." Were the FEN in question laterally enabled, its lateral powers would contract the same relations as those of the full vowel in the upper left example, which fits Cyran's *city*. The bottom right example (72d) is a situation in which a sonorant + obstruent cluster is in the way of two full vowels, as in *panda* (recall (69)). The final nucleus is called to govern the preceding empty nucleus, which it does, leaving the source nucleus with only Licensing to give to its onset. The medial empty nucleus, unlike FEN's, does not fall under parameterisation; it is permanently disabled. Hence, it dispenses neither lateral relation to its onset, and to the preceding nucleus; this V is in a "closed syllable", too. This does not mean it should be detrimental to its melody; the first vowel in *panda* is a true, i.e. non-empty, vowel, and it needs no support from the following vowel. Example (72c), on the other hand, includes a contentful nucleus governing its onset, which leaves the licensing powers of the nucleus to concentrate on the preceding, empty nucleus. The emptiness of this nucleus is different from that in (72d), as the nucleus in (72c) is flanked by onsets contracting a relation which Scheer (2004) dubs Infrasegmental Government (IG).

IG is first used in Scheer (2004: 36) to define a relation between an obstruent and the following sonorant—this corresponds to a branching onset in SGP—that need to be separated by a nucleus because of the strict CV alternation of skeletal slots. Consider (73) below.

(73) The words *truck* and *under* on Cyran's (2006: 520) reading



> The fact that the two types of clusters in [(73)], that is, RT and TR contain an empty nucleus might wrongly suggest that there is some kind of symmetry amongst them in that

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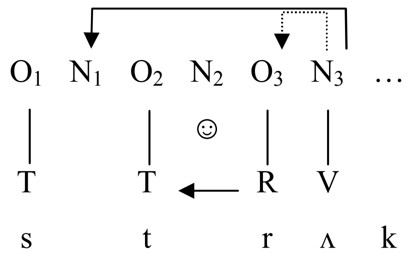
situation in which FEN's govern but do not license. In languages with such a setting, word-final consonants would be expected to undergo heavy lenition.

> they should all behave similarly because they are formally identical. According to Scheer, they are neither formally symmetrical, nor do they behave similarly. In fact there is a clear asymmetry in Scheer's model in that the TR sequence is the only one able to contract a governing relation [(73)a]. Scheer calls this relation Infrasegmental Government (IG) because it is <u>driven by melody and takes place at the melodic level.</u> Hence, the IG arrow is placed at this level… One consequence of IG is that the ECP of the intervening empty nucleus is satisfied – it does not require government from N_2, a fact which is marked by the symbol ☺. This mechanism is then similar to the operation of Interonset Government in Standard GP (e.g., Gussmann and Kaye 1993). *Note that this effectively means that the nucleus N_2 is free to properly govern another empty nucleus, should there be one in front of the TR cluster.* (Cyran 2006: 520; emphases mine)

The italicised bit of Cyran's review of Scheer (2004) betrays the 2004 IG's incompatibility with Locality, as defined for CVCV in (67), and with locality of lateral relations, as defined in (71). Potentially, one may try to represent *struck* instead of *truck*, as in (74) below.

(74) The word *struck* in (2004) CVCV based on Cyran's (2006: 520) reading



struck

That *struck* is a real word in English is beyond doubt. What is not is the governing relation between N_3 and N_1, which jumps over N_2, i.e. it is non-local, and therefore illicit in the 2008 CVCV. Locality is the reason for which Scheer (in prep.) gives a different lateral configuration for IG.[86] On the new reading, the smiling nucleus circumscribed by IG is still unlike any other non-final empty nucleus in that it needs no government from another nucleus; it is governed by being within the domain of IG as such. [87] Being governed, it can dispense lateral forces itself. Thus, *struck* is most likely to take the shape given in (75) below.

[86] The relations within IG are not explicitly redefined in Scheer (in prep.), as Locality is also missing from the draft of the book. Examples showing lateral relations in a new IG are shown (§925) but given little comment. Therefore, my reading of the 2008 IG is based on material that is not present in the draft (Scheer, in prep.), and whose English version is not published otherwise (Scheer, ms.).

[87] As marked in the underscored bit of Cyran's review quoted earlier, IG is based on the relation between the *melodies* of the segments to which it applies; all other relations named Government in CVCV only concern the *relative position* on the skeleton (onset vs. nucleus) and the presence vs. absence of melody

(75) The word *struck* in 2008 CVCV as deducted from Scheer (in prep.: §925; ms.), plotted onto Cyran's (2006) skeletal tiers

$$
\begin{array}{ccccccc}
O_1 & N_2 & O_2 & N_2 & O_3 & N_3 & \dots \\
| & & | & & | & | & \\
T & & T & \leftarrow & R & V & \\
s & & t & & r & \text{ʌ} & k
\end{array}
$$

struck

In (75), N_3 is not called to govern N_2; N_2 is governed by being squeezed between [t] and [r], joined by IG. Hence, given the *Government over Licensing* principle (see (70)), N_3 licenses its onset (O_3). The remaining relation, viz. Government, cannot be targeted at O_3 due to the same principle. Therefore, N_3 licenses N_2. N_2 is indifferent to Licensing—the relation is harmless—as it suffices that N_2 is not *governed* by N_3. Being free to act in lateral terms, N_3 governs a proper empty nucleus, viz. N_1, which is not circumscribed by IG, and needs Government. The remaining force of N_2, viz. Licensing, is targeted at its onset, viz. O_2. The leftmost onset in (75) is left with neither relation.

2.6.4. Summary: which nuclei act laterally

To clarify which nuclei may act, a short summary is at hand. Contentful nuclei and ungoverned non–domain-final empty nuclei are able to govern and license. Governed non–domain-final empty nuclei are laterally disabled. Final empty nuclei (FEN) are special. Their existence is subject to a binary parameter; particular languages either allow or disallow FEN's; in languages where FEN's are present, they are parametrically governed.[88] FEN's are subject to further parameterisation. In 2008 CVCV (Scheer, in

(full vs. empty nucleus), but not the total number or combination of GP elements (see section 1.3.3). Due to its enhancing, rather than inhibiting nature, the name 'Infrasegmental Government' is not the best choice for the relation in question. Scheer (2004: 163) notes the label 'Government' is due for refinement in "Vol.2". Cyran (2006: 533) suggests IG could be renamed "infrasegmental licensing." Scheer (in prep.), i.e. "Vol.2" is silent on the nature of IG.

[88] English and Polish are among those languages that do have FEN's, on any GP/CVCV account. Concerning parametric Government over FEN's, in SGP the mysterious parameter responsible for FEN's is p-Licensing (Kaye 1992*a*).

prep.), a single binary parameter applies: FEN's can be either laterally active, or laterally disabled. This parameter is language-specific.[89] Laterally-active final empty nuclei act like contentful nuclei (or full vowels); they govern and license. Laterally disabled FEN's are like non-final empty nuclei; they do not propagate any lateral force.

This completes the necessary introduction to lateral relations recognised in CVCV on its post-2004, Locality-oriented reading. The next section will concentrate on combining CVCV with workspaces, and on how the system endorsed here is different from what is known about Kaye's (1995) way of putting morphology into GP.

2.7. *Join*(x,y) run in CVCV

Recall that the discussion in Chapter 1 and in sections 2.1–2.5 of the current chapter has repeatedly pointed to the distinction between existing, lexical or underlying representations vs. derived representations, and between affixes that do behave as if they were part of the base (Class 1) vs. those that do not (Class 2). Given the lateral apparatus of CVCV (see above), the distinction may now be captured representationally.

2.7.1. Underlying, lexical, and phonological representations

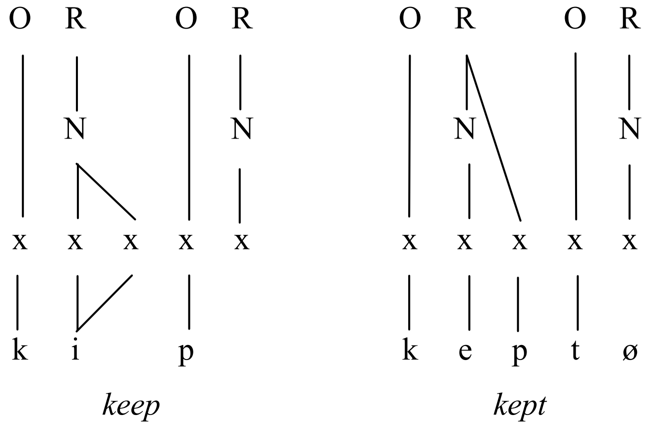
GP and CVCV alike are theories of phonological representations. In this context, 'phonological' amounts to 'not contingent on syntax and morphology and not articulatory-phonetic'. Neither KLV 1985 nor KLV 1990 use the word 'underlying' when referring to representations. They only speak of 'representation' and occasionally, as KLV 1990 do, of 'lexical representation.' The concept of underlying representations is absent. This omission of underlying structure requires that GP separate morphophonology from phonology. This is indeed the position held to this day in (S)GP; Gussmann (2007: 19) is adamant that morphophonology is a separate component. One must assume morphophonology precedes phonology in phonological

[89] Again, English and Polish are among those languages whose FEN's are laterally active. This is demostrable through the existence of simplex words with TT# clusters, such as *act, apt,* and *aft* in

derivation in GP world. Where exactly this morphophonology is located within grammar, i.e. before, after, or within syntax, remains a mystery.

This exclusion of morphophonology from phonology is evident when one thumbs through illustrations found in GP literature. A cursory look at these reveals that non-bracketed examples of GP representations show words or phrases as they appear after all word- and phrasal syntax has applied. Consider (76) below.

(76) The word forms *keep* and kept in SGP (after Kaye 1990*a*: 312)



That *keep* and *kept* are related via irregular inflection is not relevant to this example. What is relevant is the custom of showing pronounceable phonological representations, not the morphophonological activity that leads to them. *Keep* may equally well be taken to be a root, an infinitive, a present tense form (except for 3SG), or even a noun in a singular form. *Kept*, on the other hand, is only the preterite or the past participle form of *keep* the verb, not *keep* the root and what have you.

This is consistent with the assumption that GP is about *phonological* well-formedness, and other conditions defined in phonology as such, irrespectively of external conditions, i.e. morphology. In mainstream GP, all representations given in various figures that have no brackets are phonological, not morphophonological representations.

What the present study aims at is to uncover the relations that hold between phonological exponents of morphemes when they are concatenated. What the intermorphemic relations in inflected words are can be deducted from the surface; all words pronounced in sentences are taken to be inflected (even if inflection is

English, or *rdest* 'knotgrass,' *liść* 'leaf,' and *nikt* 'nobody' in Polish.

phonetically null), as sentences are formed in syntax. In the same way, i.e. through deduction, linguists discover the internal structure of words. They chop off any phonetic bits of words (and phrases) that can be systematised as roots, stems, prefixes, suffixes, clitics, and the like. Thus, one has the final product of word formation and inflection, viz. the pronounceable word, and a theory of what morphemes sit inside that word. *SPE*, Cyclic Phonology, and Lexical Phonology have all tried to relate the morphological side of words with their phonetic shape. GP has dumped the morphological side as non-contingent on phonological rules and constraints. This begs the question if morphological units, i.e. morphemes, are not subject to phonological requirements. Perhaps, morphemes may take whatever shape morphology wants them to have, and phonology is demoted to imposing its restrictions only after all morphemes are put together in words, and, what is worse, in phrases and utterances. On the account of the present study, this is not the case. Morphemes do have phonological content, and it is subject to phonological well-formedness. After all, English and Polish do not have affixes of any imaginable shape. Such hypothetical affixes as *[θrs], *[krk], or *[xwku] do not occur. This could be an accidental gap, but speakers of these languages have some intuition that these could not be part of their morphology. A true accidental gap might be the lack of such sort of the prefix *un–* in English whose nasal would always contract a place-sharing relation with the initial plosive of the root, e.g. ![ʌmˈpɒsɪbl̩]. That *un–* does not behave this way is a morphosyntactic restriction on the prefix in question being non-cohering (a.k.a. Class 2). This has nothing to do with phonological well-formedness. Well-formedness should actually make the prefix cohere. This is exactly what happens with the negative prefix *in–*, viz. [ɪmˈpɒsɪbl̩]. On the other hand, there is yet another *in–* in English, one that expresses direction, as in *input* (as opposed to *output*), which does not cohere; the form [ˈɪnpʊt] is parallel to words with *un–*. Moreover, that *possible* does not take *un–* as its negative prefix has nothing to do with phonology either. The long-standing division between the Germanic heritage of Modern English, and the Romance (or Latinate) stratum of its lexicon is morphological (or word-syntactic). Morphology imposes restrictions on which affixes go with which roots and bases, but all these morphemes must have phonological content; otherwise, the representations of words would emerge out of nothing, and would then undergo constraint-based optimisation.[90] Therefore, it is not the case that only words have

[90] The implied parallel with Optimality Theory is intended. It begs the question whether anybody has ever

phonological representation, which is implied by GP's constant reference to words in illustrated examples. Roots, and affixes also exist, even if they surface on their own only in special circumstances, e.g. when linguists use them for analysis.

Thus, when two exponents enter a workspace (because of morphosyntactic computation), the input representations must combine to form a single output, which may be called 'lexical,' 'phonological' or whatever one fancies. The crux of the combining of representations under the cohering vs. non-cohering disjunction is accounted for in the second formulation of *Join*(x,y) given earlier in (58). The following section concentrates of this distinction, and attempts to show how it may work in CVCV.

2.7.2. Combining two representations

Consider the notorious foreign word in Polish, *sinus* [sʲinus] 'sine'. As signalled in section 1.3.2, its [sʲi] sequence is non-native to word-internal contexts; a native combination of //s// and //i// is [ɕi]. What has also been signalled is that when the base-final [s] of *sinus* is followed by [i] across a base–suffix boundary, the output of that sequence in [ɕi]. Consider the base in (77) and the suffix in (78) below.

(77) *sinus* [sʲinus] 'a sine'

$$\begin{array}{cccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 \\ | & | & | & | & | & \\ s^j & i & n & u & s & \end{array}$$

(78) *–ik* [ik] '(diminutive suffix)'

$$\begin{array}{cccc} C_1 & V_1 & C_2 & V_2 \\ & | & | & \\ & i & k & \end{array}$$

Assume (77) and (78) are correct in showing the phonological nature of the base and the suffix. When *–ik* is concatenated with *sinus*, the vowel of the suffix interacts with the

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seen an underlying—as opposed to input, which is generated by the GEN function—representation in OT.

final consonant of the base, resulting in the native [ɕi] sequence. In order for [i] to have any influence on [s], the two segments must be adjacent. This is not the case in (79) below.

(79) *sinus* [sʲinus] ‘a sine’ + *–ik* [ik] ‘(diminutive suffix)’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5
|	|	|	|	|			|	|	
sʲ	i	n	u	s			i	k	

The frame in (79) shows the bit of the output representation that is formed during the concatenation; the remaining bits do not change. This is dictated by Locality of *Join*(x,y) (see (61)). The structure in (79) is well-formed from the CVCV perspective—the empty V_3 and C_4 are licit—but the melody of [s] and that of [i] are non-adjacent, which precludes their relation. In order to have a well-formed structure and to allow //s// and //i// to interact melodically—these are apparently separate issues—the supernumerary positions V_3 and C_4 have to go.[91] This is shown in (80) below.

(80) *sinus* [sʲinus] ‘a sine’ + *–ik* [ik] ‘(diminutive suffix)’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
|	|	|	|	|	|	|	
sʲ	i	n	u	ɕ	i	k	

In (80), C_3 (which comes from the base) and V_3 (which comes from the suffix) are made adjacent, and phonology may apply native conditions on their melody, viz. their phonetic interpretation is [ɕi], not *[sʲi]. This is because phonology may only build *melodic* structures native to the language. (Syllabic space is argued to be universal, though; this is the core of CVCV.) The word-initial [sʲi] is not built; it is taken from the lexicon, and remains defective (although well-formed in terms of lateral relations) during the concatenation, because it is non-local to the joint being formed.

The type of joint in which the inner edges of input representations can be manipulated to return a well-formed and non-defective structure, within the locality of

[91] This is a CVCV-ised, workspace-oriented incarnation of *Reduction*, due to Gussmann and Kaye (1993), on which more in Chapter 3.

the joint, can be called an open joint. Alternative names include cyclic, cohering, interacting, or Class 1 joint.

Against the open joint in *sinus–ik*, consider *ilustrować* [ilustrɔvatɕ] ‘illustrate, imperf.inf.’ in (81) below.

(81) *ilustrow–a–ć* [ilustrɔvatɕ] ‘illustrate, imperf.inf’

C_1	V_1	C_2	V_2	C_3	V_3	…
	|	|	|	|		
	i	l	u	s		…

The foreign origin of the word in (81) is irrelevant. The crucial lateral relations are the following. V_1 governs its empty onset (C_1) and has no segment to license. Thus, if (81) were to be concatenated with a phonological chunk on its left edge, V_1 would first try to contract lateral relations with C_1 and with the final nucleus of the concatenated chunk. Now, take *ilustrować* to be the base for prefixation with *z–*, to give *z–ilustrow–a–ć* [zʲilustrɔvatɕ] ‘illustrate, perf.inf.’ Assume the prefix in question has the phonological shape of (82) below.

(82) *z–* [z] ‘(perfective prefix)’

C_1	V_1
|	
z	

An unrestricted concatenation of (82) and (81) would most likely result in (83) below.

(83) *z–ilustrow–a–ć* *[ʑilustrɔvatɕ] ‘illustrate, perf.inf’

C_1	V_1	C_2	V_2	C_3	V_3	
|	|	|	|	|		
ʑ	i	l	u	s	…	

The representation in (83), even though well-formed (judging by lateral relations, as in (81)), is counterfactual. The //z// of the prefix and the //i// of the base do not contract the same relationship as the //s// and //i// do in (80). The attested pronunciation of (83) is [zʲilustrɔvatɕ], where the initial fricative is palatalised ([zʲ]), but not palatal, i.e. *[ʑ].

This is not to say that //z// is exceptional in that it escapes native Polish palatalisation. Consider examples in (84).

(84) *mroz–y* [mrɔzɨ] 'cold, n. (nom.pl.)' *mroz–ić* [mrɔʑitɕ] 'chill, freeze (inf.)'
groz–a [grɔza] 'threat' *groz–ić* [grɔʑitɕ] 'threaten (inf.)'

The process of converting //z// to [ʑ] is a productive regularity of Polish, and yet it does not take place in *z–ilustrować*. This cannot be due to any phonological difference between bases and prefixes. Under the spell of modularity, phonology is unable to tell one from another; the role that different exponents of morphosyntactic structure play in words is not controlled by phonology. Thus, the prefix and the base must be concluded to form a different type of joint, viz. a closed joint. Alternative names include non-cyclic, non-cohering, non-interacting, or a Class 2 joint. This is realised through *Join*(x],[y), which tells phonology it cannot modify the arguments to concatenation. Being unable to modify them, phonology returns nothing but the sum of input arguments, as in (85) below.

(85) *z–ilustrow–a–ć* [zʲilustrɔvatɕ] 'illustrate, perf.inf'

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_5
zʲ			i	l	u	s	…

The representation in (85) is defective on the minimal domain account, if one assumes morphemes occupy as few skeletal slots as possible; in any case, (85) looks as if there were a morphological boundary—the empty sequence V_1C_2 appears strange—which, quite logically, cannot be part of a minimal domain. From the perspective of the current proposal, (85) is not something that phonology could create if given a free hand. Nevertheless, it appears pronounceable. There is also an alternative to (85). Consider a slightly altered version of (83), provided in (86).

(86) *z–ilustrow–a–ć* [zʲilustrɔvatɕ] ‘illustrate, perf.inf’

C_1	V_1	C_2	V_2	C_3	V_3
|	|	|	|	|	
z^j	i	l	u	s	…

The representation in (86) is identical to (83) in terms of lateral relations, but not in terms of melody. In (86), the native //z//→[ʑ] palatalisation has not taken place. If (86) is correct, then there is a way of blocking melodic relations between arguments of *Join* at no cost to well-formedness expressed through lateral relations. Example (86) promises a situation half-way between the full coherence of (80), and the counterfactual nature of (83). To find out whether this is attainable, Chapters 3 and 5 will approach Polish palatalisation in morpheme-internal, and intermorphemic (both cohering and non-cohering) contexts.[92] Before this is done, the discussion should point an existing system of realising morphophonology in SGP, which stems from Kaye (1995).

2.7.3. Kaye (1995)

In the introduction to a chapter devoted to Kaye’s (1995) system, Scheer (in prep.) notes the following obstacle.

> A pervasive problem is that Kaye has only published one article on the subject, Kaye (1995), and that this article contains only a subset of the ideas and the empirical material that have been developed over the years. True, his 1989 book (Kaye 1989) gives the direction of much of the enterprise (parsing cues, following Trubetzkoy’s Grenzsignale), and Kaye (1992[*b*]) is also relevant (regarding affix-triggered interpretation and the φ-function). These sources, however, are either programmatic (the book) or marginal for the purpose (the 1992[*b*] article). One can then rely on secondary sources, that is work by SOAS students of the 90s who summarise Kaye’s interface design on a few pages at the outset of their own articles or dissertations. The available material here, however, is also sparse… (Scheer in prep.: §245)

Given this limitation, the present summary of Kaye (1995) does not extend to other sources, except for interpretative inspiration from Scheer (in prep.). Firstly, one should note that Kaye’s position with respect to lexicalism is similar, if not the same, as that endorsed herein. “GP does not allow for *phonological* processes applying at different levels of a derivation. Derivations are assumed to be 'blind' in the sense that no process is aware of the history nor the future of any derivation in which it is involved" (p. 290). Kaye also points to *SPE* having three types of representations: lexical, phonological, and phonetic. (Recall the discussion in section 1.3.1.) Against the ternary typology of representations in *SPE*, Kaye formulates a condition for GP, given in (87) below.

(87) *The Uniformity Condition* (Kaye 1995: 292)
"Phonological representations are directly interpretable at every level."

Condition (87) is adhered to in the present work; the building blocks of all phonological representations are the same. The present actually exceeds the requirement of (87) in that not only phonological, but also lexical representations are taken to use the same building blocks, and to be interpretable. (That they are not interpreted without undergoing derivation is not a fault of phonology; rather, morphosyntax cares for supplying roots with categorising affixes, so that nouns, verbs, and adjectives are distinguishable from one other in sentences.)

What is not adhered to is the Projection Principle, first formulated in KLV 1990 (given earlier in (32)), and repeated in Kaye (1995). For convenience, its formulation reappears in (88) below.

(88) The Projection Principle (KLV 1990: 221)
"Governing relations are defined at the level of lexical representation and remain constant throughout a phonological derivation"

Despite the apparently clear formulation of (88), Kaye provides some guidance.

> The projection principle excludes any form of resyllabification. Onsets remain onsets and nuclei remain nuclei. A 'coda' (non-existent in GP *qua* constituent but may be a synonym for a post-nuclear rhymal positions) may not change to an onset, or vice versa. Codas are governed and licensed by following onsets… An onset is licensed by a following nucleus. Shifting between onsets and codas clearly violates the projection principle.
> … [C]hanges of constituent structure, so prominent in other current phonological theories, are excluded from GP. (Kaye 1995: 293–294)

[92] It will be shown in Chapter 5 that, as far as closed joints are concerned, representations of the sort shown in (86) lose the competition to those exemplified by (85).

The present work agrees that onsets do not change into nuclei and the other way round. (Codas only exist as a label for an onset before an empty nucleus (see section 2.6), so they do not count.) The point of disagreement is the change in constituent structure. Recall that section 2.7.2 has demonstrated the plausibility of removing two consecutive slots from the skeleton during concatenation. If the Principle were to hold, the deletion of skeletal slots would be illicit.[93]

Indeed, in SGP, one does not delete slots when concatenating morphophonological chunks. Occasionally, one does not even put two chunks together. Consider (89) below.

(89) [[*black*][*board*]]

> In [(89)] we see three pairs of brackets. I will use brackets to enclose a phonological domain. The form in [(89)] has three domains: *black*, *board* and *blackboard*. How are we to interpret these brackets? In fact the brackets are not objects in themselves but rather represent instructions as to how the phonological string is to be processed. To explain what I mean let me define two functions: *concat* which takes two arguments which are strings and returns the string which results from concatenating the second argument to the first. For example, concat('abc','def') = 'abcdef'. The second function is *φ*. This function has one argument, a phonological string, and returns the application of the phonology to its argument, also a phonological string… The expression *φ*(X) means, 'apply phonology to the string X'. *φ*(X) returns the phonological string which results from the application of phonology to its arguments. We now have the necessary tools to give an exact definition to [(89)] above. This is shown in [(90)]. (Kaye 1995: 302–303)

(90) *φ*(concat(*φ*(black),*φ*(board)))

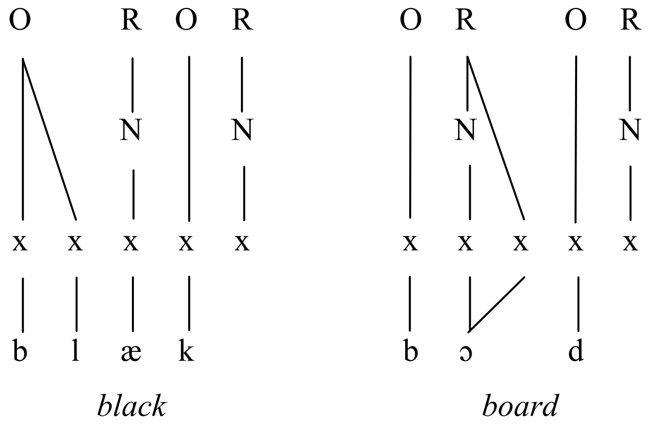
> In plain language [(90)] means, 'apply phonology to "black" and to "board"; concatenate the results to form a string and apply phonology to that string'. The brackets that are found in the representation of [(89)] are not part of phonological representation. There are no 'boundaries'. The brackets delimit phonological domains which are arguments to functions like *concat* and *φ*. (Kaye 1995: 303)

Kaye's article does not give a definite answer as to whether or not the result of (90) is a single representation. A clue is only given to the latter in the form of the internal

[93] Interestingly, the removal of skeletal slots in section 2.6 is not a contribution of this work, but of Gussmann — Kaye (1993); perhaps, when "lexical representations" become *phonological* representations, the Principle is void. Nevertheless, the ban on resyllabification is widely adhered to in GP's take on *phonological*, not lexical, representations, too. While this may be a bit confusing to the audience, this study is not in a position to judge what is meant by various formulations of principles, rules, and constraints in the literature.

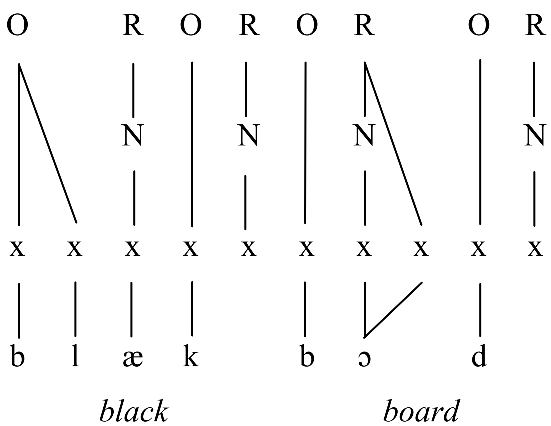
domains of *blackboard* being shown separate in an accompanying illustration, provided for convenience in (91) below.

(91) The internal domains of *blackboard* (after Kaye 1995: 303)



Kaye does not suggest what exactly happens in phonology when *black* and *board* are put together. Recall that the leftmost φ in (90) is supposed to mean "do phonology," while the embedded *concat* means the input to φ is the string that result from putting *black* and *board* together. The problem is that *black* and *board* are not together in (91). They are separate strings, which is evident from the fact that Kaye does not draw them on a single skeleton. Now, assume that *concat* and φ are taken literally. The output of *concat*(φ(black),φ(board)) should be a single string, presumably the one in (92) below (drawn on an SGP skeleton for consistency with Kaye's system).

(92) Possible result of *concat*(φ(black),φ(board))



The function *concat* as such is not designed to measure the well-formedness of the string it creates. This task is given to the function φ. It should check whether (92) meets all criteria that hold for English phonology. Now, if such criteria are discovered on the basis of what is found and what is not found in simplex words—this is the standard method of discovering morpheme-based regularity—then *φ* should treat (92) in the same way as it would treat a simple word; recall that Kaye's position is that the are no brackets in phonological representations. If so, then consider (92) as a single domain and check licensing and governing relations. Everything appears fine. The empty nucleus between [k] and [b] may be governed by the nucleus hosting [ɔː]. This looks a bit against the Projection Principle if read literally—a governing relation must have changed, because prior to concatenation, the [ɔː] did not govern the final nucleus of *black*; they were in separate, *lexical* representations—but Kaye's own explanation of the Principle only points to resyllabification as being forbidden, not to governing a segment that was not available prior to concatenation. There is no resyllabification as such in (92); onsets of the input are onsets in the output, and the same applies to nuclei. Thus, in terms of governing and licensing relations, example (92) should be fine.

The real problem is somewhere else. The cluster formed by [k] and [b] is the prime suspect. It is hardly a discovery to claim that no monomorphemic word in English has a cluster of two obstruents that disagree in voice. Morpheme-finally (in *act*, *apt* or *aft*) and, more importantly, morpheme-medially (in *after*, *cactus*, or *captain*), the condition that adjacent obstruents agree in voice is unbreakable; such sequences as *[gt], *[vt] or *[bt] are not attested. This notwithstanding, English does not impose this restriction for accidentally-adjacent morphemes, and words; *blackboard* is a fine example of this generalisation.

The big question, then, is what it means for Kaye's system to "do phonology." If it should mean that all necessary conditions are met, *blackboard* should end with either a [gb], or a [kp] cluster; which alternative is the correct one is not to be determined, as single morphemes never display any disagreement in voice that would be helpful in finding out the directionality of assimilation. Across word boundaries, there is no voice assimilation either. One would need to conclude *φ* fails to "do phonology" on *blackboard*.

On an alternative reading of what it means to "do phonology," one would concentrate on processes that apply in casual speech in English. If so, then *blackboard* is fine, as voice assimilation is not a process of this type in the language in question. This also means that *blackboard* as such is never a single skeleton for phonology, and that example (91), but not (92), is correct in showing the relations between the arguments to *φ*(*concat*(*φ*(*black*),*φ*(*board*))).

There is no point is trying to find out how this system accounts for phrasal or sentence phonology. That would be pure guessing, as Kaye's (1995) article is solely on the interaction of morphological domains and phonology. What should happen across word boundaries is left unanswered. If one assumes *φ*(*concat*(*φ*(*black*),*φ*(*board*))) could also be used to derive the accidentally adjacent *black board*, i.e. the phrase, not the compound, then the system would be in real trouble. Namely, it would assume words to be spelled out in cycles. For any phrase larger than two words, one would need to use *φ* and *concat* stacked onto each other a number of times. Say, the phrase to be spelled out is *the black board*. The concatenation and interpretation would need to go in three steps. First, *φ*(*black*) and *φ*(*board*), working in parallel, would derive the input words for the noun phrase minus the determiner. Second, *φ*(*concat*(*φ*(*black*),*φ*(*board*))) would derive the head of the noun phrase. Third, *φ*(*concat(the,φ*(*concat*(*φ*(*black*),*φ*(*board*)))), i.e. *φ*(*concat(the,(black board*))) would give the whole phrase. One is afraid to ask how to interpret a sentence with more than one phrase, say, *John took the black board and gave it to Mary*. Which word to take as the starting point, *John*, *Mary*, or a different one, is the big question mark.

Alternatively, if *concat* is used only for word building, not for phrases and sentences, then *φ* alone would be used to "do phonology" on the sentence with *John* and *Mary*. Perhaps, the application of *φ*(*John, took, the, black, board, and, gave, it, to, Mary*) would give some result. However, as far as one can tell from Kaye's article, *φ*(X) takes only one argument, and that argument has to be a string. The sentence *John ... Mary* is not a string, as the words that build it are not on a single skeleton, which has already been shown on the lack of a single skeleton for the compound *blackboard*, in (91), which is arguably a single word, not a sentence.

It is concluded Kaye's functions *φ* and *concat* cannot be used to relate to both morphophonology and utterance phonology, which is what the present work aims at.

2.7.4. Workspace-based system and *Join*(x,y) are not Kaye's *φ* and *concat*

From the discussion in section 2.7.3, it becomes clear that Kaye's (1995) system of interleaved *φ* and *concat* is inapplicable to the approach to the morphophonology of open vs. closed joints that is meant by *Join*(x,y). Essentially, *Join* as such is a new incarnation of *concat*. Unlike *concat*, however, *Join* has no sibling function, i.e. φ, to work with. Workspace-based phonology does not "do phonology" upon concatenation, it does *morphophonology*. Each application of *Join*(x,y) is like an application of φ(*concat*(φ(x,y))) minus interpretation, i.e. *concat*(x,y). Interpretation is left to the phonology–phonetics interface, which, unlike in Kaye's system, where it does not exist in the first place, proceeds in a linear order, not in cycles. Furthermore, workspace-based phonology does not distinguish between morphemes and words as such. Arguments to *Join*(x,y) can be anything that has a phonological representation. Since workspaces contain nothing but representation, they can be arguments, too.

To derive *blackboard* in workspace-based phonology, one needs to do the following steps. First, create separate workspaces for *black* and *board*. Say, *black* lands in workspace A, and *board* in workspace B. These are parallel entities, and high phonology makes no relations between them. Second, join the workspaces by invoking *Join*(A],[B). (Recall the brackets are mnemonics for 'non-cohering'). It is left to be answered in section 2.8.1 in which workspace the output of *Join*(A],[B) ends. For the time being, assume there is a third workspace (viz. C) created with the content *blackboard*, and workspaces A and B are deleted; their content has been used in *Join*(A],[B), and they are no longer accessible. This may be considered a no-look-back condition, or a workspace-oriented incarnation of the Strict Cycle (in its early, Kean (1974) reading). Its nature is also close to Bracket Erasure in LP; once concatenated, the internal arguments can no longer be accessed separately. From this point on, phonology may only manipulate *blackboard* as a whole. All low-level phonological processes, such as pre-fortis clipping of the [æ] and glottal reinforcement (or replacement) for the [k], only ever happen when *blackboard* reaches the phonology–phonetics interface.[94] For morphophonology, these phenomena do not exist, so morphophonology does not "do phonology" on *blackboard* to cause them. Phonological, as opposed to phonetic, representations do not show these processes; they are, depending on the particular process, optional or gradual. If they are gradual, they cannot be faithfully represented in binarity-oriented phonology.

[94] See, for instance, Cruttenden (2008) on low-level phenomena in English phonology.

2.8. Working formalisation of workspace-based phonology

This section is intended to provide some missing answers as to how the present work takes morphophonological and low-level phonological activity to be organised.

2.8.1. Possible arguments to *Join*

The operation (or function) *Join* takes two arguments. Anything that has a phonological representation can be an argument. Each workspace contains a phonological representation, and can be an argument to *Join*, too. Each workspace is referred to by arbitrary code—for ease of exposition, this work refers to workspaces via Roman capital letters—that can be used as an argument. For instance, *Join*(A,X) concatenates the content of workspaces A and X, in the given linear order, and returns a single output.

Since workspaces can be arguments to *Join*, morphophonology needs a mechanism for managing workspaces, i.e. to be able to create separate workspaces, and to delete those that have already been used as arguments to *Join*. It is assumed morphophonology has such a mechanism. Its potential functions could include *Open*(X) and *Close*(X), where 'X' is the reference code for a given workspace. Workspaces would be opened each time the input interface—one may assume it is either PF itself or a different intermediary—detects a separate word-like entity sent from the morphosyntax. Thus, *actor* would start as *Open*(A). Then, workspace A would be processed via *Join*(*act*,ϕ)—the zero stands for an empty argument; *act* is the only argument on the first cycle—and subsequently via *Join*(A,*–er*), where 'A' is a self-reference.

If *actor* were to form a phrase with *famous*, the latter would have to start in a separate workspace, e.g. workspace F. Subsequent applications of *Join* would build *famous* from the root up. Once the word would have been formed, it would be incorporated in a phrase. Recall that *actor* is already sitting in workspace A. Since *actor* and *famous* do not contract any lateral relations—their adjacency is accidental—*Join* needs to be invoked as a closed joint. Hence, *Join*(F],[A) should give a single representation.

If phrasal stress is considered, it is evident that *Join*(F],[A) cannot be used to derive the correct stress pattern, viz. ˌ*famous* ˈ*actor*. For that reason, *Join* needs to be told which of the arguments is more prominent. This implies hierarchical relations between arguments. Potentially, *Join* can be amended to recognise the notion of the head, e.g. *Join*(F],[A) could mean there is no lateral (both governing–licensing and melodic) relation between F and A, but stress for the output is to be calculated with A being more prominent, while F retains its original stress pattern, i.e. [ˈfeɪməs].[95] However, the phrase *famous actor* is far beyond morphophonology. The words that form this phrase do not enter a single morphophonological workspace at all. They are kept in separate workspaces until sent to the output interface.

The situation is different for compounds. The celebrated example of *blackboard* does qualify for morphophonology. If *black* and *board* enter the derivation in separate workspaces, for instance A and B, respectively, then they must meet in a single workspace at some point prior to phonetic interpretation, let alone inflection, which takes *blackboard* as a whole. In this case, *Join*(A],[B) should do the trick of keeping the arguments separate in terms of governing–licensing and melodic relations, while promoting the primary stress of *black* to the primary stress of the output, viz. ˈ*black*ˌ*board*. The calculation of stress in compounds is not a matter of phonology as such. Notice that such compounds as ˌ*second-*ˈ*class*, ˌ*down-*ˈ*grade*, or ˌ*ill-*ˈ*treat* have the main stress on the second element. The difference is down to morphology, which can tell the difference between, say, a noun–noun compound and an adverb–verb compound. Modularity-oriented phonology cannot tell the difference, for ‘verb’, ‘noun’ and other morphological labels are not part of the code that phonology understands and to which it is able to refer.

2.8.2. The phonology–phonetics interface

All workspaces contain phonological, not phonetic, representations. Morphophonology as such does not provide phonetic interpretation for the simple reason that phrases, sentences, utterances, and what have you are not formed by word syntax (a.k.a.

[95] This may potentially work with both the tree- and the grid-oriented theories of stress. As the present work concentrates predominantly on segmental issues of morphophonology and utterance phonology, it takes no position whatsoever on which theory of stress would be applicable.

morphology), but by phrasal syntax. Phonetic actualisation has to be performed by a component whose scope reaches beyond words. This is what is known in Lexical Phonology as the post-lexical component. The phonology–phonetics interface in workspace-based phonology is a different thing, though.

In LP, all representations use phonetic features in non-phonetic representations. The underlying and the intermediate representations in the lexical and the post-lexical component are phonological in nature. They are not articulatory gestures. Mohanan (1986: 11ff), following Pulleyblank (1983), is notable for taking the post-lexical component as comprising two sub-components. The first one is the standard LP post-lexical computational system, which takes the output of phrasal syntax, and provides further, non-cyclic transformations via ordered rules. (This is but another level or stratum, just like in the lexical component, but it takes words, not morphemes, as input.) The second one is effectively a phonology–phonetics interface that converts binary, phonological representations into gradual, phonetic stream. No phonetic representation is necessary, even if such a term does make an appearance.[96]

Workspace-oriented phonology is close to Pulleyblank/Mohanan's system in that the interface does a direct representation-to-articulation mapping. The major difference is that the interface does not interpret pre-computed allophonic phonological representations—in Mohanan's LP, aspiration or pre-fortis clipping has to be a post-lexical rule of the first sub-component—but morphophonemic representations. Moreover, in LP, the post-lexical actualisation cannot use word boundaries as triggers or inhibitors of rules. Boundary markers are banned in LP; this goes hand in hand with multistratality. Mohanan's flavour of LP can rely on brackets during lexical and post-lexical derivation, but there are no brackets in the output of the first post-lexical sub-component, which reaches the phonetic interface. In a workspace-oriented system, the workspaces that reach the interface have no brackets as such either, but the very fact that they are submitted to the interface one by one enables the interface to detect word breaks. After all, if two words are represented on two skeletons, the edges of the skeletons are reference points themselves. If a language has a process that is sensitive to word edges, but not to morpheme or phrase edges, such as final devoicing in Polish, let alone Poznań–Cracow Voicing (both discussed in Chapter 4), and the process is not

[96] Mohanan's (1986: 158) "phonetic representations" have binary features, which clearly distinguishes them from phonetic actualisation and perception.

contrastive in morphophonological terms, then its application is conditioned by the interface's ability to spot the edges of subsequent skeletons it receives, not by any word formation rules.

Furthermore, since workspaces contain representations built on GP/CVCV content, with all their limitations on the number and the nature of phonological features—crucially, scalar and gradual features are not represented, as SGP and CVCV use unary features only—the application of sub-phonemic variation has to be part of phonetic actualisation. Recall from section 2.7.3 that the Uniformity Condition requires that all representations be written in the same code. If such processes as aspiration or pre-fortis clipping, let alone partial devoicing of obstruents, are inexpressible through unary features, then they can never be stored in phonological (but not phonetic) representations.

2.8.3. The nature of representations

All representations in workspace-oriented phonology are morphophonemic. Any operation that modifies the content of a representation is morphophonemic. Allophonic distinctions are not represented, but may be derived during phonetic interpretation at the output interface. The interface does not produce intermediate, phonetic representations; representation-to-articulation translation is a direct, contextual process.

Representations are based on CVCV. The skeleton consists of C and V slots, a.k.a. onsets and nuclei, respectively, in strict alternation. The leftmost constituent in each representation is a C slot, and the rightmost constituent is a V slot. Representations have two tiers to express segments: the CV tier, and the melodic tier, as in (93) below.

(93) The CV tier and the melodic tier

C	V	C	V	C	V
|	|	|	|	|	|
m	e	l	ɒ	d	i

Lateral relations applying between skeletal slots are those defined for CVCV (see section 2.6). The melody is built from GP elements. These require some attention.

The careful reader may have noticed that since their introduction in section 1.3.3, GP elements have not made any noticeable appearance so far. This is not accidental. It reflects the mainstream GP treatment of melody. Except for works in which GP elements as such play a prominent role—these include, among others, KLV (1985), Harris (1990, 1994), Harris — Lindsey (1995), and a good deal of papers in Cyran (ed. 1998)—representations presented in various texts show the content of the melodic tier predominantly through IPA symbols, occasionally accompanied by spelling. There are three explanations for this state of affairs. First, this may be due to space restrictions; spelling and IPA symbols are less consuming than strings of symbols whose number is not determined a piori, since it depends on the complexity of a given segment (recall example (33)). Second, this may due to irrelevance of melody; one can hardly overlook GP's preoccupation with syllables (or rather the lack thereof). Scheer (2004) is arguably the most prominent example of this line of research in GP. GP elements do make an appearance there (pp. 44–65), but their role is not exposed in the numerous illustrations in the book. Syllabic space considerations overwhelm the melodic content that gave rise to GP, back in the days of Charm and Government (KLV 1985). Third, one may have the sneaky suspicion the melody is not shown through GP elements because the researchers who perform GP-based analyses are not sure what elements sit inside the segments, or if they do have that certainty, they do not want to share it with the audience. This is not a personal attack towards any author of a GP-based work. Rather, this is a voice saying it is hard to grasp how powerful GP is or can be if one cannot see how other researchers treat the internal structure of segments. Gussmann (2007), for instance, is definitely reader-friendly in providing a number of element-based illustrations of melody in the second and third chapter, but from the fourth chapter onward, IPA symbols take over.

Note that this is not the way the audience of *SPE* is treated. Only a few rules are written in such a way that they relate to a phonetic symbol; the remainder uses distinctive features all over the place. If GP in general and CVCV in particular are to appeal to any feature-oriented audience, those features must be used. IPA is good for showing segments not relevant to a particular discussion, but melodic relations that form the core of an illustration must be clear to the audience, provided the analysis concerns melody, not just the (lack of) syllables. Melodic features do not need to appear in every drawing, but it useful that at least they appear in the surrounding discussion.

As signalled in section 1.3.3, the number and the content of GP elements is an unsettled issue. Present-day GP does not attribute any Charm to elements, against KLV (1985, 1990), and other works from before mid-1990's. Among different proposals available in the literature, the present study chooses that of Gussmann (2007), as the subsequent analysis makes crucial reference to his work. The elements used are given in (94) below.[97]

(94) GP primes (verbatim after Gussmann (2007: 25))

{I} denotes frontness in vowels and palatality in consonants;
{A} denotes openness of vowels and coronality in consonants;
{U} denotes rounding of vowels and labiality of consonants;
{ʔ} denotes occlusion in consonants;
{h} denotes noise in consonants;
{N} denotes nasality in vowels and consonants;
{H} denotes high tone and voicelessness in consonants;
{L} denotes low tone and voicedness in consonants.

Of special interest are the four elements that appear in vowels and consonants alike. Their phonetic actualisation depends, among other things, on the type of skeletal slot with which they coincide in a representation. Consider (95) below.

(95) The CV tier and the melodic tier, filled with elements

$$\begin{array}{cccccccc} C & V & C & V & C & V & C & V \\ | & | & | & | & | & | & | & | \\ \{I\} & \{I\} & \{A\} & \{A\} & \{U\} & \{U\} & \{N\} & \{N\} \end{array}$$

If (95) were to be interpreted phonetically in accordance to (94), it could give [jiɹawuŋɯ̃]. This is due to two things. First, {I}, {A}, {U}, and {N} are interpreted in the context of the skeletal slot. Second, melodic elements are unary; if an element is not part of segment, it does not contribute to its phonetic interpretation. Thus, [j] or [i] can be represented through the element {I} alone, under a C slot or a V slot, respectively,

[97] This study is based on a conjecture that, in principle, elements may be language-specific, as they express morphophonemic, not phonetic, regularity. The choice of elements used herein is different to Scheer (2004).

while typical *SPE* features, such as [±consonantal], [±anterior] and so forth are never used.

Recall, from section 1.3.3, that GP elements may be fused to give a complex expression. The number of possible combinations is low, as no element may contribute more than once. The most complex vowel, for the time being, is a combination of {I}, {A}, {U}, and {N}, which, depending on the order of elements, may have different degrees of frontness, openness, roundness, and, arguably, nasality. Each expression has a single most prominent element, the one that makes the biggest contribution in terms of melodic properties. This element is called the head of the expression, and is customarily notated as the rightmost element in an expression. Thus, the head of {I•A•U} is {U}, while that of {U•I•A} is {A}. All other elements are operators, and it is assumed in GP that there is no hierarchy among them within an expression.[98] In case a segment has no prominent feature whatsoever, e.g. the schwa, its head position remains empty. This is customarily notated through an underscored space, e.g. {_}. This is the phonetically-oriented picture.

When taken into morphophonology—recall this is generally avoided in GP for principled reasons, and the present study aims at doing so on its own—the elements lose their direct phonetic interpretation, as they are responsible for maintaining morphophonemic oppositions. For the present study, such expressions as {A•I} and {I•A}, when found under a V slot, do not necessarily have to prompt two different vowels. Both can be pronounced as a mid front vowel, e.g. [ɛ̞]. Their difference may be in the melodic relations they contract with other segments, predominantly with their onsets. Assume a language can make morphophonological distinction between vowels and consonants that have the element {I} as their head, and those that do not. Suppose there is a condition in the language that if a nucleus has {I} as its head, then the onset that is bound to that nucleus must have {I} as its head, too. Now, consider a concatenation in which a stem-final consonant not headed by {I} is joined by an {I}-headed vowel, e.g. {A•I}, through a cohering (open, cyclic, Class 1) joint. A new structure is built. In accordance with the language's requirements on intersegmental melodic relations, the {I} head of the vowel is spread onto the consonant, demoting whatever head the consonant has had previously to an operator. This process does not

[98] This does not mean all elements must have equal strength when contributing as heads. For instance, the element {I} may be more prominent as the head than elements {A} or {U}. This is the idea behind Polish palatalisation, to be discussed in Chapter 3.

take place if the vowel in question is not {I}-headed, i.e. a vowel built from {I•A} will not cause the preceding consonant to take {I} as its head.[99]

2.8.4. Mapping morphophonemic representations onto phonetic reality

A proviso must be made with respect to the elements listed in (94). On a literal reading, these should be interpreted exactly as worded in the list. For instance, an onset filled with {ʔ•h•A•I}, assuming no voice specification means voicelessness, should be interpreted either as a (double-articulated) palatal-alveolar plosive, viz. [t͡c], or as an advanced (or fronted) palatal plosive, viz. [c̟]. Either sound could be the sum of its contributing elements. The problem is neither sound is normally found in English or Polish. Double-articulated corono-dorsals are totally absent in both languages, while English does not have an advanced palatal plosive. In Polish, a palatal plosive is indeed found, but it need not be advanced, which makes the coronality element {A} unnecessary for its representation, if phonetic reality is important. This argument points to language-specific implementation of elements.

Two languages whose phonological representations are built from the same set of elements need not interpret them in the same way. For instance, whatever combinations of elements English and Polish use for their consonants, only the former has dental fricatives, i.e. [θ] and [ð], which turns problematic for Polish learners of English, and which prevents English words containing [θ] or [ð] from being adopted, as opposed to being adapted, to Polish. For example, *thriller* has been adopted with an unchanged spelling, but with the adapted pronunciation [trʲilɛr]. The newly adopted *think tank*, however, is pronounced anywhere on the [fʲiŋktaŋk] ~ [sʲinktank] line, perhaps depending on one's spelling-to-sound mapping. Outside of loanword phonology as such, one may notice a systematic difference between the way English and Polish realise clusters of plosives. In English, *actor* is most likely to be pronounced [ˈæk̚tə], i.e. with [k] having no audible release, while in Polish, *aktor* 'actor' is definitely pronounced with both plosives fully released, viz. [ˈaktɔr]. The lack of audible release on [k] in English can be explained as an instance of gestural overlap—

[99] Essentially, this is a new, morphophonemic reading of Gussmann's (2007) analysis of palatalisation in Polish, which will be discussed in Chapter 3.

the full closure for [t] precedes the release of [k], hence the air cannot escape the oral cavity—but this overlap need not be represented through GP primes. It is a language-specific manner of phonetic actualisation. On a similar note, English and Polish both have what may be broadly called the alveolar series of consonants, viz. [t], [d], [s], [z], [ʃ], [ʒ], [l], and [r]. Presumably, they can be represented by the same melodic expressions in both languages. Still, English [t], [d], [s], [z], and [l] are plain alveolar sounds, while the respective sounds of Polish are all (post-)dental or advanced alveolar sounds, depending on one's terminology. Similarly, English [ʃ], [ʒ] are post-alveolar or palato-alveolar, while their Polish counterparts are plain alveolar. Finally, [r] in English is actually a post-alveolar approximant [ɹ] or [ɻ], depending on the variety spoken, while in Polish, it is an alveolar trill ([r]).[100] (Tapped variants exist in both languages, and they, too, follow the place distinction.) All this is systematic, and yet the elements do not provide the distinction; there is no element in (94) for, say, retraction or advancing.

Given that much variation across just two languages, this work may go a bit further in separating the default content of elements, or rather of their sum in a given expression, from their phonetic interpretation. Thus, the aforementioned {ʔ•h•A•I} need not be interpreted as [t̠ɕ] or [ç̩], but it can yield, for instance, a palatal affricate, viz. [ʨ]. Notice that this is against a phonetically preoccupied reading of the elements or of feature geometry and non-linear phonology in general. Consider (96) below

(96)

On orthodox reading, the left-hand example in (96) is a plosive. The element {h} specifies noise, i.e. obstructed airflow, while the element {ʔ} specifies occlusion, i.e. full oral closure. Together they should denote an audibly released plosive. For phonetically oriented phonology, the right-hand example is closer to an affricate. The association lines for the occlusion and for the noise are temporally separated, as per

[100] Some speakers have a uvular trill, rather than an alveolar one; this is a case of free variation in Polish.

feature geometry.[101] The phonetic detail derivable from these examples notwithstanding, this work endorses the left-hand representation as denoting the affricate [tɕ] in Polish high-level phonology. This choice is not dictated by any appeal for space saving, rather by a fact concerning the distribution of [t] and [tɕ] in Polish. Namely, a base-final [t] alternates with [tɕ] when followed by [i] across a Class 1 joint, and [tɕ], rather than [tʲ], is found before [i] morpheme-internally in native vocabulary, too. Furthermore, while [tʲi] is phonetically possible and indeed found across word edges (native and non-native alike), it is never found across a Class 1 joint in standard spoken Polish. Such a fact can always be handled in two ways. The first way is to expel the alternation from *phonology* altogether and push it into a separate component of grammar, where morphology and phonology interact in an idiosyncratic manner. This amounts to following the Lexical Phonology line of research. The second way is to allow *morphophonology* to stay oblivious to word formation rules, and notice that the [t] ~ [tɕ] alternation and the lack of [tʲ] in native morphemes are not unrelated issues. The alternation concerns native morphemes, and cohering morpheme concatenation—this type of concatenation can be assumed to happen according to native melodic requirements of Polish—while the defective [tʲ] is never built in native morphophonology, but is free to enter the lexicon through foreign vocabulary because it is systematically pronounceable by the *phonology–phonetic interface*.

Phonetic actualisation can be at odds with morphophonemic representation. As long as the phonology–phonetics interface can map one onto another, there is no way to know beforehand how far the interpretation shift can go. The phonetic discrepancy between the post-dental [t] and the palatal [tɕ] found in Polish is pronounced; the former is coronal, the latter dorsal. Should morphophonology derive one from the other via phonetically-oriented rules, one can only strive for descriptive, but not explanatory adequacy. The plethora of segmental rules alluded to in Chapter 1, many of which target Polish, are true in terms of what they describe, provided phonology as such is about matching phonetic matter with discrete features. If one looks for any explanation, though, it makes life much easier when it is accepted that the abstract features from which the phonological side of lexical entries is built are more abstract than linear (*SPE*-type), and non-linear (feature-geometric) phonetically-informed phonology would

[101] See Sagey (1986: 81) for the relevant example.

have it, and that a morphology-blind phonetic actuator can play a role in supplying abstract phonological expressions with phonetic detail.

On this reading, the morphophonemic representations for [t] and for [tɕ] can be much closer than the phonetics of these sounds would suggest, viz. both may be coronal plosives, the difference being that the latter, but not the former, is headed by a palatalisation-marking element. On the other hand, the defective [tʲ] can have exactly the same representation as [t] does, because the necessary condition for [tʲ] to ever occur in Polish is a palatal approximant or a close front vowel following a [t]~[tʲ] in phonetic, not morphophonological, terms. The remainder of this writing is based on this conjecture.

At this point, the discussion must move away from theoretical considerations, and concentrate on how this reading of GP/CVCV-based phonology is applicable to a selection of morphophonological and phonological–phonetic phenomena in Polish and English.

3. Polish palatalisation

3.1. The phonetic inventory

In a simplified manner, the phonetic inventory of Polish consonants and vowels may be presented by means of two illustrations. Table 1 below shows the consonants.

	Labial	Labiodental	(Post-)dental	Alveolar	Alveolo-palatal	Palatal	Velar
Plosive	p b		t d			c ɟ	k g
Fricative		f v	s z	ʃ ʒ	ɕ ʑ		x
Affricate			ʦ ʣ	ʧ ʤ	ʨ ʥ		
Nasal	m		n		ɲ		ŋ
Approximant	(w)(w̃)					j(j̃)	w(w̃)
Lateral			l				
Flap/trill				r			

Table 1: An inventory of Polish consonants (adapted from Jassem 2003: 103)

It should be noted that the table above omits phonetically-palatalised variants of non-dorsal consonants, and the palatal variant of the velar [x], viz. [ç].

The vowel system comprises the six non-nasal and, arguably, the two nasalised vowels shown in Diagram 1.

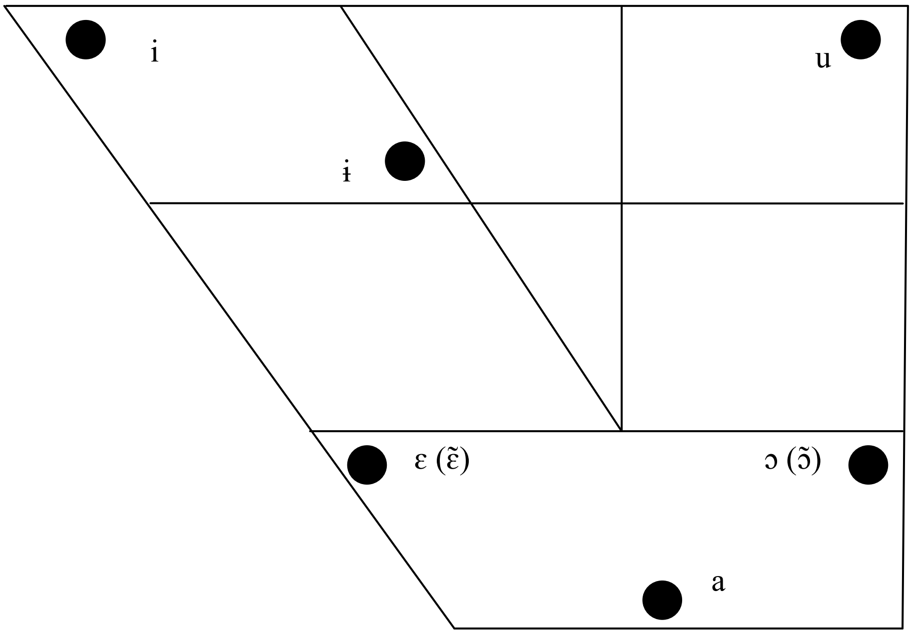


Diagram 1: An inventory of Polish vowels (adapted from Jassem 2003: 105)

In Diagram 1 the more traditional symbols [ɛ] and [ɔ] are used instead of Jassem's [e] and [o], respectively.

Length is not phonemic on consonants or vowels. Phonetically, long consonants are admissible realisations of geminates, as exemplified in (97) below.

(97) Some geminates in Polish

(97a) *Mekk–a* [kk] or [kː] 'Mecca'

mann–a [nn] or [nː] 'manna'

idyll–a [ll] or [lː] 'idyll'

(97b) *win–n–y* [nn] or [nː] 'guilty'

wan–n–a [nn] or [nː] 'bathtub'

Phonetically, there is no distinction between intramorphemic (97a) and intermorphemic (97b) sequences of geminates, the former being limited to foreign words, the latter being a result of morphophonology.

Vowel sequences are rare. Like geminate consonants, these appear predominantly in foreign words, as shown in (98a), in initialisms, as shown in (98b), and at morphological boundaries, as shown in (98c) below.

(98) Some vowel sequences in Polish

(98a) *aort–a* [a.ɔ] ‘aorta’

kakao [a.ɔ] ‘cocoa’

muze–um [ɛ.u] ‘museum’

ide–a [ɛ.a] ‘idea’

ide–i [ɛ.i] ‘idea (gen.sg.)’

(98b) *EOS* [ɛ.ɔs] ‘(trade mark)’

AF [a.ɛf] ‘(initialism for ‘auto–focus’)’

CO [ʦɛ.ɔ] ‘(initialism for *centralne ogrzewanie* ‘central heating’)

(98c) *za–orać* [a.ɔ] ‘plough (perf.inf.)’

za–intonować [a.i] ‘intone (perf.inf.)’

na–uczyć [a.u] ‘teach (perf.inf.)’

Vowel sequences at morpheme boundaries are the most interesting ones, since they hardly ever occur at boundaries other than prefix-base and preposition-host boundaries. This will be discussed in Chapter 5. Nasalised vowels play little role in the present discussion.

3.2. Palatalisation and the vowel system

3.2.1. Distribution of [i] and [ɨ]

Perhaps the most interesting feature of the Polish vowel system is the phonemic status of the vowel pair [i]–[ɨ], and the distribution of the vowel [ɨ]. Simplistically analysed, [i] and [ɨ] might be considered a pair of allophones in complementary distribution, since [ɨ] only follows non-palatalised consonants, whereas [i] appears elsewhere. The strength of this statement is built up by the total absence of [ɨ] word-initially in standard spoken Polish. The issue at hand is discussed in detail in Gussmann (2007: Chapter 3), whereto the reader is kindly referred. For the sake of brevity, only the most important portion of

Gussmann's analysis will be repeated, that which serves as the direct basis of the present proposal.

Due to the distributional limitations of [ɨ] against [i], their morphophonemic contrastiveness is best shown in the context of a preceding consonant, and because of some peculiarities of Polish palatalisation—discussed in later sections of this chapter—such a consonant should preferably be a labial. Gussmann's analysis offers two straightforward examples of the [i]–[ɨ] opposition, repeated in (99), after Gussmann (p. 33).

(99)	*pi–ł* [pʲiw] 'he drank'	*pył* [pɨw] 'dust'
	mił–y [mʲiwɨ] 'nice'	*my–ł–y* [mɨwɨ] 'they (fem.) washed'

Gussmann's analysis of the distribution of [i] and [ɨ] operates on the contrastive force these two vowels have when occurring after labial consonants. When followed by [i], a labial is phonetically palatalised, as shown in the left-hand examples in (99). As for the contrast between non-palatalised and palatalised labials as such, five examples are provided in (100), after Gussmann (2007: 33).

(100)	*pasek* [pasɛk] 'belt'	*piasek* [pʲasɛk] 'sand'
	bał–y [bawɨ] 'they (fem.) feared'	*biał–y* [bʲawɨ] 'white'
	mał–y [mawɨ] 'small'	*miał–y* [mʲawɨ] 'they (fem.) had'
	fok [fɔk] 'seal, gen. pl.'	*fiok* [fʲɔk] 'hair lock'
	wara [vara] 'beware'	*wiar–a* [vʲara] 'faith'

In Gussmann's analysis, the locus of contrastiveness is the transition between the consonantal and the vocalic part of the palatalised or non-palatalised sequence. Out of the six oral vowels [a, ɛ, i, ɔ, u, ɨ], all except [ɨ] and [i] are found both after non-palatalised and after palatalised labials, as shown in (101).

(101)	*perz* [pɛʃ] 'couch (grass)'	*pierz* [pʲɛʃ] 'wash (imp.)'
	pach [pax] 'armpit (gen.pl)'	*piach* [pʲax] 'sand'
	por–ę [pɔrɛ] or [pɔrɛ̃w̃] 'time (acc.sg.)'	*pior–ę* [pʲɔrɛ] or [pʲɔrɛ̃w̃] 'I wash'
	upór [upur] 'stubbornness'	*upiór* [upʲur] 'ghost'

Apart from never following non-palatalised labials, [i] is also exceptional in that it never forms phonetic [ji] sequences after palatalised labials–and indeed no [ji] sequences in standard spoken Polish, except for [j] breaking a vowel hiatus, and in foreign words–whereas [ɛ], [a], [ɔ], and [u] all admit alternative pronunciations with the glide [j] between the labial and the vowel, the two alternatives being non-contrastive in phonemic terms. Examples of alternative pronunciations for the words given earlier in (100) and (101) are presented in (102a) and (102b), respectively.

(102)

(102a)	*piasek* [pʲasɛk] or [pʲjasek]'sand'
	biał–y [bʲawɨ] or [bʲjawɨ] 'white'
	miał–y [mʲawɨ] or [mʲjawɨ] 'they (fem.) had'
	fiok [fʲɔk] or [fʲjɔk] 'hair lock'
	wiar–a [vʲara] or [vʲjara] 'faith'
(102b)	*pierz* [pʲɛʃ] or [pʲjɛʃ] 'wash (imper.)'
	piach [pʲax] or [pʲjax] 'sand'
	pior–ę [pʲɔrɛ]/[pʲɔrɛ̃w̃] or [pʲjɔrɛ]/[pʲjɔrɛ̃w̃] 'I wash'
	upiór [upʲur] or [upʲjur] 'ghost'

It should be clear now that, segmentally speaking, a palatalised labial can be followed by three distinct sets of speech sounds: the vowel [i] as such, any vowel other than [i] and [ɨ] without a segmental [j], and any vowel other than [i] and [ɨ] after a segmental [j]. Phonologically, this disjunctive statement can be boiled down to a single feature that all these contexts have in common. What examples (99)–(102) show is that a labial consonant is phonetically palatalised if followed by any sound whose articulation includes the approximation of the front of the tongue to the hard palate. It is not relevant if the sound is viewed (segmentally) as the vowel [i], the glide [j], or just a [j]-like transition to the actual vowel, viz. [ʲa], [ʲɔ], etc. In the context of the present proposal, this observation is of great importance. It allows for some freedom in assessing which representation is the best in capturing the relevant (contrastive) facts about what phonetically is a sequence of a palatalised labial and a vowel other than [ɨ], which never appears in such sequences.

3.2.2. Causality of palatalisation and the number of skeletal slots

Following Gussmann's analysis and the non-disjunctive statement about palatalised labials made in section 3.2.1, the palatalising factor of [j], [i] and of any speech sound that influences the palatalisation of a preceding labial should be brought into attention. In Gussmann's terms, the GP element that is responsible for palatalisation is the palatality element, i.e. {I}. In line with his analysis, two examples of minimal pairs are provided in (103) and in (104), drawn on a CVCV skeleton.

(103) [pa] as in *pasek* 'belt' vs. [p^{j}a] as in *piasek* 'sand'

(103a) [pa]

```
C          V
|          |
{ʔ•h•U}    {A}
```

(103b) [p^{j}a]

```
C            V
|            |
{ʔ•h•U•I̲}    {A}
```

(104) [pa] as in *pasek* 'belt' vs. [p^{j}ja] as in *piasek* 'sand'

(104a) [pa]

```
C          V
|          |
{ʔ•h•U}    {A}
```

(104b) [p^{j}a]

```
C          V          C          V
|_____________________|          |
{ʔ•h•U}               {I̲}        {A}
```

The notational difference between the palatalised sequences in (103b) and (104b) does not have to give different phonetic interpretations. As indicated earlier, the sequences [p^{j}a] and [p^{j}ja] are not contrastive in standard spoken Polish. The same is true of any palatalised labial consonant followed by a vowel other than [i] (and [ɨ], which is totally absent in this context). Speakers of Polish may or may not produce or perceive the phonetic difference, but in any case it is not contrastive in the given context. Indeed, if one reversed the representations shown in (103b) and (104b), they would still be identical in terms of their contrastive load. The lack of phonemic contrast leaves no clear indication which of these should be better in capturing the relevant fact about Polish palatalisation.

If one strived for a minimalist representation, one that contains as little material to allow for contrastive interpretation as possible, then the one shown in (103b) would appear better. The CV pair responsible for [p^{j}a] (or [p^{j}ja]) takes only two skeletal slots and contains all the information that in GP terms is necessary to give correct phonetic interpretation. The C slot is filled with elements responsible for the consonant being interpreted as a plosive ({ʔ} and {h} combined), whose primary place of articulation is labial ({U}), and whose most salient feature is, arguably, its palatalisation marked by {I̲}. In line with the statement about the distribution of [ɨ] against other vowels after palatalised labials, and given that the following V slot is occupied by {A}—which alone should give a non-front open vowel—it may be assumed that the phonetic interpretation would include: 1) the phonetically palatalised [p], i.e. [pʲ], and 2) the vowel [a]. The presence of [j] between the two not being contrastive, the glide may or may not be present, and appears purely a matter of interpretation.

This approach has at least one potential drawback. It obscures the causality and the directionality of Polish palatalisation. The shorter representation, in a way, implies that it is the consonant that triggers the palatalisation by itself and causes palatal phonetic effects on the transition towards the following vowel. This is against a striking fact concerning the distribution of palatalised labials as such. Namely, there are no phonetically palatalised labials utterance-finally, which entails that for words pronounced in isolation, no palatalised labial is ever found word-finally. Gussmann's analysis accounts for that by stating a licensing constraint for Polish. Given that a palatalised labial is one that has {I} in its representation, the constraint is formulated in (105).

(105) *Depalatalization constraint I* (Gussmann 2007: 41)
"The element {I} in a labial consonant must be directly licensed by a melodically filled nucleus."

Given that vowel-to-consonant licensing has a right-to-left directionality in GP terms, *Depalatalization constraint I* requires that in order for a palatalised labial to be pronounced as such, the consonantal slot under which it sits must be followed by a nuclear slot filled with melody, as opposed to an empty nucleus. For word-final consonants, this is unattainable, hence the palatality marker ({I}) on an underlyingly palatalised labial—if one assumes such labials exist—is not licensed, and consequently does not take part in the phonetic interpretation of the consonant. Given that the observation captured by *Depalatization constraint I* is descriptively correct, it makes sense to assume that it is the following vowel that enables or even triggers the palatalisation of a labial, rather than it is the labial that influences the choice of the vowel. Numbers appear to be in favour of the former approach. There are just two variants for each labial consonant: the plain and the palatalised one. Conversely, there are as many as five vowels ([a, u, i, ɔ, u]), each being possible after the palatalised labial. The final argument against the labial being the locus of palatality comes from the fact that whichever vowel follows a palatalised labial, there is a phonetic trace of palatality at the transition from the contoid to the vocoid, either by means of palatalising the labial alone, or—except for [i]—by additionally introducing the palatal glide [j]. The glide and the close front vowel being articulatorily almost identical, the locus of palatality in labial + vowel sequences can be found in what follows the labial, not in the labial itself. Hence, the palatalising trigger should come from the nuclear slot that follows the labial. This is clearly possible if the vowel happens to be [i], as shown in (106).

(106) *pi–ł* [p^jiw] '(he) drank'

[p^ji_]	C	V
	|	|
	{ʔ•h•U}	{I}

The nuclear slot in (106) is filled with {I}, which alone enjoys being phonetically interpreted as [i]. Assuming that palatalisation has a right-to-left directionality, the consonantal slot should be interpreted as palatalised, even though there is no palatality element present in its melody. However, the representation in (106) misses to answer the question why *Depalatalization constraint I* should be true if it is the vowel—not the consonant—that triggers palatalisation. The answer comes from the word-final context, where underlyingly palatalised labials may be claimed to exist. In Polish morphophonology, the palatality of stem-final consonants may influence the selection of allomorphs found in inflectional suffixes. Examples in (107) show a few cases where consonants appearing to be the same word-finally are no longer the same when followed by a genitive masculine singular suffix.

(107)

(107a)	*trup* [trup] 'corpse'	*trup–a* [trupa] '(gen.sg.)'
	głąb [gwɔmp] 'cabbage stalk'	*głąb–a* [gwɔmba] '(gen.sg.)'
	sierp [ɕɛrp] 'sickle'	*sierp–a* [ɕɛrpa] '(gen.sg.)'
(107b)	*karp* [karp] 'carp'	*karpi–a* [karp^{j}(j)a] '(gen.sg.)'
	żółw [ʒuwf] 'turtle'	*żółwi–a* [ʒuwv^{j}(j)a] '(gen.sg.)'
	gołąb [gɔwɔmp] 'pigeon'	*gołębi–a* [gɔwɛmb^{j}(j)a] '(gen.sg.)'

If the pattern at which (107) hints is not accidental, it transpires that all the words in question take the same desinence in their singular genitives, viz. [a]. The palatalisation of the stem-final labials in (107b) must be due to the labial itself, not the vowel. Hence, Gussmann's analysis takes labials in such words as those in (107b) to be underlyingly palatalised, or rather palatalised prior to the suffix being attached. The present proposal fully agrees with this observation. For cases listed in (107b) the stem-final labial has {I} present in its phonological expression, which gives the phonetic palatalisation in the singular genitive forms, where a vowel is available to fulfil *Depalatalization constraint I*. Problems only start to arise when one tries to draw a representation for any of these cases. An attempt at a relevant notation for *karp* ~ *karpia* is given in (108).

(108)

(108a) *karp* [karp] 'carp'

[_p] V C V

[…] {ʔ•h•U} {I}

(108b) *karpi-a* [karp^{j}a] 'carp (gen.sg.)'

[_p^{j}a] V C V

[…] {ʔ•h•U} {I} {A}

The delinked {I}-node in (108a) is an effect of *Depalatalization constraint I* at work. Not being licensed by a melodically-filled nucleus—this one being empty—the {I} is unlicensed and, depending on one's interpretation of licensing in GP, it is either cut off the skeleton (as in (108a)), or omitted during phonetic interpretation.[102] In (108b) the element {I} finds licensing from the vocalic slot, which enables its phonetic interpretation. Still, the representation in (108b) is in sharp contrast to that in (106), where it is clearly the vocalic slot that carries the palatality element. Crucially, the phonetic interpretation of the relevant bits in (106) and (108b) is exactly the same, viz. [pʲ].This amounts to two distinct representations giving the same phonetic output, which is never contrastive.

By itself, a situation in which two distinct representations give identical output is not forbidden in the phonological theory of this piece of work, but it may be an indication that something is missing from the analysis. In this case, the missing part is the relation that holds between consonantal and vocalic expressions. Each nucleus being the inherent counterpart of the preceding onset, the two phonological expressions contract a lateral relationship. Given that the phonetic interpretation of the palatalised part of (106) and (108b) is exactly the same, viz. [pʲ], it transpires that the palatality of consonant + vowel sequences is not a matter of either expression alone, but rather the outcome of a feature they both share. This is indeed one of the findings of Gussmann's (2007) analysis, where a palatalised labial followed by [i] is a phonetic interpretation of a structure in which the labial and the vowel not only both contain the element {I}, but more importantly, they share that single piece of melody under their respective skeletal slots. Such a structure, adapted to the CVCV skeleton, is shown in (109).

(109) *pi–ł* [pʲiw] '(he) drank'

[pʲi_]   C   V

{ʔ•h•U}   {I}

The representation in (109) has a CV pair that shares a single {I} element, which is to show that the phonetic palatalisation of the labial is a matter of the lateral relation that holds between the vocalic and the consonantal expressions.

An immediate question arises, what is the representation of a [pɨ] sequence—as in *pył* [pɨw] 'dust'—which also contains a phonetically front vowel, hence indicating that the vowel should also contain {I} in its composition. In Gussmann's (2007)

[102] Recall that in CVCV, Licensing is not necessary for melodically-filled positions to be interpreted.

analysis, this is indeed the case. What is phonetically [ɨ] may be represented with the use of {I}, albeit in a different way. The work in question takes advantage of the assumption that an element may contribute to a phonological expression, i.e. a segment, as the head or as an operator (see section 2.8.3). In short, there is no a priori limitation on the number of elements that can appear in a given expression, provided that 1) no element appears more than once[103] and 2) there appear no elements that would be mutually exclusive in a given context. (The former condition effectively limits the size of the expression to the number of elements as such plus an empty head.) The latter condition may be exemplified by the absence of the elements {L} and {H} under a single consonantal slot in any well-thought GP analysis of such languages as English or Polish; {L} being responsible for voicedness, {H} for voicelessness, the two notions being mutually exclusive phonetically.[104] The [i]–[ɨ] distinction is an example of the former condition. Having just three quality-defining primes for vowels—{I} for frontness, {A} for openness, and {U} for roundness—Gussmann's analysis must use {I} for both vowels, their phonemic contrastiveness having been shown in (99). In line with notion that the most salient property of a GP phonological expression should be captured by the head, other properties being demoted to the role of operators, Gussmann (2007: 52) takes [i] to be composed solely of the element {I} as the head, viz. {$\underline{\text{I}}$}, and [ɨ] to be composed of an empty-headed expression with {I} as the sole operator, viz. {I•_}. The headedness of {$\underline{\text{I}}$} appears to coincide with what has been said about palatalised labials. The headed {$\underline{\text{I}}$} enjoys a more intimate relationship in consonant + vowel sequences, whereas the empty-headed (or headless, if one takes the two terms to be synonymous, as Gussmann (2007) appears to do) {I•_} is hardly anything more than a licensor to its licensee in SGP vocabulary. A comparative example is provided in (110), showing a pair of words previously given in (99).

[103] This condition is not a direct consequence of replacing *SPE*-like features with elements. For example, a concurrent element-based phonological theory, Particle Phonology (Schane 1984), does not impose this particular limitation on phonological representations.
[104] In languages with more than two states of the glottis being contrastive on obstruents, {L} and {H} may appear together; potentially, {L} may be interpreted as voicedness, and {H} as aspiration. See Harris (1994: 133–138) for discussion.

(110) *pił* [p^{j}iw] '(he) drank' vs. *pył* [pɨw] 'dust'

(110a) [p^{j}i_]

C V

{ʔ•h•U} {I}

(110b) [pɨ_]

C V

{ʔ•h•U} {I•_}

The representation in (110a) shows an instance of the {I}-sharing relation, which translates into both expressions, the consonantal and the vocalic one, having an {I}-head in common, arguably making palatality the most salient property of the CV sequence. Conversely, the representation in (110b) is devoid of any {I}-sharing relation, palatality not being the most salient property, and indeed not being a property of the sequence at all. Gussmann's (2007) analysis accounts for {I}-sharing through a constraint given here under (111).

(111) *I-alignment* (Gussmann 2007: 52; his "revised" version)

"A nucleus shares I-head with the onset it licenses."

The constraint is also responsible for the phonetic non-occurrence of structures in (112) below.

(112) *[pi] vs. *[p^{j}ɨ]

(112a) *[pi_]

C V

{ʔ•h•U} {I}

(112b) *[p^{j}ɨ_]

C V

{ʔ•h•U•I} {I•_}

In SGP terminology, nuclei obligatorily *license* their onsets; in CVCV, onsets require neither licensing nor government to be interpreted (see section 2.6). *I-alignment* is explicit on the element {I} being shared between the onset and the head should either of them have {I} as its head. Configurations in which a nucleus is {I}-headed, while the onset has {I} as an operator, and the reverse are illicit in Gussmann's analysis.

Having established what sort of relation holds between palatalised labials and following vowels, it appears high time to return to the question of which representation, a shorter one, like in (103b), or a longer one, like in (104b), is better at capturing palatalised labials followed by vowels other than [i]. This is done in the next section.

3.2.3. The number of skeletal slots. [a], [ɔ], and [u]

As has been shown in section 3.2.2, there is some variability in the number of skeletal slots occupied by sequences of a palatalised labial, the optional glide [j], and a vowel other than [i]–[ɨ]. Two representations given earlier in (103b) and in (104b) are repeated for convenience in (113).

(113) [p^j(j)a] as in *<u>pia</u>sek* 'sand'

(113a) short skeleton

C	V
|	|
{ʔ•h•U•I̲}	{A}

(113b) long skeleton

C_1	V_1	C_2	V_2
|		|	|
{ʔ•h•U}		{I̲}	{A}

At first glance, it is the right-hand representation in (113) that fares better at capturing the relevant observation about the sequence [p^j], viz. {I}-sharing, which is absent in the left-hand representation. However, notice that what is shown in (113b) is an {I}-head being apparently shared between two consonantal slots, not between a C + V pair, in which case *I-alignment* (see (111)) appears to hold gratuitously, since it is not triggered by a vocalic slot. Rather, the {I}-head spreads from C_2, reaching C_1 across an empty nuclear position, viz. V_1. It is unclear if a nuclear slot to which no element {I} is attached can be claimed to have an {I}-head, as *I-alignment* would have it. On a literal reading, *I-alignment* appears to prohibit the configuration given in (114) below.

(114) [ja]

C	V
|	|
{I}	{A}

Notice that while the onset is {I}-headed, there is no {I} in the nucleus at all; *I-alignment*, however, appears to require that both expressions share the {I}-head of the onset, contrary to fact. The sequence [ja] is not only pronounceable, but also well-behaved in Polish. The list in (115) below provides just a small selection of [ja]-initial words, and the sequence as such is also found word-medially and finally.

(115) *ja* [ja] 'me'
jabłko [jabwkɔ] 'apple'
jad [jat] 'venom'
jak [jak] 'how'
jama [jama] 'hollow, n.'
jasny [jasnɨ] 'bright'

Now, leave the structure in (114) aside for a while, and concentrate on those in (113). There are three ways to circumvent the confusion. The first method is to limit the number of skeletal slots in (113b), and make it two, just like in (113a), but making sure that {I}-sharing does take place. A representation of this sort is given in (116) below.

(116) [p^j(j)a] as in *<u>pia</u>sek* 'sand' (incorrect)

C V

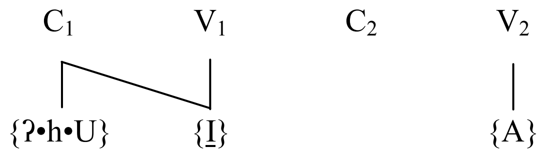
{ʔ•h•U} {I̲} {A}

Despite showing an instance of {I}-sharing, the representation in (116) is wrong for one simple reason. Given the presence of {I̲} under the vocalic slot, the expression formed under that slot is {A•I̲}, which hardly gives [a] phonetically. Rather, it gives [ɛ], which in GP terms is the most straightforward interpretation of {A} and {I} sitting under a single vocalic slot in languages that have mid front vowels, and Polish indeed does have such a vowel. Hence, what is shown in (116) is [p^jɛ], as in *pies–ek* [p^jɛsɛk] 'dog (dim.)' rather than [p^ja], as in *piasek*.[105]

[105] For {A•I̲} to give [ɛ] phonetically is indeed what Gussmann (2007) finds in his analysis (p. 57ff).

The second method is to preserve the number of slots in (113b), but to make {I}-sharing hold only between two consecutive slots. A representation drawn along these lines is shown in (117).

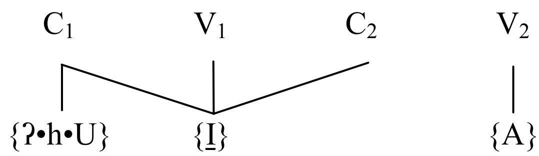
(117) [pʲ(j)a] as in <u>*pia*</u>*sek* 'sand' (incorrect)



This time, the reason for the representation being wrong is the number of separate vocalic expressions. In (117), elements {I} and {A} are attached to separate nuclear slots, with an empty consonantal slot between. The {I} under V_1 enjoys interpretation as [i]. As a result, the leftmost CV pair is interpreted as [pʲi], being hardly similar to [pʲa]. The other vocalic slot (V_2) is filled with {A}, which enjoys being interpreted as [a], all slots giving [pʲi.a], rather than [pʲa]. As has been shown in section 3.1, Polish does allow for word-internal vowel sequences, albeit in foreign words and at prefix–base and preposition–host boundaries. Thus, what is represented in (117) is the sequence [pʲi.a], as in *PR* [pʲi.ar] '(acronym for) *public relations*', a foreign initialism that has recently been attested in spoken (and written) Polish, and appears increasingly popular with Polish mass media at this writing.[106] Crucially, (117) does not give the demanded [pʲa] sequence.

An alternative might be sought in extending the {I}-head to the right-hand consonantal slot (C_2). An attempt at such salvaging of (117) is given in (118).

(118) [pʲa] as in <u>*pia*</u>*sek* 'sand' (incorrect)



As is the case with (117), the representation in (118) avoids giving [ɛ] instead of [a] as the interpretation of what follows the labial. However, this time there is another

[106] As far as I can tell, *PR* has even been granted a nativised spelling *piar*, and has become a morphological base for productive derivational morphology, e.g. *piar–ow–y* [pʲi.arɔvɨ] 'PR, adj. (masc.)'

consonant present in phonetic output. {I̲} receives its own interpretation when being the only element linked to a consonantal slot (C_2), viz. [j]. Hence, the structure shown in (118) gives [pʲija], as in *pijar* [pʲijar] 'Piarist'.[107]

The third, and the last method, is to leave (113b) as it is, and reformulate *I-alignment* to account for the data. This option is implicitly endorsed by Gussmann's comment on *I-alignment*: "The constraint, interpreted exhaustively, means that an I-headed nucleus licenses an I-headed onset and that an I-headed onset cannot be licensed by a nucleus with {I} as operator" (p. 53). Nothing is said about {I}-less nuclei. This points to the wording of constraint (111) being rather unfortunate. What Gussmann's analysis drives at is, basically, that if both expressions (or 'segments') in a CV have {I} in their respective melodies, it is prohibited that {I} be a head of one of them, and an operator of the other. To give this a strict flesh, the present analysis rewrites *I-alignment* in (119) below.

(119) *I-alignment* (revised)

In a CV, if both the onset and the nucleus contain {I} in their respective melodies, the element in question must either be the shared head of both expressions, or appear as an operator in both of them.

If translated into the more traditional feature geometry, constraint (119) amounts to saying that an onset and the following nucleus must agree in [±back].[108] (On generative accounts of Polish, [ɨ] is a [+back] vowel, its actual retracted frontness notwithstanding; see, for instance, Gussmann (1980) or Rubach (1984).)

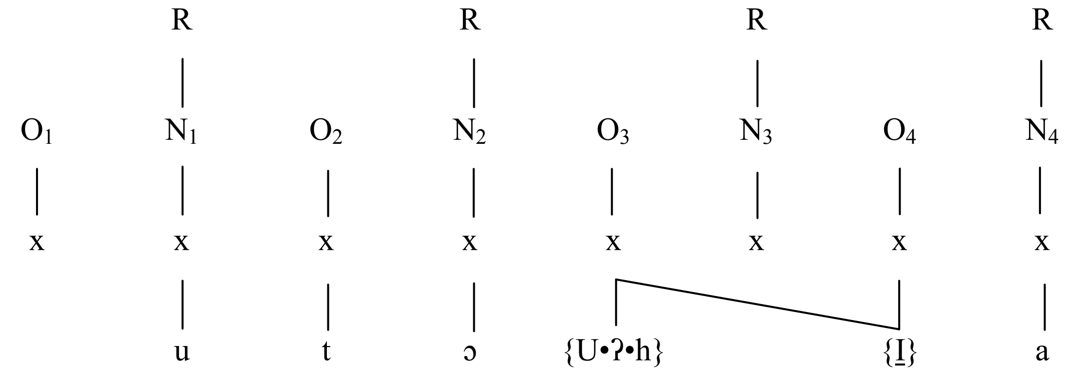
It should be noted that while Gussmann's (2007) analysis uses the formulation of *I-alignment* given in (111)—presumably, this favours fewer skeletal slots to represent a palatalised labial and a following vowel other than [i]—there are instances of the

[107] It is debatable how many speakers of Polish make phonetic distinction between *pijar* and *PR*. In any case, the former word had been attested in Polish before the latter started spreading. To my ears, *PR* is sometimes pronounced as [pʲijar], exactly the same way as *pijar* is; the [j] in *PR*, however, may be intrusive, inserted to resolve a vowel hiatus, similarly to [w] being sometimes found in *kakao* [kaka.ɔ] 'cocoa', pronounced [kakawɔ]. The digression about the vowel hiatus notwithstanding, neither [pʲi.ar] nor [pʲijar] contain the [pʲa] sequence that is found in *piasek* [pʲasɛk] 'sand'. Additionally, Gussmann (2007: 99) clearly gives an example with {I} heading three consecutive skeletal slots in *utopij–n–y* [utopʲijnɨ] 'utopian,' the [pʲij] sequence being exactly what is claimed to be represented in (118).

[108] See, for instance, Rubach (2003) for a Derivational OT analysis with such a constraint split into three subconstraints, for close, mid, and open vowels.

longer skeletal composition among the examples provided. One such example is provided in (120) below.

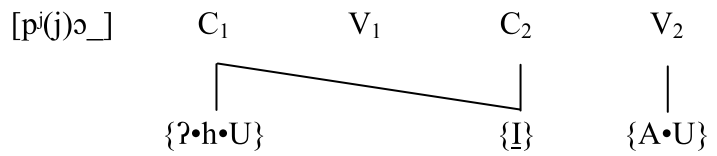
(120) *utopia* [utɔpʲ(j)a] 'utopia' (after Gussmann 2007: 97)



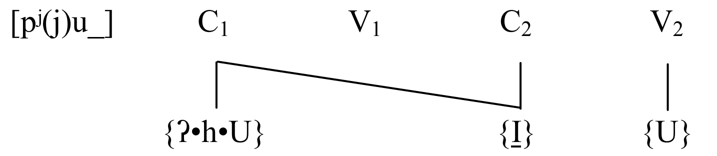
What is clear is that the {I}-head is shared between O_4 and O_3, going underneath N_3, which fulfils the new formulation of *I-alignment* given in (119); N_3 has no {I} in its composition, and therefore it is not subject to any alignment thereof in the first place.

Given that palatalised labials may be followed not only by [i], [ɛ], or [a], but also by phonetically back vowels [ɔ], and [u]—these contain no frontness element in their composition—it appears reasonable to take representations of palatalised labials followed by either of them as occupying four skeletal slots for the labial, the optional glide ([j]), and the vowel. Such representations are shown in (121) and (122).

(121) *Piotr* [pʲɔtr] or [pʲjɔtr] 'Piotr'



(122) *pióro* [pʲurɔ] or [pʲjurɔ] 'pen'



As has been indicated earlier for (116), the {I}-head in (121) and (122) must not be linked to the slot provided by V_2; otherwise, it would change the expression under V_2 into {A•U•I} and {U•I}, respectively. Neither expression finds unambiguous phonetic interpretation in Polish. The elements responsible for frontness ({I}), and for roundness ({U}) co-exist under a single vocalic slot, which for orthodox SGP presupposes rounded front vowels in Polish, contrary to fact.[109] Also, given that the combination {A•I} under a V slot has been reserved for [ɛ], it appears clear that a sequence of a palatalised labial, the optional [j], and the vowel [a] should sit over four skeletal slots, as shown earlier in (113b).

3.2.4. The number of skeletal slots. [i] and [ɛ]

Having pondered on the theoretical issue of how many skeletal slots are needed to account for sequences of palatalised labials, the optional glide, and any vowel from the set [a, ɔ, u], the analysis may now turn to the question of why this sort of discussion has been held in the first place. In short, this is because there are two more vowels in Polish that can appear after a palatalised labial, viz. [i] and [ɛ]. More specifically, there appears to be a consensus among linguists that these are the only vowels that have the ability to palatalise a preceding consonant in present-day Polish.

A representational side of the palatalising potential of [i] has been tentatively shown in (109), which is repeated for convenience in (123).

(123) *pi–ł* [pʲiw] '(he) drank'

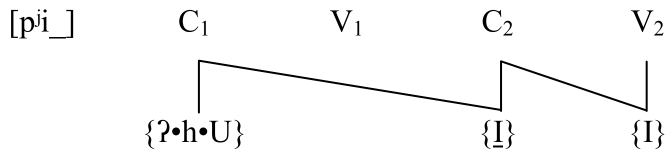
```
[pʲi_]      C          V
            |‾‾‾‾‾‾‾‾‾‾|
        {ʔ•h•U}       {I̲}
```

The labial + vowel sequence in (123) takes only two skeletal slots, and indeed Gussmann's (2007) work hardly provides an example with more slots for the same

[109] Following KLV (1985), it is not uncommon to assume that in languages lacking rounded front vowels, the tiers hosting {I} and {U} are fused, and that {I} and {U} cannot co-occur in a single expression. Notice that Polish has palatalised labials, which need both elements in their representation along the lines of Gussmann (2007). This means that either the tiers are not fused in Polish and the lack of rounded front vowels is a case of undergeneration in the system, or that labiality of consonants would better be represented by a different element, e.g. {B}. See Scheer (2004: 47–65) for discussion and further references. As the present work is not contingent on the existence of {B} on labials, the element is left unused.

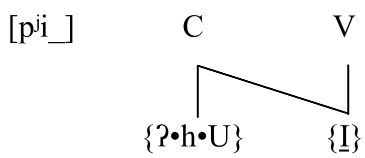
sequence. Theoretically—to bring it in line with the representations given in (113b), (121) and (122)—a longer skeleton might be entertained in (124).

(124) *pi–ł* [p^jiw] '(he) drank' (long skeleton)



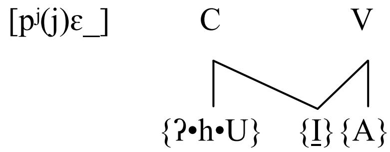
The drawing in (124) is just like (113b), (121) and (122) in attributing the palatality of [p^j] to the {I}-head shared between C_1 and C_2, a phenomenon not covered by *I-alignment*. This representation is superfluous in that the underlying glide, the {I} under C_2, is never pronounced as such in standard spoken Polish. [ji] sequences are absent, except when the [j] resolves a vowel hiatus. This by itself would not be catastrophic to a GP-based analysis of Polish, since the model is far from paying too closer attention to phonetic detail. Indeed, Gussmann's (2007) work discusses at length what is called "the irrelevance of phonetics" (pp. 25–30), and section 2.8.3 herein has shed some light on the matter, too. What is catastrophic is that (124) obscures the fact that the presence of [i] alone suffices to palatalise the preceding labial, without the phonetically untraceable [j] as the intermediary. Therefore, what should be expressed in (124) is better shown in (125), which is structurally identical to (123).

(125) *pi–ł* [p^jiw] '(he) drank' (short skeleton)



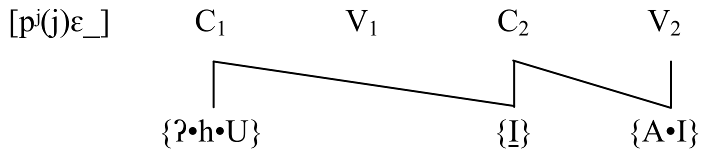
The analysis becomes slightly complicated when [ɛ] is taken into account. It has been noted in the discussion on (116) that the composition {A•I} under a single vocalic slot gives [ɛ], instead of what should have been [(j)a]. Hence, it appears that a palatalised sequence with [ɛ] should take as few skeletal slots as palatalised sequences with [i] take, as in (125). A possible representation for [ɛ] is given in (126).

(126) *pies* [pʲ(j)εs] ‘dog’



The structure shown in (126) correctly shows the {I}-head-sharing relation between the vowel and the consonant, which together meet the description of *I-alignment*. Still, unlike (121) and (122), (126) is indifferent to the possibility of [j] appearing in the phonetic interpretation [pʲjεs]. Without a doubt, it is only before [i] that the glide cannot appear in palatalised labial + vowel sequences, the absence of [ɨ] in such sequences having been discussed earlier. This might indicate that perhaps the representation in (126) had better use more skeletal slots, as illustrated in (127).

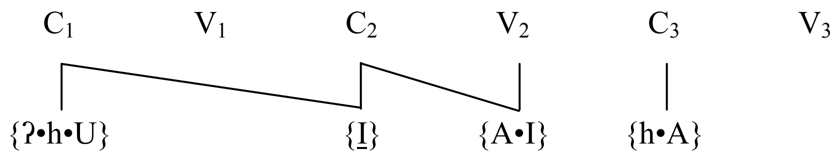
(127) *pies* [pʲεs] or [pʲjεs] ‘dog’ (long skeleton)



Just like (124), the representation in (127) obscures the source of palatalisation on [pʲ], which is the vowel itself–not the optional glide. This time, however, there is also a stronger reason for rejecting (127) as the correct underlying representation. The long {I}-sharing relation between C_1 and C_2 over V_1 fails to account for the total absence of palatality on [p] in a word form of *pies* where the vowel [ε] alternates with zero, viz. *ps–a* [psa] ‘dog (gen.sg.)’. The alternation is first given in (128), with an incorrectly drawn {I}-sharing relation.

(128)

(128a) *pies* [pʲ(j)εs] ‘dog’ (long skeleton)



(128b) *ps–a* [psa] ‘dog (gen.sg.)’ (long skeleton)

C_1	V_1	C_2	V_2	C_3	V_3
{ʔ•h•U}		{I̲}	{A•I}	{h•A}	{A}

In Gussmann’s (2007) analysis, the [ɛ] in *pies* is a floating melody, attached to the skeleton if it meets the constraint defined as *Melody Association*, given in (129).[110]

(129) *Melody Association* (Gussmann 2007: 191)
“Attach floating [ɛ] to the nucleus when the following nucleus has no melody attached to it.”

In (128a), there is no melody attached to V_3, which follows the floating [ɛ] of V_2, hence *Melody Association* applies, granting phonetic interpretation to [ɛ]. In opposition, in (128b), there is a melody ({A}) under V_3, hence *Melody Association* does not attach the [ɛ] under V_2 to skeleton, and it is not interpreted. However, (128) exhibits an {I}-sharing relation between C_1 and C_2, which for (128b) in particular presupposes that the [p] is still palatalised, and the whole word form is interpreted as *[p^jsa] or *[p^jjsa], contrary to fact. As has been the case with other debatable examples shown earlier, the discrepancy between the representation and the phonetic detail is not by itself destructive to the analysis. The problem is that (128) misses the fact that the floating vowel must always be phonetically present to give palatalisation on the labial, viz. [p^j(j)ɛs]. When it is phonetically absent, as is the case in (128b), the labial is not palatalised, viz. [psa]. The forms *[p^jsa] and *[p^jjsa] for *ps–a* ‘dog (gen.sg.)’ are never found in standard spoken Polish. Therefore, for palatalised sequences with [ɛ] a shorter skeleton should be used. The *pies~ps–a* alternation is repeated in (130) with the correct number of skeletal slots for {I}-sharing.

[110] Vowel ~ zero alternations, with references to other analyses, are further discussed in Chapter 5.

(130)

(130a) *pies* [pʲɛs] or [pʲjɛs] 'dog' (short skeleton)[111]

C_1 V_1 C_2 V_2

{ʔ•h•U} {I̲} {A} {h•A}

(130b) *ps-a* [psa] 'dog (gen.sg.)' (short skeleton)

C_1 V_1 C_2 V_2

{ʔ•h•U} {I̲} {A} {h•A} {A}

In (130b), *Melody Association* leaves the [ɛ] under V_1 completely unattached, preventing the {I}-head from contracting a sharing relation with the onset under C_1. Devoid of the element {I}, the labial is not palatalised.

A summary of the discussion on the number of skeletal slots for palatalised labial + vowel sequences is given in the next section.

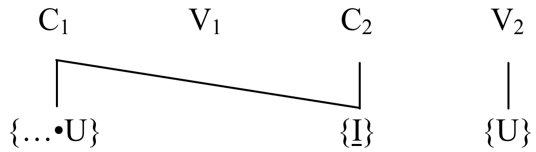
3.2.5. The number of skeletal slots. Summary

To sum up the discussion held in sections 3.2.2 to 3.2.4, this section repeats what has been found to be the correct representations for sequences in which a palatalised labial consonant if followed by [i], [ɛ], [a], [ɔ], or [u].

In line with what has been shown earlier, a sequence of a palatalised labial, the optional glide [j], and the vowel [u] may be schematised, with the superfluous use of geometric features, as in (131).

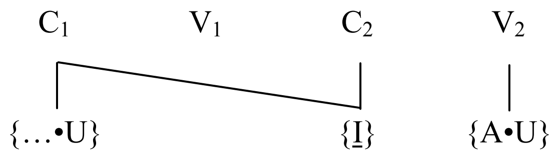
[111] Contrary to what the notation in (130) may suggest, the elements {I̲} and {A} under V_1 form a single expression—{A•I}—but it is only the {I}-head that is linked both to V_1 and C_1 if the melody under V_1 is attached and phonetically interpreted. The single melodic tier is shorthand for multi-tiered melody, where each element may occupy a separate tier, as signalled already in KLV (1985).

(131) [LABIAL; –BACK]+([j])+[u]



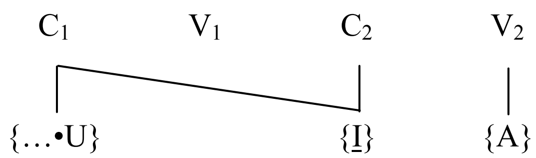
A similar sequence in which the vowel happens to be [ɔ] may take the shape schematised in (132).

(132) [LABIAL; –BACK]+([j])+[ɔ]



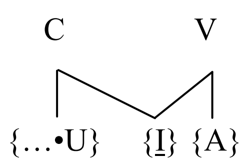
For a sequence in which the labial and the optional glide are followed by [a], the diagram takes the shape shown in (133).

(133) [LABIAL; –BACK]+([j])+[a]



What is clearly visible in (131), (132), and (133) is that none of the expressions under V_2 has {I} in its composition. For expressions that do contain {I}, the skeletal sequence is shorter. For [ɛ], the corresponding schema is the one in (134).

(134) [LABIAL; –BACK]+([j])+[ɛ]



For [i], which is never preceded by the glide [j] after a labial in standard spoken Polish, the diagram is uncontroversial, and takes the form proposed in (135).

(135) [LABIAL; –BACK]+[i]

C V

{…•U} {I̲}

The diagrams in (134) and (135) are uniform in that the {I}-head is part of the vocalic expression under the V slot, since both [ɛ] and [i] have {I} in their underlying composition, as opposed to [u], [ɔ], and [a], for which the diagrams in (131), (132), and (133) need to separate the {I}-head from the {I}-less melody of the vowel. The reason for [ɛ] spanning the smaller number of skeletal slots—despite [ɛ] taking the optional glide [j] as [a], [ɔ], and [u] do—has been shown in section 3.2.4 on the behaviour of palatalised labials before floating [ɛ]'s (see examples (128) and (130)).

In all the templates in (131) to (135) the following labial consonants may be represented by means of GP elements added next to {U} in the melody under the C slot:

- voiceless plosive [p] — {ʔ•h}
- voiced plosive [b] — {L•ʔ•h}[112]
- voiceless fricative [f] — {h}
- voiced fricative [v] — {L•h}
- nasal [m] — {N} (or, more conservatively, {ʔ•N})[113]

As has been discussed in the previous sections, the palatality of these consonants or the lack thereof can be represented by means of the element {I} serving as the head of the expression—i.e. {…•I̲}—and by the absence of that element, respectively. For labials, {I} seems never present in the role of an operator—i.e. {…•I•_}—this being conditioned by the fact that the defining phonetic property of these consonants (LABIAL) does not by itself require the use of the body of the tongue, which would translate into

[112] The present analysis follows Gussmann's (2007) work in taking voiced obstruents in Polish as having the element {L} (voicedness) in their composition; the same was used earlier in, for instance, Cyran (2003). Voiceless obstruents are representationally contrastive due to the lack of {L} in their composition. The element {H} (voicelessness) is therefore not needed for representing Polish obstruents.

[113] Polish sonorants not being contrastive in [±voice], there is no underlying voice specification for the nasal labial, i.e. no {L} is present in the expression. The labial-velar [w] is omitted due to its phonological behaviour, discussed in section 3.3.2. Furthermore, on orthodox reading a nasal stop should be specified by {N} and {ʔ}, the latter denoting the oral closure. In Polish morphophonemics, nasal stops do not contrast with nasalised approximants—these are the only class that would be specified through {N} without {ʔ} under a C slot—therefore this writing takes the liberty of not putting the element {ʔ} in illustrations of nasals.

the articulatory feature [DORSAL]. The only exception is when a labial is palatalised, in which case {I} appears as the head of expression, as shown in the preceding sections. Conforming to so-called Occam's razor, there is no need for a separate expression for any of the labials [p, b, f, v, m] that would include {I} as an operator.

Having presented the representational side of palatalised labial consonant + vowel sequences, the present work may show how {I}-sharing takes place across morphological boundaries—in line with *I-alignment*—and where it is blocked despite the conditioning factors for {I}-sharing being apparently present. The next section will start with a short discussion of palatalisation on consonants other then labials, which have been the sole class of consonants discussed in the previous few sections.

3.3. Two patterns of palatalisation in standard spoken Polish

3.3.1. Morphophonemic vs. phonetic palatalisation

Unlike labials ([p, b, f, v, m]), other classes of consonants in Polish exhibit two patterns of phonetic behaviour when subject to a palatalising condition. What has been proposed in section 3.2 is that the palatalising condition is the presence of an {I}-headed nucleus or a nucleus over which an {I}-head spreads from the neighbouring onset. For the five consonants in question, there is no phonetic difference between word-internal and word juncture context, as shown in (136).

(136)	*pi–ć* [pʲitɕ] 'drink (inf.)'	*trup Iwana* [pʲi] 'Ivan's corpse'
	bi–ć [bʲitɕ] 'beat (inf.)'	*grób Iwana* [pʲi]–[bʲi][114] 'Ivan's grave'
	fik–a–ć [fʲikatɕ] 'frolic (inf.)'	*blef Iwana* [fʲi] 'Ivan's bluff'
	widzi–e–ć [vʲidʑɛtɕ] 'see (inf.)'	*żółw Iwana* [fʲi]–[vʲi] 'Ivan's turtle'
	milcz–e–ć [mʲilʧɛtɕ] 'be silent (inf.)'	*dom Iwana* [mʲi] 'Ivan's home'

[114] The two sequences with a voiced word-final obstruent *gró*[bʲi]*wana* and *żół*[vʲi]*wana* put after the slash are typical of Poznań–Cracow Polish, and are the result of Poznań–Cracow Voicing, discussed in section 4.5ff. In Warsaw Polish, the word-final obstruents, having undergone final devoicing, do not voice in the presence of vowels and sonorants, hence *gró*[pʲi]*wana* and *żół*[fʲi]*wana*, respectively.

Against this observation, consonants outside the set [p, b, f, v, m] differ with respect to the phonetic shape of their palatalisation in the presence of an {I}-head. Some examples of juncture palatalisation—an instance of what is also called surface palatalisation or phonetic palatalisation—are given in (137).

(137) *pies* [pʲ(j)ɛs] 'dog' — *pies i kot* [sʲi] 'a dog and a cat'
kot [kɔt] 'cat' — *kot i pies* [tʲi] 'a cat and a dog'
pan [pan] 'Mr. _' — *pan i pani* [nʲi] 'Mr. and Mrs. _'
stół [stuw] 'table' — *stół i krzesła* [wʲi] 'table and chairs'
sznur [ʃnur] 'rope' — *sznur i pętla* [rʲi] 'a rope and a noose'

Against the examples in (137), consider the behaviour of voiceless velars, shown in (138).

(138) *strach* [strax] 'fear' — *strach i obawa* [çi] 'fear and anxiety'
mrok [mrɔk] 'darkness' — *mrok i chłód* [ci] 'darkness and cold'

Due to final devoicing, the juncture palatalisation on the voiced velar [g] is a bit more difficult to show unambiguously. Nevertheless, an example can be traced in the sequence of word forms and the phrase in (139).

(139) *nog–a* [nɔga] 'leg'
nóg [nuk] 'leg (gen.pl.)'
nóg i rąk [ci]–[ɟi][115] '(of) legs and arms'

In an unambiguous fashion, the palatalised counterpart of [g] is also available word-internally, as shown in (140).

[115] See previous footnote for comment on the variant with the voiced obstruent. The vowel alternation [ɔ]~[u] is not relevant to palatalisation.

(140)

(140a)	*nog–a* [nɔga] ‘leg’	*nog–i* [nɔɟi] ‘(nom.pl.)’
	drog–a [drɔga] ‘road’	*drog–i* [drɔɟi] ‘(nom.pl)’
(140b)	*gin–ą–ć* [ɟinɔ̃w̃tɕ] ‘to die’	
	gir–a [ɟira] ‘leg’(informal)	

Against this background, consider some examples of word-internal palatalisation listed in (141).

(141)	*pies* [pʲ(j)ɛs] ‘dog’	*psi–e* [pɕɛ] ‘(voc.)’
	kot [kɔt] ‘cat’	*koci–e* [kɔtɕɛ] ‘(voc.)’
	pan [pan] ‘Mr. _’	*pani–e* [paɲɛ] ‘(voc.)’
	stół [stuw] ‘table’	*stol–e* [stɔlɛ] ‘(voc.)’
	sznur [ʃnur] ‘rope’	*sznurz–e* [ʃnuʒɛ] ‘(voc.)’

All the nouns in (141) use masculine declension—whether it is animate or inanimate declension is irrelevant here—and take the same desinence in the singular vocative, a phonological expression whose phonetic output is the vowel [ɛ]. The presence of the vocalic expression—which, in line with Gussmann’s (2007) analysis, is taken to be the expression {A•I}—fulfils the criterion for *I-alignment*, provided that the {I}-head of the suffix can spread onto the stem-final consonant. A tentative illustration of one of the alternations given in (141) is provided in (142).

(142) *pan* ~ *pani–e* [pan] ~ [paɲɛ] ‘Mr. _ ~ (voc.)’

(142a) [pan]

C_1	V_1	C_2	V_2
|	|	|	
{ʔ•h•U}	{A}	{N•A}	

(142b) [paɲɛ]

C_1	V_1	C_2	V_2
|	|	|	|
{ʔ•h•U}	{A}	{N•A}	{$\underline{\text{I}}$} {A}

It should be noted that unlike palatalised labials, a word-internal realisation of a palatalised [n], viz. [ɲ], does not have the option of being followed by the glide [j] before vowels other than [i], which is also shown in (143).

(143) *pani* [paɲi] ‘Mrs. _’ *pani–e* [paɲɛ] ‘Mrs. _ (nom.pl)’
pani–ami [paɲamʲi] ‘Mrs. _ (instr.pl.)’ *pani–om* [paɲɔm] ‘Mrs. _ (dat.pl.)’
pani–ul–k–a [paɲulka] ‘Mrs. _ (pej.dim.)’

In contrast, the underlyingly non-palatalised word-final [n] in *pan* [pan] ‘Mr. _’ can freely occur in the phonetically palatalised form [nʲ] before the glide [j] across the word boundary, as shown in (144).

(144) *pan Jerzy* [panʲjɛʒɨ] ‘Mr. Jerzy _’ *pan Jan* [panʲjan] ‘Mr. Jan _’
pan Jonasz [panʲjɔnaʃ] ‘Mr. Jonasz _’ *pan Józef* [panʲjuzɛf] ‘Mr. Józef _’

Apart from confirming that the presence of [j] is sufficient to trigger phonetic palatalisation of a preceding consonant, examples in (144) show one more thing, namely that the word boundary appears to prevent the {I}-head from spreading onto the preceding onset as *I-alignment* would have it.

Before going further into the present investigation, one may consider an example that may be ambiguous in terms of which type of palatalisation is found in a word-internal context. Consider, once again, the celebrated case of *sinus* ‘sine’, accompanied by another specimen of primary school trigonometry, in (145) below.

(145) *sinus i cosinus* [sʲi sʲi sʲi] ‘a sine and a cosine’

The [sʲi] sequence across the word break is hardly controversial. It is the same sequence as the one shown earlier in the first right-hand example in (137). What is a bit puzzling is the presence of the same sequence word-internally in *sinus* and *cosinus*. These are rather uncommon in Polish vocabulary. The more typical sequence of a word-internally palatalised //s//, viz. [ɕ], is shown in (146a) morpheme-internally and (146b) across a morphological boundary.

(146)
(146a) *sika-ć* [ɕikatɕ] ‘to pee (inf.)’
siła [ɕiwa] ‘force, n.’
sin–y [ɕinɨ] (about a person) ‘blue’

(146b)	*dres* [drɛs] ‘tracksuit’	*dres–ik* [drɛɕik] ‘(dim.)’
	rys [rɨs] ‘trait’	*rys–ik* [rɨɕik] ‘(dim.)’
	plus [plus] ‘the plus sign’	*plus–ik* [pluɕik] ‘(dim.)’

The somewhat strange occurrence of the word-internal [sʲi] sequences in (145) may be accounted for by the fact that both *sinus* and *cosinus* are foreign words, which have been adapted to Polish phonetics, rather than nativised phonologically. Indeed, apart from foreign words and word juncture contexts, the sequence [sʲi] is nowhere to be found in standard spoken Polish. It would appear that foreign words are exempt from behaving as native Polish vocabulary does. Against this statement, consider (147).

(147) *s̲i̲nus̲–i̲k i cos̲i̲nus̲–i̲k* [sʲi ɕi sʲi ɕi] ‘a sine (dim.) and a cosine (dim.)’

What is presented in (147) is an example of a productive morphophonological operation, viz. forming a diminutive, on the apparently exempt foreign words. Contrary to their behaviour in the morpheme-internal context, the base-final consonants [s] do undergo typical Polish word-internal palatalisation, yielding [ɕ]. Before connecting the data presented in this section with the role and functioning of the interfaces, one may consider some more background information on the peculiarities of Polish palatalisation, which is provided in the next section.

3.3.2. Phonetically palatalised vs. functionally palatalised consonants

If one were to translate the presence of phonetic palatalisation on consonants and the lack thereof into a typical generative-phonological feature, that would best be [±back], where [–back] denotes a consonant whose production includes the raising of the front of the tongue towards the hard palate, and [+back] denotes lack thereof. [±back] being an equipollent (binary) feature, virtually all speech sound can be described as being either [–back] or [+back]. In a binary system, no sound can be *[½back] or *[¾back], no matter how close or how far from the hard palate the front of the tongue is. In those phonological models that use [±back] as a distinctive feature of speech sounds, the feature inevitably plays a role in a systematic description of a language’s phonology. Rules or constraints can be formulated with the use of the feature. In a rule-based system, for that matter, surface palatalisation in Polish can be stated by means of a simple rule, given in (148).

(148) *Palatalization* (Gussmann 1980: 20; his rule (33))
[+cons] → [–back] / _[–back]

Rule (148) is descriptively correct for word juncture contexts, and for labial consonants, which exhibit only one pattern of palatalisation. Assuming that a non-palatalised consonant is [+back], it becomes palatalised [–back] each time there is a [–back] segment following. It appears uncontroversial that among the sounds that make up Polish phonetic inventory, the close front vowel [i] and the palatal glide [j] can be described as [–back]. Given the data presented in section 3.2.4, it appears that the vowel [ɛ] is [–back], too; indeed, phonetically, it is a front vowel, frontness being a clear opposite to backness.

On the face of it, the whole discussion in section 3.1 appears pointless, since the genuine GP-based discovery that palatalisation is driven by {I}-headed expressions seems nothing but a translation of rule (148). However, the traditional generative rule does not fare well in those cases in which a consonant subject to a palatalising condition is pronounced with little or no trace of *phonetic* palatality. Assuming that [ɛ] is [–back], i.e. it has the feature required to palatalise the preceding consonant, consider examples of feminine singular declension in (149).

(149)

(149a) *klap–a* ~ *klapi–e* [p ~ p^j(j)ɛ] ‘lid ~ (dat.sg.)’
ryb–a ~ *rybi–e* [b ~ b^j(j)ɛ]‘fish ~ (dat.sg.)’
gaf–a ~ *gafi–e* [f ~ f^j(j)ɛ] ‘gaffe ~ (dat.sg.)’
law–a ~ *lawi–e* [v ~ v^j(j)ɛ] ‘lava ~ (dat.sg.)’
mam–a ~ *mami–e* [m ~ m^j(j)ɛ] ‘mum ~ (dat.sg.)

(149b) *rad–a* ~ *radzi–e* [d ~ ʥɛ] ‘advice ~ (dat.sg.)’
kas–a ~ *kasi–e* [s ~ ɕɛ] ‘cash register ~ (dat.sg.)’
gaz–a ~ *gazi–e* [z ~ ʑɛ] ‘gauze ~ (dat.sg.)’
ran–a ~ *rani–e* [n ~ ɲɛ] ‘wound ~ (dat.sg.)’

(149c) *strzał–a* ~ *strzal–e* [w ~ lɛ] 'arrow ~ (dat.sg.)'

much–a ~ *musz–e* [x ~ ʃɛ] 'fly ~ (dat.sg.)'

par–a ~ *parz–e* [r ~ ʒɛ] 'steam ~ (dat.sg.)'

ręk–a ~ *ręc–e* [k ~ ʦɛ] 'hand ~ (dat.sg.)'

nog–a ~ *nodz–e* [g ~ ʣɛ] 'leg ~ (dat.sg.)'

Phonetically, as many as three patterns can be distinguished in (149). For nouns in (149a), the stem-final consonant emerges as phonetically palatalised and followed by the vowel [ɛ], with the optional glide [j] between them. In (149b), the consonant in question is phonetically an alveolo-palatal consonant, followed by [ɛ] without the glide [j] in between. The difference between the optional presence of [j] in (149a) and the lack thereof in (149b) can be accounted for articulatorily; the palatalised consonants in (149b) being produced with the use of the front of the tongue in the first place, they are not followed by [j], which is palatal, too, and whose presence would violate a non-suprasegmental reading of the Obligatory Contour Principle (OCP).[116] Conversely, in labials, the primary place of articulation has nothing to do with the hard palate, hence the presence of what is segmentally recognised as [j]—but what is in fact only an instance of articulatory overlap between the palatalised labial and the following mid front vowel—is not subject to OCP.

Assuming that the same suffix is adjoined to the stem throughout the right-hand word forms in (149), it must be concluded that—at least for the cases in (149a) and (149b)—the vowel has a palatalising potential. Representationally, it is {A•I}, and so it subjects the stem-final consonant to *I-alignment*.

Against the two patterns, notice that the stem-final consonants in (149c) hardly bear any phonetic trace of palatality when followed by what is phonetically the same vowel [ɛ]. None of the consonants in the set [l, ʃ, ʒ, ʦ, ʣ] uses the front of the tongue as an active articulator. They are all coronals, (post-)dental ([l, ʦ, ʣ]) or alveolar ([ʃ, ʒ]). However, by no means does it disqualify them from being pronounced as (phonetically) palatalised. See examples in (150).

[116] The term *Obligatory Contour Principle* appears in Goldsmith (1976: 23, 63), where it is credited to Leben (1973); Leben indeed discusses tone contours, but without proposing the aforementioned term as such.

(150)

(150a) *ból* [bul] ‘pain’

ból i cierpienie [lʲi] ‘the pain and the suffering’

szusz [suʃ] ‘dry sticks’

susz i ściółka [ʃʲi] ‘dry sticks and litter’

twarz [tfaʃ] ‘face’

twarz i ręce [ʃʲi]–[ʒʲi][117] ‘the face and the hands’

brzdąc [bʒdɔnʦ] ‘toddler’

brzdąc Ireny [ʦʲi] ‘Irena’s toddler’

ksiądz [kɕɔnʦ] ‘priest’

ksiądz i zakonnica [ʦʲi]–[ʣʲi] ‘a priest and a nun’

(150b) *litr* [lʲi] ‘litre’

sushi [ʃʲi] ‘sushi’

Żiwkow [ʒʲi] ‘Zhivkov’

circa [ʦʲi] ‘circa’

Except for [ʣ], which is somewhat mysteriously missing in word-internal [ʣʲi] sequences, all the consonants in the set [l, ʃ, ʒ, ʦ, ʣ] can be phonetically palatalised both across the word boundary (150a), and word-internally (150b), although it should be noted that except for [l], all palatalised consonants in (150b) occur in word-internal consonant + [i] sequences in foreign words only. The consonant [l] does not obey these restrictions, and appears in a handful of native, or at least not conspicuously foreign, words, just a few of which are given in (151).[118]

(151) *liść* [lʲiɕʨ] ‘leaf’ *list* [lʲist] ‘letter’

litość [lʲitɔɕʨ] ‘mercy’ *liczba* [lʲiʤba] ‘number’

lipiec [lʲipʲ(j)ɛʦ] ‘July’ *lizak* [lʲizak] ‘lollipop’

[117] The alternative pronunciations with the voiced consonant, given after the slash, are found in Poznań–Cracow Polish. In Warsaw Polish, the underlyingly voiced word-final consonant is pronounced voiceless. See section 4.5ff for more data and discussion.

[118] An attempt an explanation of why the sequence [ʣʲi] is mysteriously missing from both the native Polish vocabulary and from foreign vocabulary adopted to Polish pronunciation is postponed until section 6.3.2.

Given the phonetic data in (149c) and (150), the present work concludes that the consonants [l, ʃ, ʒ, ʦ, ʤ] found in (149c) are examples of so-called functionally palatalised consonants.[119] Provided the morphophonemic desinence used in (149c) is the same as in (149a) and (149b), i.e. it is compositionally {A•I}, it transpires that although phonetically [l, ʃ, ʒ, ʦ, ʤ] behave as if they were [+back], phonologically they are all [–back], or in the terminology of the present analysis, {I}-headed. This appears to be a very explicit example of the dichotomy between phonetics and phonology, or between phonology as a system defining co-occurrence pattern of articulatory gestures and morphophonology as a system defining patterns of contrastive oppositions via abstract features.

3.3.3. Well-formedness, completeness and defectiveness

This section aims at introducing a new distinction into GP/CVCV-based phonology. In the discussion so far, the notion of well-formedness has made a few appearances (sections 1.3, 2.4, and 2.7). Strangely, it has not been defined yet. On standard autosegmental reading, well-formedness can be defined as in (152) below.

(152) *Well-formedness Condition* (Goldsmith 1976: 48; his "initial statement")

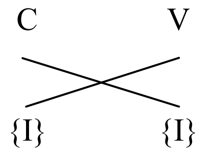
"[1.] All vowels are associated with at least one tone;
All tones are associated with at least one vowel.

[2.] Association lines do not cross."

The first condition has no bearing on the present discussion; this work (unlike Goldsmith's) does not concern tone languages. The second condition, however, is the basis of non-linear, feature geometric approaches to phonology. (Sagey (1986: 297) makes it clear that of the two sub-conditions in (152) only the second is considered in her dealing with well-formedness.) When translated into the melodic part of GP/CVCV, well-formedness prohibits the crossing of association lines shown in (153) below.

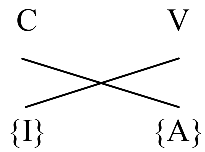
[119] See Gussmann (2007: 46–49) for discussion.

(153) crossing of association lines; ill-formed



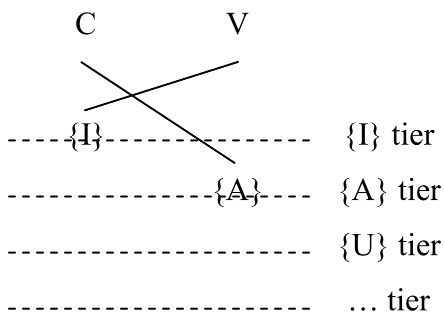
The null hypothesis in GP is that each element sits on its own tier. Therefore, the crossing of nodes joining the two instances of {I} in (153) is against well-formedness as understood in non-linear phonology. The crossing of association lines joining distinct features is a different matter. Consider (154) below.

(154) crossing of association lines; well-formed



The well-formedness of (154) can be explained in visual terms when (154) is expanded into feature geometry, as in (155).

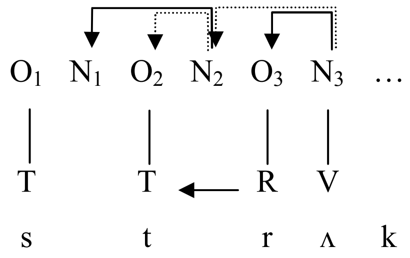
(155) crossing of association lines; well-formed



The crossing lines in (155) do not relate the same melody-defining prime to the skeleton; the structure has no temporal feature clash, and therefore it is interpretable. This exposition should do with respect to features for the time being.

In GP, the term 'well-formedness' is predominantly used with respect to a different issue. Recall the discussion on lateral relations in GP and CVCV in sections 2.6 and 2.7. Reconsider (75), repeated for convenience as (156) below.

(156) The word *struck* in 2008 CVCV as deducted from Scheer (in prep.: §925; ms.), plotted onto Cyran's (2006) skeletal tiers



struck

The nucleus N_2 is devoid of melody, i.e. empty. All non-final empty positions must be governed in CVCV—in SGP, they must be licensed; this is but a difference in terminology—otherwise the structure is *ill-formed*. In (156), the necessary governing power is provided by N_2, which makes the structure *well-formed*. The core of well-formedness discussion in those branches of GP that concentrate on syllable structure (or the lack thereof)—CVCV is definitely among these—is about which melodies can occupy onsets, and nuclei. Much less attention is given to melody, except for the long-standing conjecture that only an obstruent + sonorant, but not a sonorant + obstruent cluster forms a lateral relation among its segments. Examples (153)–(155) are undeniably well-formed with respect to lateral relations. Only (154) and (155), however, are well-formed with respect to melodic relations.

In Scheer (2004), a distinction between the "HIGH" and "LOW" areas of autosegmental representation is hinted at a few times (see pp. 241–246, 266, and 614–617). In short, Government and Licensing, discussed in section 2.6, are "HIGH" relations, i.e. they act as if *above* the skeleton, originating in their skeletal slots—C, and more importantly V—and the binary distinction whether they do or do not contain melody that is attached to the skeleton via association lines. The interaction of melodic primes as such between segments is a "LOW" relation. Any element spreading from one segment onto another does so as if *below* the skeleton.[120]

When an 'above' vs. 'below' the skeleton distinction is adopted, it becomes clear that well-formedness must be split into a 'high' and a 'low' condition. The lateral

[120] Infrasegmental Government is considered a "LOW" relation in Scheer (2004). As with a number of issues signalled in Scheer (2004) (see section 2.6 herein), the "HIGH" vs. "LOW" distinction is promised to return in "Vol.2", but so far, this has not come to fruition.

relations summarised in section 2.6 are the 'high' ones. Now is the time to formalise the 'low' ones.

Recall that *I-alignment* (119) requires that in a CV, if the nucleus is headed by {I} or, the melody attached to C must be {I}-headed, too. The reverse must also be true. The constraint is static; it only captures existing structures, and says nothing about combining structures. This is not striking if one notices that Gussmann (2007) does not do any morphophonology via GP representations. In his analysis, morphophonology is a separate component. Where exactly it is located and whether the relation between morphophonology and phonology is serial or parallel is not stated explicitly.[121] In any case, Gussmann's (2007) *I-alignment* concerns representations that are pronounceable, and that include all morphology that is provided by morphosyntax. The constraint is not used for morpheme concatenation, which does not take place in GP representations in that analysis at all. What the readers receive is an inflected representation, where inflection is the domain of morphosyntax after all.

Now, since the present work aims at doing morphophonology on GP-based, or rather CVCV-based representations, some constraints must govern what happens when a morpheme-final consonant and a morpheme-initial vowel are brought into adjacency by means of morphological activity. Recall that *I-alignment* is unable to tell what happens if such a consonant and such a vowel display the following configuration: 1) the consonant is {I}-headed, the vowel has {I} as an operator, 2) the reverse is true, 3) the consonant has no {I} at all, while the vowel is {I}-headed. The third option is the most interesting at this moment, as it fits the structural description of palatalisation run along the lines of traditional generative analyses, and such rules as the one given earlier in (6) and repeated for convenience in (157) below.

(157) *Palatalization* (Gussmann 1980: 20; his rule (33))

$[+\text{cons}] \rightarrow [-\text{back}] / \_\_ [-\text{back}]$

Unlike *I-alignment,* rule (157) is clear on the causality and directionality of the process; the backness of the vowel forces the backness on the consonant. In an autosegmental GP-like environment, this is statable as (158) below.

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[121] This has been noticed also by Tobias Scheer (p.c.), whose review of Gussmann (2007) is in a draft version at the time of this writing, and which comments on the issue.

(158) *I-spread*

The {I}-head of a nucleus spreads to its onset.

Constraint (158) is a dynamic, strictly directional, and strictly local statement about Polish *morpho*-phonology. It does not replace *I-alignment*, but then *I-alignment* is not a *morpho*-phonological, but a phonological–*phonetic* requirement.

Under *I-spread*, if C_1 is {I}-headed, the following V_1 does not need to be headed by {I}; that would be mandated by *I-alignment*. The same applies to C_2 whether or not V_1 is empty. *I-spread* is strictly local and directional.

Alongside that statement, consider the familiar example of foreign words subjected to productive morphophonology. For convenience, (145) and (147) are repeated as (159) and (160), respectively.

(159) *sinus i cosinus* [sʲi sʲi sʲi] ‘a sine and a cosine’

(160) *sinus-ik i cosinus-ik* [sʲi ɕi sʲi ɕi] ‘a sine (dim.) and a cosine (dim.)’

Both diminutives in (160) displaying the same palatalisation patterns on their respective underlying //s//’s—viz. [sʲi ɕi]—only the shorter word will be examined for the sake of brevity. May it be posited that the phonetic distinction between [sʲ] and [ɕ] in *sinus* is directly related both to *I-spread* and to *I-alignment*.

On a non-contrastive level of phonology—where *I-spread* is not operative—[sʲi] and [ɕi] are unrelated entities. The consonantal part of the first CV sequence is a palatalised (post-)dental fricative. The palatalisation is part of the low-level phonology, which precludes [si] from being pronounced in Polish. In phonetic terms, the raising of the front of the tongue in spoken Polish enjoys the status of anticipatory co-articulation. This has nothing to do with morphology, and morphophonology; any underlying //si// must be pronounced with the gestural overlap on the part of the dorsum. This is evident from the word juncture context, examples of which have been shown for //s// and a number of other consonants in (136)–(138).

The consonantal part of the second CV sequence is an alveolo-palatal fricative. It obeys low-level phonology in that its primary place of articulation is defined by the front of the tongue as such, and no secondary articulation is required to agree with the vowel. This is not important. What is important is that [ɕi] is the only systematic pronunciation—in standard spoken Polish—of one morphophonological object found morpheme-internally and intermorphemically, an object that *never* gives lexical contrast with [sʲi] within the *native* vocabulary of Polish. This is not an accident. The word-internally non-native [sʲi] is not represented by any well-behaved morpheme-internal structure. If it were, one would expect native Polish vocabulary to show numerous instances of [sʲi] not only morpheme-internally, but also across those morphological breaks that may be typecast as Class 1 affixation (recall discussion in Chapter 2). The data are clear that this is not the case.

Now, if phonology is a system that governs sound patterns in terms of what is possible, and what is not, then both [sʲi] and [ɕi] are not only admissible, but also fully productive. The former appears at word breaks and in some foreign vocabulary, the latter is found in all relevant contexts. In the same way, phonology bans *[sʲɨ] and *[ɕɨ] from occurring as ill-formed. Notice, however, that the lack of *[sʲɨ] and *[ɕɨ] can be explained on articulatory grounds without any recourse to underlying logic. One could surely draw a skeleton, a melodic tier, and some association line between any phonetic or phonetically-translatable feature and the skeleton and explain that [sʲi] and [ɕi] are good because they share the palatality element {I} as their head, and that *[sʲɨ] and *[ɕɨ] are bad because they do not. This is exactly what Gussmann's *I-alignment* says.

Looked at from the morpholexical—not phonological–phonetic—perspective, the leftmost //s// in *sinusik* may fail to obey *I-spread*. It is not created via concatenation; it is dormant morpheme-internally. In other words, it is a static structure, not a dynamic one. Since [sʲi] does not appear as a result of structure-building operations in Polish—no [sʲi] is ever found across a morphological, not lexical, division in standard spoken Polish—this disqualifies the word-internal [sʲi] sequence as a native standard Polish structure, while the other realisation of //s//, viz. [ɕi], is simply elegant.

As stated by *I-alignment*—the static constraint—a word-internal structure which phonetically gives [ɕi] must consist of an onset + nucleus sequence in which both phonological expressions share the element {I} as their heads. A corresponding fragment of a relevant phonological representation is shown in (161).

(161) Word-internal [ɕi]

C V

{h•A} {$\underline{\text{I}}$}

What is phonetically [s^ji] (see (145)/(159) and (147)/(160)) in *sinus* should, in principle, fulfil *I-alignment*, but may it be posited that at the morphophonological level of description it cannot do it.

One reason for that has apparently nothing to do with the split-component workspace-based approach to phonology promoted in the present analysis. Essentially, there are not enough GP elements to account for the [s^ji] sequence in a word-internal context. Gussmann's set of phonological primes (GP elements) comprises: {I}, {A}, {U}, {ʔ}, {h}, {N}, and {L} (see (94) in section 2.8.3)[122]. Given this set, where only three elements denote place of articulation[123], there appears to be no room for a separate structure for [s^ji] in which: 1) the nucleus shares its {I}-head with the onset, and 2) the phonetic contrast between [s^ji] and [ɕi] can be captured representationally at a morphophonemic level. (Recall that [s^ji] is a sequence typical for juncture palatalisation, and is absent morpheme-internally in native words in standard spoken Polish.)[124]

To account for such sequences within words, the present analysis proposes a structure that may be considered ill-formed in terms of *I-alignment*, which nevertheless may emerge as [s^ji] in foreign words, in (162a), and across (any) word boundary, in (162b), where it is no longer a single morphophonemic skeleton, and *I-alignment* would only target it by virtue of phrasal phonology eliminating the inner, melodically-empty VC.

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[122] The element {H} also appears, but is used only for expository purposes. Chapter 7 in Gussmann (2007), entirely devoted to Polish voice phenomena, makes it clear that only the element {L} is used for voice specification in the analysis.

[123] With respect to consonant place-defining primes, these are only {I} for palatality, {A} for coronality, and {U} for labiality. There is no element for velarity, so consonants represented without a place-defining element are velars by virtue of empty-headedness.

[124] This does not mean [s^j] and [ɕ] cannot be represented at the phonological–phonetic level of description; this can surely be done in Gussmann's system, but recall that that system does not grant representational reality to morphophonology.

(162) Word-internal [s^{j}i] and juncture [s^{j}i]

(162a) word-internal

C	V
|	|
{h•A}	{I̲}

(162b) across word edges

C	V]	[C	V
|			|
{h•A}			{I̲}

Even though the structure in (162a) appears ill-formed in terms of *I-alignment* (but not in terms of 'high' lateral relation), it should have an unambiguous phonetic interpretation, given that palatalisation phenomena in Polish have a right-to-left directionality. It appears as no accident that in standard spoken Polish, the somewhat strange [s^{j}i] sequence is only found in foreign words and across word boundaries. The more common [ɕi] sequence, typical for native words, comes from the well-formed structure shown earlier in (161). The present proposal concludes that (162a) and (162b) are possible representations, because these two environments are those in which no *workspace-internal* structure is *created* during phonological derivation, as opposed to being *across workspaces* or *given* in the lexicon. For foreign words, a structure like that in (162a) is already present in the lexicon, and escapes *I-alignment* (and *I-spread*). For word boundaries, on the other hand, the adjacency between a word-final [s] and a word-initial [i] is accidental; the phonetically adjacent segments do not form a single phonological workspace, and no onset + nucleus structure is created, hence escaping *I-alignment*, (and *I-spread*) too, as in (162b).

As the split-component view of phonology endorsed here assumes morphophonological representations are sent to the phonology–phonetics interface for actualisation, it is quite conceivable that the interface—governed by GP/CVCV based mechanisms, and using the same set of features—translates both (162a) and (162b) into static, well-formed, and *I-alignment*-obeying structures, in which case Gussmann's generalisation still holds, because it is very precise in capturing what relation must hold between phonological expressions that are pronounceable. Recall that *[si], *[s^{j}ɨ], and *[ɕɨ], for that matter, do not occur in Polish. Gussmann's version of *I-alignment* is phonetically-true, but this is a relation that applies halfway between morphophonology and phonetic substance.

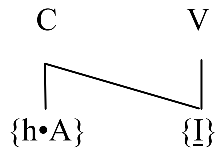
This apparent ill-formedness of word-internal, or rather morpheme-internal sequence [s^{j}i] calls for clarification. Namely, may it be posited that representation (162a) is indeed *well*-formed, but it is *defective* in the sense that morphophonology never builds such a structure if given a free hand. Recall from sections 2.4 and 2.7 that morphophonology is only blocked from applying to closed (non-cohering, non-interacting, Class 2) joints and outside the locality of all joints as such. It is therefore assumed that all open (cohering, interacting, Class 1) joints should behave like native, *complete* or *elegant* structures do, e.g. representation (161). The terms *completeness* (used interchangeably with *elegance*) and *defectiveness* will now denote the 'low' lateral relations, i.e. those at the melodic tier, only.

3.3.4. Excursus: the Strict Cycle and Derived Environment

The apparent ability of the structure shown in (162a) to escape *I-alignment*—and by extension, to escape (melodic) completeness as such—is an important claim in the current analysis. If representationally, the word-internal [sʲi] is correctly shown in (162a), it becomes relevant that phonology proper will not remove or in any other way change the offending representation. In order not to blur the phonetic distinction between [sʲi] and [ɕi]—the former being part of the representation against *I-alignment*—it is concluded that any word-internal onset + nucleus sequence that escapes *I-alignment* must be allowed to remain as such throughout morphophonological (but not phonological–phonetic) processing. Inevitably, this brings around the familiar concepts of the Strict Cycle and Derived Environment, pondered on in nauseating detail in Chapter 1. The need for these generative phonological devices being transplanted into the phonological theory of the current analysis becomes clear if one considers what options are available.

Firstly, one might disregard the Strict Cycle and Derived Environment because these are theory-specific devices used in cyclic and lexical phonologies that GP, apparently, was to replace. If so, one would need to find an alternative CV pair that would capture the distinction between [sʲi] and [ɕi] representationally. At face value, this is hardly difficult. A theoretically possible alternative for word-internal [sʲi] is given in (163).

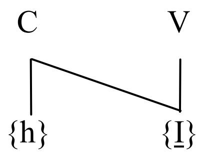
(163) Word-internal [s^ji] (theoretical alternative)



The representation in (163) is identical to that in (161). This time, however, the phonetic output is supposed to be [s^ji], not [ɕi]. The elements that make up the consonantal bit of (163) seem to correspond to the desired phonetic interpretation perfectly. Assuming that obstruents in Polish are voiceless unless specified otherwise, the consonant [s^j] needs no voice specification and so the element {L}—for voicedness—is absent. The element {h} denotes noise, which is interpretable as a fricative. The element {A} stands for coronality, and [s^j] is indeed a coronal consonant. Finally, the element {I} is responsible for palatality, which is also a feature of the phonetic output.

In order to preserve phonetic, and more importantly, morphophonemic contrast, the other consonant + vowel sequence—viz. [ɕi]—might theoretically take the representational shape given in (164).

(164) Word-internal [ɕi] (theoretical alternative)



As is the case with (163), the phonetic correspondence of the elements under the C slot in (164) seems impeccable. In contrast to the melody under the C slot in (163), the one in (164) is deprived of the element {A}, which leaves it with only the element {I} specifying its place of articulation, viz. palatal. Indeed, [ɕ] is phonetically an alveolo-palatal consonant, so everything appears to be correct for the two representations above. This is so only apparently. Assuming that the non-palatalised base-final [s] in the *sinus* ~ *sinusik* alternation is representationally {h•A}—as shown in (162), for example—it becomes noticeable that (163) and (164) are painfully missing simple answers to two entwined questions. Firstly, why is it so that whenever a suffix beginning with what is phonetically [i] is added to a [s]-ending base, the consonant heard at what is derivationally the morpheme boundary is always [ɕ] in standard spoken Polish? Secondly, if representationally, the fricative [s^ji] is a well-formed sequence—as suggested by (163)—why is it so that in the word-internal context it is only found in foreign words in standard spoken Polish? The answer is that the former is a result of a well-formed and melodically-elegant morpheme concatenation, whereas the latter is a phonetic interpretation of a well-formed, but defective structure.

Were it the case that (163) and (164) captured the relevant generalisation about Polish phonology, the answers to the two questions would be as follows. As for the former, the analysis would need to conclude that the productive [s] ~ [ɕ] alternation has nothing to do with autosegmental properties of the sound pattern of Polish, and that the change from [s] to [ɕ] is either an effect of an arbitrary rule, or a phonetic translation of a diacritic hidden somewhere in the suffix, for that matter. Neither option is compelling for the view on phonology that the present analysis endorses. As for the latter question, the conclusion would be that the absence of [sʲi] in native words in Polish is an accidental lexical gap, since representationally, there is nothing wrong with what is shown in (164).

This line of reasoning is indefensible. Thus, failing to do away with the Strict Cycle and Derived Environment by means or switching representational patterns, the analysis needs to find another argument for keeping these devices, albeit in a GP-inspired, workspace-based model.

The second attempt at dispensing with the notions of the Strict Cycle and of Derived Environment hinges directly at the question of economy, and at the question of how much trust a linguist should have in the native lexicon of the language under investigation. The former notion does not seem popular in phonological research, except for a long-standing principle of choosing a grammar with the smallest number of rules or the shortest derivation.[125] The latter is virtually non-existent. The position held in the present analysis is that native vocabulary is inherently well-formed and complete. This conjecture has a number of consequences for the analysis. In the context of this section, the most important consequence is the assumption that if native vocabulary is indeed well-formed and complete—this translates into phonological representations of minimal domains (morphemes) thereof being well-formed and complete by virtue of logical entailment—then there should be no a priori reason for phonology proper to check if representations are properly built. There is an important disclaimer to this assumption. Namely, the well-formedness and completeness of representations is only claimed for

[125] This goes back at least to the concluding chapter of *SPE*.

what is present in the lexicon as a single entity, i.e. a single chunk of phonological representation. Such chunks, in line with the view endorsed by the present analysis, carry no brackets, *SPE*-like boundary markers, or any other diacritic. Singular chunks may only consist of what uses the code that phonology is able to compute, which is, metaphorically, the language of phonology. If this assumption is correct, then a theory that allows or orders phonology to check if the input representation is properly built is suspicious. The reason for that conclusion is the conjecture that if it is phonology alone that reads phonological chunks off the lexicon, then it must be the same phonology that writes new phonological chunks, or re-writes the existing ones, onto the same lexicon. Should that be true, or a least logically sound, then there can be no a priori reason for phonology storing ill-formed chunks in the lexicon, from which it later takes them. Foreign vocabulary adopted by a language may be defective, but not ill-formed.

On an economy-oriented point of view, it should be noted that if phonology should first try to formulate a well-formed representation in the process of acquiring a new lexical item by the speaker, so as to store a proper entry in the lexicon, then scanning the same chunk for errors in the reverse process of phonological processing or derivation, in order to perform a speech act, is nothing but doing the same job twice. In a workload-conscious approach to generative linguistics, such a situation would be unsolicited. Following this line of reasoning, it appears high time to consider what happens when two singular chunks are brought together to form a bigger singular chunk. While it is reasonable to assume that the two chunks alone, the x and the y for the operation *Join*(x,y) (see Chapter 2), are well-formed, it is equally sound to think of their sum as well-formed, too.

There is one important distinction between summation in arithmetical terms and chunk concatenation in phonology. Chunks not being numbers, the output of their addition is not merely the sum of their respective representations. Rather, it is the two representational strings put in linear order—provided one does not delve into a language with non-concatenative morphology—except for a strictly defined fragment of each string that influences or which is influenced by a strictly defined fragment of the other string; Locality bites. In phonological tradition, this exceptional bit of the output of chunk concatenation is known as the morpheme boundary. Various models and theories have their own set of rules or constraints that describe the behaviour of phonological representations at morphological boundaries. In generative phonologies, it is not uncommon to formulate transformational rules that are supposed to be sensitive to or triggered by boundaries. (Some of this has been signalled in Chapter 1.)

The model endorsed in this work views the issue from a different angle. Constraints are enforced not by the presence of a morpheme boundary as such, which would have to be marked with a diacritic hidden either in the input, or in the rule as such, but by the need to provide a singular, seamless, diacritic-free representation from the two chunks given as the input. In this approach, there is no need for stating ordered transformational rules. It suffices to state that phonology does its best to make the concatenation of the two chunks well-formed (and melodically complete), and to find what sort of generalisations hold for a given language both within singular chunks, and their joints, or boundaries, to use the traditional term.

For the Polish [s] ~ [ɕ] alternation, the generalisation is the following. When a morphological base (root or stem) which phonetically ends in [s] is morphologically expanded by means of a suffix which phonetically begins with [i], the output form, phonetically, has [ɕi] at the point where the [s] followed by [i] would be expected. Furthermore, [ɕi] is also found in countless native Polish words, including morpheme-internal contexts. On the other hand, in standard spoken Polish, [sʲi] is only found in singular chunks of foreign origin, and at word junctures. These statements are verifiable. The present analysis concludes that the complementary distribution of [ɕi] and [sʲi] is not accidental, and that it reflects important generalisations about Polish phonology. Assuming that [sʲi] is never captured by a melodically complete, i.e. *I-alignment*-fulfilling, bit of a singular phonological representation, one of these generalisations is that a chunk-final consonant is subject to a complete lateral relationship with a chunk-initial vowel whenever two such chunks are combined to form a singular, bigger chunk, unless there is an external factor blocking the joint.[126] Essentially, this is a GP-ised translation of Derived Environment. Without an {I}-headed object following word-internally, the chunk-final //s// in *sinus* remains [s], never becoming [ɕ].[127] Conversely, when concatenated with an {I}-headed vocalic expression within a phonological workspace a //s// always turns out as [ɕ]. Across the workspace,

[126] Cases of blocking are discussed, among others, in Chapter 5, where Polish prefixes and prepositions are analysed, and in Chapter 6, where English Class 1 and Class 2 affixes are considered.
[127] This statement does not concern chunk-final [ɕ]'s appearing without a following vowel; the formulation of *I-alignment* in (119) is neutral with respect to such cases.

nothing of this sort happens. Not quite incidentally, this is also an example of what in GP analyses is known as Kaye's (1992*b*) Non-Arbitrariness Condition, given in (165).

(165) Non-Arbitrariness Condition (Kaye 1992*b*: 141; his "minimalist hypothesis")
"Processes apply whenever the conditions that trigger them are satisfied."

In the view of the present proposal, the necessary condition for [s] to become [ɕ] is the presence of [i], or rather their representational denotations. Namely, whenever [i] is added next to [s], the result is [ɕi]. At the same time, the present work points out that Non-Arbitrariness Condition cannot trump over the Strict Cycle/Derived Environment complex at the morphophonemic level of description.[128] Recall that *sinus* is [sʲinus], i.e. in the presence of [i], the initial [s] gives [sʲi], not [ɕi]. Assuming that [sʲi] cannot be an interpretation of a complete structure, i.e. it must be defective, this indicates that phonology does nothing (or at least fails) to 'repair' the representation and enforce native melodic relations on it. The reason for this appears to be that *sinus* is stored by means of a defective chunk, which is taken from the lexicon as it is, and in which the initial [s] + [i] sequence is outside the locality of any chunk concatenation (see sections 2.5 and 2.6.3 for Locality). Notice that even in segmental terms, the initial [s] of [sʲi] in *sinus-ik* [sʲinuɕik] is four segments away from the [i] of the suffix, and it escapes being changed into [ɕ]. Whatever names may be given to them, GP-ised counterparts to the Strict Cycle and Derived Environment are a necessity.

[128] The discussion in Chapter 1 points to Derived Environment alone being at stake here; Kean's (1974) view on the Strict Cycle would not block //s//→[ɕ]/_[i] on the first cycle; Kiparsky's (1982*a*) SCC would. The Strict Cycle is reflected in the present analysis by the conjecture that there are no diacritics in the workspaces that would allow detecting a morphological boundary after the application of *Join*(x,y), i.e. no backtracking is allowed.

3.4. Palatalisation replacement (PR) patterns, *I-alignment* and *I-spread*

3.4.1. Introduction

Gussmann's (2007) analysis resorts to so-called palatalisation replacement patterns (PR's) to express consonantal plain-to-palatalised (and vice-versa) exchanges in morphophonological operations, i.e. at the word level (p. 125ff). Gussmann's work carefully avoids stating palatalisation phenomena at morpheme boundaries in terms of GP representations, and leaves open the question how to capture such phenomena representationally, or if to do so at all. Morphophonology appears to be a separate entity from phonology proper in that analysis, and so it is unclear how much of it is element-based. In the said analysis, the PR's are supposed to substitute segments—not features—for one another, at the expense of blurring the autosegmental interaction that chunk (or morpheme) edges may go into with each other. Most strikingly, Gussmann's formulation of *I-alignment* plays no explicit role in the palatalisation replacement patterns in the (2007) analysis.

There are seven PR patterns. Of these, the first one (PR1) is arguably the most understood in Polish morphophonology. It is presented in (166).

(166) PR1 (Gussmann 2007: 128)

p	b	f	v	m	r	w	n	t	d	s	z
p^j	b^j	f^j	v^j	m^j	ʒ	l	ɲ	tɕ	dʑ	ɕ	ʑ

The upper series is formed by phonologically plain—"hard" or [+back]—consonants, whereas the lower series comprises their respective phonologically palatal or palatalised—"soft" or [–back]—counterparts.

The alternations concerning the labials [p, b ,f, v, m] have been comprehensively discussed in section 3.2, where a number of examples regarding palatalised and non-palatalised labials are shown. In addition, some attention has been paid to the coronals [r, n, t, d, s, z], especially in sections 3.3.1, 3.3.2, and 3.3.3. This leaves the [w]/[l] pair as requiring some attention.

3.4.2. Excursus: the true nature of the phonetic [w]

At this point in the discussion, may it suffice to say that what is phonetically [w] in present-day standard spoken Polish is historically a velarised lateral [ɫ]. Today, the status of the latter form is rather regional. Still, there are alternations that uncover the phonological identity of the phonetic [w], as shown in (167).

(167)

(167a) *sta–ł–y* [stawɨ] '(they) stood (fem.)'

sta–l–i [stalʲi] '(they) stood (non-fem.)'

gra–ł–y [grawɨ] '(they) played (fem.)'

gra-l–i [gralʲi] '(they) played (non-fem.)'

(167b) *strzał* [stʃaw] 'shot'

strzel–a–ć [stʃɛlatɕ] 'shoot (inf.)'

nie–wypał [ɲɛvɨpaw] 'unfired round'

wypal–i–ć [vɨpalʲitɕ] 'open fire, v. (inf.)'

It appears clear that the phonetic [w] alternates with [l], or rather [lʲ], in the presence of [i], which may be translated into an {I}-headed vocalic expression. However, before the present analysis shows that this is indeed the case—which requires that the {I}-headed expression giving [ɛ], viz. {A•I}, is also dwelled upon—there is one important observation that should be made. Assuming that [w] and [l] are the plain and the functionally palatalised counterparts of the same phonological expression, differing only in the presence of the palatality element {I}, one might expect not to find any word in Polish that would be pronounced with the sequence [wʲi]. This is true to some extent. There is no [wʲi] sequence in native Polish vocabulary, and this is hardly surprising, since the phonetic [i] is an {I}-headed expression, and so the preceding consonant must be headed by {I} by virtue of *I-alignment*. There is, however, one very conspicuous example that blurs this generalisation. It is the word *weekend* 'weekend', nowadays predominantly pronounced [wʲikɛnt]. Obviously, this is an English word adapted to Polish. In the light of the present analysis, the example of *weekend* only shows that foreign vocabulary can escape constraints on elegance of Polish phonology.

3.4.3. An element-based approach to PR1

The current proposal is that the consonants forming the upper series in (166) all lack {I} in their elemental composition. Conversely, all the consonants forming the lower series in (166) not only have the element {I}, but moreover, they are {I}-headed, and share their {I}-heads with the nuclei that license their presence. In line with *I-alignment*, this accounts for their alternations at chunk boundaries, whenever an {I}-headed vocalic expression is adjoined to give a well-formed, seamless singular chunk, as discussed in section 3.3.4. Some examples follow.

Recall the lengthy analysis of the productive diminutive formation on *sinus* (example (159)) that gives *sinus–ik* (example (160)). A representational side of both the base *sinus* and the suffix *–ik* is proposed in (168), and (169), respectively.

(168) *sinus* [sʲinus] 'sine'

C_1	V_1	C_2	V_2	C_3	V_3
|	|	|	|	|	
{h•A}	{I}	{N•A}	{U}	{h•A}	

(169) *–ik* [ik] '(diminutive suffix)'[129]

C_1	V_1	C_2	V_2
	|	|	
	{I}	{ʔ•h}	

A comment appears necessary in the case of (169). In Gussmann's (2007) analysis, word-initial [i]'s in Polish are representationally a sequence of an onset and a nucleus sharing an {I}-head without any other element in the composition. As indicated earlier in this chapter, word-initial [ji] sequences are virtually absent in standard spoken Polish.[130] To account for this, Gussmann proposes a configuration that is presented in (170) below.

---

[129] In this and in subsequent examples of suffixes (and prefixes alike), it is assumed there are no fewer skeletal slots than there are melodic expressions. An alternative approach would be to chop C_1V_1 off and have the vocalic melody sit on the melodic tier with no skeleton to attach to until concatenated.
[130] See Gussmann (2007: Chapter 3) for discussion.

(170) Word-initial [i] based on Gussmann (2007), on a CVCV skeleton

C V

$\{\underline{\mathrm{I}}\}$

This, however, does not fully answer the question why there is any melody present under left-most C slot in (169) in the first place. On the face of it, it appears that this is an instantiation of *I-alignment* combined with a theory-internal conjecture in (Standard) Government Phonology, an in CVCV alike, that each skeleton starts with a consonantal position and terminates in a vocalic one. If inspected more closely, the initial CV pair in (169) turns out to be an effect of another licensing constraint found in Gussmann's analysis, viz. *Empty Heads*, presented in (171).

(171) *Empty Heads* (Gussmann 2007: 52)

"An empty-headed nucleus cannot license an empty-headed onset."

In the case of (169) alone, the adequateness of *Empty Heads* may not be obvious. It becomes much clearer if one looks at the absolute absence of the vowel [ɨ] word-initially in Polish. Being a front vowel phonetically, [ɨ] is a clear candidate for having the element {I} in its representation. However, since it never follows a palatalised consonant, it cannot be represented by the {I}-headed expression $\{\underline{\mathrm{I}}\}$. Another reason for this is that there already is such an expression in the analysis, viz. the $\{\underline{\mathrm{I}}\}$ under a vocalic slot which phonetically gives [i], and which conforms to the analysis of *I-alignment* presented earlier in this chapter. For those two reasons alone, the present proposal follows Gussmann's (2007) work in representing the vowel [ɨ] by means of the empty-headed expression {I•_}. Potentially, this has a very elegant consequence for both analyses. It helps to explain the distributional gap of [ɨ]. Consider the representation in (172).

(172) Word-initial [ɨ] (absent)

C_1 V_1

{I•_}

Assuming that [ɨ] has phonemic status, that example (172) is correct, and that this representation is indeed illicit, there would hardly be any phonological explanation for the absence of [ɨ] word-initially. One would need to call it a systematic gap, or a lexical gap. Put against *Empty Heads*, however, (172) reveals its alleged ill-formedness. There is one glitch, though.

Recall from section 1.3.3 that [ɨ] is found in suffixes. Reconsider (35), repeated for convenience in (173) below.

(173)

(173a)	*bram–a* [brama] 'gate'	*bram–y* [bramɨ] '(gen.sg.)'
	traw–a [trava] 'grass'	*traw–y* [travɨ] '(gen.sg.)'
	rop–a [rɔpa] 'crude oil'	*rop–y* [rɔpɨ] '(gen.sg.)'
(173b)	*nut–a* [nuta] 'note' (music)	*nut–y* [nutɨ] '(gen.sg.)'
	bluz–a [bluza] 'sweatshirt'	*bluz–y* [bluzɨ] '(gen.sg.)'
	żon–a [ʒɔna] 'wife'	*żon–y* [ʒɔnɨ] '(gen.sg.)'

In a modularity-oriented phonology, the distinction between a word and a suffix is not captured in representational terms. Thus, unlike Gussmann (2007), the current analysis is compelled to take (172) as a licit representation. By doing so, it must find a different explanation for why the incriminated vowel is never found word-initially. Please excuse the honesty of explanation to follow. It might be an accident that Polish has no words beginning in [ɨ] in morphophonemic terms. It might also be the case that whatever vocalic expression appears at the left edge of a word, it is never interpreted as [ɨ]. Gussmann's analysis cannot declare the content of (172) as such illicit in all contexts, even though the *Empty Heads* constraint does its best; it can only say (172) is not allowed word-initially. The possibility of (172) being correct for suffixes is not discussed for the simple reason that Gussmann is consistent in separating morphophonology from phonology.[131] If the perspective is switched to a split-component view of phonology, for instance the one espoused herein, then the lack of word-initial [ɨ] receives a different interpretation. Namely, the phonology–phonetics

[131] This move may have come as a surprise to the readers of Gussmann (2007) familiar with the *SPE*-driven Gussmann (1980). Judging from a very subjective standpoint, a good deal of arguments that the 1980 book put for morphophonology being part of phonology are mercilessly suppressed in the 2007 work.

interface refuses, in its idiosyncratic way, to interpret any workspace-initial object as [ɨ]. This is uncontrollable from the morphophonological side of the system.

Turning now to the word-initial [i], the perspective can be switched, too. Representation (170) may be correct, but it need not. Again, Gussmann's analysis speaks of "word-initial", not of any *morpheme*-initial [i]. For the approach espoused in this work, the reason for the lack of the word-initial [ji] sequence—the major argument for (170) in Gussmann (2007)—can be the defiance on the part of the interpretative interface to pronounce [ji] workspace-initially. If this is true, then any [i] could take the shape given in (174) below.

(174) Any [i]

$$\begin{array}{cc} \mathrm{C} & \mathrm{V} \\ & | \\ & \{\mathrm{I}\} \end{array}$$

If morphophonology is freed from representing distributional patterns that can be handled by recourse to word edges—recall these are taken to be workspace edges in this study—then an element-based approach to palatalisation can be shown for base–suffix concatenations in the next section.

3.5. The mechanics of a single-step concatenation

When concatenated, *sinus* and *–ik* are subject to well-formedness and elegance requirements, most importantly *I-spread*. To show the effects of this constraint on the phonological operation in question, the concatenation is presented in steps. This is only for illustrative purposes; it is a major assumption of the present analysis that the derivation avoids enforcing different constraints one after another—which would merely be a translation of classic generative rule ordering—and instead, it returns the result of the operation in one go. The first illustration is provided in (175).

(175) *sinus* + *–ik* concatenation (illustration, stage 1); portion shown is [us] + [i]

…	V_2	C_3	V_3	C_4	V_4	…
|	|	|			|	|
…	{U}	{h•A}			{I}	…

The portion shown in the frame is where the two chunks phonologically contact one another, which is exactly where high-level phonology works to give a well-formed and elegant output. At face value, it appears that there is not much to do. The empty nucleus in V_3 appears licit, even though it is empty. V_4 can be called to govern V_3 and to license C_4 (see section 2.6 for lateral relations in CVCV). This can be pictured in (176) below.

(176) *sinus* + *-ik* concatenation (illustration; stage 2) (incorrect)

…	V_2	C_3	V_3	C_4	V_4	…
|	|	|			|	|
…	{U}	{h•A}			{I}	…

The arrows in (176) indicate the alleged lateral forces dispensed by V_4. As such, the representation appears well-formed. The lack of melody under V_3 is not detrimental to the consonant under C_3. In CVCV, C_3 needs no lateral force from V_3 to be pronounced; unlicensed positions are allowed. Because the [i] of the suffix *–ik* does not alternate with zero, there is no situation in which the melody under V_4 would detach from the skeleton in standard GP terms. If it were the case that the melody of [i] could be muted in the presence of a melody under V_5, its power to govern V_3 would be lost; Government is not recursive, and cannot spread over more than one nuclear position (see section 2.6.3 for discussion).

The reason for (176) missing the point is different. If the nucleus under V_3 were indeed empty, there could be no representational explanation for the consonant under C_3 changing its phonetic shape from [s] to [ɕ]. Firstly, the empty nucleus under V_3, the only licit licensor or governor for C_3, has no melody, so it cannot influence C_3's melody by means of *I-spread*. Secondly, the nucleus under V_4, i.e. the one that does have the element {I} that could influence the melody under C_3, cannot have any influence on C_3 for two reasons. It is too far away from the relevant skeletal slot—there are two skeletal slots (V_3, and C_4) intervening—and the melody under C_3 is already under the spell of

V_3, which is apparently its sole licit governor–licensor. Hence, if the representation in (176) were correct, its phonetic interpretation would be *[sʲinusʲik], contrary to fact.

Since the representation shown in (176) is indefensible—well-formed, but melodically untrue—an alternative must be sought. Preferably, it should be a representation that would capture the fact that the base-final [s] of *sinus* is interpreted as [ɕ] in the presence of the suffix *–ik*. An alternative illustration of what may be considered stage 2 of the concatenation is given in (177).

(177) *sinus* + *-ik* concatenation (illustration; stage 2) (potentially correct); portion shown is [_uɕi_]

…	V_2	C_3	$\boxed{V_3}$	$\boxed{C_4}$	V_4	…
…	{U}	{h•A}			{I̲}	…

Notice that (177) is only an illustration of a process that applies in one step. The particular illustration shows what is necessary for the vocalic expression of the suffix to influence the consonantal expression of the base. The element {I} needs to spread from V_4 onto C_3, to apply *I-spread* (and *I-alignment*) to that skeletal position. As good as it is for illustrative purposes, the representation in (177) cannot be correct. There is no reason for the melody under V_4 to suddenly spread onto C_3. Not only is C_3 too far away for V_4 to reach it, but also the Locality of lateral relations in CVCV requires that V_4 license its closest preceding onset, C_4, not any other.

Since representation in (175), (176), and (177) only serve as an illustration of why it is impossible to capture the concatenation representationally using multi-stage operations in a CVCV-based setting, the last illustration in the series–(178)–shows the representation of *sinusik* as a singular domain, after the concatenation.

(178) *sinus* + *-ik* concatenation (illustration; stage 3); portion shown is [sʲinuɕi]

C_1	V_1	C_2	V_2	C_3	V_3	…
{h•A}	{I̲}	{N•A}	{U}	{h•A}	{I̲}	…

When compared to the pre-concatenation stage shown in (175), the representation in (178) misses two skeletal slots, viz. the V_3 and C_4 of (175). What is V_3 in (178) is the same slot that is labelled V_4 in the other example. Before the somewhat mysterious, and potentially unsolicited, deletion of the two skeletal slots is discussed, one may consider if what is given in (178) captures the relevant facts about the phonetic output of *sinus* + *–ik*, viz. *sinusik* [sʲinuɕik]. Firstly, the representation is well-formed—the initial C_1V_1 sequence is just defective—which is the same situation as in (168). This indicates that the concatenation has no influence on the melody under those slots; they persist in failing to obey *I-alignment*. Secondly, the onset labelled C_3 has a different governor now. No longer is it an empty nucleus found in (168); rather, the vocalic expression of the suffix (V_3) is promoted to act as the governor. In CVCV terms, a phonetically expressed nucleus is inherently a better governor than a muted nucleus. Notice also that in the non-suffixed form *sinus*—as drawn in (168)—the empty nucleus under V_3 is just a consequence of theory-internal assumptions that are practised in GP. Phonetically, the empty nucleus has no interpretation, unlike the melodically-filled nucleus that is part of the suffix in *sinus–ik*. If (178) is correct, then the CV pair C_3V_3 exhibits an instance of {I}-head sharing, where the element {I}—the head of the vocalic expression of the suffix—is shared by the base-final consonantal expression, as per *I-alignment*. Crucially, having {I} as the head of expression, the consonant under C_3 is representationally distinct to that under C_1, which has no element {I} in its composition. This accounts for the difference in phonetic interpretation, viz. [ɕ] against [sʲ].

There is just one slight glitch to mention. Nothing has been said on the theoretical grounds on which two skeletal slots present in (175) have disappeared on their way to (178). In theory, no skeletal slots should ever be lost in a GP analysis, as this would apparently violate the *Projection Principle*, introduced in (32), repeated in (179).

(179) *The Projection Principle* (KLV 1990: 221)
“Governing relations are defined at the level of lexical representation
and remain constant throughout a phonological derivation”

The source of the statement in (179) provides an explicit interpretation thereof:

> The Projection Principle defines a two-pronged state of affairs: for any two objects, either they stand in a government relationship defined at the level of lexical representation … or not. If they do not, no such relationship can be created in course of a phonological derivation. If they do, the relationship is inalterable. (KLV 1990: 221)

If the present proposal stuck to the Projection Principle as it is given in (179), the post-concatenation representation in (178) would be unsolicited on the grounds that two of the governing relations present in the input to the process in question—the last CV pair in (168), and the first CV pair in (169)—are gone in the output; the CV pair formed by C_3 and V_3 in (178) are hardly adjacent in the input. Recall that what is called a "governing relation" in (179) does include the nucleus-to-onset relation that is part of *I-alignment*. Thus, it becomes clear that one obstacle has to go. Either it is the 1990 reading of the Projection Principle, or the facts about Polish morphophonology presented so far. Notice that the Projection Principle is not a well-formedness constraint on morphophonology. Rather, it is a constraint on phonological operations, i.e. once a given relations is present or absent, it remains so. Actually, there is an instance of this constraint in work in (178), viz. the initial CV pair that gives [sʲi] in *sinus* continues to give [sʲi] in *sinus-ik*, which indicates that no relation between the two expressions, the onset and the nucleus, has changed in the course of the derivation. As for the morphological boundary, however, it must be concluded that well-formedness and elegance—manifested by *I-spread* working on the //s// + //i// sequence to give [ɕi]—trumps over the Projection Principle in the locality of the concatenation. The outcome is twofold. The skeletal slot that hosts the final empty nucleus in *sinus*, see (168), is deleted, and the initial onset of the suffix is removed, too. Their melodies are also gone, but neither of them is needed. The empty nucleus and the empty onset have no melody in the first place. The loss of the two skeletal slots, somewhat against the Projection Principle, is empirically motivated.

There is, however, a good cause not to worry about the apparent violation of the Projection Principle. Notice that both the formulation in (179) and the block quote that follows speak of "lexical representation" as the context in which the principle should hold. This is may be fine with singular phonological chunks that are present in the lexicon. With regard to the live morphophonological operation of joining two chunks—arguably manifested by the concatenation in question—there is no representation of the joint given in the lexicon beforehand. Otherwise, if the diminutive form *sinus–ik* were already given, as opposed to created, phonology would have nothing to work on. If it is not given a priori, the analysis must conclude that the Projection Principle does not hold over the locality of the joint.

The final blow to the Projection Principle with respect to concatenation comes, perhaps surprisingly, from Gussmann and Kaye (1993). Working on cyclic suffixation in Polish—something that Gussmann (2007) avoids—they come across a similar situation. Namely, after a concatenation, they are left with an empty nucleus followed by an empty onset, i.e. an empty VC. They ignore any Projection Principle—it is not even mentioned in their article—and delete the empty VC, pointing to a process that in their view is part of UG, not of Polish as such, which they call *Reduction*; see (180) below.

(180) *Reduction* (Gussmann — Kaye 1993: 433)

> "An empty nucleus followed by a pointless onset are removed from any phonological representation in which they occur."

Before the analysis proceeds any further, consider, once again, the input and the output of the *sinus* + *–ik* concatenation, without intermediate steps, which are unwarranted empirically. The input is repeated in (181a), and the output in (181b).

(181) *sinus* + *–ik* concatenation (single step)

(181a) input: *sinus* + *–ik* [sʲinus] + [ik]

$$\begin{array}{ccccccc} \ldots & V_2 & C_3 & V_3] & [C_4 & V_4 & \ldots \\ | & | & | & & & | & \\ \ldots & \{U\} & \{h\bullet A\} & & & \{\underline{I}\} & \ldots \end{array}$$

(181b) output: *sinusik* [sʲinuɕik]

$$\begin{array}{ccccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 & \ldots \\ | & | & | & | & | & | & \\ \{h\bullet A\} & \{\underline{I}\} & \{N\bullet A\} & \{U\} & \{h\bullet A\} & \{\underline{I}\} & \end{array}$$

The mechanism manifested in (181) is *Join*(x,y), which concatenates and interprets, in the morphologically-relevant sense, two arguments, and which is free to manipulate their edges, so that the output meets the same requirements that native, elegant minimal domains do, but only with respect to the locality of the joint, which is marked via frames in (181a) and (181b). Whatever content lies outside this locality is not subject to change. This is the representational–transformational Derived Environment.

After the concatenation, the input arguments are no longer accessible as separate entities. The concatenation takes place in a single workspace, and phonology does not provide an ‘undo’ command to split the workspace in two. It would not know where to split it, unless there were some diacritic left. This is the representational–transformational Strict Cycle.

3.6. Probable representations for palatalised labials

For convenience, PR1 from (166) is repeated below as (182).

(182) PR1 (Gussmann 2007: 128)

p	b	f	v	m	r	w	n	t	d	s	z
|	|	|	|	|	|	|	|	|	|	|	|
p^j	b^j	f^j	v^j	m^j	ʒ	l	ɲ	tɕ	dʑ	ɕ	ʑ

Recall from 3.2.5 the representations for labial consonants followed by the six oral vowels of Polish. All labials are taken to be headed by the element {U}. Their palatalisation via *I-spread* is no different to the extranumerary examples of the trigonometric diminutive given so far. For the sake of brevity, the number of illustrations given in the remainder of this chapter is limited to the necessary minimum. Example (183) below illustrates the stem-final //b//~//b^j// alternation in *rop–a ~ ropi–e* [rɔpa] ~ [rɔp^j(j)ɛ] ‘crude oil ~ (dat.sg.)’.

(183) [pa] vs. [p^j(j)ɛ] [132]

…	C	V		…	C	V
…	{ʔ•h•U}	{A}		…	{ʔ•h•U}	{I̲}{A}

Example (184) below illustrates the [va] ~ [v^j(j)ɛ] alternation found in, for instance, *traw–a ~ trawi–e* [trava] ~ [trav^j(j)ɛ] ‘grass ~ (dat.sg.)’

[132] For a [ba] ~ [b^j(j)ɛ] distinction, as in *ryb–a ~ rybi–e* [rɨba] ~ [rɨb^j(j)ɛ] ‘fish ~ (dat.sg.)’, add {L} as the leftmost operator under the C slot.

(184) [va] vs. [v^j(j)ɛ] [133]

C V | C V
{L•h•U} {A} | {L•h•U} {I̲}{A}

Finally, to encompass the labial nasal, example (185) below illustrates the [ma] ~ [m^j(j)ɛ] alternation found in, for instance, *ram–a* ~ *rami–e* [rama] ~ [ram^j(j)ɛ] 'frame ~ (dat.sg.)'

(185) [ma] vs. [m^j(j)ɛ] [134]

C V | C V
{N•U} {A} | {N•U} {I̲}{A}

The defective word-internal sequence [w^ji], found in foreign words, such as *weekend* [w^jikɛnt]—potentially found in initialisms, too—may use an *I-alignment*-breaking representation in (186); notice that this sequence is not formed across open joints.

(186) [w^ji] (defective)

C V
{ʔ•U} {I}

3.7. Probable representations for palatalised coronals

Coronals found in native word-internal palatalising environments are phonetically removed from those [+back] coronals that are found before [i] or [j] across word boundaries or, occasionally, word-internally in foreign vocabulary. The *sinus–ik* case, with the [s] ~ [ɕ] alternation, has been shown a number of times in this chapter already;

[133] For a [fa] ~ [f^j(j)ɛ] distinction, as in *szaf–a* ~ *szafi–e* [ʃafa] ~ [ʃaf^j(j)ɛ] 'wardrobe ~ (dat.sg.)', remove {L} from underneath the C slot.

its voiced counterpart has not. Example (187) below illustrates the [za] ~ [ʑɛ] alternation found in, for instance, *bryz–a ~ bryzi–e* [brɨza] ~ [brɨʑɛ] 'breeze ~ (dat.sg.)'

(187) [za] vs. [ʑɛ]

Word-internal (native) palatalised plosives are phonetic affricates. Underlying //t// is [tɕ] when occurring before an {I}-headed nucleus, while //d// is [dʑ]. The agreement in the place of articulation that the two pairs display add to the belief that morphophonemic palatalisation is not random. Illustrations (188) and (189) below provide an attempt at showing the relevant structures. The former fits the stem–suffix boundary in, say, *łat–a ~ łaci–e* [wata] ~ [watɕɛ] 'patch ~ (dat.sg.)'. The latter may be related to the alternation found in *rad–a ~ radzi–e* [rada] ~ [radʑɛ] 'council ~ (dat.sg.)'

(188) [ta] vs. [tɕɛ]

(189) [da] vs. [dʑɛ]

Notice that for orthodox GP (and CVCV), the right-hand representations in (188) and (189) are far removed from their phonetics. The elements used to denote the consonants sharing the {I}-heads with the nucleus filled with {A•I}, i.e. an {I}-headed, and therefore 'palatalising' [ɛ], are attached to the skeleton as single-rooted expressions. Representations closer to phonetics would have double-rooted, linearly ordered

[134] Notice that nasal stops may also include the occlusion element {ʔ} in their phonological representations. This is not marked herein, as nasals do not give morpholexical contrast with nasalised approximants in Polish.

expressions, in which the left part would contain the occlusion element {ʔ}, and the right part the noise (release) element {h}. The single-rooted expressions are chosen for two reasons. Firstly, they correctly show the autosegmental side of coronal palatalisation in Polish. Secondly, palatalised non-affricates [tʲ] and [dʲ] are not found in native minimal domains, i.e. morphemes. This points to such sequences as [tʲi], [dʲi], [tʲ(j)ɛ], and [dʲ(j)ɛ] are being CV pairs in which the consonant is not headed by {I} in morphophonemic representations—this is against elegance as dictated by *I-alignment*—which can be pronounced with the front of the tongue raised as a result of the activity of the phonology–phonetics interface.

The (post-)dental nasal [n] and its morphophonemic palatalised counterpart [ɲ] can be denoted as in example (187) below, which illustrates the [na] ~ [ɲɛ] alternation found in, for instance, *ran–a* ~ *rani–e* [rana] ~ [raɲɛ] 'wound ~ (dat.sg.)'

(190) [na] vs. [ɲɛ]

The alveolar trill [r] is arguably the most interesting in the coronal series, as its palatalised counterpart is a fricative. More precisely, it can be two fricatives. The voiceless alveolar [ʃ], and its voiced accomplice [ʒ]. Intervocalically, only the latter is found in word-medial positions. Example (191) below illustrates the [ra] ~ [ʒɛ] alternation found in, for instance, *czar–a* ~ *czarz–e* [ʧara] ~ [ʧaʒɛ] 'goblet ~ (dat.sg.)'

(191) [ra] vs. [ʒɛ]

As the representation of the phonetic [ʒ] in (191) does not have any elements responsible for airflow obstruction, there is no way to represent the voiceless [ʃ] that acts as the other palatalised counterpart to [r]. This is not accidental, as morphophonemically palatalised //r// is pronounced as [ʃ] only when forming a word-internal cluster with a preceding voiceless obstruent. Thus, in (192) below, one finds the [ʃɛ] from the [ra] ~ [ʃɛ] alternation found in, for instance, *cytr–a* ~ *cytrz–e* [ʦɨtra] ~ [ʦɨtʃɛ] 'zither ~ (dat.sg.)'

(192) [tʃɛ] (underlyingly //trʲɛ//)

```
        C          V          C          V
        |                     |\        /|
     {ʔ•h•A}                 {A}  {I̲} {A}
```

The progressive voice assimilation to which [ʒ] falls prey will be touched upon in Chapter 4. The choice of representations is facilitated by the fact the word-internal [rʲɛ] sequences are not found in native Polish vocabulary, which points to their being defective; hence, there is no representation clash.

3.8. Probable representations for palatalised velars

Palatalised variants of velars are the most removed from any behaviour that would be considered phonetically-motivated. Under the charm of the following vowel, the morphophonemic //k//, //g//, and //x// may turn out as three disparate sets of consonants. When appearing word-finally or before a vowel that lies outside the phonetic set [i, ɨ, ɛ], the velars in question are unremarkable. Examples in (193) below attempt at illustrating this.

(193)

(193a)	*rąk* [rɔŋk] 'hand (gen.pl.)'	*ręk–a* [rɛŋka] '(nom.sg.)'
	nóg [nuk] 'leg (gen.pl.)'	*nog–a* [nɔga] '(nom.sg.)'
	much [mux] 'fly (gen.pl)'	*much–a* [muxa] '(nom.sg.)'
(193b)	*ręk–ą* [rɛŋkɔ̃w̃] 'hand (instr.sg.)'	
	nog–ą [nɔgɔ̃w̃] 'leg (instr.sg.)'	
	much–ą [muxɔ̃w̃] 'fly (instr.sg.)'	
(193c)	*krok* [krɔk] 'step'	*krok–u* [krɔku] '(loc.sg.)'
	śnieg [ɕɲɛk] 'snow'	*śnieg–u* [ɕɲɛgu] '(loc.sg.)'
	rzęch [ʒɛ̃w̃x] 'banger; old car'	*rzęch–u* [ʒɛ̃w̃xu] '(loc.sg.)'

The distribution with respect to other vowels appears erratic. In native vocabulary, the sequences [kɨ] and [gɨ] are not found. The exceptional examples *kynolog* [kɨnɔlɔk] ‘cynologist’ and *gyti–a* [gɨtʲja] ‘gyttja; a mud rich in organic matter’ are loans from English and Swedish, respectively. One finds it tempting to posit these are only pronounced the way they are due to a ‘read as you write’ principle for loanwords. Similarly, *Kyrie* [kɨrʲjɛ] ‘Kyrie’ (as in *Kyrie eleison* ‘Lord, have mercy’) comes for a spelling pronunciation of transliterated Greek *Κύριε ἐλέησον*. (Notice that the palatalised [rʲ] manages to escape native //r//→[ʒ] palatalisation.) The foreign and unproductive nature of [kɨ] and [gɨ] points to their melodic defectiveness; they do not arise morpheme-internally in native vocabulary, and they are not found across open joints.

Unlike //k// and //g//, the fricative //x// does appear in native sequences with [ɨ], some examples of which are provided in (194) below.

(194)

(194a)	*chyba* [xɨba] ‘perhaps’	
	chyb–ić [xɨbʲitɕ] ‘miss, v. (inf.)’	
	chyl–ić [xɨlʲitɕ] ‘bow, v. (inf.)’	
(194b)	*cech–a* [tsɛxa] ‘feature, n.’	*cech–y* [tsɛxɨ] ‘(nom.pl.)’
	much–a [muxa] ‘fly, n.’	*much–y* [muxɨ] ‘(nom.pl.)’
	pach–a [paxa] ‘armpit’	*pach–y* [paxɨ] ‘(nom.pl.)’

The sequence in question appears both in morpheme-internal (194a), and in intermorphemic (194b) contexts. The conspicuous difference in the distribution of [xɨ] in comparison to [kɨ] and [gɨ] points to the suspicion that they do not form a single class of morphophonemic units.

In Gussmann’s (2007: 88–90) analysis, the fricative [x] is analysed as stemming either from {h} or {h•_}, where the empty head of the latter denotes velarity, while the noise element of the former expression is only interpreted as velar by convention. The plosives [k] and [g] are represented as {ʔ•h•_} and {L•ʔ•h•_}, respectively (see pp. 49–56). These representations, however, are directly interpretable in phonetic terms. They are not morphophonemic abstractions. This is not without a reason. Recall that Gussmann’s analysis postulates palatalisation replacement patterns (PR’s), of which only PR1 has been discussed here so far. Of the remaining six, two patterns, PR2 and

PR5, target the velars in question. The latter is of particular interest to this work, and is given in (195) below.

(195) PR5 (Gussmann 2007: 128)

k	g	zg	x
|	|	|	|
ʧ	ʒ	ʒʤ	ʃ

The [zg] ~ [ʒʤ] alternation, despite its similarity to [g] ~ [ʤ], must be left aside for the time being. The remaining three pairs show the second of the patterns in which //k//, //g//, and //x// surface.

The defiant nature of velars has been signalled in Chapter 1, where some ink was spilled over the "intrinsic content" of features, pondered on in *SPE*. Not much can be said right now about any teleology of, say, //k// appearing as [ʧ]. Nevertheless, the pattern can be exemplified in (196) below, where two examples of word-internal First Velar Palatalisation in Polish given earlier in (13) are enriched with two other pairs of examples.

(196)

(196a)	*walk-a* [k] 'fight, n.'	*walcz-yć* [ʧɨ] 'fight, v.'
	znak [k] 'sign, n.'	*znacz-yć* [ʧɨ] 'sign, v.; leave trace'
(196b)	*krąg* [k] 'circle, n.'	*krąż–yć* [ʒɨ] 'circle, v. (inf.)'
	sług–a [g] 'servant'	*służ–yć* [ʒɨ] 'serve, v. (inf.)'
(196c)	*patałach* [x] 'bungler'	*patałasz–yć* [ʃɨ] 'bungle, v. (inf.)'
	strach [x] 'fear'	*strasz–yć* [ʃɨ] 'frighten (inf.)'

The existence of the sequences [ʧɨ] and [ʒɨ] would not be surprising if the vowel of the suffix in the right-hand forms in (196) were found to be //ɨ// beyond doubt. In such a case, the attested CV's would be explained to be phonetic realisations of CV's formed at open joints, where [kɨ] and [gɨ] must not be formed, as both are defective structures. (The sequence [ʃɨ] in (196c) would be a strange realisation of an underlying //xɨ// then; surface [xɨ] sequences are licit. Notice, however, that Gussmann (2007) recognises two expressions that surface as [x], whose morphophonemic distribution may be different.)

This goes against an assumption that the vowel in the verbalising suffix is //i//, which can be shown on the examples of labial- and coronal-stemmed words in (197) below.

(197)

(197a)	*mow–a* [v] ‘speech’	*mów–ić* [vʲi] ‘speak (inf.)’
	chlub–a [b] ‘pride, n.’	*chlub–ić* [bʲi] ‘pride, v. (inf.)’
	krzep–a [p] ‘brawn; force’	*krzep–ić* [pʲi] ‘fortify (inf.)’
(197b)	*głos* [s] ‘voice’	*głos–ić* [ɕi] ‘propagate (inf.)’
	rad–a [d] ‘advice, n.’	*radz–ić* [ʥi] ‘advise, v.’
	z–groz–a [z] ‘fear’	*groz–ić* [ʑi] ‘threaten (inf.)’

It appears, then, that either the verbaliser in (196) is exceptional in having {I•_} as its vowel, or it is the same {I} as in (197), and that the velars undergo palatalisation via *I-spread*, and—for whatever reason—the phonetic interpretation of these sequences has no trace of palatality. (See, for instance, Gussmann (1980), and Rubach (1984) for generative, linear accounts of these alternations.) If these were the only non-obvious alternations in Polish, one could simply state that the morphophonemic representations of sequences [ʧɨ] and [ʒɨ] would be {I}-headed CV’s, perhaps those in (198) below.

(198) [ʧɨ] (from //k//+//i//) vs. [ʒɨ] (from //g//+//i//)

What is compelling about the representations given in (198) is that their do not cause any contrastive blur with [ʨi] and [ʥi]—the palatalised counterparts of //t// and //d//, respectively—which have been claimed to have the element {A} in their composition. (See examples (188) and (189) for sequences [ʨɛ] and [ʥɛ], i.e. those with the {I}-headed, palatalising [ɛ].) Notice that on literal reading, the structures in (198) should give [ci] and [ɟi], the ordinary, phonetic palatal variants of //k// and //g//. Recall, however, that [ci] and [ɟi] are rare in native morpheme-internal contexts. Morpheme-internally, they occur in loans. The list in (199) provides a few examples.

(199)

(199a)	*kicz* [ciʧ] 'kitsch'	
	kibel [cibɛl] 'toilet (inform.)'	
	kinkiet [ciŋcɛt] 'wall lamp'	
	kilo– [cilɔ] 'kilo–'	
	kino [cinɔ] 'cinema'	
(199b)	*gibon* [ɟibɔn] 'gibbon'	
	giga– [ɟiga] 'giga–'	
	gitara [ɟitara] 'guitar'	
	girlanda [ɟirlanda] 'garland'	
	giser [ɟisɛr] '≈metalworker'	

The sequences [ci] and [ɟi] are also found in a handful of native intramorphemic contexts, such as *kilk–a* [cilka] 'a few' or *gib–ać* [ɟibaʨ] 'sway (inf.)', but, more importantly, they are productive in appearing across open joints, some of which are shown in (200) below, repeated for convenience from (36).

(200)	*ręk–a* [rɛŋka] 'hand'	*ręk–i* [rɛŋci] '(gen.sg.)'
	szczęk–a [ʃʧɛŋka] 'jaw'	*szczęk–i* [ʃʧɛŋci] '(gen.sg.)'
	nog–a [nɔga] 'leg'	*nog–i* [nɔɟi] '(gen.sg.)'
	drog–a [drɔga] 'road'	*drog–i* [drɔɟi] '(gen.sg.)'

The discussion surrounding examples in (36) in Chapter 1 has pointed to the desinence on these nouns being [i] despite labial- and coronal-stemmed nouns taking [ɨ] in the same number and case. Consider the desinence patterns in (201) below, repeated from (35).

(201)

(201a)	*bram–a* [brama] 'gate'	*bram–y* [bramɨ] '(gen.sg.)'
	traw–a [trava] 'grass'	*traw–y* [travɨ] '(gen.sg.)'
	rop–a [rɔpa] 'crude oil'	*rop–y* [rɔpɨ] '(gen.sg.)'
(201b)	*nut–a* [nuta] 'note' (music)	*nut–y* [nutɨ] '(gen.sg.)'
	bluz–a [bluza] 'sweatshirt'	*bluz–y* [bluzɨ] '(gen.sg.)'
	żon–a [ʒɔna] 'wife'	*żon–y* [ʒɔnɨ] '(gen.sg.)'

Notice that the number and the case in the right-hand word forms in (200) and (201) is the same. It appears, then, that //k// and //g// each enjoy a duel of personalities. When forming a new CV with an {I}-headed vowel in an open joint, their respective phonetic shapes are [ʧ] and [ʒ]. Conversely, when forming an open joint with the headless //ɨ//, they surface as [ci] and [ɟi]. This pattern does not extend beyond workspaces. When followed by [i], word-final //k// and //g// only become [c] and [ɟ]. This has been shown for //k// in (12), and is repeated in (202) below.

(202) *rok̲ i̲ kilka miesięcy* [ci] 'a year and a few months'
brak̲ j̲edzenia [cj] 'lack of food'

As for //g//, Polish voice phenomena—to be addressed in Chapter 4—preclude the possibility of giving similar examples that would hold in all variants of Polish. The phenomenon of Poznań–Cracow Voicing (section 4.5), however, may manifest in the [ci] and [cj] from (202) appearing as [ɟi] and [ɟj], respectively. Potentially, the word-internal pattern of //k// and //g// forming joints with //ɨ// may be represented as in (203) below.

(203) [ci] (from //k//+//ɨ//) vs. [ɟi] (from //g//+//ɨ//)

C	V		C	V
|	|		|	|
{ʔ•h}	{I•_}		{L•ʔ•h}	{I•_}

What is evident from (203) is that if GP elements that build these CV's were to be interpreted directly, these objects should emerge as [kɨ] and [ɡɨ], correspondingly. However, as has been signalled earlier in this section, such sequences are not found in native Polish vocabulary, and they only ever occur in a handful of borrowings. It is the foreign words that need different representations, then. How exactly Polish morphophonemics captures morpheme-internal [kɨ] and [ɡɨ] is open to debate. Whatever structures are utilised, they may be safely assumed to be melodically defective. Those shown in (198) and (203)—their phonetic remoteness notwithstanding—are productive, which presupposes their melodic elegance.

Fruitful as the foregoing discussion may have been, it has kept aside the most unnerving glitch found under the banner of First Velar Palatalisation: the diminutive *–ek* [ɛk] found after palatals. Consider examples given in (204) below.

(204)

(204a)	*dom* [m] ‘house’	*dom–ek* [mɛ] ‘(dim.)’
	ząb [p] ‘tooth’	*ząb–ek* [bɛ] ‘(dim.)’
(204b)	*pies* [s] ‘dog’	*pies–ek* [sɛ] ‘(dim.)’
	kot [t] ‘cat’	*kot–ek* [tɛ] ‘(dim.)’
(204c)	*blok* [k] ‘block’	*blocz–ek* [ʧɛ] ‘(dim.)’
	znak [k] ‘sign, n.’	*znacz–ek* [ʧɛ] ‘(dim.)’
	rok [k] ‘year’	*rocz–ek* [ʧɛ] ‘(dim.)’
(204d)	*pieróg* [k] ‘pirog’	*pieroż–ek* [ʒɛ] ‘(dim.)’
	śnieg [k] ‘snow’	*śnież–ek* [ʒɛ] ‘(dim.)’
	stóg [k] ‘stack’	*stoż–ek* [ʒɛ] ‘(dim.); cone’
(204e)	*groch* [x] ‘pea(s)’	*grosz–ek* [ʃɛ] ‘(dim.)’
	loch [x] ‘dungeon’	*losz–ek* [ʃɛ] ‘(dim.)’
	proch [x] ‘(gun) powder’	*prosz–ek* [ʃɛ] ‘(baking) powder’

The underlying word-final consonant in the left-hand forms in (204d) is //g//. As evident from the forms with labials (204a) and coronals (204b), the phonological expression of the vowel in the suffix *–ek* has no palatalising potential, i.e. it is not an {I}-headed expression. Nevertheless, when forming an open joint with //k// (204c), //g// (204d), and //x// (204e), the morphophonological substance of this vowel acts as if it were indeed an {I}-headed expression, such as the //i// that gives [ʧɨ], [ʒɨ], and [ʃɨ] in (196). The adverbial used in the preceding sentence is not accidental. Chances are the analysis will not have to postulate the existence of a lexically-specified allomorph of *–ek* for use with velars. Before further statements can be made on the apparent First Velar Palatalisation caused by *–ek* as such, the writing needs to repeat a few examples from the ever expanding vault of foreign words in Polish. Those in (205a) below are repeated from (97); those in (205b) are also repeated from (97), but only the second example is a borrowing (from German *Wanne*).

(205) Some geminates in Polish

(205a) *Mekk–a* [kk] or [kː] ‘Mecca’

mann–a [nn] or [nː] ‘manna’

idyll–a [ll] or [lː] ‘idyll’

(205b) *win–n–y* [nn] or [nː] ‘guilty’

wan–n–a [nn] or [nː] ‘bathtub’

As signalled at the outset of the present chapter, there is no phonetic distinction between intramorphemic (205a) and intermorphemic (205b) sequences of geminates, the former being limited to foreign words, the latter being a result of morphophonological activity. It is high time this bit of information played a role in this story. Notice that [nn], for instance, is found not only in the borrowing *mann–a*, but also in the products of native morphophonology *win–n–y* and *wan–n–a*. The latter two have alternative word forms. *Win–n–y* may also appear as *wini–en* [vʲiɲɛn]; both forms are masculine singular nominative adjectives. *Wan–n–a*, on the other hand, has the plural genitive of *wani–en* [vaɲɛn], which a native product, not warranted by the German source. The vowel [ɛ] appearing between the nasals alternates with zero. Its presence is governed by *Melody Association*, given in (129), repeated in (206).

(206) *Melody Association* (Gussmann 2007: 191)

“Attach floating [ɛ] to the nucleus when the following nucleus has no melody attached to it.”

If a CVCV skeleton of, say, *wini–en* were to be a prudent investment for the analysis, it would look as in (207) below.

(207) *wini–en* [vʲiɲɛn] ‘guilty (masc.nom.sg.)’

C V C V C V

{L•h•U} {I} {N•A} {I} {A} {N•A}

When the desinence *–a* appears under the rightmost V slot, the condition of *Melody Association* is not met. Example (208) below illustrates such a configuration.

(208) *win–n–y* [vʲinnɨ] ‘guilty (masc.nom.sg.)’

C	V	C	V	C	V
{L•h•U}	{I̲}	{N•A}	{I̲}{A}	{N•A}	{I•_}

The case in which two [n]’s are phonetically adjacent would be unremarkable, were it not for the fact that the velar //k// is resistant to double its presence in native vocabulary. In the foreign *Mekk–a*, this is not a problem. The dative singular thereof is *Mekk–ę* [mɛkkɛ(w̃)] ~ [mɛkːɛ(w̃)]. The problem with the word in question is that it has no form in its declension that would betray an [ɛ] hidden between the velars. If one were to ever clone the city in question, the plural genitive is most likely to be ?[mɛkk] ~ ?[mɛkː]. These forms are hypothetical. There is a good cause, however, to believe that the putative plural would not be ![mɛkɛk]. This form brings the discussion right into the heart of the illustrious *–ek* suffixation.

Each time a velar is followed by *–ek*, its phonetic shape is far removed from velarity. As signalled earlier, the behaviour of labial- and coronal-stemmed nouns with respect to *–ek* suggests that the vowel in the suffix is unable to palatalise. It does so against its limitations. To see why this should be connected with the geminates in (205), one needs to look for sequences of [kɛk] in native Polish vocabulary, where a root can be backtracked by chopping off affixes. There are no such sequences.[135] The closest one could get to [kɛk] is in the word *keks* [kɛks] ‘fruit cake’, but that is a loanword from English; *cake* looks like a good source candidate. Then, there is *Keke Rosberg*, the former F1 world champion, whose nickname is unremarkably pronounced as [kɛkɛ], in accordance with a ‘read as you write’ principle for non-native vocabulary. Crucially, the presence of two [ɛ]’s in consecutive CV’s shows that neither of them is a floating vowel. The other noun has a stable vowel, too. The locative singular of *keks* is *keksi–e* [kɛkɕɛ], not *[kɕɛ].

Now turn to *–ek*, whose vowel, unlike that of *keks*, is floating. Recall the *pies* ~ *ps–a* alternation from (130). The diminutive of *pies* [pʲ(j)ɛs] ‘dog’ is *pies–ek* [pʲ(j)ɛsɛk]. The diminutive can be doubled, in which case the form is not **pies–ek–ek* *[pʲ(j)ɛsɛkɛk], but *pies–ecz–ek* [pʲ(j)ɛsɛʧɛk]. The genitive nominatives of the (single)

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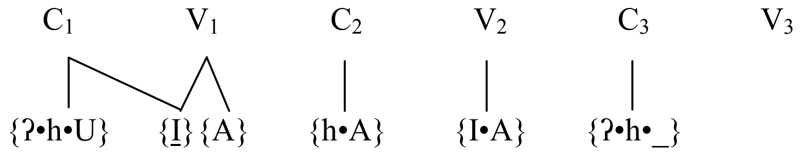
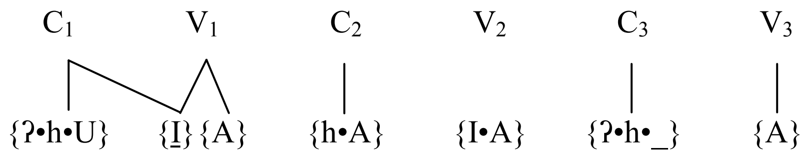
[135] Gussmann (1980: 60–61) makes a similar claim.

diminutive and the double diminutive are *pies–k–a* [p^j(j)ɛska] and *pies–ecz–k–a* [p^j(j)ɛsɛʧka], in that order. This is illustrated in (209)–(212) below.

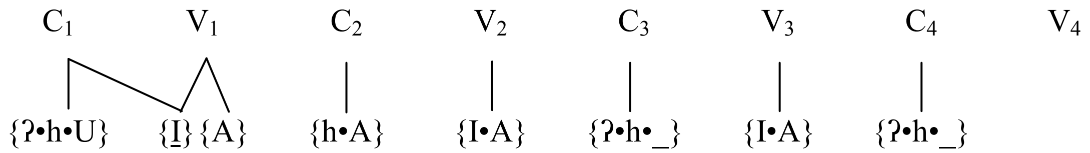
(209) *pies–ek* [p^j(j)ɛsɛk] 'dog (dim.)'



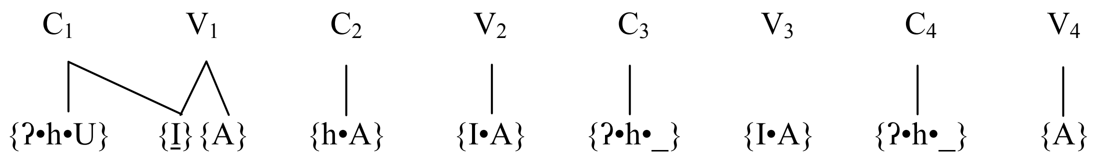
(210) *pies–k–a* [p^j(j)ɛska] 'dog (dim.gen.sg.)'



(211) *pies–ecz–ek* [p^j(j)ɛsɛʧɛk] 'dog (dim.dim.)'



(212) *pies–ecz–ka* [p^j(j)ɛsɛʧka] 'dog (dim.dim.gen.sg.)'



Notice that when the first diminutive is added, the underlying //s// in *pies* does not become [ɕ], which betrays the [ɛ] of the suffix as non-{I}-headed. This is also postulated here for the [ɛ] of the second diminutive, shown in (211) and (212). The expression representing the [ʧ] is the same as that for the following [k]; these are onsets C_3 and C_4 in the examples in question.

This is a new perspective on the matter. Classic generative rules that encompass the transformation //k//→[ʧ] do not allow the velar plosive not to convert to the alveolar affricate when the relevant condition applies.[136] A specimen of this tradition comes with the rule presented in (213).

(213) *First Velar Palatalization* (Rubach 1984: 112; his rule (160))

$$\begin{bmatrix} +\text{obstr} \\ -\text{coron} \\ +\text{high} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{high} \\ +\text{coron} \\ +\text{strid} \end{bmatrix} / \_\_ \begin{bmatrix} -\text{cons} \\ -\text{back} \end{bmatrix}$$

In Rubach's analysis, rule (213) is responsible for turning, among others, //k// into [ʧ], including the case of the doubled suffix *–ek*. As evident from the rule formulation (and from an accompanying example in the book; pp. 112–113), Rubach's analysis takes the vowel of suffix to be [–back], despite *–ek* never causing palatalisation on labials and coronals.[137] This problem notwithstanding, rule (213) has a locality span of two segments. The strict enclosure of the trigger within one segment, i.e. the [–back] vowel, precludes the rule—and the analysis—from considering the underlying nature of what *follows* the vowel. This limitation is enforced by the framework in which Rubach (1984) is written. The subsequent diminutives come in successive cycles, one suffix per cycle, and the rule—ascribed to the cyclic block of the lexical component in LP—must apply at once, not being given the chance to 'see' what comes on the next cycle.

The hypothetical take on the apparent First Velar triggered by *–ek* that is being presented here is *not* meant to argue against cyclicity. It has been signalled in section 3.3.4 that this work recognises not only a representational–transformational incarnation of the Strict Cycle—adhering to the way put forward in Kean (1974)—but also a representational–transformational form of the Derived Environment. These issues are kept independent. The Strict Cycle is enforced by workspaces having no 'undo' command. Derived Environment is enforced by Locality of *Join*. (Dormant representations e.g. *sinus* are not DE's, unlike the joint in *sinu<u>s</u>–<u>i</u>k*.) Now, the way //k//→[ʧ] is handled in the case of *–ek* in this work is compliant with both the Strict Cycle and the Derived Environment. Reconsider (211) and (212). When the second *–ek* is added on the relevant cycle, the floating vowel composed of {I•A} does nothing to

[136] Rubach (2006) offers an overview of post-*SPE* perspectives on palatalisation in Polish, as well as a multistratal, Derivational OT-based analysis thereof.

the onset with which it forms a single CV through an open joint, i.e. *Join*(x,y). The melody of the vowel (V_3) is not an {I}-headed expression, hence it cannot be subject to *I-spread* with respect to the onset (C_3). The melody of the onset, viz. {ʔ•h•_}, has no element {I} at all, so the resultant structure cannot be subject to *I-alignment*. What is formed is a morphophonemically [+back] CV sequence. Now, notice that at the time of the second *–ek*'s appearance in the structure, a CVCV sequence is formed ($C_3V_3C_4V_4$), in which both onsets are occupied by consonants whose melody should give [k]. As discussed earlier, the sequence [kɛk] is nowhere to be found in the native vocabulary of Polish. What makes the morphophonemic //pʲɛsɛkɛk// surface as [pʲ(j)ɛsɛʧɛk], at least from a purely synchronic (and hypothetical) perspective, is arguably an OCP-influenced mapping between the given workspace and the phonetic substance provided by the phonology–phonetics interface. The [ʧ] may be seen as a product of dissimilation, then.

The phonetic value of the dissimilated first //k// is not entirely accidental. The element {A}, which is the head of the expression {I•A} in the vowel, is not known to have any morphophonemic transformational potential in Polish. The OCP is then stimulated by the other element found in the vowel, viz. {I}. It might well be the presence of {I}, rather than the putative existence of two lexically-specified allomorphs of *–ek*, that cues the interface to interpret the underlying //k// as if it were palatalised by an {I}-headed vowel, as shown earlier in this section.

As for the genitive form shown in (212), and the underlying //k// (C_3) being realised as [ʧ], despite the vowel (V_3) being unpronounced, notice that the melody of the vowel is *not deleted*. It fails to be attached via *Melody Association*, because the next nucleus has the melody {A} attached. Being unattached, it is not pronounced as such, but its melody is still present in the representation. Thus, the phonology–phonetics interface may consider the floating melody and produce the cluster [ʧk] instead of the underlying //kk//. Recall that *Me<u>kk</u>–a* [kk] ~ [kː] 'Mecca' does not have a floating vowel between the velar plosives. The interface does not need to 'know' this word is foreign—on the modularity assumption, the interface *cannot* know the origin of words—it simply distinguishes between two //k//'s separated by a floating melody, and those separated by an empty nucleus.

[137] Gussmann (1980: 60ff) receives the credit for postulating two *–ek*'s, i.e. one with a palatalising [ɛ], and one with a non-palatalising [ɛ]; see Rubach (1984: 40–41). Still, Gussmann (p. 60) notes that, phonologically, both *–ek*'s could be one /ɛk/ supplied with different diacritics.

Some attention must be paid to the other two velars, viz. //g// and //x//, which exhibit the same behaviour that //k// does when confronted with the suffix *–ek*. Examples in (204d) and (204e) have illustrated the fate of //g// and //x// when followed by *–ek*, which is an open joint context. For the sake of exposition, two forms of the diminutive of one word from each set are shown in (214)–(217) below

(214) *stoż–ek* [stɔʒɛk] 'stack (dim.); cone'

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
{h•A}		{ʔ•h•A}	{A•U}	{L•ʔ•h•_}	{I•A}	{ʔ•h•_}	

(215) *stoż–k–a* [stɔʃka] 'stack (dim.gen.sg.); cone (gen.sg.)'[138]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
{h•A}		{ʔ•h•A}	{A•U}	{L•ʔ•h•_}	{I•A}	{ʔ•h•_}	{A}

(216) *prosz–ek* [prɔʃɛk] '(gun) powder (dim.); (baking) powder'

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
{ʔ•h•U}		{A}	{A•U}	{h•_}	{I•A}	{ʔ•h•_}	

(217) *prosz–k–u* [prɔʃku] '(gun) powder (dim.gen.sg.); (baking) powder (gen.sg.)'

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
{ʔ•h•U}		{A}	{A•U}	{h•_}	{I•A}	{ʔ•h•_}	{U}

The vowel of the suffix, present under V_3 in the examples above, is a floating melody. Its alternation with zero is shown in (215) and (217). The underlying consonants //g// and //x// are apparently subjected to First Velar Palatalisation—the melody under V_3 is {I•A}, i.e. it is a non-palatalising [ɛ]—and the OCP-triggering factor is the presence of the velar //k// under C_4, which follows the vowel. The claim that underlying //gEk// and

[138] The voice agreement between the members of the phonetic cluster [ʃk] is morphophonemically irrelevant. See section 4.2 for discussion on regressive voice assimilation between obstruents.

//xEk// are both interpreted as [ʃk] is strengthened by the absolute lack of phonetic sequences [ɡk] in Polish—Chapter 4 will provide the data on regressive voice assimilation—and the fact that the sequence [xk] enjoys a very limited distribution word-internally. One instance thereof is found in *jakichkolwiek* [jacixkɔlvʲ(j)ɛk] 'whichever (gen.pl.)', which a compound, build from *jaki–ch* and *kolwiek*, which betrays the cluster in question as not sitting over an open joint. Across word edges, phonetic [xk] is unremarkable. It appears freely in phrases exemplified in (218) below.

(218) *adresa<u>ch</u> <u>k</u>oleżanek* [xk] '(female) colleagues' addresses (loc.)'
agenta<u>ch</u> <u>k</u>ontrwywiadu [xk] 'counterintelligence agents (loc.)'
ambona<u>ch</u> <u>k</u>ościelnych [xk] '(church) pulpits (loc.)'

This lack of word edge limitation on [xk] should not be surprising if phonology is composed of two components. The morphophonological component does not provide any morpheme-internal or open joint structure that is interpreted as [xk]. On the other hand, compounds—arguably built over closed joints, which not Polish-specific; recall Halle and Mohanan (1985) put compounding after Class 1 affixation—are like separate words in that their inner edges may be phonetically, but not morphophonemically, adjacent.[139]

It should be stressed that the attempt at an analysis of what looks like First Velar Palatalisation in the presence of the suffix *–ek* shown in this section is purely hypothetical, and its purpose is to show that in the workspace-oriented approach to phonology, one can view the phenomenon in question as a matter of matching non-palatalised morphophonemic //k//, //ɡ// or //x// with a phonetic output typically recognised as functionally-palatalised, viz. [ʧ], [ʒ], and [ʃ], in that order. It does not claim that *–ek* cannot have two allomorphs, i.e. one with a palatalising //ɛ// to be concatenated after velars, and one with a non-palatalising //ɛ// to be used elsewhere. Given the tenets of the model espoused herein, both alternatives are possible, since the phonetic value of a piece of melody is only palpable after it passes through the phonology–phonetics interface.

[139] In models of phonology where both word- and phrasal-phonology are fused into a single computational unit, this distinction may be hard to capture. See, for instance, Rubach (1997 et seq.) for successive arguments why monostratal—in the sense of putting morphemes and phrases on one level—parallel Optimality Theory has a hard time with Polish, and other Slavic languages.

4. Polish voice phenomena

This chapter concentrates on voice phenomena in standard spoken Polish. It should be noted that by 'standard' it is meant that the analysis primarily concerns a north-eastern variety of spoken Polish, known as Warsaw Polish. Arguably, this is 'the' standard variety for geopolitical and broadcasting reasons. By no means does the present work grant Warsaw Polish primacy over other regional variants of spoken Polish. However, for expository purposes, the analysis needs to concentrate on such a variant, whose existence is verifiable, and on which some data and analyses are available. This is true of Warsaw Polish. Within the generative tradition, Polish voice phenomena have been analysed, among others, by Gussmann (1992), Bethin (1992), and Rubach (1996). Within GP, the most comprehensive analysis appears to be that of Gussmann (2007), which will be summarised in section 4.4. For the sake of brevity, sections 4.1, 4.2, and 4.3 will concentrate on data relevant for the discussion on interfaces.

4.1. Word-internal voice contrast on obstruent

Voice on obstruents is contrastive when a vowel or a sonorant follows word-internally. Consider examples in (219) below.

(219)

(219a)	*pat* [pat] 'stalemate'	*bat* [bat] 'whip, n.'
	tam [tam] 'there'	*da–m* [dam] 'I will give'
	sad [sat] 'orchard'	*zad* [zat] '(horse's) croup'

(219b) *kłód* [kwut] 'log (gen.pl.)' *głód* [gwut] 'hunger'
plotka [plɔtka] 'gossip' *blotka* [blɔtka] 'plain card'
trąc [trɔ̃w̃ʦ] 'rubbing, part.' *drąc* [drɔ̃w̃ʦ] 'tearing, part.'

Notice that, phonetically, prevocalic sonorants preceded by voiceless obstruents, as in (219b), are only slightly devoiced; Polish does not employ the feature known as [SPREAD GLOTTIS] on its voiceless obstruents. In structuralist terms, this is allophonic, as sonorants as such never contrast in voice. As for obstruents, the contrast is neutralised word-finally, where final devoicing applies, as presented in (220).

(220) *ogrodu* [ɔgrɔdu] 'garden (gen.sg.)' ~ *ogród* [ɔgrut] '(nom.sg.)'
drzewo [ˈdʒɛvɔ] 'tree' ~ *drzew* [dʒɛf] '(gen.pl.)'
sady [sadɨ] 'orchard (nom.pl.)' ~ *sad* [sat] '(nom.sg.)'

In addition, sonorants in TR# clusters may be transparent to the final devoicing of obstruents. Examples in (221) illustrate final devoicing in such clusters; note that the sonorants in question are not prevocalic in this context.

(221) *ka<u>dr</u>-y* [dr] 'frame, n. (nom.pl.)' ~ *ka<u>dr</u>* [tr̥] '(nom.sg.)'
żu<u>br</u>-y [br] 'wisent (nom.pl.)' ~ *żu<u>br</u>* [pr̥] '(nom.sg.)'
wy<u>dm</u>-a [dm] 'dune' ~ *wy<u>dm</u>* [tm̥] '(gen.pl.)'
przyja<u>źn</u>-i [ʑɲ] 'friendship (gen.sg.)' ~ *przyja<u>źń</u>* [ɕɲ̊] '(nom.sg.)'

Viewed in phonemic terms, word-final obstruents—alone or in TR# clusters—defy the structuralist assumption that a single segment should never be an allophone of two distinct phonemes. Consider examples in (222) below.

(222)
(222a) *kod-y* [kɔdɨ] 'code (nom.pl.)' ~ *kod* [kɔt] '(nom.sg.)'
kot-y [kɔtɨ] 'cat (nom.pl.)' ~ *kot* [kɔt] '(nom.sg.)'
(222b) *kadr-y* [kadrɨ] 'frame (nom.pl)' ~ *kadr* [katr̥] '(nom.sg.)'
wiatr-y [wʲ(j)atrɨ] 'wind (nom.pl)' ~ *wiatr* [wʲ(j)atr̥] '(nom.sg.)'

This observation is important for the present proposal. Contrastiveness of underlying representations may be lost due to positional effects. When not supported by a vowel within the domain of a word, obstruents and TR clusters do not contrast in voice. This indicates there is a reason not to handle final devoicing by means of contrastive representations. However, before this argument is developed in full, some more data are necessary.

There is a slight glitch in TR# clusters. Gussmann (2007: 295) notes that word-final sequences of a voiced obstruent and a sonorant frequently escape final devoicing. Hence, the right-hand word forms in (221) may appear in alternative forms, illustrated in (223) below.

(223) *ka<u>dr</u>* [tr̥] or [dr] 'frame, n.'
żu<u>br</u> [pr̥] or [br] 'wisent'
wy<u>dm</u> [tm̥] or [dm] 'dune (gen.pl)'
przyja<u>źń</u> [ɕɲ̊] or [ʑɲ]'friendship'

At this point in the discussion, it is too early to draw conclusions as to of what importance this finding is. It might only indicate that there is variation in the realisation of voiced TR# clusters, which may be sub-phonemic, but which should be accounted for. The issue will resurface in section 4.8.

4.2. Regressive voice assimilation

Examples in (224) show regressive voice assimilation on obstruents word-internally, with devoicing shown in (224a) and voicing in (224b); examples in (224b) are adapted from Gussmann (2007: 292).

(224)

(224a) *ża<u>b</u>a* [b] 'frog'~ *ża<u>b</u>–<u>k</u>a* [p k] '(dim.)'
zą<u>b</u>–ek [b] 'tooth (dim.)' ~ *zą<u>b</u>–<u>k</u>a* [p k] '(dim.gen.sg.)'
ksią<u>ż</u>–ek [ʒ] 'book (gen.pl.)' ~ *ksią<u>ż</u>–<u>k</u>i* [ʃ c] '(nom.pl.)'

(224b) *pro<u>s</u>–ić* [ɕ] 'request, v.' ~ *pro<u>ś</u>–<u>b</u>a* [ʑ b] 'request, n.'
li<u>cz</u>–yć [ʧ] 'count, v.' ~ *li<u>cz</u>–<u>b</u>a* [ʤ b] 'number'

The examples in (224) show that in what is phonetically a cluster of obstruents, it is the last obstruent that controls the voice feature. Unsurprisingly, such clusters undergo final devoicing as a whole. Consider examples in (225).

(225) *groź–b–a* [ʑ b] ~ *gróź-b* [ɕ p] 'threat'
proś–b–a [ʑ b] ~ *próś-b* [ɕ p] 'request, n'
(Compare *groz-ić* [ʑ] 'threaten' and *pros-ić* [ɕ] 'request, v.'.)

As shown in (225), regressive voice assimilation is insensitive to morphological divisions. It is also insensitive to word divisions. Examples in (226) show voice assimilation applying across the word boundary, devoicing being presented in (226a) and the reverse process in (226b) below.

(226)
(226a) *żab–y* [b k] 'frog (nom.pl.)' ~ *żab Karola* 'Karol's frog' [p k] '(gen.pl.)'
ogrod–y [d] 'garden (nom.pl.)' ~ *ogród Piotra* [t p^j] 'Piotr's garden'
(226b) *but–y* [t] 'shoe (nom.pl.)' ~ *but Wiesława* [d v^j] 'Wiesław's shoe'
brat–a [t] 'brother (gen.sg.)' ~ *brat Basi* [d b] 'Basia's brother'

4.3. Progressive voice assimilation

Word-internally, prevocalic sonorants following voiceless obstruents do not undergo progressive devoicing. Polish lacks a fortis/lenis distinction on obstruents—plosives are never aspirated in standard speech—which does not warrant the use of the IPA 'voiceless' diacritic in this context, as shown in (227).

(227) *prąd* [pr] 'current, n.'
tło [tw] 'background'
klątwa [kl] 'curse, n.'
śnić [ɕɲ] 'dream, v.'

As indicated under (219b), sonorants do not contrast in voice. More importantly, they have no bearing on the voice of the preceding obstruent.

Sonorants in word-internal TR clusters are transparent to voice assimilation. Examples in (228) below illustrate regressive voice assimilation on these clusters across the word boundary, with devoicing shown in (228a) and voicing in (228b); in this context, i.e. non-prevocalically within a word, a sonorant may be devoiced.

(228)

(228a) *kadr-y* [dr] ‘frame, n.’ (nom.pl.)

kadr szeroki [tr̥ ʃ] ‘wide-angle frame’

wydr-a [dr] ‘otter’

wydr polskich [tr̥ p] ‘Polish otter’ (gen.pl.)

(228b) *wiatr-y* [tr̥] ‘wind’ (nom.pl.)

wiatr zachodni [dr z] ‘westerly wind’

baśni-e [ɕɲ̊] ‘fairy tale’ (nom.pl.)

baśń braci Grimm [ʑɲ b] ‘Grimms’ tale’

Unlike sonorants in word-internal obstruent + sonorant clusters (TR#), sonorants found in obstruent + sonorant clusters formed at word junctures (T#R) are not transparent to voice. They do inhibit regressive voice assimilation of obstruents.[140] Consider examples of the lack of regressive assimilation across T#RT clusters in (229) below; examples in (229b) are adapted from Gussmann (2007: 297).

(229)

(229a) *potok* [k] ‘stream’ ~ *potok rwący* [k rv] ‘torrent’

przestać [tɕ] ‘to stop’ ~ *przestać lżyć* [tɕ lʒ] ‘to stop reviling’

(229b) *krzew-u* [v] ‘shrub’ (gen.sg.) ~ *krzew rdestu* [f rd] ‘knotgrass shrub’

ślad-y [d] ‘trace’ (nom.pl) ~ *ślad rdzy* [t rdʑ] ‘trace of rust’

The lack of regressive voice assimilation in T#RT clusters is most striking in sequences in which the word-final obstruent in underlyingly voiced, as in (229b). The obstruent in question exhibits final devoicing.

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[140] This observation appears to have been first made by Rubach and Booij (1990*a*).

4.4. Voice phenomena in Gussmann's (2007) analysis

Gussmann's (2007) monograph on Polish phonology offers a representational analysis of voice phenomena in standard (Warsaw) Polish (Chapter 7; pp. 288–312). Having to choose between the element {H} and the element {L} to capture voice contrast on Polish obstruents, Gussmann's analysis settles for the latter to represent voiced obstruents; voiceless obstruents are unspecified for voice. The present proposal will follow this choice.[141] The advantage thereof is the simplicity with which Gussmann's analysis treats final devoicing. Consider example (230), drawn on a CVCV skeleton.

(230) *kod* [kɔt] 'code'; based on Gussmann (2007)

C	V	C	V
|	|	╪ |	
{ʔ•h•_}	{A•U}	{L}{ʔ•h•A}	

The dotted arrow in (230) illustrates the causality of final devoicing. When not licensed by a melodically-filled nucleus—this is the case word-finally—an obstruent loses licensing on its voice specification; the element {L} is unlicensed, and not taken into account in phonetic interpretation.[142] Given that the last skeletal position in (230) and in any consonant-final word form hosts an empty nucleus, Gussmann (2007: 290) suggests final devoicing be a consequence of "the reduced licensing potential" of domain-final empty nuclei. Notice that the inability to license {L} on an onset is only limited to nuclei that meet two criteria: they are empty and they are domain-final. Conversely, it appears that domain-medial empty nuclei and domain-final filled nuclei have enough power to licence {L} on their onsets.[143] Compare examples in (231) and (232).

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[141] The use of the element {L} in analysis of voice contrast in Polish obstruents appears motivated by the discussion in Harris (1994: 133-138). Cyran (2003) uses {L} for Polish voiced obstruents, too.

[142] Notice that Gussmann's analysis is SPG-based; in CVCV, Licensing is not a necessary condition for an onset to enjoy phonetic interpretation; see section 2.6.3. The illustrations herein are plotted on CVCV skeletons, but the summary of Gussmann's analysis is not translated into CVCV.

[143] Notice, again, that Gussmann's (2007) analysis is couched in SGP, where Licensing is an important issue; in CVCV, onsets need no lateral force to be pronounced; see section 2.6.

(231) *kod-y* [kɔdɨ] ‘code’ (nom.pl)

C	V	C	V
{ʔ•h•_}	{A•U}	{L•ʔ•h•A}	{I•_}

(232) *gdzie* [gʥɛ] ‘where’

C	V	C	V]
{L•ʔ•h•_}		{L•ʔ•h•A}	{I̲} {A}

In order to account for regressive voice assimilation, Gussmann’s analysis makes use of a constraint called *Voice Adjustment*, which is given in (233) below.

(233) *Voice Adjustment* (Gussmann 2007: 291)

“The tonal specification of the last obstruent controls the laryngeal tier of the sequence.”

Notice that although the formulation of (233) includes the term ‘laryngeal tier,’ representationally, this is nothing but the presence or absence of {L}. As described by *Voice Adjustment*, obstruent clusters undergo regressive devoicing, which representationally translates into the delinking of the {L} element on all obstruents affected. Conversely, regressive voicing results from linking the same element. Consider examples of word-internal voice assimilation in (234) and (235) below.

(234) *żab–k–a* [ʒapka] ‘frog’ (dim.) (//ʒab//+//k//+//a//)[144]

C	V	C	V	C	V
{ʔ•h•I•A}	{A}	{L}{ʔ•h•A}		{ʔ•h•_}	{A}

[144] This illustration ignores the possibility that the underlying //b// and //k// in *żab–k–a* may be flanking a nucleus with an unattached floating melody //E// (=[ɛ]). This plays no role in the present discussion.

(235) *prośba* [prɔʑba] ‘request, n.’ (//prɔɕ//+//b//+//a/); portion shown is [_ɔʑba]

[…]	V	C	V	C	V
[…]	{A•U}	{L}{h•A•I̲}		{L}{ʔ•h•U}	{A}

Across the word boundary, *Voice Adjustment* appears just as effective as word-internally. Consider examples in (236) and (237).

(236) *żab Karola* [ʒap karɔla] ‘Karol’s frog (gen.pl)’ (//ʒab//+//karɔla//); the portion shown is [ʒapka_]

C	V	C	V	C	V
{ʔ•h•I•A}	{A}	{L}{ʔ•h•A}		{ʔ•h•_}	{A}

(237) *proś Bartka* [prɔʑ bartka] ‘ask Bartek’ (//prɔɕ//+//bartka//); portion shown is [_ɔʑba]

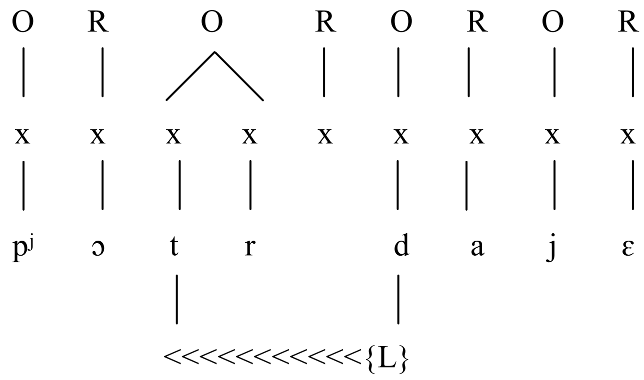
[…]	V	C	V	C	V
[…]	{A•U}	{L}{h•A•I̲}		{L}{ʔ•h•U}	{A}

The representations in (236) and (237) are essentially the same as in (234) and (235), respectively. The reason for this is the conjecture made in Gussmann (2007) that the application of *Voice Adjustment* across word junctures is possible when adjacent words form a single domain. Notice that the representations in (234)–(237) have a single empty nucleus where the left-hand morpheme or word terminates. Assuming that the addition of the right-hand morpheme or word does not add empty nuclei to the skeleton—an assumption which will be revisited later in this chapter—the empty nucleus ceases to be domain-final by becoming domain-medial and being able to license {L} in (235) and (237), just like the domain-medial empty nucleus does in (232).

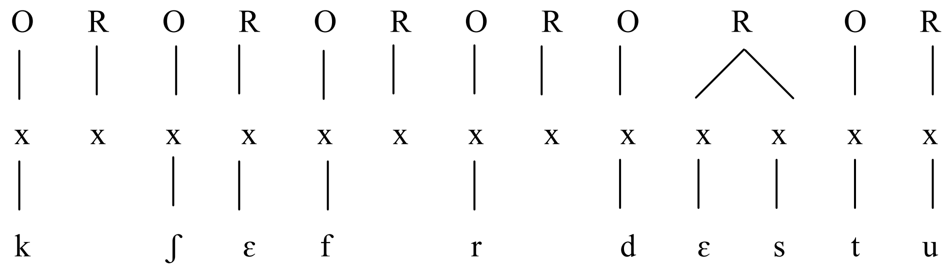
This summary and analysis of Gussmann’s findings may now turn to TR clusters. Recall that sonorants in TR# clusters are transparent to regressive voice assimilation, while those in T#RT clusters are not. Gussmann’s analysis attributes the difference to the number of empty nuclei present in the representations of the two types of phrases in question. Consider his examples given in (238) (redrawn after p. 298).

(238)

(238a) *Piotr daje* [pʲ(j)ɔdr dajɛ] ‘Peter gives’



(238b) *krzew rdestu* [kʃef rdɛstu] ‘knotgrass shrub’



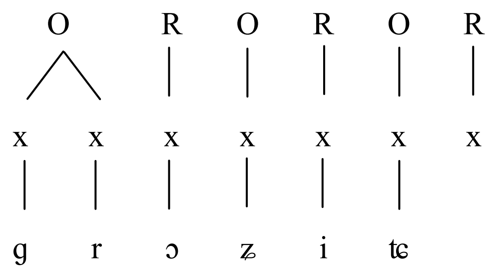
The successful application of *Voice Adjustment* across the juncture in (238a) is said to be thanks to just a single empty nucleus separating the obstruents //t// and //d//. Conversely, the failure of *Voice Adjustment* to cross the juncture in (238b) is apparently the consequence of there being two consecutive empty nuclei between the obstruents //f// and //d//. The original comment appears necessary:

> The concatenation in [(238b)] brings about a sequence of two empty nuclei: one is the former domain-final nucleus reborn as domain-internal and another one intervening between the first two consonants of the second word. Since obviously [rd] is not a possible onset, the two consonants have to belong to separate onsets of which the first is licensed by an empty nucleus, While the words have unexceptional structure in isolation, their combination creates—or would create—a configuration of two consecutive empty nuclei, which is not tolerated within Polish. A structure which violates the prevailing constraints is simply not created, which means that the structure suggested in [(238b)] is illicit as the two words do not form a single domain but remain separate. (Gussmann 2007: 298)

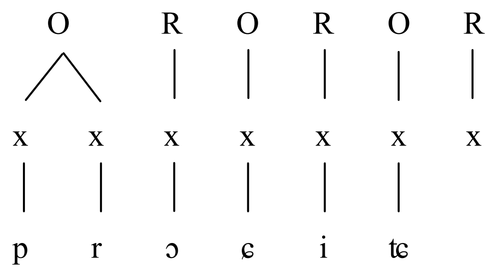
Notice that unlike the #RT cluster in (238b), in which the sonorant bears no relation to the obstruent in licensing/governing terms, the TR# cluster in (238a) is a single branching onset in standard GP terms. It is only due to the governing relations in branching onsets—the obstruent being the governor, the sonorant the governed—that one can explain the voice transparency of this sonorant. By itself, this is not suspicious, since the pattern is replicated word-internally. Recall that sonorants in word internal TR clusters depend on the voice of the obstruent. Voiceless obstruents cause slight devoicing of the sonorant. Compare examples in (239), the latter of which would use an appropriate diacritic under [r] were it available in the IPA chart.

(239)

(239a) *groz-ić* [grɔʑitɕ] 'threaten'



(239b) *pros-ić* [prɔɕitɕ] 'request, v.'



Since the present proposal uses the CVCV skeleton, a translation of Gussmann's *Voice Adjustment* working across the word boundary appears necessary. Consider the examples in (240) (with IPA transcription instead of GP elements for space reasons).

(240)

(240a) *Piotr daje* ‘Peter gives’ [pʲ(j)ɔdr dajɛ]

```
C   V   C   V   C   V   C   V   C   V
|   |   |       |       |   |   |   |
pʲ  ɔ   t  <==  r       d   a   j   ɛ
        |               |
        <<<<<<<<<<<<<<<<{L}
```

(240b) *krzew rdestu* ‘knotgrass shrub’ [kʃef rdɛstu]

```
C   V   C   V   C   V   C   V   C   V   C   V   C   V
|       |   |   |       |       |   |   |       |   |
k       ʃ   ɛ   f       r       d   ɛ   s       t   u
```

The representation in (240a) assumes there is an instance of Infrasegmental Government (IG; ‘<==’) between the [t] and the [r] in *wiatr* that makes the TR cluster a single phonological object, so that neither the sonorant nor the empty nucleus flanked by the two consonants blocks *Voice Adjustment*. As for (240b), the situation on a CVCV skeleton is hardly any different from that on an SGP skeleton in (238b). The sonorant and the obstruent forming the #RT cluster in *rdestu* are laterally unrelated. They form no governing or licensing relationship, and the empty nucleus between them is governed by the nucleus carrying the vowel [ɛ]. In CVCV, a sequence of two consecutive non-final empty nuclei in which neither is circumscribed by IG is as illicit as a sequence of any two non-final empty nuclei is in standard GP. A sequence of two final nuclei of which the second one is domain-final is exempt from this state (see Scheer 2004: 67ff). In (240b), however, the sequence would be domain-medial. Since this would be illicit, such a structure is apparently not created. Hence, a CVCV-ised *Voice Adjustment* fails to cross the juncture in (240b) because the two words cannot form a single domain.

The idea that adjacent words may form single domains and that this is a triggering factor for *Voice Adjustment* to cross the word boundary has at least two consequences. Firstly, it gives the impression that it is possible to capture Polish voice phenomena in (standard) GP (or CVCV) on a purely representational basis, without a set of ordered rules or constraints, or without contextual interpretation. Secondly, it implies that representations alone can explain the contexts in which something may be a single phonological domain or not. Both impressions are false. To show this, the present proposal must first show data on Poznań–Cracow Voicing that destroy the simplicity of the picture.

4.5. Poznań–Cracow Voicing: the data

Apart from Warsaw Polish, there is another variant of spoken Polish that may be considered standard, viz. Poznań–Cracow Polish. The label is a deliberate misnomer on the part of this work. Poznań and Cracow are not quite the same phonologically.[145] They have one thing in common, though. Unlike in Warsaw Polish, not only obstruents, but also sonorants and vowels may trigger regressive obstruent voice assimilation across the word edge. The vowel- and sonorant-triggered assimilation in Poznań–Cracow Polish is known as Poznań–Cracow Voicing or Cracow Voicing for short.[146] The examples in (241) below, inspired by Rubach (1996: 72), show the phonetic contrasts between the standards in fast speech.

(241) Voice phenomena in T#R and T#V clusters: Warsaw Polish vs. Poznań–Cracow Polish

		Warsaw Polish	Poznań–Cracow Polish
(241a)	*ogród Leona* 'Leon's garden'	[t l]	[d l]
	ogród Roberta 'Robert's garden'	[t r]	[d r]
	ogród matki 'mother's garden'	[t m]	[d m]
	ogród ojca 'father's garden'	[t ɔ]	[d ɔ]
(241b)	*brat Leona* 'Leon's brother'	[t l]	[d l]
	brat Roberta 'Robert's brother'	[t r]	[d r]
	brat matki 'mother's brother'	[t m]	[d m]
	brat ojca 'father's brother'	[t ɔ]	[d ɔ]

[145] Poznań Polish, for instance, has two rather conspicuous features of intonation. Firstly, declarative sentences are often pronounced with a rising nuclear tone. Secondly, in wh- questions, the nuclear tone tends to fall not on the wh- word but on the main verb. This has no bearing on the present discussion.
[146] The term 'Cracow Voicing' is the one used by Rubach in his (1996) analysis. Gussmann's (1992) analysis uses the term 'Cracow-Poznań dialect' when referring to the variant of spoken Polish. Bethin

Compare the word-boundary situation in the two standards when the word-initial segment in the second word is an obstruent, causing regressive voice assimilation; see examples in (242) below.

(242) Voice phenomena in T#T clusters: Warsaw Polish vs. Poznań–Cracow Polish

		Warsaw Polish	Poznań–Cracow Polish
(242a)	*ogród Dawida* ‘Dawid’s garden’	[d d]	[d d]
	ogród Basi ‘Basia’s garden’	[d b]	[d b]
(242b)	*brat Dawida* ‘Dawid’s brother’	[d d]	[d d]
	brat Basi ‘Basia’s brother’	[d b]	[d b]

Viewed from a contrastive point of view, the data in (241) and (242) reveal the similarity between both variants of spoken Polish. Neither of them maintains a systematic contrast in voice on word-final obstruents. The difference in the non-contrastive realisation can be described on purely phonetic grounds. Warsaw Polish allows for voice neutralisation by preserving the effect of final devoicing in all contexts except when before voiced obstruents, where regressive voice assimilation has precedence, as shown in (242). Poznań–Cracow Polish, on the other hand, allows for the neutralisation by assimilating all word-final obstruents to whatever follows, i.e. voicing them when followed by sonorants, vowels and voiced obstruents, and devoicing them when followed by voiceless obstruents or pauses.

Despite the same phonetic setting, voice is not neutralised, and Poznań–Cracow Voicing does not apply, word-internally, as exemplified in (243).

(243) *brat–ow–a* [bratɔva] ‘brother’s wife’
brat–n–i [bratɲi] ‘brotherly’ (masc.)
(Compare examples in (241b) and (242b).)

It is concluded that Poznań–Cracow Voicing, even though easy to be labelled as ‘phonetically-motivated’ or indeed ‘phonetic,’ is phonological in its application,

(1992) names the process at hand ‘Cracow–Poznań Voice Spread’. My preference—against alphabetic ordering—is for ‘Poznań–Cracow Voicing’ and ‘Poznań–Cracow Polish.’

otherwise the prevocalic [±voice] distinction, would be lost, contrary to fact. Compare examples from (219a) repeated for convenience in (244) below.

(244) *pat* [pat] ‘stalemate’ *bat* [bat] ‘whip, n.’
tam [tam] ‘there’ *da–m* [dam] ‘I will give’
sad [sat] ‘orchard’ *zad* [zat] ‘(horse’s) croup’

All other relevant data on Polish voice phenomena hold for Poznań–Cracow Polish. Sonorants in TR clusters have no bearing on the voice of the obstruent. Examples from (219b) are repeated for convenience in (245) below.

(245) *kłód* [kwut] ‘log’ (gen.pl.) *głód* [gwut] ‘hunger’
plotka [plɔtka] ‘gossip’ *blotka* [blɔtka] ‘plain card’
trąc [trɔ̃w̃ʦ] ‘rubbing, part.’ *drąc* [drɔ̃w̃ʦ] ‘tearing, part.’

Just like in Warsaw Polish, prevocalic sonorants in word-internal TR clusters are transparent to voice assimilation. Examples in (246) illustrate regressive voice assimilation on these clusters across the word boundary, with devoicing shown in (246a) and voicing in (246b).

(246)

(246a) *kadr-y* [dr] ‘frame, n.’ (nom.pl.)
kadr szeroki [tr̥ ʃ] ‘wide-angle frame’
wydr-a [dr] ‘otter’
wydr polskich [tr̥ p] ‘Polish otter’ (gen.pl.)

(246b) *wiatr-y* [tr̥] ‘wind’ (nom.pl.)
wiatr zachodni [dr z] ‘westerly wind’
baśni-e [ɕɲ̥] ‘fairy tale’ (nom.pl.)
baśń braci Grimm [ʑɲ b] ‘Grimms’ tale’

The data in (243), (244), (245) and (246) are uniform for Warsaw Polish and Poznań–Cracow Polish. The only difference appears when a non-obstruent is the first sound across the word boundary. Unlike in Warsaw Polish, sonorants found in T#R clusters do not inhibit regressive voice assimilation of obstruents. Quite the reverse, they trigger it.

Consider examples of Poznań–Cracow Voicing in T#R clusters (247) below; examples in (247b) are adapted from Gussmann (2007: 297).

(247)

(247a)	*potok* [k] 'stream' ~ *potok rwący* [g rv] 'torrent'
	przestać [tɕ] 'to stop' ~ *przestać lżyć* [dʑ lʒ] 'to stop reviling'
(247b)	*krzew-u* [v] 'shrub' (gen.sg.) ~ *krzew rdestu* [v rd] 'knotgrass shrub'
	ślad-y [d] 'trace' (nom.pl) ~ *ślad rdzy* [d rdz] 'trace of rust'

4.6. Poznań–Cracow Voicing vs. Gussmann (2007)

Gussmann's (2007) analysis does not account for Poznań–Cracow Voicing. The discussion of this phenomenon in the book is reduced to a single footnote, without a single hint as to how to account for the phenomenon representationally.[147] It seems Gussmann's analysis does not cover Poznań–Cracow Voicing because the theoretical machinery of GP does not allow for treating this phenomenon as a phonological process consisting of the spread of voice from a sonorant or a vowel to an obstruent. Recall the two examples of *Voice Adjustment* at work given in (238), repeated for convenience in (248) below.

[147] Part of the footnote reads: "Various interpretations of this phenomenon have been suggested in the derivational-generative literature but none of them appears very satisfactory and they all smack of gimmicky manipulations encouraged by the theoretical machinery of default filling, voice spreading from sonorants and the like (Bethin 1992; Gussmann 1992; Rubach 1996)." (Gussmann 2007: 301) I presume the hypothetical analysis given in section 4.7 herein fits in with this description. Its major goal, however, is to show that Poznań–Cracow Voicing is not analysable on a purely representational basis in GP or CVCV, and needs to be dealt with via the phonology–phonetics interface.

(248)

(248a) *Piotr daje* [pʲɔdr dajɛ] 'Peter gives'

```
O    R    O        R    O    R    O    R
|    |   / \       |    |    |    |    |
x    x   x   x     x    x    x    x    x
|    |   |   |          |    |    |    |
pʲ   ɔ   t   r          d    a    j    ɛ
         |              |
         <<<<<<<<<<<<<{L}
```

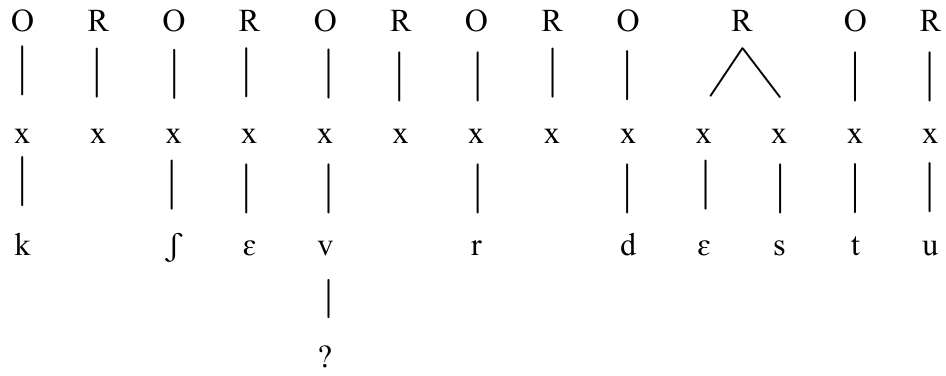
(248b) *krzew rdestu* [kʃef rdɛstu] 'knotgrass shrub'

```
O    R    O    R    O    R    O    R    O     R       O    R
|    |    |    |    |    |    |    |    |    / \      |    |
x    x    x    x    x    x    x    x    x    x   x    x    x
|         |    |    |         |         |    |   |    |    |
k         ʃ    ɛ    f         r         d    ɛ   s    t    u
```

The successful application of *Voice Adjustment* in (248a) is due to the voiced obstruent //d// spreading its element {L} across an empty nucleus, and across the sonorant //r//—which sits in a branching onset—to the voiceless //t//, which becomes voiced, i.e. [d]. The lack of voice assimilation in (248b) is due to the inability of the element {L} in the voiced //d// to spread to the underlyingly voiced //v// across two empty nuclei. The two obstruents remain in separate domains, the //v// being domain-final, and consequently devoicing to [f]. Crucially, the sonorant //r//, not being part of the same onset as //v//, is opaque to voice assimilation. Neither does it influence the //v// itself. Not being an obstruent, //r// has no element {L} in its melody. Unlike in Gussmann's (1992), Bethin's (1992), and Rubach's (1996) analyses, the sonorant cannot be specified for voicedness in Gussmann's (2007) work, for principled reasons.

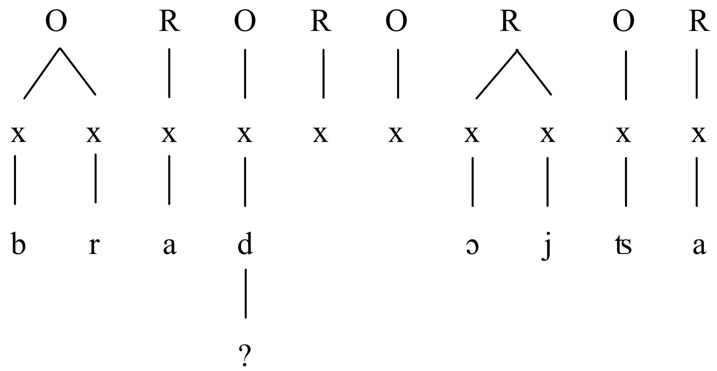
The example in (248b) is true for Warsaw Polish. However, in Poznań–Cracow Polish, the situation would be as in (249) below.

(249) *krzew rdestu* [kʃev rdɛstu] ‘knotgrass shrub’ (Poznań–Cracow Voicing)



In (249), the word-final //v// is voiced, as if it carried the element {L}, against *Voice Adjustment*. In Gussmann’s (2007) analysis, this behaviour cannot be accounted for. Firstly, the {L} on the word-final [v] could not have spread from the //d// across the word juncture. These consonants are separated by two empty nuclei; this is a non-local environment. Secondly, this number of empty nuclei disqualifies (249) as a well-formed single domain. Thirdly, not being in the same domain as the //r//, the //v// is domain-final, where its element {L} is not licensed, and the consonant should be voiceless, contrary to fact. Consider one more example, in (250) below.

(250) *brat ojca* [brad ɔjʦa] ‘father’s brother’ (Poznań–Cracow Voicing)[148]



As with (249), the example in (250) shows a voiced word-final obstruent, viz. [d]. Similarly to (249), there is no phonological expression with the element {L} in (250) that could influence the voicedness of this consonant. In fact, none of the expressions in *ojca* [ɔjʦa] ‘father’ (gen.sg.) is specified for voice in GP. The vowels and the glide [j]

[148] This one and the following few examples with *ojca* [ɔjʦa] ‘father (gen.sg.)’ ignore the floating melody present underlyingly, viz. *ojc{iE}c ~ ojc–a*.

are non-obstruents, while the affricate is underlyingly voiceless. (Recall that voice is privative in GP; the lack of {L} is not balanced by the presence of {H}, for that matter.)

If translated into a CVCV skeleton, the two representations remain equally mysterious. See CVCV-ised examples in (251) and (252).

(251) *krzew rdestu* [kʃev rdɛstu] 'knotgrass shrub' (Poznań–Cracow Voicing)

```
C   V   C   V   C   V   C   V   C   V   C   V   […]
|       |   |   |       |       |   |   |
k       ʃ   ɛ   v       r       d   ɛ   s       […]
                |
                ?
```

(252) *brat ojca* [brad ɔjʦa] 'father's brother' (Poznań–Cracow Voicing)

```
C   V   C   V   C   V   C   V   C   V   C   […]
|   |   |   |   |           |   |       |
b  <==  r   a   d           ɔ   j       ʦ   […]
                |
                ?
```

Whatever the number of intervening empty nuclei, there is nothing to spread onto the word-final obstruent in (251) and (252), since the sonorant [r] and the vowel [ɔ] are not specified for voice. In this respect, CVCV is not different from standard GP. *Voice Adjustment* cannot apply representationally, and yet a non-obstruent behaves as if it were an obstruent.

It is concluded that Poznań–Cracow Voicing cannot be captured by means of the constraints that Gussmann's (2007) analysis proposes. A flawed alternative is summarised in the next section.

4.7. Poznań–Cracow Voicing: what not to do representationally

This section explores the theoretical concept of enriching the leftmost C slot of words starting with non-obstruents with the element {L}.[149] It should be stressed that this is only a hypothetical solution. Due to its incompatibility with the tenet of (standard) GP (and CVCV alike) that non-obstruents are never specified for voice, the proposal discussed in this section is only to show that a representational way of accounting for Poznań–Cracow Voicing is not workable.

Since Poznań–Cracow Voicing is only found at word junctures, the additional element {L} would only affect the left edge of words. In order for the phenomenon in question to be possibly captured by *Voice Adjustment*, the triggering factor must act as a word-initial obstruent representationally; hence, it can only appear under the leftmost C slot in the skeleton. Two examples of such a configuration are shown in (253).

(253)

(253a) *ojc–a* 'father (sg.gen.)' (with an additional {L})

C	V	C	V	C	V
{L}	ɔ	j		ʦ	a

(253b) *Leon–a* 'Leon (sg.gen.)' (with an additional {L})

C	V	C	V	C	V
{L} l	ε		ɔ	n	a

In the illustrations in (253), the element {L} is shown attached to the skeleton with a dashed line only for the purpose of exposition. Its presence is essentially a representational marker of the voice feature that the left edge of the words in (253) has phonetically, but which is not lexically specified under GP terms.

[149] The content of this section is essentially a CVCV-ised and workspace-oriented translation of sections 7, and 8 of Michalski (2008), an article devoted to showing the inability of GP as a model to account for Poznań–Cracow Voicing by means of phonological representation.

It should be noted that the presence of {L} under a consonantal slot should be interpretable as nothing but voicedness. If put under an otherwise empty slot—as in (253a)—the presence of {L} has no detrimental effects on the interpretation; it carries no information that would cause it to be interpreted as any particular consonant. It only specifies voicedness, which is not contrastive with the vowel that follows. The same applies to the consonantal slot occupied by the sonorant in (253b); the {L} only adds voicedness to what already is a voiced speech sound.

In the examples that follow, only a sonorant-initial case will be used as an exponent of all phonological chunks beginning with a vowel or a sonorant, which in articulatory terms both belong to a natural class of spontaneously-voiced speech sounds.

To show that the presence of the left-edge {L} for the purposes of Poznań–Cracow Voicing would only be worth considering for words—not for suffixes, for that matter—the examples to follow will concentrate on the phrase given in (254), on the string of two suffixes given in (255), and on the word form given in (256) below.

(254) *brat Leona* //brat//+//lɛɔna// [bradlɛɔna] 'Leon's brother'

(255) *–n–i* //n//+//i// [ɲi] '(adjectival suffix)' + '(nom.sg.masc.)'

(256) *brat–n–i* //brat//+//n//+//i// [bratɲi] 'brotherly (masc.)'

The pronunciation of (256) is the same in Poznań–Cracow Polish and Warsaw Polish, while the pronunciation given in (254) is not attested in Warsaw Polish, where it is [bratlɛɔna] (see section 4.5). Consider representations in (257), (258), and (259) below.

(257) *brat* //brat// [brat] 'brother'

C	V	C	V	C	V
|		|	|	|	
b	<==	r	a	t	

(258) *brat Leona* //brat//+//lɛɔna// [bradlɛɔna] ‘Leon’s brother’ (Poznań–Cracow Voicing)

```
C   V   C   V   C   V   C        V   C   V   C   V
|       |   |   |      /'\       |       |   |   |
b       r   a   d     {L} l      ɛ       ɔ   n   a
                <<<<<<<<<{L}
```

(259) *brat-n-i* //brat//+//n//+//i// [bratɲi] ‘brotherly (masc.)’

```
C   V    C   V   C   V   C   V
|        |   |   |       |   |
b   <==  r   a   t       ɲ   i
```

Potentially, if the leftmost onset of a word beginning with a non-obstruent has the element {L}, Poznań–Cracow Voicing, shown in (258), would be captured by *Voice Adjustment*, similarly to (248a). The spread would not take place between the base and the suffix in (259), since the suffix has no extraneous {L} in its melody.

If there were no differentiation between the left edge of words and the left edge of any representation, including suffixes, the word in (259) would take the form shown in (260) below.

(260) *brat-n-i* //brat//+//n//+//i// *[bradɲi] ‘brotherly (masc.)’

```
C   V    C   V   C   V     C      V
|        |   |   |        /'\     |
b   <==  r   a   d       {L} ɲ    i
                 <<<<<<<<<{L}
```

The representation in (260) is counterfactual. Word-internally, sonorants and vowels do not trigger voicing of underlyingly voiceless obstruents.

From what has been shown in the present section, the adoption of an extraneous element {L} on the left-edge C slot of a word may appear an autosegmentally-plausible way of analysing Poznań–Cracow Voicing. More importantly, the representational device of adding what, in GP terms, is unambiguously interpretable as the type of voicing typical of obstruents does not introduce any opacity to other voice-related phenomena in Polish. Its use in the present analysis has been restricted to the left edge of words that do not begin with an obstruent. Still, the assumption that the extra {L} should only appear on words, but not on morphemes as such, would have some potential consequences, if only this were a serious analytic proposal.

Firstly, this would require a constraint that would 1) enforce (or link) an extraneous {L} on any initial C slot in words in which that slot is not occupied by an obstruent, 2) prohibit (or delink) such an {L} on any morpheme-initial C slot which is not the initial C slot of a word at the same time, and 3) hold only for Poznań–Cracow Polish, never for Warsaw Polish.

Secondly, constraints—the way they are understood in this work—pertain to phonology proper, which does not by itself distinguish between morphemes and words. As long as something has a phonological representation, it is computable in phonology, no matter what its identity is.

Thirdly, the way it has been presented, the concept of adding the element {L} to left-edge C slots not occupied by obstruents may be leading to a reasonable but incorrect conclusion that speakers of Warsaw Polish and speakers of Poznań–Cracow Polish should have systematically different underlying (morphophonemic) representations.

Finally, it would appear that these representations should be different for no particular reason other than to account for a single phenomenon, viz. Poznań–Cracow Voicing.

Thus, it must be concluded that a representational account of Poznań–Cracow Voicing, within the limitations imposed by GP, has not been found, and appears impossible.

4.8. Voice phenomena are handled by the phonology–phonetics interface

The conclusion reached in Michalski (2008) is that Poznań–Cracow Voicing should be tackled from the point of view of phonetic interpretation. In fact, the idea endorsed by the present study is that all voice assimilation in Polish should be handled interpretationally.

By 'interpretationally' it is meant that although the lateral relations between phonological expressions and their affinity to particular workspaces is a decisive factor for triggering or blocking a particular phenomenon, the realisation thereof is carried by the phonology–phonetics interface, which is sensitive to workspace edges.

As has been shown earlier in section 4.2, an obstruent found in a context for regressive obstruent voice assimilation loses its contrastiveness with respect to voice. An underlyingly voiceless obstruent will turn out voiced in such a context, and vice versa. In phonemic–allophonic terms, the voice of such an obstruent is fully predictable. Since the approach in the present study is that GP/CVCV representations are for expressing only what is contrastive and unpredictable, doing this type of voice assimilation on GP/CVCV representations is pointless. Recall the glitch with voiced TR# clusters occasionally escaping final devoicing. Word forms from (223) are repeated for convenience in (261) below.

(261) *ka<u>dr</u>* [tr̥] or [dr] 'frame, n.'
żu<u>br</u> [pr̥] or [br] 'wisent'
wy<u>dm</u> [tm̥] or [dm] 'dune' (gen.pl)
przyja<u>źń</u> [ɕɲ̥] or [ʑɲ]'friendship'

When these examples first appeared in the present chapter, it was concluded it was too early to draw conclusions as to of what importance this finding was. It was said, this might only indicate that there is variation in the realisation of voiced TR# clusters, which may be sub-phonemic, but which should be accounted for. Precisely, it is quite unclear how to account for that on a representational basis. An original comment appears necessary:

> In some forms the devoiced cluster sounds distinctly artificial (e.g. *wydm* [vɨtm̥] 'dune, gen.pl.', *kadm* [katm̥] 'cadmium') while in others the devoiced variant is the only possible as long as the cluster is simplified. This particularly true about the numerous derivatives in *–izm, -yzm* (*marks-izm* [markɕis(m̥)] 'Marxism', *fanat-yzm* [fanatɨs(m̥)] ['fanatism'], where—despite normative admonitions—the final nasal is deleted and then the fricative must be voiceless. To conclude then, clusters of toned [={L}-carrying; GM] obstruents followed by a sonorant word-finally *tend* to become devoiced although the sonorants may prevent the devoicing from taking place. This results in the co-existence of voiced and voiceless variants controlled by factors such as word familiarity and frequency, tempo of speech, degree of speech monitoring by individual speakers and the like. Anyway, in contradistinction to the absolute word-final obstruents where the devoicing is practically categorical, sonorants intervening between the obstruent and the pause enrich the picture and introduce more variability. (Gussmann 2007: 296)

It should be noted such terms as ‘word familiarity and frequency, tempo of speech, degree of speech monitoring by individual speakers and the like’ hardly translate into and from GP representations. The block quotation above turns out a cryptic way of saying representation alone cannot handle voice phenomena in Polish.

Indeed, for word forms in (261), there is not much one can do to account for the difference representationally. A plausible representation of a word fitting that set is given in (262).

(262) *bojaźń* //bɔjaʑɲ// [bɔjaɕɲ̥] or [bɔjaʑɲ] ‘fear’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
|	|	|	|	|		|	
b	ɔ	j	a	ʑ	<==	ɲ	

The empty nucleus under V_3 hosts no vowel ~ zero alternation site. Hence, it is reasonable to think of the TR# cluster as being a domain of IG. If this is the case, then the pronunciation without final devoicing, viz. [bɔjaʑɲ], blurs the analysis of regressive voice assimilation across word juncture. Consider the data from Gussmann (2007: 296) given in (263).

(263)

(263a) *bojaźń boża* [bɔjaʑɲ bɔʒa] ‘fear of God’

(263b) *bojaźń przed* [bɔjaɕɲ̥ pʃɛt] ‘fear of’

An attempt at relevant representations is given in (264).

(264)

(264a) *bojaźń boża* [bɔjaʑɲ bɔʒa] ‘fear of God’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4]	[C_1	V_1	C_2	V_2
|	|	|	|	|		|		|	|	|	|
b	ɔ	j	a	ʑ	<==	ɲ		b	ɔ	ʒ	a
				<<<<<<<<<<<<<<<<{L}							

(264b) *bojaźń przed* [bɔjaɕɲ̥ pʃɛt] ‘fear of’[150]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4]	[C_1	V_1	C_2	V_2	C_3	V_3
|	|	|	|	|		|		|		|	|	|	
b	ɔ	j	a	ɕ	<==	ɲ̥		p		ʃ	ɛ	t	
				<<<<<<<<<<<<<<<{Ł}									

In (264), the voice of the TR# cluster appears to depend solely on the voice specification of the obstruent across the juncture, under “[C_1”. In (262), there is no obstruent across the juncture, and no slot “[C_1”. The parallel pronunciations—[bojaɕɲ̥] and [bɔjaʑɲ]—are not handled on a representational basis. If they were, one of them would be non-existent, contrary to fact.

On a related matter, Poznań–Cracow Voicing must be the domain of the phonology–phonetics interface for two reasons. Firstly, its occurrence across workspace edges means that the trigger and the target of voicing are not part of the same CVCV skeleton, at least under the reading thereof endorsed in this work. Secondly, the phenomenon in question is subject to sociolinguistic variability. It is not found in Warsaw Polish, while in Poznań and Cracow Polish, its status is optional, and crucially dependent on phonetic, but not morphophonemic, adjacency. In LP terms, this is a post-lexical phenomenon, and has been analysed as such in Rubach (1996).

The variability of TR# clusters, on the other hand, points to a more general observation with respect to word-internal TR clusters. Recall the data from section 4.3, where progressive voice assimilation is labelled as not occurring in prevocalic positions word-internally. Examples from (227) are repeated in (265) below, where the sonorant has no bearing on the voicelessness of the obstruent.

(265) *prąd* [pr] ‘current, n.’
tło [tw] ‘background’
klątwa [kl] ‘curse, n.’
śnić [ɕɲ] ‘dream, v.’

[150] This illustration ignores the question of what the lateral relation between C_1 and C_1 in *przed* is, if any.

As claimed earlier, sonorants do not contrast in voice. There is no point in showing any devoiced variants of [r], [w], [l] and [ɲ] by means of a morphophonemic representation, as they are not found in the relevant context in the first place. However, some instances of prevocalic progressive voice assimilation do appear, and they may be strange at first sight. Consider examples in (266).

(266)

(266a)	*kwarc* [kfart͡s] 'quartz'
	kwater–a [kfatɛra] 'quarters'
	kwik [kfʲik] 'squeal'
	kwot–a [kfɔta] 'amount; quota'
(266b)	*gwar* [gvar] 'noise'
	gwardi–a [gvardʲja] 'guard'
	gwizd [gvʲist] 'whistle, n.'
	gwóźdź [gwuɕt͡ɕ] 'nail'

The pattern is clear. The voice of the fricative [f]~[v] depends on the voice of the preceding obstruent. Despite spelling being sometimes a bad advisor, notice that the second letter in the systematised spelling of the words in (266) is 'w'. Now, a principle of 'read as you write' has been called for a few times in Chapter 3, where its role was to explain why some loanwords escape native word-internal palatalisation, and behave as if they had a word break morpheme-internally, hardly elegant. Now, if the principle were adhered to in the case of the words given in (266a), their phonetic shapes should be *[gvart͡s], *[gvatɛra], *[gvʲik], and *[gvɔta], in that order, counterfactually. Of course, morphophonology should not be conditioned by spelling; rather the reverse might be useful. Assume, then, that morphophonology is unaware of the superfluous 'w' and that the underlying representations of relevant morphs are encoded in such a way that voice on the fricative is not contrastive. The immediate problem is that obstruents have been claimed to preserve their voice specification before sonorants and vowels word-internally. If this is so, then the answer comes straight from the set of consonants that is complementary to obstruents. To put it bluntly, the morphophonemic representation of those [f]'s and [v]'s found in (266) is that of a sonorant.

The possibility of [f] and [v] being derived from underlying //w// has appeared a number of time in the literature, although sources differ with respect to which [f]'s and

[v]'s are derived, and which are present underlyingly.[151] Available analyses are particularly not uniform with respect to those fricative that do not alternate in voice, such as in *twój* [tfuj] 'yours' and *dwa* [dva] 'two'.[152] In his discussion of the underlying labiodental approximant //ʋ// in Slovak, Rubach (1993: 244) enumerates its phonetic realisations as comprising the labiodental approximant [ʋ] as such, as well as the labio-velar approximant [w], the voiced labiodental fricative [v], and the voiceless labiodental fricative [f].[153] A useful comment is provided in the book, reproduced below.

> This is a rather spectacular range of differentiation: from a glide to a voiceless obstruent. However, there is no reason for concern. As is well known, Proto-Slavic had only the glide [[w]]. In the course of historical development [[w]] changed into the fricative [v], but the extent to which this happened is different in different Slavic languages. In Polish the change is complete in the sense that the fricative [v] has been restructured as the underlying representation.
> [The paragraph below is the content of the footnote to which the above paragraph points; GM]
> This is shown by the fact, amongst others, that Polish, unlike all other Slavic languages, has a rule of progressive devoicing; compare Polish *bitw+a* [–tf–] 'battle' and Russian *bitv+a* [–tv–] 'battle'. (Rubach 1993: 244)

The shift on which Rubach comments—and which is apparently not taken by Gussmann (1992) and Bethin (1992: 162–188) as having resulted in any restructuring in Polish—is pondered on by Cyran and Nilsson (1998), with examples given not only for Polish, Russian, and Slovak, but also for Czech and Upper Sorbian. On Cyran and Nilsson's account—presented in GP—the historic consonantal expression {U} (denoting nothing but [w]) has undergone an element-based shift towards {L•h•U}, which is indeed what the set of GP elements given in (94) offers for the present-day [v].

Now, earlier analyses notwithstanding, if the [f] and [v] given in (266) should be fricatives in their respective representations, one must take note that putting them together with other obstruents is problematic both for Standard GP, and CVCV. Consider illustrations (267) and (268) below.

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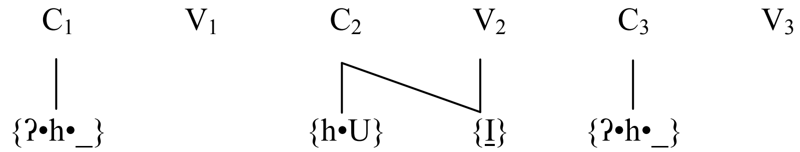
151 See, for instance, Gussmann (1981), Booij — Rubach (1987), Rubach — Booij (1990*b*), Gussmann (1992), Bethin (1992), and Rubach (1996).

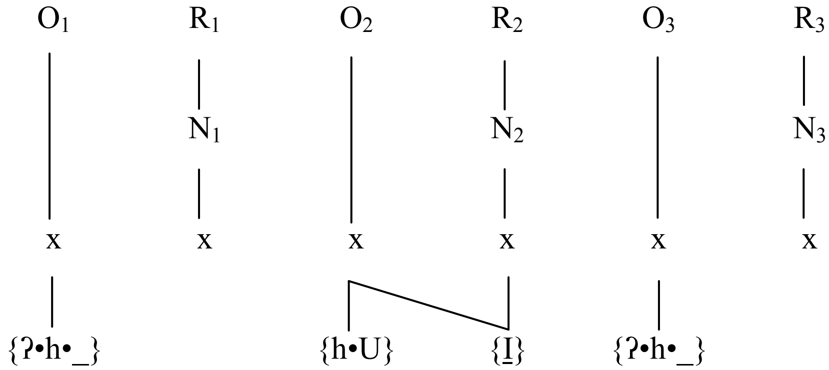
152 For [tf] and [dv] in such words being underlyingly //tf// and //dv//, as opposed to //tw// and //dw//, in that order, see Booij — Rubach (1987), Rubach — Booij (1990*b*), and Rubach (1996).

153 A convention is adopted in Rubach (1993), whereby the labio-velar approximant [w] is transcribed as [u̯]. This has no bearing on the data.

(267) *kwik* [kfʲik] ‘squeal’, putative CVCV representation

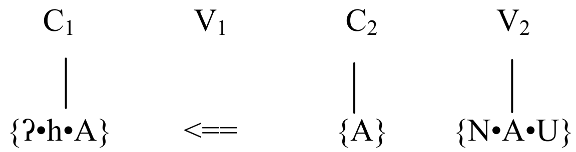


(268) *kwik* [kfʲik] ‘squeal’, putative SGP representation

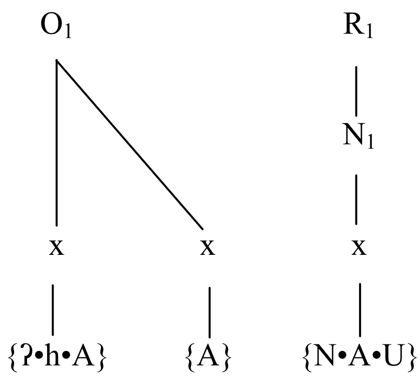


Representations (267) and (268) show no progressive devoicing at all. The fricative under C_2 or O_2 is already voiceless in its phonological expression, viz. {h•U}. Against these two illustrations, consider representations in which the consonant whose voice is truly irrelevant for the obstruent is a sonorant, in (269) and (270) below.

(269) *tr–ą* [trɔ̃w̃] ‘they rub’, CVCV representation[154]



(270) *tr–ą* [trɔ̃w̃] ‘they rub’, SGP representation



[154] The internal composition of the nasal vowel follows Gussmann (2007: 72–74).

The TR cluster qualifies for Infrasegmental Government in CVCV, and for a branching onset in SGP (see section 2.6). On either account, this means the obstruent and the sonorant form what syllable-aware post-*SPE* frameworks would call a licit onset, i.e. one that fulfils Selkirk's Sonority Sequencing Generalization.[155] The fact that //r// does not influence the voice of the preceding obstruent—no voicing to [d] takes place—is then a matter of phonetic interpretation of a sonorant caught between an underlyingly voiceless obstruent and the nucleus, all three found in a single syllabic space, which is painfully visible in (270), which holds for Warsaw Polish, and for Poznań–Cracow Polish, too.

Keeping the trivial case shown in (269) and (270) aside, consider a word form that is related to *tr–ą* through conjugation, where inflectional alternants are taken to be semantically transparent and derivable in morphophonology via morphophonemic concatenation, unlike, say, derivational morphology, i.e. word formation. Consider the series formed by illustrations (271)–(274) below.

(271) *trz–e* [tʃɛ] '(he/she/it) rubs', CVCV representation with [ʃ] as a sonorant

C_1 V_1 C_2 V_2

{ʔ•h•A} <== {A} {I̲}{A}

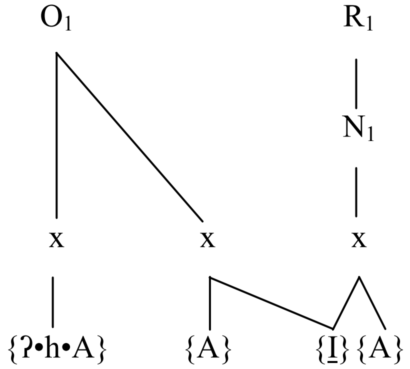
(272) *trz–e* [tʃɛ] '(he/she/it) rubs', CVCV representation with [ʃ] as an obstruent

C_1 V_1 C_2 V_2

{ʔ•h•A} {h•I•A} {A•I}

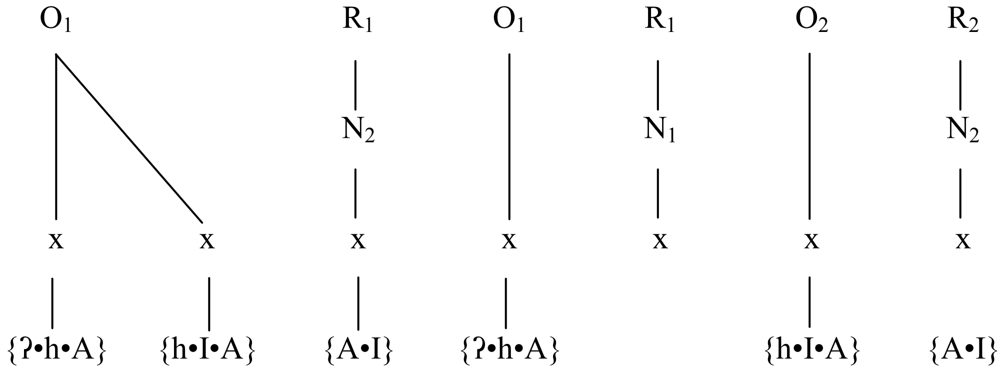
[155] "In any syllable, there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values." (Selkirk 1984: 116) See also Rubach — Booij (1990*b*) for syllabification of Polish in LP, and Gussmann (1992) for syllabification in a non-linear, non-cyclic model.

(273) *trz–e* [tʃɛ] ‘(he/she/it) rubs’, SGP representation with [ʃ] as a sonorant



(274) *trz–e* [tʃɛ] ‘(he/she/it) rubs’, SGP representations with [ʃ] as an obstruent

(274a) illicit (274b) licit (?)



At first sight, the CVCV representations in (271) and (272) are unremarkable, except for onsets C_1 and C_2 losing their Infrasegmental Government (‘<==’) when the second onset is filled with the melody {h•I•A} in the latter example; a pair of obstruents does not qualify for IG. Recall from Chapter 3 that the palatalisation //r//→[ʒ] is a productive morphophonemic process in Polish. Now, if the palatalised //r// is a sonorant in the representation, the lack of regressive voicing //t//→[d] is trivial. The obstruent under C_1 preserves its voice contrast, since C_2, being a sonorant, is not in a position to trigger any regressive assimilation—the context is not that of Poznań–Cracow Voicing; see section 4.5—so if C_2 is to be phonetically an obstruent, its voice has to agree with the preceding (not following) segment. This is the case in (271). If, however, the palatalised //r// is an obstruent, as in (272), it begs the question why it is voiceless; after all, {I}-headed vowels were suppose to palatalise //r// to [ʒ], not [ʃ]. (The latter sound was to be the phonetic output of the word-internal palatalisation of //x//; see Chapter 3.)

The difference between representations in (273) and (274) is by far more pronounced. The one in (273) has [ʃ] as a sonorant, against its phonetic property, but in accordance with word-internal, morphophonemic palatalisation. The left-hand representation in (274), i.e. (274a), preserves the branching onset, but is illicit for the same reason that bars representation (272) from having an IG domain between the onsets. Under no orthodox account of GP can two obstruents form a single onset. The apparently licit representation in (274b), on the other hand, is under suspicion of having violated the Projection Principle (see section 1.3.3), which bans resyllabification; an instance of a consonant 'jumping' to a different onset is penalised in orthodox GP, let alone the fission of one onset into two.

Gussmann (2007) does away with GP orthodoxy when analysing voice phenomena. Recall the overused example of *krzew rdestu*, which is repeated once more in (275) below.

(275) *krzew rdestu* [kʃef rdɛstu] 'knotgrass shrub' (adapted from Gussmann 2007: 298)

O	R	O	R	O	R	O	R	O	R		O	R
x	x	x	x	x	x	x	x	x	x	x	x	x
k		ʃ	ɛ	f		r		d	ɛ	s	t	u

Gussmann plays it safe when he presents the cluster [kʃ] as spanning two non-branching onsets. It is hardly surprising, since his analysis suppresses the fricative [ʃ] being the output of an autosegmental morphophonemic palatalisation caused by the vowel [ɛ]. (Recall the "Palatalization Replacement" patterns (PR's), signalled in Chapter 3 herein, say nothing of autosegmental palatalisation at a morphophonemic level of description.) Yet, a footnote is provided on the possible nature of the [ʃ] in question. "The fricative [ʃ] could be argued to be [r] marked for palatalisation (<PR1>) and thus form a branching onset with the preceding velar plosive…" (Gussmann 2007: 298). Now, the '<PR1>' bit in the reference is a diacritic. Workspace-based, modularity-oriented approach to phonology cannot use diacritics of this sort. Thus, there are two ways to go about it.

The first way is to forget about the regularity with which //r// is palatalised to [ʒ], and—even worse—take the voiceless counterpart of [ʒ], i.e. [ʃ], to be unrelated, in which case representations (272), (274b), and (275) are surface true, and their interpretation consists merely of connecting GP elements to skeletal slots to provide the correct and attested articulatory gestures. This is blatant phonetics. One could just as well use IPA symbols or go back to *SPE* and rely on linear bundles of features. They would work just fine.

The second way is notice that (272), (274b), and (275) painfully lose the relevant generalisation about Polish phonology as a whole, i.e. word-internally, prevocalic obstruents contrast for [±voice], while sonorant consonants do not. When occurring after a *phonetically* voiceless obstruent and before a vowel, where both sounds are part of the same word, i.e. a single workspace, the alveolar fricative can only be voiceless. This is because for morphophonology—not for phonetics—it acts as a sonorant, and is treated as such, despite the obstruentisation, when the relevant workspace is actualised phonetically by the phonology–phonetics interface.

If the first perspective is upheld, it is not inconceivable that a good deal of ink used to print this work has been wasted. Phonetic generalisations will stay orthogonal to phonology. If the second perspective is granted existence, though, the peculiarity of so-called progressive devoicing can be explained.

The phonetic [v] and [f] in the examples given in (266) can be //w// for the purposes of high-level phonology. This by itself is not an original contribution. Rubach (1993), and Cyran and Nilsson (1998) point to [v] and [f] being historically related to nothing else but [w]. Notice also that what is phonetically [w] in present-day Polish is historically-related to [ɫ] (see section 3.4.2). Hence, there should be no blurring of representations. May it be posited that the word *kwik* [kfʲik] 'squeal', shown earlier in (267), takes the representation in (276) below.

(276) *kwik* [kfʲik] 'squeal', new CVCV representation

C_1	V_1	C_2	V_2	C_3	V_3
|		|	|	|	
{ʔ•h•_}	<==	{U}	{I̲}	{ʔ•h•_}	

The underlying //wi// in (276) is interpreted as [fʲi] only when the preceding onset is a voiceless obstruent, and, more importantly, both onsets are on the same skeleton. As indicated earlier, across word edges, phonetic TT clusters have regressive voice assimilation. Thus, the position of consonants with respect to the skeletons on which they sit plays a crucial role in determining the directionality of assimilation.

A note is necessary. By no means does this work postulate that all [f]'s and [v]'s in Polish be represented as the sonorant //w//. This would be indefensible, as shown by word-internal lexical voice contrast these sounds provide. A few examples are given in (277) below.

(277)	*traf–i–ć* [fʲ] 'hit, v. (inf.)'	*traw–i–ć* [vʲ] 'digest, v. (inf.)
	traf–y [f] 'stroke of luck (nom.pl.)'	*traw–y* [[v] 'grass (gen.sg.)'
	fili–i [fʲ] '(office) branch (gen.pl)'	*will–i* [vʲ] 'villa (gen.pl)'
	fiz–a [fʲ] 'physics (inform.)'	*wiz–a* [vʲ] 'visa'

It should be noted that word-sized minimal pairs with [f] ~ [v] distinction are not numerous. Still, the systematic voiced vs. voiceless distinction is captured in other examples, some of which are given in (278).

(278)

(278a)	*fach* [fax] 'trade, n.'
	farb–a [farba] 'paint, n.'
	figur–a [fʲigura] 'figure, n.'
	firm–a [fʲirma] 'firm, n.'
	fok–a [fɔka] 'seal (mammal)'
(278b)	*wad–a* [vada] 'flaw'
	walk–a [valka] 'fight, n.'
	wart–ość [vartɔɕtɕ] 'value, n.'
	widok [vʲidɔk] 'view, n.'
	wol–a [vɔla] 'will, n.'

The analysis may now turn to explain that the claim about [f] and [v] being //w// underlyingly is restricted to those cases in which the phonetic shape of //w//, i.e. [f] or [v], is dependent solely on the voice specification of the obstruent that precedes it word-internally. If no obstruent precedes [f]/[v] word-internally, as is the case in (278), the underlying expressions are those for labial fricatives, i.e. {h•U} and {L•h•U}, correspondingly.

A word may be said about those generative accounts of Polish voice phenomena in which an underlying //v// or an intermediate /v/ is targeted by a rule of progressive devoicing. Following a much earlier analysis of so-called glide shifts in Polish (//w//→[v], //ł//→[w]; see Gussmann 1981), Gussmann (1992) takes [v] to be derivable from underlying //w// in the related words in (279) below; examples are adopted from Gussmann (1992: 50).

(279) *z–myw–aj–ą* [v] 'they wash up' *z–myj–ą* [j] '(id.fut.)'
żyw–y [v] 'alive' *żyj–ą* [j] 'they live'
siew–u [v] 'sowing (gen. sg.)' *siej–ą* [j] 'they sow'

In short, if the obstruent [v] in the left-hand word forms is underlyingly the sonorant //w//, chances are that the word pairs are morphophonologically related; the right-hand forms have underlying //j//'s, which alternate with //w// in morphologically conditioned environments. The underlying //w// is later converted to /v/ via so-called obstruentisation of sonorants. Once obstruentised, it can undergo regressive obstruent voice assimilation. Gussmann's analysis makes crucial reference to syllable structure. When an underlying //w// forms an onset with a preceding obstruent, the voice specification of that obstruent governs the voice specification of the underlying sonorant. (Notice sonorants are specified for [±voice] in the 1992 treatment.) Thus, when a //w// undergoes obstruentisation, the voice specification of the output fricative is dependent on the voice of the preceding obstruent, i.e. [v] after a voiced, [f] after a voiceless obstruent. Syllabification and resyllabification are governed by rules in Gussmann (1992), not by lexical specification; this analysis cannot be mechanically translated into GP. Nevertheless, the set of rules Gussmann proposes allows for deriving the word sets in (280) below.[156]

(280)

(280a) *bit–w–a* [bʲitfa] 'battle, n.'
bite–w [bʲitɛf] 'battle, n. (gen.pl.)'
bite–w–n–y [bʲitɛvny] 'battle, adj.'

(280b) *krew* [krɛf] 'blood'
krw–i [kr̥fʲi] 'bloody (gen.sg.)'
krew–n–y [krɛwnɨ] 'relative; next to kin'

[156] The list (280) combines word forms from Gussmann (1992: 50) and Rubach (1996: 73).

The most welcome outcome of Gussmann's analysis is the handling of the rather exceptional noun *krew* [krɛf] 'blood'. It can be shown that its final consonant is not a voiceless obstruent underlyingly. The related adjective *krew–n–y* has the voiced [v] in the relevant position. Recall from earlier discussion in the current chapter that word-internally, sonorants do not cause regressive voice assimilation on consonants. The [v] cannot be derived from //f// through assimilation. Compare word forms in (281).

(281) *traf–u* [trafu] 'hit, n. (gen.sg.)' *traf–n–y* [trafnɨ] 'accurate; well-aimed'
traw–y [travɨ] 'grass (gen.sg.)' *traw–n–y* [travnɨ] 'made of grass'

The relevant position in *traf–n–y* is occupied by [f], while that of *traw–n–y* by [v]. The sonorant [n] has no bearing on the voice contrast between [f] and [v], in accordance with what has been claimed at the outset of this chapter. Now, if the final [f] of *krew* were underlyingly //v//, one would expect it to cause regressive voice assimilation on the preceding obstruent, the sonorant trapped between notwithstanding; recall that sonorants found in word-internal TR clusters are transparent to regressive assimilation across obstruents. This is not the case here. The putative form *krw–i* *[grvʲi] 'blood (gen.sg.)' is unattested. Similarly, *krw–aw–ić* 'bleed (inf.)' is pronounced [kr̥favʲitɕ], not *[grvavʲitɕ]. If surface [f] and [v] are allowed to be morphophonemically a single //w//, the account of progressive devoicing appears easy. The phonology–phonetics interface operates on the premises listed in (282).

(282)

Word-internally, sonorants preceded by obstruents have no voice contrast.

Word-internally, sonorants not preceded by obstruents are voiced.

Word-internally, non-prevocalic obstruents have no voice contrast.

Phonetically adjacent underlying obstruents take the voice of the rightmost obstruent.

Word-final obstruents—alone and in TR clusters—when not phonetically adjacent to a following obstruent, neutralise voice to voiceless or to the intralexical sonorant (Warsaw Polish) or neutralise voice to what follows phonetically, lexical divisions notwithstanding (Poznań–Cracow Polish).

The appearance of the notion ‘word’ is fully mandated, provided words are delimited by workspaces in which their skeletons are put together. When workspaces are sent for phonetic interpretation, the five conditions given above apply in parallel. The distinction between obstruents and sonorants forming intralexical vs. interlexical clusters—crucial for differentiating sonorants undergoing progressive devoicing from those that can trigger Poznań–Cracow Voicing—is captured by reference to workspace breaks. No intermediate representations are necessary.

As for the neutralisation of underlying //w// and //v// into phonetic [v], the following may be said. Whatever caused underlying //w// to obstruentise to [v] and [f]—the time this change started in the history of the language is irrelevant for the synchronic description—once this took place, there appeared a systematic gap between the morphophonemic and the phonetic identity of [v] and [f]. The phonetic fricatives, despite their affiliation to the morphophonemic sonorant, were now regularly pronounceable. That is, they became part of the *phonetic* inventory of Polish. From that moment on, it was just a matter of time for new words to appear, either as product of native innovation or—very likely—as borrowings, and force the morphophonemic component to recognise them as unrelated to //w//. A cursory look at examples in (278a) will reveal that a number of these words are borrowings. For morphophonology, their [f]’s may be true fricatives, because the relevant context for acquiring them as //w//, i.e. systematic progressive devoicing after voiceless obstruents, is not available. In the same way, not all [ʃ]’s have to be devoiced forms of palatalised //r//. Those [ʃ]’s, [ʒ]’s, [f]’s and [v]’s for which no voice alternation after word-internal obstruents can be established must be analysed as underlying fricatives. This is not at all problematic for the view on phonology endorsed in this work. To the contrary, workspaces delimit domains over which morphophonemic regularity can be acquired, preserved, and produced. Any denial of words being separable entities in phonology is bound to fail.

5. Polish prefixes and prepositions

This chapter discusses some aspects of the behaviour of prefixes and prepositions in Polish. In particular, the discussion focuses on the two classes of morphological objects with respect to voice phenomena and palatalisation. Prefixes and prepositions displaying different patterns of behaviour with respect to these issues when compared to suffixes and words as such, the aim of the chapter is to generalise about the conditions under which both types of objects enter phonological workspaces. As a by-product of the analysis, the chapter needs to turn to floating melodies, whose behaviour in the context of prefixes and prepositions strengthens the conclusion that the existence of the workspace as an entity bigger than the minimal domain but smaller than an utterance can be accounted for.

5.1. Prefixes and prepositions escape final devoicing

This short section provides a handful of examples showing that prefixes and, more importantly, prepositions are integral parts of workspaces. Consider examples in (283) below.

(283)

(283a) *w–łącz–y–ć* [vwɔ̃w̃ʧɨʨ] ‘turn on (inf.)’
z–łącz–y–ć [zwɔ̃w̃ʧɨʨ] ‘connect (inf.)’

(283b) *w–łącz–n–ik* [vwɔ̃w̃ʧɲik] ‘switch, n.’
z–łącz–e [zwɔ̃w̃ʧɛ] ‘connector’

(283c) *w łącz–n–ość–i* [vwɔ̃w̃tʃnɔɕtɕi] 'in communication'
z łącz–n–ości–ą [zwɔ̃w̃tʃnɔɕtɕɔ̃w̃] 'with communication'

Recall from Chapter 4 that voice contrast on obstruents is preserved word-internally when followed by a vowel or by a prevocalic sonorant. The ability of prefixes to escape final devoicing appears hardly surprising if one considers them an integral part or words, and takes final devoicing to operate word-finally. (Note that the data in (283) are true of Warsaw Polish, which does not exhibit Poznań–Cracow Voicing.) Since, however, the term 'word' is absent from phonology proper, it must be concluded that prefixes are part of workspaces, over which contrastive phonological regularity holds. Consequently, final devoicing, discussed in Chapter 4, is workspace-final, which is definable in phonological terms; the right edge of each workspace is where the voice contrast on obstruents is lost.

5.2. Prefixes, prepositions, and palatalisation

Arguably, the most prominent property of prefixes and prepositions is their defiance in obeying the productive, word-internal palatalisation, over which Chapter 3 has pondered rather excessively. Consider examples in (284) below, with prefixes in (284a) (examples from Gussmann 2007: 303), and prepositions in (284b).

(284)

(284a) *po<u>d</u>-<u>i</u>rytowany* 'piqued' [d^j i]
be<u>z</u>-<u>i</u>mienny 'nameless' [z^j i]
prze<u>d</u>-<u>i</u>mek 'article' [d^j i]

(284b) *po<u>d</u> <u>i</u>nnym domem* 'in front of a different house' [d^j i]
be<u>z</u> <u>i</u>mienia 'without a name' [z^j i]
po<u>d</u> <u>i</u>mieniem 'under the name' [d^j i]

The list could be much longer, and it would not change the evident pattern. At the prefix–root and preposition–host joints shown in (284), the underlying //d// and //z// palatalise to [d^j] and [z^j] instead of the not very unexpected [dʑ] and [ʑ], in that order. This lack of open joint palatalisation is the first palpable diagnostic of prefixes and prepositions entering workspaces through closed (non-cyclic, non-interacting, non-cohering, Class 2) joints, presumably via *Join*(x],[y). In the case of prepositions, this is hardly surprising. It appears intuitive that prepositions are products of phrasal syntax, and they attach to words, possibly to their inflected forms, rather than constitute the base for further morphological activity. The linguistic register of English provides an appropriate name here, viz. clitics. These are word-like entities that do not appear on their own, at least in non-focused clauses, and their prosody is governed by the host on which they sit. Under this view, it should not be surprising that prepositions display the surface type of palatalisation, just as edges of adjacent words do. On the other hand, the fact that prepositions do not undergo final devoicing, which is unexceptional before non-obstruents in Warsaw Polish, shows that they are indeed present on the skeleton. Should this assumption not hold, much of this work would be futile. With respect to prefixes, the palatalisation pattern may be surprising at first sight, but is no longer exceptional when a short list of available prefixes and prepositions is produced, as in (285) below.

(285) Some prefixes and corresponding prepositions, and their default semantics (prefixes listed after Svenonius 2004: 194)

prefix	preposition	pronunciation	gloss
do	*do*	[dɔ]	to
z	*z*	[z]	up
za	*za*	[za]	down
pod	*pod*	[pɔd]	under
przy	*przy*	[pʃɨ]	at
od	*od*	[ɔd]	from
w	*w*	[v]	in
wy	*wy*	[vɨ]	out
po	*po*	[pɔ]	along
na	*na*	[na]	on
prze	*prze*	[pʃɛ]	across
u	*u*	[u]	at
o	*o*	[ɔ]	about

As shown in (285), Polish has a number of prefix–preposition pairs, which may indicate affinity of these classes in morphosyntactic terms. It is imaginable that for phonology as such, there is no distinction between them; distributional issues, such as prepositions appearing to the left of prefixes, not the other way round, are not phonological.

5.3. Vowel deletion

This section summarises some observations about vocalic sequences in Polish that are hardly any revelation, but which help to analyse the behaviour of prepositions and prefixes in terms of the input interface, and the workspaces. Recall from section 3.1 that in phonetic terms, vocalic sequences are admissible in Polish. Examples from (98) are repeated for convenience in (286).

(286)

(286a) *aort–a* [a.ɔ] 'aorta'
kakao [a.ɔ] 'cocoa'
muze–um [ɛ.u] 'museum'
ide–a [ɛ.a] 'idea'
ide–i [ɛ.i] 'idea (gen.sg.)'

(286b) *EOS* [ɛ.ɔs] '(trade mark)'
AF [a.ɛf] '(initialism for 'auto-focus')'
CO [ʦɛ.ɔ] '(initialism for *centralne ogrzewanie* 'central heating')

(286c) *za–orać* [a.ɔ] 'plough (perf.inf.)'
za–intonować [a.i] 'intone (perf.inf.)'
na–uczyć [a.u] 'teach (perf.inf.)'

As mentioned in section 3.1, sequences of vowels are not widespread in Polish. They appear predominantly in foreign words, (286a), in initialisms, (286b), and at morphological boundaries, as shown in (286c). While this was not particularly important to mention it in section 3.1, it now seems the right time to give more precision to the expression 'at morphological boundaries.' The choice of the context in (286c), i.e. a prefix–root boundary, was not at all accidental. This context, together with preposition–host boundaries, appears the only one in which a sequence of two underlying vowels can be found in a native Polish word.[157] The limitation does not apply to word junctures. Consider examples in (287).

(287) *matka orze* [a.ɔ] ‘the mother ploughs’
inne odkrycia [ɛ.ɔ] ‘other discoveries’
inny urząd [ɨ.u] ‘another office’

The lack of any limitation on the existence of V#V sequences—recall, however, that [ɨ] does not appear word-initially; see section 3.2.1—is not surprising if one considers morphophonological regularity to reach no further than to the edges of a workspace, a premise on which the present work is built. Prepositions and prefixes have already been shown to display unorthodox behaviour—they resist native, word-internal palatalisation—so their ability to take part in vocalic sequences need not be disturbing. It will be dealt with shortly. It is the limitation found elsewhere that is puzzling.

Based on the original observation made by Jakobson (1948), concerning Russian conjugation, the rule of vowel deletion has been formulated for Slavic languages. In (288) below, one finds a typical formulation used for Polish.

(288) *Vowel Deletion* (Gussmann 1980: 59; his rule (101))
$V \rightarrow \phi \, / \, \_ + V$

The formulation given in (288) is not the only one used in generative analyses of Polish. Consider a different formulation, given in (289).

(289) *Vowel Deletion (V-del)* (Rubach 1984: 97; his rule (147))
$[+\text{syll}] \rightarrow \phi \, / \, \_ \, [+\text{syll}]$
$]_V$

Notice the formulation in (289) is more restrictive than that in (288). It limits the application of *Vowel Deletion* to verbs. Additionally, it appears that, by means of the

[157] This statement deliberately excludes examples in (286a), and such native vowel sequences where [i] alone is the phonetic realisation of an underlying //ji// sequence, e.g. *do–i–ć ~ doj–ę* [dɔ.itɕ] ~ [dɔjɛ(w̃)] ‘milk, v. (inf.) ~ (1sg.pres.)’, where [dɔ.itɕ] is morphophonemically //dɔjitʲ//.

closing bracket, rule (289) limits the application of the rule to the right edge of verbs.[158] The use of the feature [+syll] need not be worrying. In the context of Rubach's (1984) analysis, rule (289) only concerns vowels; Polish does not have syllabic consonants. To get a broader picture, consider a newer formulation of *Vowel Deletion* used in Rubach's (1993) analysis of another Slavic language, Slovak, in (290) below.

(290) *Vowel Deletion* (Slovak) (Rubach 1993: 49)[159]

$$V \rightarrow \phi \ / \ \_\ V]_{\text{VERB}}$$

The formulation in (290) is closer to (288) in terms of notational devices. The basic difference between them stays in place. Rubach's approach to *Vowel Deletion* is restricted to verbs. Rubach (1984) offers some discussion on why *Vowel Deletion* should be limited to verbs:

> The restriction to verbs makes Vowel Deletion an almost entirely transparent rule… Vowel sequences, which are a commonplace in borrowings, are now automatically accounted for without constraining [(289)] to etymologically native words. There is nothing particularly important about viewing Vowel Deletion in this way. The only thing we can gain is avoiding the usage of [±Foreign] as a lexical feature. In general, this should be considered a virtue since the partition of the lexicon into major lexical categories such as nouns, verbs, etc. is unquestionable while the division of the vocabulary into native and foreign is a very delicate matter… [T]he line between borrowings and genuine exceptions is virtually impossible to draw.
>
> Etymologically foreign nouns and adjectives have vowel sequences not only inside morphemes (*teatr* 'theatre', *poet+a* 'poet', etc.) but also across morpheme boundaries… Furthermore, these vowel clusters do not show any tendency towards simplification no matter whether the words in question are recent or fairly old borrowings. This is true in equal measure about both derivational and inflectional morphology, which is surprising as inflection is by and large governed by very transparent and exceptionless rules. (Rubach 1984: 97)

The restriction of *Vowel Deletion* in Rubach's analysis is to account for the lack of simplification in vocalic sequences found in words such as those listed in (291) (adapted from Rubach 1984: 97);

[158] Within the architecture of Lexical Phonology, Rubach's (1984) *Vowel Deletion* is a cyclic rule.
[159] Rubach's (1993) *Vowel Deletion* for Slovak is a cyclic rule, too.

(291)

(291a) *ide–a* [idɛ.a] ‘idea’ ~ *ide–i* [idɛ.i] ‘(gen.sg.)’

(291b) *ide–a* ‘idea’ ~ *ide–ow–y* [idɛ.ɔvɨ] ‘idealistic’

(291c) *lice–um* [lʲiʦɛ.um] ‘high school’ ~ *lice–al–n–y* [lʲiʦɛ.alnɨ] ‘(adj.)’

All the left-hand forms in (291) are of foreign origin. The pair in (291a) shows inflectional, while the ones in (291b) and (291c) derivational relatedness. Derivational morphology is not transparent to phonology under the present work’s terms. The pairs in (291b) are (291c) are related words. Phonology proper has little to say on their shape, since it cannot operate on morphosyntactic categories, such as ‘verb’ or ‘adjective’. These have no phonetic correlates. It might be, however, the case that in derivational morphology some phonological regularity is blocked, so that the [ɛ] is not lost in (291b) or (291c). As for inflectional relatedness of the pair in (291a), it should be noted that indeed, by the sound of its desinence, the form *ide–a* appears to be inflected just as if it had a stem-final consonant. Similarly, *lice–um* has *lice–a* [lʲiʦɛ.a] as the genitive singular form. These need to be treated as exceptions to purely phonological generalisations on Polish. They are foreign and their derivational and inflectional morphology is exceptional, even if it sounds native. As a counterexample, consider the foreign word *album* [album] ‘album’. Unlike *liceum* or *muzeum* [muzɛ.um] ‘museum,’ *album* has been fully nativised in modern Polish, losing its Latin semantics of ‘white’ along the way. Unlike the other two nouns, *album* is not inflected as neuter, but as a masculine inanimate noun. The genitive singular is *album–u*. The nominative plural is *album–y*. (The desinences are the same as for the native *dom* [dɔm] ‘house’.) What has most probably happened is that the neuter desinence *–um* was at some point parsed as part of the stem, and consequently the noun has received a regular native inflection. Conversely, the same process has not taken place in the other words, which are still used with exceptional declension.

As has been shown, the restriction of *Vowel Deletion* solely to verbs in order to account for nouns and adjectives of foreign origin is not the most suitable option from the point of view taken in the present analysis. If *Vowel Deletion* is a true generalisation about Polish phonology, it cannot be overtly limited to verbs, because the term ‘verb’ is not interpretable in phonology.

As an argument for Rubach's (1984, 1993) take on *Vowel Deletion*, it should be noted that these formulations appear true to the spirit of Jakobson's (1948) analysis. That work only covered verbs. Other lexical categories were not discussed.

It would appear that the earlier formulation by Gussmann (1980), given in (288), fares better in fitting to the current analysis. It crucially mentions an important piece of the context. Consider that rule, repeated in (292), once more.

(292) *Vowel Deletion* (Gussmann 1980: 59; his rule (101))

$V \rightarrow \phi \, / \, \_ + V$

Gussmann's *Vowel Deletion* makes use of the diacritic '+' as part of the context for the rule. It does not suffice for two vowels to be adjacent. Their adjacency must be across a morpheme boundary.[160] This is exactly what is needed to account for the lack of (underlying) vowel sequences in inflectional morphology of native Polish words. However, *Vowel Deletion* as given in (292) fails to be assimilated into a CVCV-based analysis on two grounds. Firstly, it is a rule whose trigger contains a diacritic. Diacritics as such are not represented in CVCV. Secondly, the rule does not encompass morpheme-internal vowel sequences, which—in native Polish words—are conspicuously absent. Therefore, to capture these findings a new melodic elegance constraint needs to be formulated, in (293).

(293) *No Hiatus*

Contentful nuclei may not flank an empty onset.

Notice that *No Hiatus* is an elegance constraint on native underlying and on computed representations, and since these do not extend beyond workspaces, the generalisation is oblivious to word junctures. (Compare examples in (287).) Against this background, recall the prefixes in (286c). The list could be much longer. Examples abound; some are given in (294).

[160] In orthodox *SPE* terms, '+' is a boundary feature complex with the following primitives: [–segment; +FB; –WB], where 'FB' stands for 'formative boundary', and 'WB' for 'word boundary'; see *SPE* (pp. 66–67) for discussion.

(294)

(294a) *za–instal–ow–ać* [a.i] ‘install (perf.inf.)’
za–implement–ow–ać [a.i] ‘implement (perf.inf.)’
za–interes–ow–ać [a.i] ‘interest (perf.inf.)’

(294b) *prze–inacz–yć* [ɛ.i] ‘contort (perf.inf.)’
prze–ocz–yć [ɛ.ɔ] ‘overlook (perf.inf.)’
na–o–gląd–ać [a.ɔ] ‘watch (too much) (perf.inf.)’
za–iskrz–yć [a.i] ‘sparkle (perf.inf.)’
za–ostrz–yć [a.ɔ] ‘sharpen (perf.inf.)’
za–uważ–yć [a.u] ‘notice (perf.inf.)’

(294c) *za–instal–ow–an–y* [a.i] ‘installed (adj.)’
nie–adekwat–n–y [ɛ.a] ‘non–adequate’

(294d) *za–ocz–n–y* [a.ɔ] ‘extramural’
na–ocz–n–y [a.ɔ] (adj.) *świadek* _ ‘eyewitness’
nie–odz–ow–n–y [ɛ.ɔ] ‘indispensable’

(294e) *re–inkarn–acj–a* [ɛ.i] ‘reincarnation’
re–organiz–acj–a [ɛ.ɔ] ‘re–organisation’

(294f) *nie–um–ie–jęt–n–ość* [ɛ.u] ‘lack of ability’
za–ostrz–eni–e [a.ɔ] ‘sharpening, n.’

The lengthy list in (294) encompasses prefixed verbs ((294a) and (294b)), adjectives ((294c) and (294d)), and nouns ((294e) and (294f)). Foreign bases or prefixes are used in (294a), (294c), and (294e), while (294b), (294d), and (294f) arguably comprise native morphemes. The pattern is uniform. The prefixes do not lose their final vowels.[161] This indicates that the operation during which these prefixes and their morphological bases are concatenated allows for *No Hiatus* not to apply.

[161] This is hardly a new discovery. It has been pointed out and analysed, for example, by Booij and Rubach (1984).

5.4. Coherence glitch

The closed joint pattern shown for prefixes and preposition in the preceding sections is somewhat broken by the peculiar behaviour of a few prefixes in morphosyntactically conditioned environments. Consider examples in (295); left-hand examples are all perfective infinitives, right-hand examples are all imperfective infinitives.

(295)

(295a)	*za–br–a–ć* [zabratɕ] 'take away'	*za–bier–a–ć* [zab^j(j)ɛratɕ]
	wy–br–a–ć [vɨbratɕ] 'choose'	*wy–bier–a–ć* [vɨb^j(j)ɛratɕ]
	u–br–a–ć [ubratɕ] 'put on'	*u–bier–a–ć* [ub^j(j)ɛratɕ]
	po–br–a–ć [pɔbratɕ] 'take'	*po–bier–a–ć* [pɔb^j(j)ɛratɕ]
	na–br–a–ć [nabratɕ] 'take for a fool'	*na–bier–a–ć* [nab^j(j)ɛratɕ]
	prze–br–a–ć [pʃɛbratɕ] 'change clothes'	*prze–bier–a–ć* [pʃɛb^j(j)ɛratɕ]
(295b)	*ze–br–a–ć* [zɛbratɕ] 'fetch'	*z–bier–a–ć* [zb^j(ɛ)ratɕ]
	ode–br–a–ć [ɔdɛbratɕ] 'take from'	*od–bier–a–ć* [ɔdb^j(j)ɛratɕ]
	pode–br–a–ć [pɔdɛbratɕ] 'take away'	*pod–bier–a–ć* [pɔdb^j(j)ɛratɕ]
	roze–br–a–ć [rɔzɛbratɕ] 'take off'	*roz–bier–a–ć* [rɔzb^j(j)ɛratɕ]

The two sub-groups in (295) show two patterns of prefixes available in Polish. Those in (295a) emerge with their vowel both in the left-hand and in the right-hand forms. The presence of the final vowel of those in (295b) coincides with the absence of the vowel in the base (or the root). Notice that the conditioning factor is not the mere phonetic quality of the vowel in the prefix; the last example in (295a) has an [ɛ] that does not disappear in the right-hand form *prze–bier–ać*. Conversely, in all the cases in (295b) the [ɛ] of the prefix is dependent on the presence of the vowel between the [b] and the [r] of the morphological base. Vowel ~ zero alternations are exhibited by prepositions, too. Compare examples in (296a) and (296b) below.

(296)

(296a) *ode złego* [ɔdɛzwɛgɔ] ‘from evil’

ode mnie [ɔdɛmɲɛ] ‘from me’[162]

beze mnie [bɛzɛmɲɛ] ‘without me’

(296b) *od złych* [ɔd zwɨx] ‘from evil _ (gen.pl.)’

od mniejszych [ɔd mɲɛjʃɨx] ‘from smaller _ (gen.pl.)’

bez mniejszych [bɛz mɲɛjʃɨx] ‘without smaller _ (gen.pl.)’

The respective clusters of the hosts in (296a) and (296b) are (phonetically) identical, viz. [zw], and [mɲ]. The phonetic presence or absence of [ɛ] in (295b) and (296) is reminiscent of floating melodies, targeted by *Melody Association*, given earlier in (129), and repeated for convenience in (297) below.

(297) *Melody Association* (Gussmann 2007: 191)

“Attach floating [ɛ] to the nucleus when the following nucleus has no melody attached to it.”

At first sight, it appears that the some prefixes and prepositions have floating [ɛ]’s, whose attachment to the skeleton is conditioned by the root or host having or not having a vocalised vowel. If the cases shown in (295) point to a clearly demarcated duality of prefixes with respect to their vocalic behaviour, Gussmann (2007) offers a pair of ambiguous cases. Consider (297); examples are adapted from Gussmann (2007: 239).

(298) *ze–tl–i–ć* [zɛtlʲitɕ] ‘burn to cinders’ *s–tl–i–ć* [stlʲitɕ] ‘burn to cinders’

ze–psi–e–ć [zɛpɕɛtɕ] ‘go to the dogs’ *s–psi–e–ć* [spɕɛtɕ] ‘go to the dogs’

Now consider the trivial word forms in (299).

(299) *gr–a* [gra] ‘game; play’ *gier* [ɟɛr] ‘(gen.pl.)’

gr–a–ć [gratɕ] ‘play (perf.inf.)’ *gr–yw–a–ć* [grɨvatɕ] ‘(imperf.inf.)’

[162] It should be noted that in *ode mnie* and *beze mnie* the stress falls on what is the penultimate syllable of the phrase, viz. [ɔˈdɛmɲɛ], and [bɛˈzɛmɲe], not the penultimate syllable of the preposition; the forms *[ˈɔdɛmɲɛ] and *[ˈbɛzɛmɲɛ] are conspicuously absent in standard spoken Polish.

The vowel [ɛ] in the *gra ~ gier* alternation qualifies as a floating melody. The verbal forms have their [ɛ]'s left unattached, so one would expect the prefixes of the type given in (295b) to surface with vocalised [ɛ]'s both in the perfective, and in the imperfective infinitive. Consider the forms in (300), however.

(300)	*w–gr–a–ć* 'copy (onto); (lit: 'play in')'	*w–gryw–a–ć* '(id.imperf.)'
	z–gr–a–ć 'fit together; copy (from)'	*z–gryw–a–ć* '(id.imperf.)'
	ode–gr–a–ć 'act out; get even'	*od–gryw–a–ć* '(id.imperf.)'
	roze–gr–a–ć 'play (a game, e.g. of chess)'	*roz–gryw–a–ć* '(id.imperf.)

The pattern is not uniform. The prefixes *z(e)–* and *roz(e)–* have been shown, in (295b), to both vocalise their alleged //ɛ//'s before the phonetic TR cluster of the root, and not to vocalise the vowel when preceding a phonetic TVR sequence. In (300), however, the latter prefix repeats the pattern, but the former stays unvocalised in both forms. The word forms in (300) are attestable in Polish, and—on a subjective judgement—they are 'correct', whatever this term may mean.[163] Their 'correctness' notwithstanding, the picture is blurred by the erratic behaviour of *z(e)–* and *roz(e)–* when examples in (300) are compared with those in (295b).

This work does not propose any answer to the question why this is so. May it suffice to say that the duality of vocalic identity of prefixes cannot be exhaustively examined without moving outside the realm of phonology. Hardly can it be overlooked that the word forms in question are paired not only because of their phonological, or rather phonetic, behaviour, but also, perhaps more importantly, because of their aspectual properties. Aspect is not a phonological category. An examination of the whole structure done by means of chopping off audible affixes and determining possible domains without any analysis of underlying morphology is a risk that this study will not take.[164]

Morphosyntactic reservations notwithstanding, the discussion will assume that prefixes can be subdivided into interacting and non-interacting.[165] The question is how this disjunction can be captured in representational terms. Recall that this work endorses

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[163] The word forms are also found in the second edition of the IPI PAN corpus of written Polish (http://korpus.pl/), checked on 25 March 2009.
[164] See, however, Svenonius (2004*a*,*b*) for data and analysis of Slavic prefixes, and for further references.
[165] Szpyra (1989: 200ff) offers a tripartite division of prefix groups.

the view that phonological representation is built from objects that can be phonetically interpreted, but which are not phonetic objects themselves. The concatenation of interacting or non-interacting prefixes takes place at the abstract level of phonology, and it is no sooner than during phonetic interpretation at the phonology–phonetics interface that the product of concatenation is mapped onto phonetic substance. This approach excludes any transformation of phonetically-real features during the application of *Join*; only morphophonemic objects—GP elements, and skeletal slots—can be manipulated. This precludes this study from simply following those analyses of Polish prefixes in which objects that are transformed have direct phonetic equivalents, independent of representation–substance mapping, i.e. *SPE*-like or feature-geometric features.[166]

Gussmann's (2007) analysis ascribes the behaviour of prefixes and prepositions to domain structure. In short, those prefixes and prepositions that do not interact with their bases are separated by a domain boundary, while those in the other group form a single domain with the base.

An attempt at representing the first members of (296a) and (296b) is given in (301), deliberately sketched on a Standard GP skeleton, (301a) being an unfaithful adaptation of Gussmann's example (79) (p. 236).

(301) *ode złego* vs. *od złych*

(301a) *ode złego* 'from evil' [ɔdɛzwɛgɔ]; the portion shown is [ɔdɛz_]

O_1	N_1	O_2	N_2	O_3	N_4	[…]
x	x	x	x	[x	x	x
	{A•U}	{L•ʔ•h•A}	{I•A}	{L•h•A}		

[166] Such analyses include, among others, Laskowski (1975), Gussmann (1980), Rubach (1984), Booij — Rubach (1984), Nykiel-Herbert (1985), Szpyra (1989), and Bethin (1992).

(301b) *od złych* ‘from evil _ (gen.pl.)’ [ɔdzwɨx]; the portion shown is [ɔdz_]

O_1	N_1	O_2	N_2	O_3	N_4	[…]
x	x	x	x	[x	x	x
	{A•U}	{L•ʔ•h•A}	{I•A}	{L•h•A}		

In both cases, there is no expression under the N slot following what is interpreted as [z]. There being no vowel ~ zero alternation site, the position is empty. For (301a), this might be an explanation why the allegedly floating melody in //ɔdE// is attached; the next nuclear position has no full vowel, hence phonology attaches the //E// permanently. However, (301b) having the same empty position after [z], it is initially hard to explain why the //E// remains unattached.

Presumably, there is no lateral relation between [z] and [w] in *złego* and *złych*.[167] It would seem, nothing prohibits melody attachment from ‘looking’ into the nuclear slot flanked by the two consonants, as per *Melody Association*, so one might expect a uniform treatment of the floating melody in (301). This is a direct consequence of Kaye’s (1992*b*) Non-Arbitrariness Condition, given in (165), and repeated for convenience in (302) below.

(302) Non-Arbitrariness Condition (Kaye 1992*b*: 141; his “minimalist hypothesis”)
“Processes apply whenever the conditions that trigger them are satisfied.”

Gussmann’s analysis does account for this. Cases such as *od złych* are handled as being composed of a preposition devoid of its own domain being attached to the domain of the host, with which it crucially does not form a single domain. Conversely, cases like *ode złego* are analysed as constituting a single domain as a whole. Indeed, Gussmann (p. 236) suggests that phrases of the sort given in (296a) are fixed, *ode złego* appearing

[167] Gussmann’s (2007: 236) illustration of *ode złego* clearly puts [z] and [w] in separate onsets, as opposed to a single, branching onset, which is also available in Standard GP, and indeed is used a number of times in the book. The absence of a branching onset—which would translate into two unary onsets enclosed by Infrasegmental Government in CVCV—suggests the nucleus between the onsets may host a vowel ~ zero alternation site. Unfortunately, this is not to be confirmed, since the adjective *zły* ‘evil’ does not exhibit forms with a vowel between the consonants. Moreover, the nominal congener *zło* [zwɔ] does not have a plural form, which would betray the vowel’s presence. The form *?zeł* [zɛw] ‘evil (gen.pl.)’ is only hypothetical.

exclusively in the context of *nas zbaw ode złego* 'deliver us from evil,' and *beze* appearing almost exclusively before the pronoun *mnie*. In the view of this statement, (301) is redrawn as (303), where (303a) is faithful to Gussmann's example (79) in terms of domain structure.

(303) *ode złego* (with no domain boundary) vs. *od złych* (with an internal domain boundary)

(303a) *ode złego* 'from evil' [ɔdɛzwɛgɔ]; the portion shown is [ɔdɛz_]

O	N	O	N	O	N	[…]
|	|	|	|	|	|	|
x	x	x	x	x	x	x
	|	|	|	|		
	{A•U}	{L•ʔ•h•A}	{I•A}	{L•h•A}		

(303b) *od złych* 'from evil _ (gen.pl.)' [ɔdzwɨx]; the portion shown is [ɔdz_]

O	N	O	N	O	N	[…]
|	|	|	|	|	|	|
x	x	x	x	[x	x	x
	|	|		|		
	{A•U}	{L•ʔ•h•A}	{I•A}	{L•h•A}		

A remark is necessary. The position taken by the present analysis is that phonology proper has no way of telling that a phonological chunk is devoid of its domain.[168] Phonology cannot tell a preposition from a morphological base, or from a suffix. In order to do that, phonology would need to access non-phonological information. Recall that morphosyntactic terms, such as 'verb', 'prefix', or 'participle', have no phonetic correlates, and so cannot be represented on a skeleton. Hence, if Gussmann's analysis is correct, it should be concluded that the application of *Melody Association*, in order to be somehow compatible with the Non-Arbitrariness Condition, could be externally blocked in a preposition–host concatenation, where the floating vowel clearly fails to be

[168] Scheer (in prep.: §851) concludes domainhood cannot be stored lexically. In workspace-oriented phonology, lexical and phonological representations use the same code; hence, domain-delimiting brackets are not recorded in phonological representations either. See section 2.7 for discussion on the assumptions of workspace-oriented concatenation.

attached. The present proposal concludes that this blocking a matter of the syntax–phonology relation, and how the operation *Join* is run, i.e. with open or closed arguments.

From a phonological point of view, the blocking is not limited to *Melody Association*. Any operation whose Locality would cross the boundary between the preposition and the host would be affected. Before turning to data from other areas of investigation, the analysis will try to find the cause of *Melody Association* failing to attach the floating [ɛ] in (303b). A CVCV-ised and superfluously detailed illustration of that example is provided in (304).

(304) *od złych* [ɔd zwɨx] 'from evil _'; the portion shown is [ɔdz_]

C_1	V_1	C_2	V_2	[C_3	V_3	[…]
	|	|		|		
	{A•U}	{L•ʔ•h•A}	{I•A}	{L•h•A}		

The dotted arrow in (304) indicates the causality of *Melody Association*. The double bar on the arrow indicates the blocking thereof. In short, if there were no boundary between the preposition and the host—this is the case in the lexicalised expression *ode złego* in (303a)—the empty nucleus under V_3 would trigger *Melody Association* to attach the floating melody under V_2 to the skeleton. If, however, there is a boundary, *Melody Association* fails to notice the lack of melody attached to V_3 and leaves the melody under V_2 unattached. The problem is how to encode that boundary without using brackets.

It is crucial to provide a formal statement on how the operation of connecting the preposition to the host is carried out in morphophonological terms. Firstly, it is the task of the input interface to decode from the morphosyntactic structure that the two phonological chunks in (304), viz. *od* and *złego*, fulfil two conditions:

1. They are both to enter the same workspace, which entails that their concatenation is to take place in phonology proper, as opposed to finding one another casually adjacent across workspace edges, and,
2. They do not interact; the operation *Join* is performed as (x],[y) or, in classic terms, as a non-cyclic/non-cohering/Class 2 affixation.

That both chunks end up in a single workspace is evident by the lack of final devoicing on *od*, which has been demonstrated in (296b), where a sonorant follows in the second and the third example. Were *od* to remain in a workspace of its own, its obstruent should be devoiced. This is the case for citation forms of prepositions. A standalone *od* is, unsurprisingly, [ɔt]. What is perhaps less evident is the alleged immunity to argument modification under *Join*(x],[y). Consider the illustration in (305) below.

(305) *od złych* [ɔd zwɨx] 'from evil _'; the portion shown is [ɔdz_]

C_1	V_1	C_2	V_2	C_3	V_3	[…]
	|	|		|		
	{A•U}	{L•ʔ•h•A}	{I•A}	{L•h•A}		

The representation in (305) is nothing but the output of the concatenation shown earlier in (304). Notice the lack of the superficial bracket on C_3. Notice also that the nuclei V_2 and V_3 are supposed to be null phonetically. Recall that in the discussion on regressive voice assimilation in section 4.4 it has been mentioned that in Gussmann's (2007) terms a sequence of two consecutive empty nuclei does not qualify as a single domain.[169] Even though Gussmann's analysis does not use the notion of the workspace—morphophonology is a separate component in his terms—it is clear that what is represented in (305) is a chunk that is phonetically interpretable as a single entity. If there is a pause in the phonetic interpretation of the phrase *od złych*, this is not an interpretation of (305); rather, [ɔt | zwɨx] is an interpretation of a citation form of *od* and the adjective, each in a separate workspace, with the non-attached preposition yielding to final devoicing. However, the nucleus labelled V_2 in (305) is not empty; it has a floating melody, which, for reasons to be explained, has failed to become attached to the skeleton, even though the condition for its attachment, under *Melody Association*, is met, i.e. the next nucleus (V_3) has no melody attached to the skeleton.

At this point, the discussion must switch to the issue of how vowel ~ zero alternations have been handled in Standard GP, and to their treatment in CVCV. This is done in the next section.

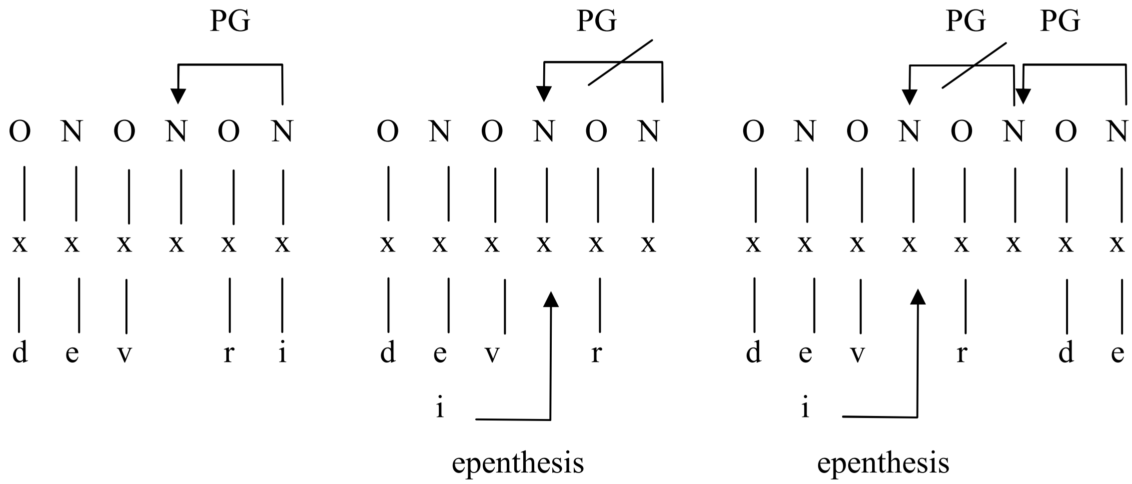
[169] This was to be the cause of the lack of assimilation in the phrase *krzew rdestu* [kʃɛf rdɛstu] 'knotgrass shrub'; see example (240b).

5.5. Floating melodies: the CVCV take

In the early days of GP, the standard assumption was that vowels that alternate with zero are lexically empty, and that the alternation as such is dependent on Proper Government. Recall from section 2.6.2 an illustration of this mechanism, given in (64), and repeated for convenience in (306) below.

(306) Representation of basic vowel ~ zero alternations in Standard Government Phonology; Turkish “transfer” (adapted from Scheer 2004: 776)

(306a) devr–i ACC (306b) devir NOM (306c) devir–den ABL



The assumption was that if a non-final empty nucleus was not properly governed, it had to vocalise for reasons of well-formedness. Virtually all early analyses of vowel ~ zero alternations in GP appeal to this mechanism; these include Charette (1991), Kaye (1990*b*, 1992*b*, 1995), and Gussmann — Kaye (1993). Interestingly, Gussmann (2007) ignores the Proper Government story while postulating *Melody Association*.[170]

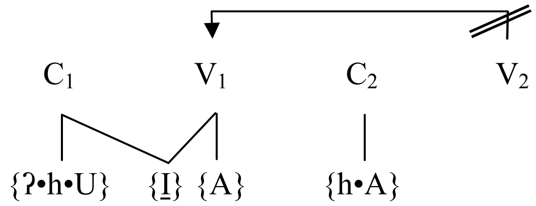
There is one good reason for agreeing with the floating vowel analysis. Namely, the phonetic quality of Polish vowel ~ zero alternants cannot be predicted. Usually, the vowel that alternates is pronounced as [ɛ]. However, there are no fewer than two [ɛ]’s at the morphophonemic level of description, i.e. the palatalising [ɛ] ({A•I}), and the non-palatalising [ɛ] ({I•A}), which this work has inherited from Gussmann (2007) in

[170] The assumption that the alternating vowels are underlyingly present in the lexicon is more along the lines of Rubach (1986) or Kenstowicz — Rubach (1987) than early GP.

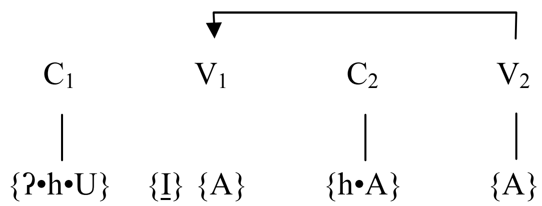
Chapter 3.[171] Both [ɛ]'s can alternate with zero.[172] On a cross-linguistic view, one can find a Slavic language in which the difference in the underlying melody of the alternating vowels surfaces phonetically, viz. Slovak.[173] The unpredictability of vowel quality appears to be the major reason for which Scheer (2004) takes the alternating vowels to have lexically-specified melody in CVCV, against earlier GP accounts. The lateral force of Government is still needed, though. That part of the early GP story has not changed. Consider examples (307) and (308) below.

(307) Vowel ~ zero alternation in CVCV, 1

(307a) *pies* [pʲ(j)ɛs] 'dog'



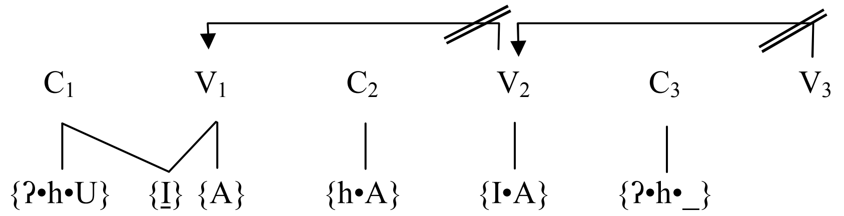
(307b) *ps–a* [psa] 'dog (gen.sg.)'



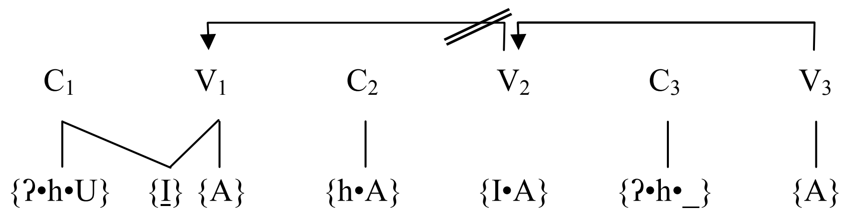
[171] Gussmann (2007) also has a third [ɛ], composed of {A•I•_}, which plays no role in the present work. See Gussmann (pp. 56–72) for discussion.
[172] Polish also has a handful of words in which the melody of the alternating vowel is pronounced as [ɔ]. These include *osioł ~ osł–a* [ɔɕɔw] ~ [ɔswa] 'he-goat (~ gen.sg.)' and *kocioł ~ kotł–a* [kɔtɕɔw] ~ [kɔtwa] 'cauldron (~ gen.sg.)'. The peculiarity of these words is that they appear to have a phonetically-back morphophonemically-palatalising vowel; notice the [s]~[ɕ] and [t]~[tɕ] alternations; I can only hypothesise if Polish morphophonology can accommodate the melody {A•U•I} as a possible nucleus; on orthodox GP's take, this is impossible, as it presupposes a rounded front vowel; for a morphophonemically-run GP/CVCV, however, this is not inconceivable. See Gussmann (2007: 246) for just a few more words of this sort.
[173] See Rubach (1986) for arguments that vowels found in vowel ~ zero alternation sites have their melodies lexically specified, and that the melodies of such vowels match those of stable vowels, unlike in earlier analyses, such as Gussmann (1980) or Rubach (1984), where the underlying melody of an alternating vowel does not match the melody of any stable vowel. See also Kenstowicz — Rubach (1987), and Rubach (1993: 134–160) on the same matter.

(308) Vowel ~ zero alternation in CVCV, 2

(308a) *pies–ek* [pʲ(j)ɛsɛk] ‘dog (dim.)’



(308b) *pies–k–a* [pʲ(j)ɛska] ‘dog (dim.gen.sg.)’

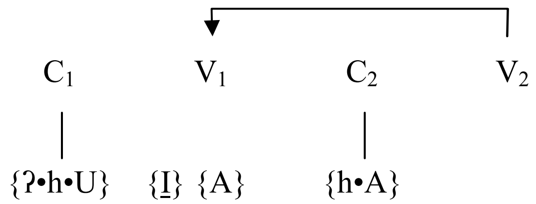


The core of Scheer’s treatment of vowel ~ zero alternations is the silencing power of Government dispensed from the next nucleus. In (307b) and (308b), the final nucleus is a full vowel; hence, it governs the nucleus carrying the floating melody, viz. V_1 in the former, and V_2 in the latter. In (307a) and (308a), the final nucleus is empty, and—apparently—does not govern the preceding nucleus, which has to vocalise. Unlike in early GP analyses, the quality of the vowel is not a single, default epenthetic vowel, but the one specified lexically; compare the two [ɛ]’s in (308a).

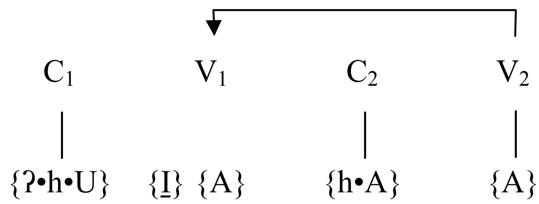
One thing needs to be clarified. Recall from section 2.6.4, that FEN’s are subject to parameterisation. In the 2008 CVCV (Scheer, in prep.), a single parameter applies: FEN’s can be either laterally active, or laterally disabled. This parameter is language-specific. Laterally-active final empty nuclei act like contentful nuclei (or full vowels); they govern and license. Laterally disabled FEN’s are like non-final empty nuclei; they do not propagate any lateral force. In Polish, final empty nuclei are active. If a FEN could govern a preceding nucleus hosting a floating melody, representations (307a) and (308a) would be against CVCV. Consider the counterfactual cases in (309) and (310) below.

(309) Vowel ~ zero alternation in CVCV, 3 (hypothetical)

(309a) *pies* *[ps] 'dog' (counterfactual)

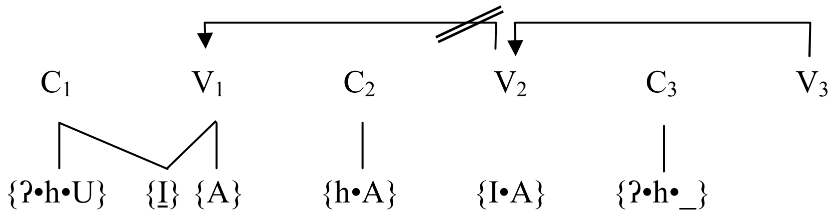


(309b) *ps–a* [psa] 'dog (gen.sg.)'

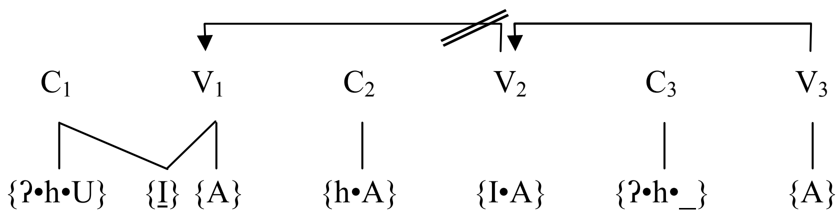


(310) Vowel ~ zero alternation in CVCV, 4 (hypothetical)

(310a) *pies–ek* *[pʲ(j)ɛsk] 'dog (dim.)' (counterfactual)



(310b) *pies–k–a* [pʲ(j)ɛska] 'dog (dim.gen.sg.)'



The hypothetical representations (309a) and (310a) are avoided in CVCV due to the following assumption. Those FEN's that can dispense lateral forces—which is the case in Polish—cannot govern nuclei with floating melodies. Furthermore, a nucleus with a floating melody cannot govern another nucleus with a floating melody. This approach results in a ternary distinction of what a nucleus can do. A full nucleus, i.e. one with a melody attached lexically, can govern and license. A nucleus with a floating melody cannot govern nor license; furthermore, it must vocalise if it is not governed by another nucleus. A final empty nucleus can govern and license an empty nucleus, but it cannot govern a nucleus with a floating melody. A non-final empty nucleus can do nothing. Thus, full nuclei, nuclei with floating melodies, and empty nuclei form three groups, the last of which is further subdivided.

The distinction between final and non-final empty nuclei, as well as the distinction between empty nuclei and those with floating melodies will play a crucial role in further analysis.

5.6. Obligatory vs. optional assimilation

To give more evidence for the distinction between domains and workspaces, the analysis now turns to the question of how far word-internal (or rather workspace-internal) palatalisation can reach. Consider the noun in (311).

(311) *sen* [sɛn] 'dream, n.'

When inflected through a non-zero desinence, the word in (311) exhibits forms with the floating [ɛ] unattached, some of which are given in (312).

(312)

(312a)	*sn–u* [snu] '(gen.sg.)'
	sn–em [snɛm] '(instr.sg.)'
(312b)	*śni–e* [ɕɲɛ] '(loc.sg.)'
	śni–e [ɕɲe] '(voc.sg.)'

It is hardly controversial that the vowel in the desinences found in (312b) is the so-called palatalising [ɛ]. Compare word forms in (313).

(313)

(313a) *brat* [brat] ‘brother’

brat–a [brata] ‘(gen.sg.)’[174]

brat–em [bratɛm] ‘(instr.sg.)’

(313b) *braci–e* [braɕɛ] ‘(loc.sg.)’

braci–e [braɕɛ] ‘(voc.sg.)’

In both nouns, the vowel [ɛ] of the locative singular and that of the vocative singular result in word-internal palatalisation of the stem-final consonant. (It is clear this is not juncture palatalisation, as the respective stem-final consonants in (312) and (313) would be [nʲ] and [tʲ], respectively, contrary to fact.)

What is not found in (313), but conspicuous in (312), is that the palatalisation affects not only the stem-final consonant //n//, but also the preceding one, viz. //s//. More strikingly, the underlying //s// in *sen* displays the typical word-internal, contrastive palatalisation—its output is [ɕ]—not the merely phonetic juncture palatalisation, viz. [sʲ]. Similarly, *sp–a–ć* [spatɕ] ‘sleep, v. (inf.)’, morpholexically-related to *sen*, is shown in (314) with the same behaviour under palatalisation.

(314)

(314a) *sp–a–ć* [spatɕ] ‘sleep, v. (inf.)’

sp–a–ł [spaw] ‘(he) slept’

sp–a–l–i [spalʲi] ‘(they) slept’

(314b) *śp–i–ę* [ɕpʲ(j)ɛ(w̃)] ‘(I) sleep’

śp–i–sz [ɕpʲiʃ] ‘(you (sg.)) sleep’

śp–i–j [ɕpʲij] ‘(sg.imperat.)’

śp–i–ą [ɕpʲ(j)ɔ̃w̃] ‘(they) sleep’

Clearly, the forms in (314b) show palatalisation on the underlying //p//. As shown earlier in section 3.3, labials [p, b, f, v, m] display the same phonetic pattern of palatalisation word-internally and across junctures, so sometimes it is not obvious which type of palatalisation applies. Here, the context in (314b) has to be word-internal.

[174] The difference in the desinence for the genitive singular is a matter of two inflectional sub-classes used; *sen* is masculine inanimate—hence the [u] in (312)—while *brat* is masculine animate. This difference is immaterial to the analysis.

The preceding consonant also palatalises, viz. //s//→[ɕ]. This palatalisation appears to be conditioned by the morphophonological relation between the sounds involved. Across the word boundary, a word final //s//, unlike //sʲ//, does not give [ɕ] before a palatalised labial, as shown by the minimal pair in (315) below

(315) *nos Pinokia* [nɔs pʲinɔca] 'Pinocchio's nose'
noś Pinokia [nɔɕ pʲinɔca] 'carry Pinocchio'

The palatalisation of //s// into [ɕ] is not phonetic. Word-initially, [ɕ] can freely precede a non-palatalised consonant. Consider examples in (316):

(316) *śruba* [ɕruba] 'screw, n.'
średnik [ɕrɛdɲik] 'semicolon'
środa [ɕrɔda] 'Wednesday'

It must be concluded that the presence of a palatalising, i.e. {I}-headed, vowel has a bearing not only on its immediate onset, viz. //p//, but it can also influence the preceding onset, i.e. //s//. Against this background, consider examples in (317).

(317) *pi–ć* [pʲitɕ] 'drink, v. (inf.)'
pij–a–ć [pʲijatɕ] '(imperf.inf.)'
pij [pʲij] '(sg.imperat.)'

As such, the examples in (317) are barely exciting. They become more interesting when enriched with a prefix. Compare examples in (318) below.

(318) *s–pi–ć* [spʲitɕ] 'make (sb.) drunk (inf.)'
s–pij–a–ć [spʲijatɕ] '(imperf.inf.)'
s–pij [spʲij] '(sg.imperat.)'

Of special attention is the pair formed by the singular imperatives of *sp–a–ć* and *s–pij–a–ć*, repeated in (319).

(319)

(319a) *śp–i–j* [ɕp^{j}ij] ‘sleep, v. (sg.imperat.)’

(319b) *s–pij* [sp^{j}ij] ‘make (sb.) drunk (sg.imperat.)’

The former has a word-internally palatalised //s//, viz. [ɕ]. The latter exhibits no palatalisation on the //s//. If any, there could only be phonetic palatalisation in (319b), viz. [s^j], but this is non-contrastive in this context, i.e. not governed by morphophonemic operations.

The reason for the difference appears simple. In (319a), the //sp// sequence is morpheme-internal, while in (319b), the //s// and the //p// belong to separate morphological entities. Palatalisation on the //p// in *s–pij* does not cross the morphological division, and it could not do so, because the prefix does not phonologically ‘see’ the morphological base (the root).[175] This behaviour follows that of prepositions. Compare examples in (320).

(320) *z piwem* [sp^{j}ivɛm] ‘with beer’
z piłką [sp^{j}iwkɔ̃w̃] ‘with a ball’

The lack of word-internal palatalisation on the preposition in (320) is not accidental in the light of the foregoing discussion. The only problem is how to capture the difference representationally. Consider illustrations in (321).

(321)

(321a) *s–pij* //zE//+//pij// [sp^{j}ij] ‘make (sb.) drunk (sg.imperat.)’

C	V	C	V	C	V
|		|	|	|	
z	ɛ	p^j	i	j	

(321b) *z piwem* //zE//+//pivɛm// [sp^{j}ivɛm] ‘with beer’

C	V	C	V	C	V	C	V
|		|	|	|	|	|	
z	ɛ	p^j	i	v	ɛ	m	

[175] See Szpyra (1989: 218–219) for similar examples.

The way the two phrases are presented in (321), they are hardly different to the word form without prefixes or prepositions, shown in (322).

(322) *śpij* //s$^{(j)}$p^{j}ij// [ɕp^{j}ij] ‘sleep, v. (sg.imperat.)’

C	V	C	V	C	V
|		|	|	|	
ɕ		p^{j}	i	j	

What distinguishes (322) from (321) is the lack of a floating melody. Notice, however, that the imperfective form of *sp–a–ć*, viz. *syp–i–a–ć* [sɨp^{j}(j)atɕ], does exhibit a vowel between the consonants [s] and [p]. The difference does not lie in the floating vowel, which can be demonstrated on yet another pair of examples, in (323) and (324) below.

(323)

(323a) *sn–u* //sEnu// [snu] ‘sleep, n. (gen.sg.)’

C	V	C	V
|		|	|
s	ɛ	n	u

(323b) *śn–ie* //sEn^{j}ɛ// [ɕɲɛ] ‘sleep, n. (loc.sg.)’

C	V	C	V
|		|	|
ɕ	ɛ	ɲ	ɛ

(324)

(324a) *z nami* //zE//+//nam^{j}i// [znam^{j}i] ‘with us’

C	V	C	V	C	V
|		|	|	|	|
z	ɛ	ɲ	a	m^{j}	i

(324b) *z nimi* //zE//+//n^{j}im^{j}i// [zɲim^{j}i] ‘with them’

C	V	C	V	C	V
|		|	|	|	|
z	ɛ	ɲ	i	m^{j}	i

The representations in (323) and (324) cannot explain why it is so that the //s// palatalises to [ɕ] in the former, but the //z// does not do palatalise to [ʑ] in the latter; recall from Chapter 3 that, across open joints, //s// and //z// palatalise to [ɕ] and [ʑ], correspondingly. The word forms in both sets of examples have a floating melody at the relevant V slot, and yet the behaviour of the //z// in the preposition does not follow that of the morpheme-internal //s//. The same applies to the [s] (//z//) of the prefix in (319b) when compared to the morpheme-internal [ɕ] (//s^{j}//) in (319a).

Of course, were it not for the assumption that all phonetic interpretation is done at the phonology–phonetics interface, and that the morphophonemic level of phonology is monostratal (see Chapter 2), the analysis could revert to such analyses as Booij — Rubach (1984), where prefixes are added to the representation on the last cycle, i.e. after inflectional suffixes are adjoined, or follow Gussmann — Kaye (1993) or Kaye (1995), where domain structure and cyclic, outward concatenation and interpretation does the trick. Recall the reservations about the *φ*/*concat* system of Kaye's (1995) (see section 2.7), most importantly the doubts as to the functions *φ* and *concat* being able to concatenate and interpret anything bigger than a word. The current analysis assumes phonological exponents of morphemes can be added in whichever order morphosyntax wishes to send them via PF, on the condition that phonology is informed on which side, i.e. to the left or to the right of the existing structure, it should put the new input. The phonological side of words can be built from the root outwards, from the leftmost prefix rightwards, or even from the rightmost suffix leftwards, as long as the Class 1 vs. Class 2 distinction between particular concatenations can be captured in the resultant representation.

Now, unlike in earlier sections of this chapter, the examples of prefixes and prepositions attached to their respective morphological bases that have been pondered on in the current section are all of the non-interacting/non-cohering/non-cyclic/Class 2 type. They all fail to have their floating vowels attached, they fail to palatalise they way morpheme-internal and Class 1 structures do, and yet they escape final devoicing, which means that, at least for phonology, they are all parts of the words to which the attach. Notice, however, that they cannot escape the omnipresent regressive voice assimilation across obstruents; recall this type of assimilation is uniform for Warsaw Polish and for Poznań–Cracow Polish. This brings the analysis to the major question. Except for escaping final devoicing, prefixes and prepositions behave as if they were separate words. ‘Separate words’ in the workspace-oriented take on phonology means ‘separate representations.’ The break in skeletal continuity has been argued to provide word-sized cues for interpretation of phonological structures by the output interface, and has been the crucial reference point for Poznań–Cracow Voicing. Now, if prefixes and prepositions are not separate words, but their behaviour cannot be properly explained by representational means as long as they are part of the same representation as the rest of the word, then all that is left is to break the skeletal, and melodic, continuity without breaking the workspace. What is more, there exists a phonological object that can serve the purpose. Something that is not an *SPE* diacritic, or an LP stratum. Something that Scheer (2004 et seq.) might take to be an object native to phonology. Enter the empty CV, presented in the next section.

5.7. Empty CV’s

In Scheer (2004; in prep.; ms.), an empty CV is a representational device that is supposed to occupy the left edge of words in languages that lack #RT clusters. Consider (325) below.

(325) Initial CV vs. #TR and #RT clusters, based on Scheer (2004; in prep.; ms.), the 2008 CVCV state (includes Locality)

languages without initial CV, e.g. Polish

(325a) #TR; well-formed

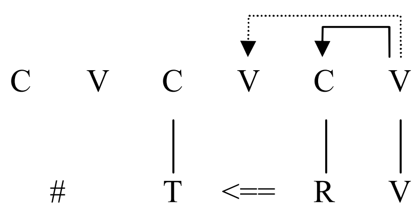
```
      C   V   C   V
      |       |   |
#     T  <==  R   V
```

(325b) #RT (or #RR; #TT); well-formed

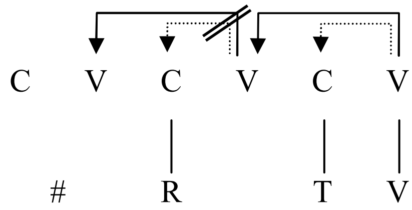
```
      C   V   C   V
      |       |   |
#     R       T   V
```

languages with initial CV, e.g. English

(325c) #TR; well-formed



(325d) #RT (or #RR; #TT); ill-formed

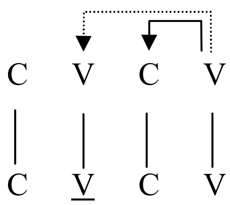


The hashes represent the left edge of words. Recall the 2008 CVCV lateral relations, from (72), repeated for convenience in (326) below.

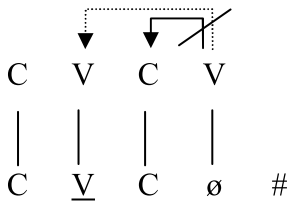
(326) Open vs. closed syllables in the 2008 CVCV, a "final version" (interpretation based on Scheer, ms.; arrow typology from (69) applies)

vowel in an "open syllable" — vowel in a "closed syllable"

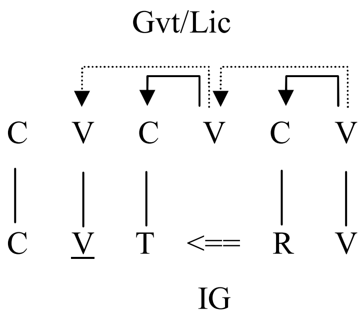
(326a) one consonant intervening



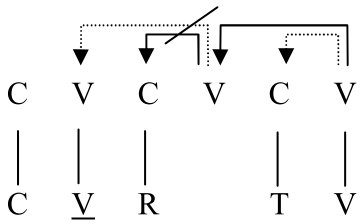
(326b) final



(326c) "branching Onset" intervening



(326d) internal



Notice that truly empty non-final nuclei, like the one flanked by R and T in (326d), do nothing. They are laterally disabled, to use Scheer's terminology. Scheer's (in prep.) application of empty CV's is orthogonal to morphophonemics. His treatment of the CV is to account for word-initial allophony in Corsican (§§943ff) and Belarusian connected speech (§§956ff). Note that from the perspective of Workspace Phonology, these are issues related to the phonology–phonetics interface. In Scheer (in prep.), the extraneous CV is not analysed in terms of Class 1 vs. Class 2 affixation. In fact, Scheer's analysis is explicitly distanced from connecting the CV with affixation.

> The introduction of the general properties of the initial CV calls for an attempt to prevent a frequent and besetting misunderstanding. For some reason, it is often believed that in languages where words are headed by the initial CV, there must be an empty CV unit at the prefix–stem boundary; for instance, *im–possible* identifies as /in–CV–possible/ on this count. This is not the case; a prefix boundary is not a word boundary. Whether a (class of) prefixes projects a CV unit is a question that is entirely independent of the decision regarding the beginning of the word. (Scheer, in prep: §920, footnote 187)

If the present work has understood the above citation correctly, the CV is mainly about the word-initial context, but Scheer does not exclude the possibility of there being CV's connected with morphological breaks. If so, then these are worth trying out in a morphophonological setting, far removed from connected speech allophony.

Recall from the lengthy exposition carried out so far, that the locus of well-formedness for morphophonology—as opposed to phonology–phonetics interpretation—is what occurs and what does not occur in morphologically simple structures. For instance, nasal + plosive clusters in English always share their place of articulation within a minimal domain, i.e. the phonological exponent of one morpheme, whereas they may (phonetically) but need not do so across certain morphological breaks (Class 2), and across word edges. This may be but need not be accidental with respect to the empty CV.

Imagine the empty CV delimits the skeletal run over which morphophonological well-formedness and elegance holds. No condition pertaining to minimal domains in morphophonemics ever crosses an empty CV unit. In English, nasals do not have to assimilate to plosives across a CV. Underlying //ŋg// clusters simplify to [ŋ] when followed by a CV. Internal arguments to compounds do not assimilate their edges to one another when separated by a CV. Finally, Polish prefixes and preposition do not palatalise properly when separated from their bases and hosts with a CV.

Imagine this is all phonologically licit. The only evidence for that is twofold. First, the aforementioned phenomena are all instances of a yes–no division of processes collected by the ever growing literature on English and Polish, let alone other languages. These are segmental reflexes of Siegel's (1974) Affix Ordering Generalisation, pondered on in section 2.3. From the current perspective, the generalisation boils down to the following. Across a morphological boundary, phonological generalisations hold as if there were no division, or those generalisations that are contingent on Locality fail. There is nothing in between for morphophonemic treatment of phonology. Second, if the basic method of collecting evidence in phonology is through analysis of phonetic data, and if there is a systematic break in linguistic patterns that can be logically traced to coincide with morphosyntactic structure—any theory of syntax will do here, potentially—then a representational blocking unit should be considered in the analysis.

Notice that an empty CV is at the risk of being taken for a diacritic. Its occurrence coincides with morphosyntactic activity. Unlike *SPE* boundaries, and LP brackets, however, an empty CV cannot trigger a specific rule to convert X into Y by itself. All it can do is to chop up representations in workspaces, so that the phonology–phonetic interface can spot the break in regularity when words are interpreted.

Therefore, the new reading of the empty CV will now make its maiden flight over Polish prefixes, and prepositions, in the next section.

5.8. Prefixes, prepositions, and the empty CV

Reconsider examples from list (98c), repeated in (327) below.

(327) *za–orać* [a.ɔ] 'plough (perf.inf.)'
za–intonować [a.i] 'intone (perf.inf.)'
na–uczyć [a.u] 'teach (perf.inf.)'

If prefixes were to be concatenated with their bases, i.e. roots, via open joints (*Join*(x,y)), then *za–intonować* 'to intone' should provide the sharpest example of this being false. Consider (328) below.

(328) *za–* + *intonować* concatenation via *Join*(x,y) (hypothetical)

(328a) input: *za–* + *intonować* [za] + [intɔnɔvatɕ] (the portion shown is: [za.in_])

C_1	V_1	C_2	V_2	C_3	[…]
|	|		|	|	|
{L•h•A}	{A}		{I}	{N•A}	[…]

(328b) output: **zintonować* *[ʑintɔnɔvatɕ] (the portion shown is: [ʑint_])

C_1	V_1	C_2	V_2	C_3	[…]
|	|	|		|	|
{L•h•A}	{I}	{N•A}		{ʔ•h•A}	[…]

The counterfactual example (328b) would be doomed to occur if prefixes were concatenated through open joints. This is the effect of no fewer than two constraints posited for Polish earlier. Under *No Hiatus*, underlying vocalic sequences are defective in Polish. The constraint, formulated in (293), reappears for convenience in (329) below.

(329) *No Hiatus*

Contentful nuclei may not flank an empty onset.

The constraint *No Hiatus* targets C_2 in the input. It is flanked by contentful nuclei, and is itself empty. It has to go. If C_2 is deleted, one V slot has to go with it. It is not V_2, though. Recall that if it were the right-hand nucleus that should be deleted, Polish would never have palatalisation triggered by melodies brought along with suffixes. Recall *I-spread,* formulated in (158), and repeated in (330) below.

(330) *I-spread*

The {I}-head of a nucleus spreads to its onset.

Under *I-spread*, if the V_2 of the input spreads its {I}-head, it should affect its onset. Now, if its original onset (C_2 in the input) is deleted, then C_1 of the output is its post-concatenation onset, while the nucleus as such is now V_1. Since a new structure is formed in a seamless fashion—this is idea of *Join*(x,y)—then an {I}-sharing relation must be contracted, and {I} becomes the head of the melody in the onset. All this is counterfactual in the case of prefixation. Against this, consider (331), then.

(331) *za–* + *intonować* concatenation via *Join*(x],[y) (actual)

(331a) input: *za–* + *intonować* [za] + [intɔnɔvatɕ] (the portion shown is: [za.in_])

C_1	V_1	C_2	V_2	C_3	[…]
|	|		|	|	|
{L•h•A}	{A}		{I}	{N•A}	[…]

(331b) output: *za–intonować* [za.intɔnɔvatɕ] (the portion shown is: [za.i_])

C_1	V_1	C_2	V_2	C_3	V_3	[…]
|	|				|	|
{L•h•A}	{A}				{I}	[…]

In example (331), neither argument to *Join* is modified. The respective bits of representation (331b) stay as they were in (331a), which is shown by the superimposed frames in both representations. The only thing that changes is the number of skeletal slots. These are the C_2V_2 pair in (331b).

The role of the empty CV in (331) may be disputed. After all, it would suffice to say that *I-spread* and *No Hiatus* are just 'blocked' from applying, and since later concatenations, should there be any, cannot access the joint in (331)—the Strict Cycle bites—the CV is pointless. Against this early conclusion, reconsider the cases of assimilation of the place of articulation, given in section 5.6. Examples (323) and (324) from that section are reworked as (332) and (333) below, in that order.

(332)

(332a) *sn–u* //sEnu// [snu] 'sleep, n. (gen.sg.)'

C	V	C	V
|		|	|
s	ɛ	n	u

(332b) *śnie* //sEnʲɛ// [ɕɲɛ] 'sleep, n. (loc.sg.)'

C	V	C	V
|		|	|
ɕ	ɛ	ɲ	ɛ

(333)

(333a) *z nami* //zE//+//namʲi// [znamʲi] ‘with us’

C_1	V_1	C_2	V_2	C_3	V_4	C_5	V_5
z	ɛ			n	a	mʲ	i

(333b) *z nimi* //zE//+//nʲimʲi// [zɲimʲi] ‘with them’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
z	ɛ			ɲ	i	mʲ	i

The representations in (332) and (333) may potentially explain the difference in the behaviour of //s// and //z// with respect to palatalisation. What they miss, however, is the lack of the floating //ɛ//’s attachment to the skeleton in (333). Under Gussmann’s *Melody Attachment*, these vowels should be attached, as the next nucleus (V_2) has no melody attached. Similarly, in CVCV, an empty nucleus cannot govern one with a floating melody, so V_1 should vocalise, which it does not do. It would appear as if the idea of putting an empty CV between morphemes were flawed. This is not necessarily so. Notice that, on most if not all accounts, empty nuclei have been used in SGP and CVCV to capture lateral relations at the word-level, more specifically, for words that are past all morphosyntactic activity, and the phonological representations thereof are closely related to the phonetic side, save for those poor empty positions. Furthermore, the core of vowel ~ zero alternations is not merely the fact that consecutive nuclei do or do not contract lateral relations. In all known cases, the relations that govern the alternations at hand are between nuclei that have contentful onsets. The alternations shown earlier in (209)–(212) are repeated for convenience in (334)–(337) below.

(334) *pies–ek* [pʲ(j)ɛsɛk] ‘dog (dim.)’

C_1	V_1	C_2	V_2	C_3	V_3
{ʔ•h•U}	{I̲}{A}	{h•A}	{I•A}	{ʔ•h•_}	

(335) *pies–k–a* [p^{j}(j)ɛska] ‘dog (dim.gen.sg.)’

C_1	V_1	C_2	V_2	C_3	V_3
{ʔ•h•U}	{I̲}{A}	{h•A}	{I•A}	{ʔ•h•_}	{A}

(336) *pies–ecz–ek* [p^{j}(j)ɛsɛʧɛk] ‘dog (dim.dim.)’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
{ʔ•h•U}	{I̲}{A}	{h•A}	{I•A}	{ʔ•h•_}	{I•A}	{ʔ•h•_}	

(337) *pies–ecz–ka* [p^{j}(j)ɛsɛʧka] ‘dog (dim.dim.gen.sg.)’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
{ʔ•h•U}	{I̲}{A}	{h•A}	{I•A}	{ʔ•h•_}	{I•A}	{ʔ•h•_}	{A}

In all the cases in (334)–(337), the nuclei that host alternating vowels have melodically-filled onsets. In Polish, no vowel ~ zero alternation ever occurs between two nuclei not separated by at least one consonant. In the light of the elegance statement, labelled *No Hiatus* in this work, this is not an accident. Prototypical Polish syllabic units are plain CV’s. Polish also has clusters of consonants—at times, these can span a considerable number of segments—but no underlying vowel sequences in native minimal domains, or across open joint affixation. This calls for a revision of the statements responsible for capturing vowel ~ zero alternations in the GP/CVCV environment. If Gussmann’s (2007) *Melody Association* is to be upheld, it requires a new formulation, possibly the one proposed in (338) below.

(338) *Melody Association* (revised)

Attach floating melody to the nucleus when the following CV is non-empty, and the nucleus of that CV has no melody attached to it.

By ‘non-empty CV’ it is meant that at least one of the positions in question has melodic content, floating or stable. Potentially, it can be the onset, the nucleus, or both. If it is only the nucleus, *Melody Association* will not attach the melody of its target; besides, such a configuration, i.e. a nucleus with a floating melody followed by empty onset, followed by a non-empty nucleus is ruled out in native sequences by *No Hiatus*. If only the onset has melodic content—presumably stable, but this is hard to verify, as Polish appears not have *consonant* ~ zero alternations—*Melody Association* applies.

If the CVCV pattern is considered, i.e. it is only the matter of internuclear Government that regulates vowel ~ zero alternations, then a word must be said about those nuclei that have the necessary power to govern. In all cases under consideration—see any example of vowel ~ zero alternation in Polish shown so far in this work—the nucleus that silences and the nucleus that is being silenced are separated by a melodically-filled onset. Thus, even if *Melody Association* is not needed in CVCV, the governing relation takes place only between nuclei of non-empty CV's.

Against the assertion above, notice that the empty CV put between the host and the preposition in (333) does not qualify for being the trigger of the revised *Melody Association*. Thus, on Gussmann's approach to vowel ~ zero alternations—albeit slightly twisted in the present analysis—there is no longer any problem with prefixes and prepositions that fail to vocalise their [ɛ]'s. On Scheer's (2004) approach, however, the empty CV would appear problematic. The nucleus being empty, it should have no governing power, and the vowel of the preposition should vocalise, contrary to fact. Notice again, however, that Scheer's approach to vowel ~ zero alternations works on non-empty CV's without making crucial reference to the content of the C slot.[176] Thus, all empty nuclei that cannot govern other nuclei in CVCV have contentful onsets; all except the special empty nucleus at the beginning of the word in some languages (see section 5.7). Hence, an empty CV inserted between morphemes, in the way postulated here, is effectively a word break within a word, and may it be posited that unlike ordinary final empty nuclei, the empty CV does have the power to govern the preceding nucleus.

[176] Jakobson (1948) did not make it to the references section in Scheer (2004).

6. English affixes

This chapter investigates the behaviour of phonology proper when faced with certain affixes in English. The discussion begins with a brief overview of English phonetics, and structuralist phonology of the language. Following the phonetic observation, the discussion will switch to textbook affixation, regular plurals and third person present tense markers. It will be shown that in these contexts phonology is deprived of interfering with the structure of the stems and the affixes, but that some well-formedness is still evident in the output of each concatenation. Later, the discussion will concentrate on the classic Class 1 vs. Class 2 distinction in English affixes, using the concept of the intermorphemic empty CV, as introduced in section 5.8.

6.1. The phonetic inventory

The variant of spoken English from which phonetic data used in the present work are taken is customarily classified as Received Pronunciation (henceforth RP). It is a spoken variety of so-called British English or English English. The variety as such is also known as Southern British English, or BBC English. A structuralist inventory of RP consonants is given in Table 2.

	Labial	Labiodental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosive	p b			t d			k g	
Fricative		f v	θ ð	s z	ʃ ʒ			h
Affricate					ʧ ʤ			
Nasal	m			n			ŋ	
Approximant	(w)				ɹ	j	w	
Lateral				l				

Table 2: An inventory of (RP) English consonants (adapted from Roach 2004: 240)

It should be noted that Table 2 deviates from Roach's (2004) illustration in assigning the glyph [ɹ] to the post-alveolar approximant–against [r]–and in the order and naming of rows and columns. It is also assumed the default realisation of //l// is the velarised [ɫ], which gives way to non-velarised [l] before vowels or [j].

Unlike (standard spoken) Polish, RP has many more than six vocalic expressions to recognise. Diagram 2 illustrates pure vowels (short and long monophthongs).

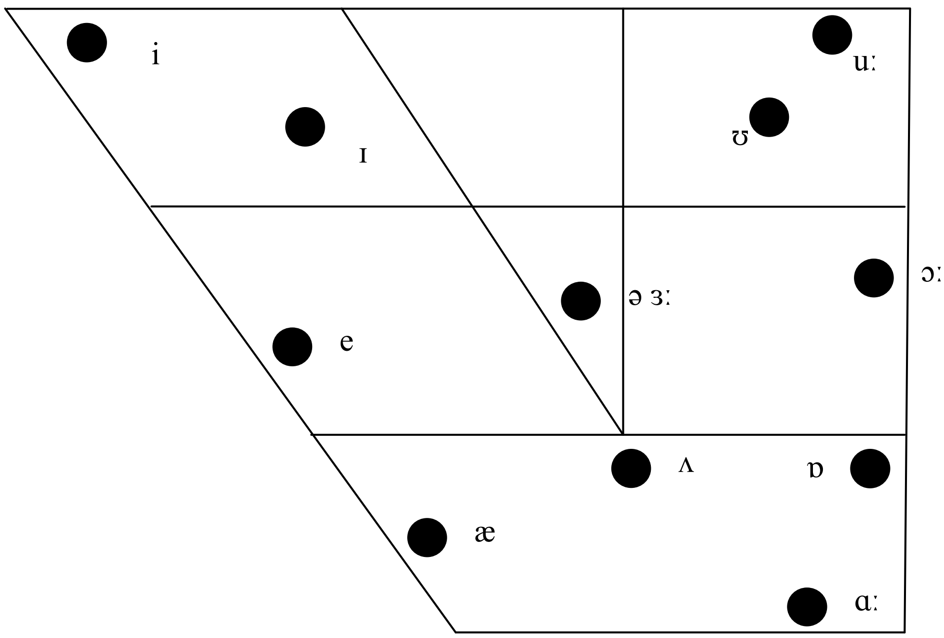


Diagram 2: An inventory of (RP) English pure vowels (adapted from Roach 2004: 242)

Closing (long) diphthongs are illustrated in Diagram 3 below.

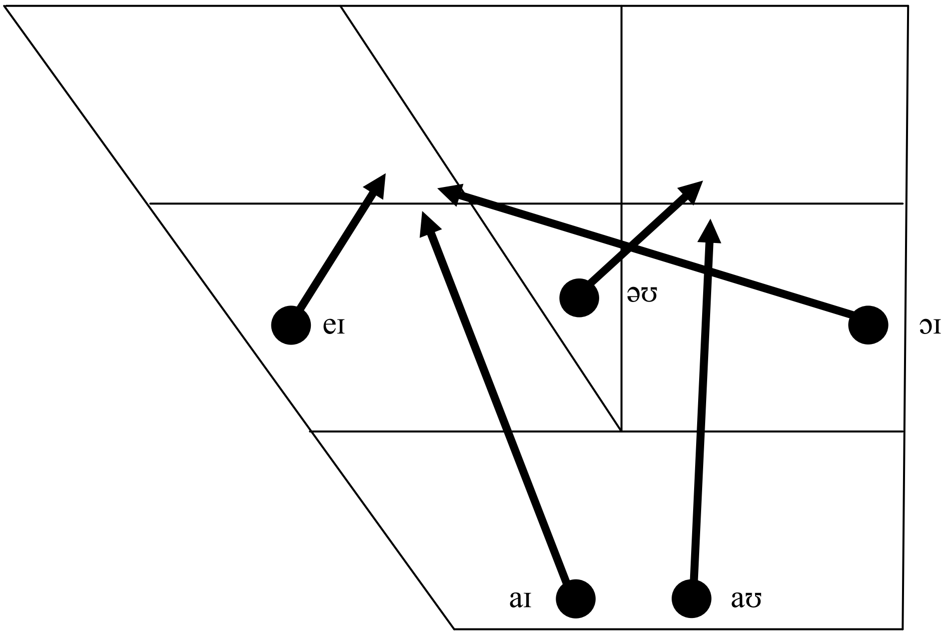


Diagram 3: An inventory of (RP) closing diphthongs (adapted from Roach 2004: 242)

Finally, (long) closing diphthongs are shown in Diagram 4.

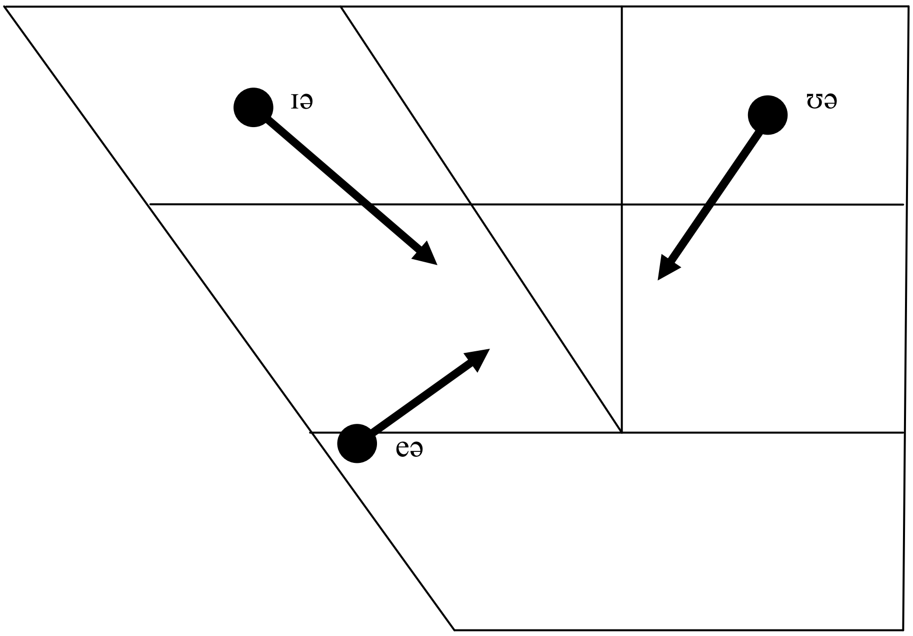


Diagram 4: An inventory of (RP) English centring diphthongs (adapted from Roach 2004: 242)

6.2. Contrastive oppositions

This section briefly discusses the most important properties of RP (and English in general) from the point of view of the present discussion.

Voice on obstruents is contrastive in English. Furthermore, there is no final devoicing on obstruents in the sense of Polish final devoicing—see Chapter 4—but non-contrastive partial devoicing is attested; it will not be marked in transcriptions herein. The voice contrast on obstruents can be shown by means of minimal pairs, such as those in (339).

(339)

(339a)	*pat* [pæt][177]	*bat* [bæt]
(339b)	*back* [bæk]	*bag* [bæg]

The contrast in voice on obstruents is not obliterated by voice assimilation. Across lexical divisions, including compounds, there is no regressive or progressive voice assimilation on obstruents. Consider examples in (340).

(340)

(340a)	*black* [blæk]
	board [bɔːd]
	blackboard [ˈblækˌbɔːd]
(340b)	*Jack* [ʤæk]
	jump–ed [ʤʌmpt]
	Jack jumped. [ˈʤæk ˈʤʌmpt]

On the one hand, such examples as those in (340) should not be overlooked. They clearly show that, from a purely phonetic point of view, English accepts clusters of obstruents with a voice contour. On the other hand, it must be stressed that morpheme-internally, two obstruents in a row must not disagree in voice. Morpheme-internal

[177] Voiceless plosives in stressed positions are aspirated, except for [s]+T and TR clusters, e.g. [st] in *string*, or [pl] in *plural*. Vowels closed by voiceless obstruents in stressed positions are clipped. See, for instance, Cruttenden (2008) for further information. Neither observation is relevant for the present analysis. Their effects are not marked in transcriptions.

clusters such as [kb] or [kʤ] are not attested. If monomorphemic chunks should form the basis of the search of well-formedness in a given language, then English data lead to the tentative formulation of hardly a novel constraint, given in (341).

(341) *Voice Agreement*
In a well-formed structure, a cluster of obstruents must agree in voice.

Non-prevocalic alveolar consonants are susceptible to regressive place of articulation (POA) assimilation. Consider examples in (342).

(342) *good* [gʊd]
boy [bɔɪ]
girl [gɜːɫ]
good boy [gʊbˈbɔɪ] ~ [gʊbːɔɪ]
good girl [gʊgˈgɜːɫ] ~ [gʊgːɜːɫ]

Notice that phonetic realisation of geminates—in the case of (342) these are the assimilated [bb] and [gg] sequences—may vary from a geminate to a phonetically long consonant. Long consonants are otherwise absent in English, and length is not contrastive on consonants. It appears hardly accidental that morpheme-internally, English does not exhibit geminates.

Unlike for alveolars, for labials and dorsals (velars) to assimilate their place of articulation to one another or to coronals (alveolars) is rare; see Cruttenden (2008: 301–303) for discussion.

6.3. Regular plurals: first approximation (wrong)

Section 6.3 as a whole entertains the possibility that the existence of three phonetically distinct plural morphs—viz. [s], [z], and [ɪz]—in English regular plural formation is a matter of phonologically-governed allomorph selection. After presenting distributional facts on regular plurals, the section offers discussion on well-formedness of English phonological minimal domains, and concludes that an allomorphy approach to plural formation would require some sort of constraint evaluation, effectively introducing

Optimality-Theoretic line of reasoning into the system. This approach is later refuted on principled grounds in section 6.4. Therefore, the remainder of section 6.3 is presented for expository purposes and for the sake of argument, rather than to claim that a constraint-based analysis of allomorph selection is what the present study endorses.

6.3.1. Phonetics, well-formedness, allomorph selection, and domain structure

Most nouns in English have regular plural markers. These occur as three morphs. Consider examples in (343).

(343)

(343a)	*ship* [ʃɪp] ~ *ship-s* [ʃɪps]
	cat [kæt] ~ *cat-s* [kæts]
	clock [klɒk] ~ *clock-s* [klɒks]
(343b)	*web* [web] ~ *web-s* [webz]
	rod [ɹɒd] ~ *rod-s* [ɹɒdz]
	dog [dɒg] ~ *dog-s* [dɒgz]
(343c)	*watch* [wɒʧ] ~ *watch-es* [ˈwɒʧɪz]
	box [bɒks] ~ *box-es* [ˈbɒksɪz]
(343d)	*law* [lɔː] ~ *law-s* [lɔːz]
	glow [ɡləʊ] ~ *glow-s* [ɡləʊz]
(343e)	*zone* [zəʊn] ~ *zone-s* [zəʊnz]
	bell [beɫ] ~ *bell-s* [beɫz]

Given the examples in (343), it is concluded that the regular plural marker can take one of the following phonetic shapes: [s], [z], or [ɪz].[178] It is also concluded, given the reservations stated in section 6.2, that the choice of a particular shape is conditioned on phonological grounds. Stems ending in a vowel, as in (343d), or in a sonorant, as in (343e), are invariably followed by [z] in regular plurals. The same morph occurs after voiced obstruents, as in (343b). Stems ending in a voiceless obstruent, as in (343a), are

[178] Among irregular plural markers one may list *–en* found in, for example, *ox* ~ *oxen* or *child* ~ *children*, and the zero found in, for example, *aircraft* ~ *aircraft* or *sheep* ~ *sheep*. These have no bearing on the present analysis.

followed by [s]. The only glitch is the presence of [ɪz] in the examples given in (343c). Before revealing the apparent constraints behind the odd morph, the analysis will investigate the mechanism behind the apparent selection of [s] and [z].

Following Harris's (1994) analysis of English, the present study takes [+voice] to be the unmarked voice value on English obstruents. An argument in favour of this assumption is the lack of final devoicing in English, which contrasts with other Germanic languages, such as German or Dutch, not to mention Slavic languages, such as Polish, or Slovak. Conversely, an argument for taking [–voice] obstruents as marked is the aspiration found on prevocalic voiceless plosives, the shortening of vowels preceding voiceless obstruents, and the devoicing of sonorants following voiceless obstruents, all phenomena taking place in stressed positions. Considering this, the present study follows Harris (1994) in attributing no voice specification to voiced obstruents in English. Conversely, voice is only specified for voiceless obstruents, by means of the element {H}.

With respect to (343b), (343d), and (343e), the selection of plural morphs appears straightforward. Voiced stem-final obstruents in (343b) having no voice specification, the plural suffix for these nouns is also unspecified for voice. The same appears to apply to vowel- and sonorant-terminated stems. Recall from the discussion on Poznań–Cracow Voicing in 4.7 that sonorants and vowels are never specified for voice in mainstream GP. The two classes belong to spontaneously-voiced speech sounds, and their voice is not contrastive, which is the main reason for excluding voice specification on sonorants and vowels in the present study. Having no voice specification on the final expression, i.e. the final segment, the stems in (343d) and (343e) follow those in (343b) in taking [z] as their plural morph.

Potentially, the idea of allomorph selection for regular plural in English may be wrong. Given that the voice of the plural marker is predictable on a phonological basis, it could be the case that the content of the suffix is simply assimilated in terms of voice. Under such a view, the underlying representation is phonetically [z], but will assimilate to [s] when following a voiceless obstruent, or—under circumstances to be investigated—emerges with an epenthetic vowel as [ɪz]. (This is actually the option investigated later in this chapter, but for expository purposes, a different analysis is presented first.)

Concerning voice alone, this approach appears well-motivated. It is backed up by the observation that morpheme-internal obstruent clusters always agree in voice. In terms of well-formedness and elegance, this observation has been captured as *Voice Agreement* in (341). As for stems ending in a sonorant or a vowel, it would suffice to take the suffix as underlyingly unspecified for voice, so there is no need for assimilation in (343d) and (343e).

Keeping this line of reasoning, one would need to ask why it is so that the stems in (343c), ending in a voiceless obstruent, refuse to take [s] as the plural morph, and take [ɪz] instead. Part of the answer comes from investigating the difference between stem-final consonants of the words in (343c) and those in (343a). All of them are voiceless, but those in (343c) are specifically a fricative in *box* and an affricate in *watch*. Still, the mere fact that *box* ends in a fricative is not the key factor. Against *box*, compare the examples in (344).

(344) *chief* [ʧi:f] ~ *chief–s* [ʧi:fs]
puff [pʌf] ~ *puff–s* [pʌfs]
birth [bɜ:θ] ~ *birth–s* [bɜ:θs]
myth [mɪθ] ~ *myth–s* [mɪθs]

Examples in (344) demonstrate that having a stem end in a fricative is not a sufficient condition for having the plural morph emerge as [ɪz]. If manner of articulation is not the factor, it might be the place. Consider examples in (345).

(345)

(345a)	*chief* [ʧi:f] ~ *chief–s* [ʧi:fs]
(345b)	*birth* [bɜ:θ] ~ *birth–s* [bɜ:θs]
(345c)	*base* [beɪs] ~ *base–s* [beɪsɪz]
	leash [li:ʃ] ~ *leash–es* [li:ʃɪz]
	box [bɒks] ~ *box–es* [bɒksɪz]
	blitz [blɪts] ~ *blitz–es* [blɪtsɪz]
(345d)	*pause* [pɔ:z] ~ *pause–s* [pɔ:zɪz]
	luge [lu:ʒ] ~ *luge–s* [lu:ʒɪz]
	adze [ædz] ~ *adze–s* [ædzɪz]
	cage [keɪʤ] ~ *cage–s* [keɪʤɪz]

The data in (345) help to identify the triggering condition for the presence of [ɪz] as the plural suffix. It is not a fricative as such (see (345a) and (345b)) but rather a fricative or an affricate whose place of articulation is alveolar or post-alveolar, independently of whether it is voiceless (in (345c)) or voiced (in (345d)). One may conclude that perhaps there is something illicit about having a [ss] or a [ʃs] sequence in English. Phonetically, these clusters are not impossible in English. The former may be found in a number of words, e.g. *dis–similitude*, *dis–satisfaction*, or *dis–service*. The latter sequence occurs in word-internal contexts rather rarely. Nevertheless, it does appear in, for example, *wash–stand*, *brush–stroke*, or *push-start*. It would be hard not to notice, however, that in all these instances, the cluster is a phonetic realisation of two consonants belonging to separate morphological entities. The examples with [ss] are all words with the prefix *dis–*, while those with [ʃs] are all morphological compounds. The rarity or rather the virtual non-existence of [ss] or [ʃs] in monomorphemic words is telling. In the lack of distributional counterevidence, it is concluded that, for whatever reason, English phonology bans these clusters as melodically complete structure, i.e. they are defective.

Viewed along these lines, the presence of [ɪz] as one of the plural morphs may indeed be viewed as an example of phonology intervening not to form a defective structure in a workspace. By the same token, the three examples given for the [ss] and the [ʃs] cluster each may indicate that when confronted with the prefix *dis–* and with a case of compounding, phonology fails to break the offending cluster, for example, by inserting an epenthetic vowel. The behaviour of plurals would suggest so. Still, a question must be asked if the [ɪ] in the [ɪz] morph is really epenthetic. Theoretically, it might be. The vowel in the suffix emerges unstressed, and its quality—also known as the KIT vowel from Wells's (1982) list of lexical sets—is not absent in monomorphemic words. Examples, however, are not particularly numerous. Unstressed [ɪ] emerges, for example, in *acid, biscuit, bonnet, carpet, debit, exit, habit,* or *locket*.[179] Importantly, in RP, these words apparently do not take alternative pronunciations with the schwa instead of the unstressed [ɪ].[180] There are also words, however, in which

[179] By a strange coincidence, all these words are borrowings from Latin, some of them via Old French; they all appear not to be monomorphemic in their source languages (according to their entries in *NODE*). They are hardly decomposable into smaller entities in English, though. Both facts may but do not have to indicate that in native English monomorphemic words, an unstressed [ɪ] is very rare.

[180] One should be aware, however, that the pronouncing dictionaries that the present analysis uses as a source of distributional data—these are *CEPD*, *LDP,* and *ODP*—have some prescriptive, rather than just descriptive flavour. By no means does the present work imply that an RP speaker would never reduce an unstressed KIT vowel to [ə].

either vowel may appear in the unstressed position. Examples include *bullet, claret, collet, garret, pellet, pullet,* or *turret.* There are also monomorphemic words in which the schwa is the only vowel in the unstressed position, such as *abbot, ballot,* or *carat*. This suggests that in RP, [ɪ] and [ə], or rather /ɪ/ and /ə/ have not undergone a phonemic merger. While it is reasonable to view the schwa as the most unmarked weak vowel in English, its distribution against [ɪ] is not a case of free variation. Against this observation notice that, except maybe for fast speech, the plural morph [ɪz] does not emerge as [əz] in RP. This is one reason not to treat the [ɪ] in this morph as epenthetic.[181]

Another argument comes from the study of vowel epenthesis in English as such. The phenomenon in question seems quite rare. English appears to be fine without vowels breaking consonant clusters. On the contrary, some clusters appear in the phonetic output because of vowel deletion. For instance, in fast speech, the word *potato* may be pronounced [ˈpteɪtəʊ]. The presence of a word-initial [pt] appears otherwise restricted to the single name *Ptah*, which is not native to English. Even for this word, alternative pronunciations, [tɑː] and [pəˈtɑː], do not exhibit the [pt] cluster. Incidentally, if [pəˈtɑː] should be viewed as a case of an epenthetic vowel breaking a disallowed consonantal sequence, in the word-initial context, then it is hard not to notice that the epenthetic vowel is the schwa, not the KIT vowel. By entailment, a truly epenthetic vowel breaking the non-occurring [ss] and [ʃs] clusters in regular plurals would be expected to be the schwa. It may be the case that in other varieties of English, for instance, Australian English or Irish English, the *–es* morph is realised as [əz], but it is not so in RP.[182]

Based on these premises, it is tentatively concluded that the vowel in the plural [ɪz] is not epenthetic. Rather, it is underlyingly present in the phonological representation of the morph as the KIT vowel. What remains to be answered is the mechanism governing the selection.

Firstly, it needs to be made clear that the analysis presented in the present section takes the process in question to be allomorph selection, rather than any sort of assimilation or dissimilation (which is the option that will be entertained in section 6.4).

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[181] Notice, however, the reservations about pronouncing dictionaries made in footnote 180. Notice also that, just like the words on which footnote 179 comments, none of the words listed in the previous two series, starting with *bullet* and *abbot*, respectively, is of Germanic origin, which adds to the dubious status of the unstressed [ɪ] as phonemic (or morphophonemic) in English.

Leaving the possibility of voice assimilation aside, the analysis will concentrate on the place of articulation. The pattern shown in (343) is clear. Stems ending with a bilabial, alveolar, or a velar plosive all take an alveolar fricative as the plural morph. Crucially, the place of articulation of either the stem-final consonant or the suffix consonant does not change. There is no assimilation in terms of place. This does not mean that any assimilation should be expected. There are instances of word-final bilabial plosive + alveolar fricative or velar plosive + alveolar fricative clusters in monomorphemic words in English, which indicates that such sequences are not banned in minimal domains. Consider examples in (346).

(346)

(346a)	*apse* [æps]
	corpse [kɔːps]
	lapse [læps]
(346b)	*axe* [æks]
	box [bɒks]
	flex [fleks]

Against this observation, notice that, proper names and borrowings excluded, unambiguously monomorphemic word-final alveolar plosive + alveolar fricative sequences are quite rare. Phonetic dictionaries may list dozens or hundreds of such words, but the alveolar plosive would only be present under certain conditions. Consider examples in (347).

(347) *cense* [sen(t)s]
ounce [aʊn(t)s]
dance [dɑːn(t)s]
balance [ˈbælən(t)s]

In all the examples in (347) the [t] may appear phonetically, but in contrastive terms its presence is vacuous. All these words are morpholexically the same if the plosive is absent. The reason for this is that in contrastive terms the cluster only comprises //n//

[182] See Wells (1982) for data and discussion on variants of English. Notice also footnote 180.

and //s//. The presence of [t] in the articulation thereof is but a timing mismatch between the raising of the velum and the release of the closure between the tongue and the alveolar ridge in //n//. In morphophonemic terms, a true word-final //ts// cluster is conspicuously rare in contexts where the consonants are not separated by a morphological division, and where one can trace back a Germanic root, which is obviously a method not applicable to proper names and Romance borrowings.

The voiced cluster //dz// fares just a little better in terms of its presence. Among monomorphemic non-borrowings, it is found in *adze* [ædz].[183] Apart from this word, word-final //dz// is just as rare as //ts// is. This indicates that, for reasons not relevant at this point in the discussion, alveolar plosive + fricative clusters found domain-finally are somewhat defective. Otherwise, one would expect a plenty of words with such clusters. Alternatively, one could assume that there is nothing phonologically inappropriate about these clusters, but they simply occur quite rarely. By doing so, one would have to conclude that there is a systematic undergeneration in the phonology of English, the reasons for which would remain a mystery. The present analysis is rather keen on the former conclusion. Domain-finally, alveolar plosive + fricative clusters are defective.

Against this background, the lack of dissimilation of //ts// and //dz// clusters in plural forms is evident. Consider forms in (348).

(348)

(348a)	*eight–s* [eɪts]
	oat–s [əʊts]
	rat–s [ɹæts]
	thought–s [θɔːts]
(348b)	*ode–s* [əʊdz]
	bead–s [biːdz]
	mood–s [muːdz]
	sword [sɔːdz]

[183] Incidentally, it appears that its Old English source *adesa* had no such cluster, since there was a vowel separating the consonants. (Etymology of *adze* is the one given in *NODE*.)

If word-final //ts// and //dz// clusters are as rare in monomorphemic words as to declare them defective, then the abundance of these clusters across a morphological boundary can be explained under one condition only. When joining the stem and the suffix, phonology fails to enforce melodic completeness on the last consonant of the stem, e.g. by changing its POA, deleting it or introducing an epenthetic vowel. In interface terms, this is an instance of *Join* in which the left-hand argument is closed to structural change. It remains to be answered if the right-hand argument, the suffix, is closed, too, or if it is open.[184] This is where less frequent intermorphemic clusters come into play. Consider the forms in (349).

(349)

(349a)	*six* [sɪks]	*six–es* [sɪksɪz]
	six–th [sɪksθ]	*six–th–s* [sɪksθs]
(349b)	*seven* [ˈsevən]	*seven–s* [ˈsevənz]
	seven–th [ˈsevənθ]	*seven–th–s* [ˈsevənθs]

The ordinal suffix *–th* appears as one morph only, viz. [θ]. From the word form *seven–th* it is clear that there is no voiced morph [ð] that would follow sonorants across the morphological division; phonetically, the final cluster is [nθ], not [nð]. There is no POA assimilation either. The suffix morph emerges as a dental fricative, not an alveolar one, while the stem-final //n// remains alveolar.[185] More importantly, if the plural suffix follows the ordinal, the resultant cluster is melodically complete with respect to voice only. If one excludes proper names (e.g. *Bethsaida*), complex words (e.g. *notwithstanding*), and de-pluralised *–s* formations (e.g. *maths*), it turns out there is not a single word in English that would contain the cluster //θs//, let alone //sθs// or //nθs//. Viewed from this perspective, the forms *six–th–s* and *seven–th–s* are either totally exceptional or telling. What they indicate is that not only is the morphophonological joint made in such a way that the left-hand argument is immune to change, but also the right-hand argument escapes modification. Were it not the case, one would expect an epenthetic vowel to break the //θs// sequence or for one of the consonants to either

[184] The present discussion is oblivious to *Join*(x,[y) and *Join*(x],y) not being on empirical record, to which the discussion on Polish in the earlier chapters has pointed.

change its POA or to delete. (Similarly, one would expect a voiced variant of the ordinal *–th* to appear after sonorants and voiced obstruents alike, viz. *[ˈsevənð].) It is concluded that that regular plural formation in English may be captured by a double-closed execution of *Join*, i.e. *Join*(x],[y).

If this conclusion is right, what needs to be explained is on what phonological grounds the alleged allomorph selection takes place. The examples in (349) have shown that despite there being a massive cluster in the word form *six–th*—there are three consonants in a row—no vowel epenthesis takes place when the plural suffix is added, resulting in *six–th–s* with a cluster of four. To see the gravity of ill-formedness in such a sequence as a whole, consider a potential representation of the right-edge of *six–th–s*, where there are as few skeletal slots as possible on CVCV skeleton. Such a representation is given in (350) (with IPA transcription for space reasons).

(350) *six–th–s* [sɪksθs]; the portion shown is [_ksθs]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
|		|		|		|	
k		s		θ		s	

The representation in (350) cannot be a well-formed minimal domain in CVCV (or in standard GP either), which does not mean it cannot be part of a workspace. A sequence of four empty nuclei escapes any governing or licensing relations recognised in SGP and CVCV. Indeed, no more than two empty nuclei in a row are recognised as allowed in CVCV (Scheer 2004). Hence, (350) must be the output of two consecutive closed concatenations, shown in (351) and (352).

(351) *six+–th* //sɪks//+//θ// [sɪksθ]; the portion shown is [_ksθ]

C_1	V_1	C_2	V_2]	[C_3	V_3
|		|		|	
k		s		θ	

[185] In the examples in (349) the stem-final alveolar fricative /s/ in *six–th* and the stem-final alveolar nasal /n/ in *seven–th* may emerge as dentalised alveolar consonants, viz. [s̪] and [n̪], respectively. This is a co-articulatory effect of a non-contrastive nature.

(352) *six–th+–s* //sɪksθ//+//s// [sɪksθs]; the portion shown is [_ksθs]

$$\begin{array}{cccccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3] & [C_4 & V_4 \\ | & & | & & | & & | & \\ k & & s & & \theta & & s & \end{array}$$

If morphology trumps over phonological well-formedness, then the output of (351) qualifies as the input to (352), which in turn yields the earlier example (350).

As for allomorph selection, there is none in (351); it has been noted that *–th* has only one morph, viz. [θ], thus there is not much choice. On the contrary, the plural suffix has been shown to have three morphs, viz. [s], [z], and [ɪz]. The discussion has pointed to [ɪz] being the most restricted, occurring only after alveolar and post-alveolar fricatives (and affricates). The word form *six–th–s* confirms that observation. The triggering factor for the selection of [ɪz] is not met in (352). The choice of [s] is made against the heaviness of the resultant cluster [ksθs]. Arguably, the output structure would be less defective if [ɪz] were chosen, giving *[sɪksθɪz]. Still, the chosen morph is [s], not [z], for that matter. Recall that, on the one hand, there appears to be no phonetic requirement on obstruents agreeing in voice in English; in compounds (e.g. *blackboard*) and across lexical boundaries (e.g. *Jack jumped*), clusters may disagree in voice. On the other hand, morpheme-internally, no instance of a cluster disagreeing in voice is found. If simplex words are the goal of the search for well-formedness in English, then it must be concluded that, after all, the choice of [s] for *six–th–s* does obey some constraints. The constraint that appears to be operative in this case is *Voice Agreement*, formulated in (341), and repeated for convenience in (353) below.

(353) *Voice Agreement*

In a well-formed structure, a cluster of obstruents must agree in voice.

One will easily notice that *Voice Agreement* alone is not enough to prevent the selection of [ɪz], especially that it would not violate the constraint at all, and the output of [sɪksθ] + [ɪz] would not contain the monstrous cluster. To show why the vowel-initial morph is not selected, the analysis will entertain an unattested case of [ɪz] being the selected morph. (354) shows the input and (355) the output.

(354) **six–th+–es* //sɪksθ//+*//ɪz// *[sɪksθɪz] (incorrect input); the portion shown is [_ksθɪz]

C_1	V_1	C_2	V_2	C_3	V_3]	[C_4	V_4	C_5	V_5
k		s		θ			ɪ	z	

(355) **six–th+–es* //sɪksθ//+*//ɪz// *[sɪksθɪz] (incorrect output); the portion shown is [_ksθɪz]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5
k		s		θ			ɪ	z	

Recall that the analysis has found the regular plural formation to be a case of *Join*(x],[y), where neither argument is open to structural change. As a result, phonology may not change the number of skeletal slots between the sum of the input arguments and the output. The Projection Principle, repeated in (356), has to hold.

(356) *Projection Principle* (KLV 1990: 221)
"Governing relations are defined at the level of lexical representation and remain constant throughout a phonological derivation"

The result of a closed joint in (355) is a structure in which there are four empty nuclei, three of them (V_1, V_2, and V_3) ungoverned. Notice that the vowel under V_4 is not a licensor to the consonant under C_3. Their relation is non-local. Against this observation, notice that in (350), repeated for convenience in (357), only two empty nuclei (viz. V_1 and V_2) appear ungoverned.

(357) *six-th-s* [sɪksθs]; the portion shown is [_ksθs]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
k		s		θ		s	

Should (357) be a minimal domain, the empty nucleus under V_4 is governed by virtue of being domain-final, although the nature of domain-final government of empty nuclei has always been somewhat mysterious in GP.[186] Even though V_4 is melodically empty, it governs V_3, which allows it to remain silent, too.[187] In the earlier example (355), this is not possible. The empty nucleus under V_5 cannot reach over V_4 to govern the empty V_3; such a governing relation would be non-local. Still, government could be established between V_4 and V_3 alone. V_4 is melodically-filled, so in GP/CVCV terms it is a fully-fledged licensor and governor. That leaves V_2 ungoverned, an illicit situation in minimal domains (if V_2 is not the last but one nucleus), as V_3 has no power to dispence; it is empty.

In (standard) GP, the existence of such forms as *six–th–s* has been accounted for by means of domains, and, although the term is not particularly popular, domain nesting. Namely, [sɪks] is the innermost domain, over which [[sɪks]θ] is built, followed by [[[sɪks]θ]s] (see Gussmann — Kaye 1993, and Kaye 1995). In this way, the empty nuclei under V_2, V_3 and V_4 in (352) are each a domain-final nucleus, which allows for their emptiness. Notice, however, that for the phonology–phonetics interface, whose task is to give phonetic interpretation to phonological representations, the internal bracketing of domains is inaccessible. There is hardly any evidence to the contrary, since such words as *six–th–s* are pronounced as one, not as *[sɪks | θs], for instance. The present analysis attributes this effect to all the potential domains that may be part of *six–th–s* being a single workspace. Workspaces are phonetically interpreted as structural monoliths. In addition, since there is no look-back into previous stages of derivation, domain nesting is not overtly expressed in the representation. Hence, the bracketed notation [[[[sɪks]θ]s] is for expository purposes only; phonologically, the representation has no brackets. (Recall that they must not be present in the structure for the simplest reason that a bracket on its own has no phonetic reality, as opposed to GP elements, albeit in conjunction with a skeletal position.) No matter how many domains enter a workspace, what is the output of each concatenation is a flat structure with no overt domain nesting. By entailment, no concatenation may be influenced by the previous steps in the derivation of either argument. This is the workspace-oriented reading of the Strict Cycle. In addition, since earlier domains are not represented in any input representation, only what is an input argument-final object counts as domain- or workspace-final for the purposes of future computation. Out of the four final obstruents

[186] If one assumes the right edge of a domain to be its head, then the final empty nucleus may be taken to be governed due to the special status of the head with respect to the remainder of the domain.
[187] This is an interpretation of the discussion on final empty nuclei in Scheer (2004: 70–71).

in *six–th–s* in (357), viz. [ksθs], only the [θs] cluster is treated as argument-final. By the same token, in *six–th* [sɪksθ], only the [sθ] cluster is relevant for the evaluation of well-formedness of empty nuclei during future concatenations. This is required by Locality.

Against the notion of domains, notice that although *Join*(x],[y) is barred from changing any structure present in the input, it must still return so well-formed and melodically complete a structure as possible in its output. This brings the analysis to an instance of constraint ranking in a model not affiliated with Optimality Theory. Consider the list of morphs available for the *six–th* + [PLURAL] concatenation in (358) and (359) below (shown with IPA transcription).

(358) Left-hand argument (one form available): *six-th* [sɪksθ]; the portion shown is [_ksθ]

$$\begin{array}{cccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 \\ | & & | & & | & \\ \mathrm{k} & & \mathrm{s} & & \theta & \end{array}$$

(359) Right-hand argument: three allomorphs in a single lexical entry (putative)

(359a) [s]

$$\begin{array}{cc} C_4 & V_4 \\ | & \\ \mathrm{s} & \end{array}$$

(359b) [z]

$$\begin{array}{cc} C_4 & V_4 \\ | & \\ \mathrm{z} & \end{array}$$

(359c) [ɪz]

$$\begin{array}{cccc} C_4 & V_4 & C_5 & V_5 \\ & | & | & \\ & \text{ɪ} & \mathrm{z} & \end{array}$$

If the assumption that (358) and (359) are to be joined by means of *Join*(x],[y) is correct, phonology may not change whatever is already present in the representations in the input. Still, having three unordered representations for the right-hand argument to choose from, it must rely on its own mechanisms to choose one. (The lack or ordering on the morphs in (359) is a result of the conjecture that there are no diacritics to 'tell' phonology which morph to choose, and that the selection is done on purely phonological grounds, as opposed to lexical specification.) Phonology has to evaluate the available morphs and choose the one that will give a well-formed output, or at least the one whose contribution will give the least defective structure.

As for the morph [s], the output would give the monstrous cluster [ksθs] in *six–th–s*, but for the locality of *Join*, the cluster that is under investigation is only [θs]. The [ks] cluster is not at the right edge of *six–th*, so its presence is not relevant for the concatenation. The potential output is considered defective; even though the number of empty nuclei in the locality of the joint would be fine, English does not allow final fricative + fricative clusters, and phonology proceeds to evaluate the other two morphs.

The voiced obstruent [z] in the second morph—recall that the order is given only for expository purposes; the morphs do not have to be ordered in any particular way for phonology—would give an equally defective output, or so it would seem. The cluster that is local to *Join* is the [θz] that would be the output of *six–th* and [z]. Again, the number of empty nuclei, viz. the two in [θϕzϕ], appears legitimate, but a final cluster of two fricatives does not. What worsens the chances of [z] being selected is that the resultant cluster would disagree in voice. Recall that *Voice Agreement* bans obstruent clusters with a voice contour. Thus, what would give [sɪksθz] as a whole is ranked below what would give [sɪksθs].

The remaining morph, viz. [ɪz], would not add to a quadruple cluster, but this is not relevant to the joining of the two representations. The locality of the joint only concerns the potential [θɪz]. Phonetically, there is nothing wrong with the sequence in question.[188] Compare the relevant portion of each of the potential concatenations in (360), (361), and (362).

[188] Interestingly, though, [θɪz] is totally absent domain-finally in monomorphemic words in English. In fact, this sequence is nowhere to be found, even domain-medially or initially, in monomorphemic English words of Germanic origin.

(360) *six–th+–s* //sɪksθ//+//s// [sɪksθs] (output 1); the portion shown is [_θs]

[…]	C_1	V_1	C_2	V_2
	θ		s	

(361) *six–th+–s* //sɪksθ//+//z// [sɪksθz] (output 2); the portion shown is [_θz]

[…]	C_1	V_1	C_2	V_2
	θ		z	

(362) *six–th+–es* //sɪksθ//+//ɪz// [sɪksθɪz] (output 3); the portion shown is [θɪz]

[…]	C_1	V_1	C_2	V_2	C_3	V_3
	θ			ɪ	z	

As indicated earlier, if *Join*(x],[y) returns what should be a well-formed and elegant structure, then the bits shown in (360) and (361) should be taken as domain- or rather workspace-final, the more so since the plural morph in both cases has only two slots in its representation. A situation in which there are two consecutive empty nuclei domain-finally is nothing illicit in CVCV. English offers a number of words which, due to the unary syllabic constituents in CVCV, have to be analysed as having a sequence of two empty nuclei at the right edge, e.g. *act, apt, belt, bulk, rust, axe, box,* or *lapse*. In all these words, there is an empty nucleus between the consonants that make up what is phonetically a cluster. Thus, the form [sɪksθs] in (360) would qualify as well-formed and elegant if only it did not contain a cluster of two fricatives. The same would be true of the form [sɪksθz] in (361), except that a cluster of obstruents disagreeing in voice is never melodically complete in English phonology proper. Finally, the portion of [sɪksθɪz] shown in (362) appears to actually qualify as a well-formed domain, perhaps surprisingly. If V_1 is empty, V_2 is called to govern it; the ungoverned empty C_2 is licit; CVCV imposes no restrictions on empty onsets (see, however, sections 5.7 and 5.8).

Given these three variants, it appears phonology must perform the following ranking:

- Allow for a banned fricative + fricative cluster with no voice contour, all other well-formedness constraints being satisfied,
- Allow for a banned fricative + fricative cluster with a voice contour, all other well-formedness constraints being satisfied,
- Allow for a licit (governed) non-final empty nucleus (V_1) and a licit (ungoverned) empty onset (C_2), all other well-formedness constraints being satisfied.

It is concluded that given these choices, phonology returns a representation with the non-contoured fricative + fricative cluster *against* the ranking. If the ranking were indeed decisive, the plural of *sixth* would be *[sɪksθɪz], contrary to fact.

The failing mechanism of selection may be applied, uselessly, to stems ending in a plosive, such as those given in (348). Hence, the output of the concatenation of, for example, *eight* and the plural marker would be *[eɪtɪz], against the ranking. Conversely, the plural of *ode*, for instance, would be *[əʊdɪz]. For both words, a plural formed with [ɪz] would be well-formed. Notice also that from a purely phonetic point of view, the unattested forms *[eɪtɪz] and *[əʊdɪz] would be somewhat 'better,' as they exhibit no consonant cluster.

When the stem ends in an alveolar or a post-alveolar fricative, such as in *six*, the ternary ranking appears to work, surprisingly. The plural of *six* [sɪks] is *six–es* [sɪksɪz], apparently in accordance with the ranking. Yet, in the case of *six*, another constraint comes into play. Recall that the discussion has pointed to such words as *di<u>s</u>–<u>s</u>imilitude*, *di<u>s</u>–<u>s</u>atisfaction*, or *di<u>s</u>–<u>s</u>ervice* as being exceptional in that they contain the cluster [ss]. The relative uniqueness of these words stems from the fact that no monomorphemic word in (Modern) English, proper names and borrowings excluded, contains a cluster of two identical consonants, otherwise known as geminates. Thus, what appears to hold for English is a constraint given in (363).

(363) *No Geminates*

Onsets flanking a phonetically unexpressed nucleus must not contain the same melody.[189]

Against this constraint, consider the choices phonology appears to have when *six* is to be concatenated with the plural suffix by means of *Join*(x],[y). Consider representations in (364) and (365) below.

(364) Left-hand argument (one form available): *six* [sɪks]; the portion shown is [_ks]

```
C1   V1   C2   V2
|         |
k         s
```

(365) Right-hand argument: three allomorphs in a single lexical entry

(365a) [s]

```
C   V
|
s
```

(365b) [z]

```
C   V
|
z
```

(365c) [ɪz]

```
C1   V1   C2   V2
     |    |
     ɪ    z
```

The evaluation follows the same principles as shown for *six–th–s*. The difference is the constraints that would be violated by the choice of the particular allomorphs. The

[189] The strength of *No Geminates* is only enhanced by the observation that consonantal length is not distinctive in English; phonetically-long consonants do not enjoy phonemic status against short consonants.

relevant parts of the three potential output representations are given in (366), (367), and (368) below.

(366) *six+–s* //sɪks//+//s// [sɪkss] (output 1); the portion shown is [_ss]

…	C_1	V_1	C_2	V_2
	s		s	

(367) *six+–s* //sɪks//+//z// [sɪksz] (output 2); the portion shown is [_sz]

…	C_1	V_1	C_2	V_2
	s		z	

(368) *six+–es* //sɪks//+//ɪz// [sɪksɪz] (output 3); the portion shown is [θɪz]

…	C_1	V_1	C_2	V_2	C_3	V_3
	s			ɪ	z	

As has been the case with the previous concatenation, viz. *six–th + –s,* all of the potential results, i.e. (366), (367), and (368), have a licit number of empty nuclei. Phonologically, the only difference between the concatenation leading to *six–th–s* and the one leading to *six–es* is the possibility of their being a geminate in the output. Given the three choices, phonology seems to perform the following ranking:

- Allow for a defective fricative + fricative cluster with no voice contour, which at the same time is a geminate, all other well-formedness constraints being satisfied,
- Allow for a defective fricative + fricative cluster with a voice contour, which would qualify as a geminate (were it not for voice), all other well-formedness constraints being satisfied,
- Allow for a licit non-final empty nucleus (V_1) and a licit empty onset (C_2), all other well-formedness constraints being satisfied.

What the data suggest is that, in this case, the ranking gives the attested result. The attested plural of *six* [sɪks] is definitely *six–es* [sɪksɪz]; hence, the sneaky suspicion that lexical selection based on candidate ranking does not work as it should. In one case, it delivers; in other cases, it points to the unattested output.

6.3.2. A residual problem

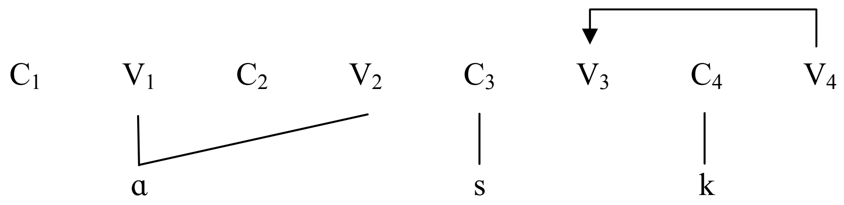
A peculiar property of final obstruent + obstruent clusters in English is the pattern concerning the manner of articulation. Of the three classes: plosives, fricatives, and affricates, the last one is not found at all. Strangely, though, not only are [ʧ] and [ʤ] barred from being the second obstruent in the cluster, which would be explained by them not being plain alveolars, but also from being the first one. Clusters of the sort [ʧs], [ʧt], [ʤz], [ʤd] are not found word-finally in monomorphemic words. Furthermore, of the remaining logical combinations—these are: plosive + plosive, plosive + fricative, fricative + plosive, fricative + fricative—only three are attested. A final cluster of fricatives is nowhere to be found in native simplex words of English (proper names excluded). This can hardly be an accident. It transpires that apart from imposing limitations on the place of articulation of the second obstruent in the final position, English also restricts the manner of articulation on the first obstruent. Namely, it can only be a fricative if the final consonant is not a fricative. This somewhat complicates the analysis. In GP terms, plosives are more complex than fricatives of the same place of articulation. Furthermore, if the cluster in question is a fricative + plosive cluster, the restrictions on the place of articulation of the second consonant appear lifted. Consider examples in (369).

(369)

(369a)	*aft* [ɑːft]
	last [lɑːst]
(369b)	*ask* [ɑːsk]
	gasp [gɑːsp]

Recall that in final plosive + plosive clusters, the final plosive has to be alveolar. It transpires that English should have a very complex licensing mechanism at the right edge of a domain. To see what lateral relations should hold between relevant expressions in such words as *aft*, or *ask*, consider the illustration of *ask* in (370).

(370) Final fricative + plosive cluster: *ask* [ɑːsk]



The final nucleus (V_4) is both the licensor to C_4, and the governor to V_3. Government allows V_3 to remain mute. Finally, the empty nucleus under V_3 does not dispense any lateral force on its own; non-final empty nuclei are laterally disabled in CVCV. This configuration is not problematic for CVCV at all. What could be problematic is the number of consecutive empty nuclei as such. What is not shown in (370) but what is imaginable is that there could be more empty nuclei in a row, in which case some of these would stay ungoverned. In the case of (370), V_4 governs V_3, while V_3 cannot govern V_2. The latter must not be silent, and it is not, since it has a lexically specified melody. If it did not have the melody, the structure would be defective; recall from 5.5 that Polish vowel ~ zero alternations apply to floating melodies, but English does not have vowel ~ zero alternations. The supernumerary empty nucleus would either escape the constraints on native minimal domains of English, or it would need to vocalise epenthetically, as in early GP treatments of the matter.

As licit as the structure in (370) appears, with all governing and licensing relations in place, it has no power of explaining, among other things, the complex relations between the place and the manner of articulation of monomorphemic TT# clusters in English. To see that the analysis along the lines of lateral relations (Government and Licensing) is in vain, consider the combinations of fricative and plosives occurring at the right edge of monomorphemic words in English, shown in Table 3, Table 4, Table 5, and Table 6 below.[190]

[190] The data included in these tables are based on research I have performed with the use of *CEPD*'s electronic version's "sound search" function—it has been used to find words of English, mono- and polymorphemic, that have the combinations in question in their standardised RP pronunciations—and

$T_{lab}T_{lab}$# NO *[pp]/[bb]	$T_{lab}T_{alv}$# PARTIAL [pt], *[bd]	$T_{lab}T_{vel}$# NO *[pk]/[bg]
$T_{vel}T_{lab}$# NO *[kp]/[gb]	$T_{vel}T_{alv}$# PARTIAL [kt], *[gd]	$T_{vel}T_{vel}$# NO *[kk]/[gg]
$T_{alv}T_{lab}$# NO *[tp]/[db]	$T_{alv}T_{alv}$# NO *[tt]/[dd]	$T_{alv}T_{vel}$# NO *[tk]/[dg]

Table 3: Occurrence of domain-final plosive + plosive clusters in English[191]

$S_{lab}S_{lab}$# NO *[ff]/[vv]	$S_{lab}S_{dent}$# NO *[fθ]/[vð]	$S_{lab}S_{alv}$# NO[192] *[fs]/[vz]	$S_{lab}S_{p\text{-}alv}$# NO *[fʃ]/[vʒ]	$S_{p\text{-}alv}S_{lab}$# NO *[ʃf]/[ʒv]	$S_{p\text{-}alv}S_{dent}$# NO *[ʃθ]/[ʒð]
$S_{p\text{-}alv}S_{alv}$# NO *[ʃs]/[ʒz]	$S_{p\text{-}alv}S_{p\text{-}alv}$# NO *[ʃʃ]/[ʒʒ]	$S_{alv}S_{lab}$# NO *[sf]/[zv]	$S_{alv}S_{dent}$# NO *[sθ]/[zð]	$S_{alv}S_{alv}$# NO *[ss]/[zz]	$S_{alv}S_{p\text{-}alv}$# NO *[sʃ]/[zʒ]

Table 4: Occurrence of domain-final fricative + fricative clusters in English

NODE and *OED*, used to check their etymology in order to slash polymorphemic words from the resultant list.

[191] In this and in the three subsequent tables the following conventions are used for the leading rows: T = plosive, S = fricative, lab = labial, alv = alveolar, p-alv = post-alveoral, and vel = velar.

[192] Word-final [fs] and [vz] sequences–totally absent in native (rooted) monomorphemic words in English–are not uncommon in proper names, pluralia tantum, and de-pluralised *–s* formations, e.g. *fisticuffs, nerves, Graves*.

$T_{lab}S_{lab}$# NO *[pf]/[bv]	$T_{lab}S_{dent}$# NO[193] *[pθ]/[bð]	$T_{lab}S_{alv}$# PARTIAL [ps], *[bz]	$T_{lab}S_{p\text{-}alv}$# NO *[pʃ]/[bʒ]	$T_{vel}S_{lab}$# NO *[kf]/[gv]	$T_{vel}S_{dent}$# NO[194] *[kθ]/[gð]
$T_{vel}S_{alv}$# PARTIAL [ks], *[gz]	$T_{vel}S_{p\text{-}alv}$# NO *[kʃ]/[gʒ]	$T_{alv}S_{lab}$# NO *[tf]/[dv]	$T_{alv}S_{dent}$# NO[195] *[tθ]/[dð]	$T_{alv}S_{alv}$# YES [ts]/[dz]	$T_{alv}S_{p\text{-}alv}$# NO *[tʃ]/[dʒ]

Table 5: Occurrence of domain-final plosive + fricative clusters in English

$S_{lab}T_{lab}$# NO *[fp]/[vb]	$S_{lab}T_{alv}$# PARTIAL [ft], *[vd]	$S_{lab}T_{vel}$# NO *[fk]/[vg]
$S_{p\text{-}alv}T_{lab}$# NO *[ʃp]/[ʒb]	$S_{p\text{-}alv}T_{alv}$# NO *[ʃt]/[ʒd]	$S_{p\text{-}alv}T_{vel}$# NO *[ʃk]/[ʒg]
$S_{alv}T_{lab}$# PARTIAL [sp], *[zb]	$S_{alv}T_{alv}$# PARTIAL [st], *[zd]	$S_{alv}T_{vel}$# PARTIAL [sk], *[zg]

Table 6: Occurrence of domain-final fricative + plosive clusters in English

As evident from the tables above, native monomorphemic words in English exhibit a very limited set of possible final fricative/plosive combinations. Interestingly, even if a given combination of place and manner does appear—this happens in 9 out of 34 possible cases—only one combination is attested in both the voiceless and the voiced variant, viz. [ts] and [dz]. The remaining eight cases are exclusively voiceless. One might take this to be an accident, but for the present study, this state of affairs suggests just one conclusion as far as melodic elegance is concerned; word-final clusters of obstruents are defective in English. Were clusters of obstruents elegant in English, one would expect them to occur in more than 10 combinations out of 34 possible. (Actually, if one should distinguish between the elegance of voiceless clusters and that of voiced

[193] The word *depth* seems the only genuine example of a word in English that terminates in //pθ//, i.e. where the plosive is not epenthetic, as in e.g. *warmth* [wɔːm(p)θ]. Nevertheless, just as *warmth* may be claimed to be morphologically decomposable into *warm+th*, *depth* might be derivationally related to *deep+th*, which disqualifies it from the table.
[194] In phonetic terms, such word like *length, strength* may contain [ŋkθ]. However, the presence of [k] is contrastively vacuous. Furthermore, both words might be derivationally related to *long+th* and *strong+th*, respectively.
[195] Such words as *breadth, width*, even though terminating in [tθ] or [dð]—both combinations are attested—hardly qualify as monomorphemic.

clusters, it must be noticed that there are only 10, counting [ts] and [dz] separately, combinations attested out of 68 appearing licit under *Voice Agreement*, and 136 technically possible, *No Geminates* notwithstanding.) What remains to be answered is not why so many combinations are unattested, but rather what allows the minority of 10 combinations, if one distinguishes between [ts] and [dz], to occur in what appears to be native monomorphemic words in English.

Leaving the voiced sequence [dz] aside for a while, notice again that in all instances where the first consonant is a plosive, the second consonant is always a plain alveolar. All the attested combinations boil down to the following short list: [pt], [kt], [ps], [ks], and [ts]. It appears amusingly non-accidental that the second member of all these clusters, viz. [t] and [s], is independently found as an inflectional morph in English. The former is the morph found in regular preterite and perfective participle formation. The latter has been discussed at length as one of the morphs found in regular plural formation. (Notice that the voiced sequence [dz] also displays what is otherwise found as a plural morph, viz. [z].)

In those combinations where the first member is a fricative, the second one may only be a plain alveolar plosive. The resultant list of attested cases is even shorter: [ft], [sp], [st], and [sk]. In the case of [ft] it is strikingly obvious that the final [t] is also found in preterite and perfective participle word forms in English. The same applies to the sequence [st]. However, in the case of [st] one should also consider the other two clusters beginning with [s], viz. [sp] and [sk], so-called *s*+C clusters (due to Kaye 1992*a*). The three are exceptional in English. Not only do they occur domain-finally, against the predominant pattern of no obstruent clusters in that position, but they also occur domain-initially, where they may also form triplets with an approximant being the third member of the cluster.[196] If sequences such as [kst] in *text*, [spɹ] in *spring* or [skw] in *squeeze* should be perfectly elegant, it begs the question why English does not have voiced counterparts to these. Domain-final [gzd] and domain-initial [zbɹ] or [zgw] are absent. From this perspective, there is little point in asking how the attested (voiceless) sequences found their way into English in the first place, and hypothesising on Classical Greek, Latin, Common West Germanic or other sources. Notice that the question is not why voiceless *s*+C clusters abound in present-day English on any functional grounds. It

[196] These sequences have been subject to some investigation in GP. Arguably, the most influential analysis is Kaye's (1992*a*) paper, which has introduced the notion of *Magic Licensing*. See also Scheer (2004: 103–108) for discussion on Kaye's analysis and a different proposal.

seems rather uncontroversial that [s], being a sibilant, is perceptually salient, so it makes a welcome sound for any functionality-oriented theory of phonology. Still, its voiced counterpart [z] is hardly ever found in intramorphemic clusters with a voiced plosive following, not to mention clusters in which the plosive as such would be followed by an approximant. Why that should be so is left unanswered.

An alternative approach to the incriminated consonantal sequences is to think of them as being foreign to English, and thus defective in terms of their phonological representation, but nevertheless dormant, and under no threat of extinction, by virtue of being systematically pronounceable at the phonology–phonetics interface. If one looks at *s*+C clusters through a structuralist, segmental prism, it is hardly a discovery that in all the cases found in English, each of the putative segments that build these clusters enjoys a considerable amount of phonological freedom in occurring in CV units. Word-initial [s] + vowel, voiceless plosive + vowel, and approximant + vowel combinations are commonplace. If all the ingredients: [s], voiceless plosives, and approximants, are found in English independently of *s*+C clusters, then there is no a priori reason for them not to be pronounceable when combined. It is worthwhile that all the *s*+C clusters in English, if viewed in (linear) segmental terms, can be broken down into sequences in which [s] is word-final, while the plosive + approximant remainder follows across the word boundary. More importantly, while the [s] may but does not have to be part of a monomorphemic word—it may just as well be phonetic interpretation of an inflectional morpheme—all the word-initial plosive + approximant sequences across the word boundary may be found to belong to non-prefixed words in English.[197] This is not to say that any sequence that is otherwise attested across the word boundary should become part of English words. In the case of [z] followed by, for example, [dɹ] in *John'<u>s</u> <u>dr</u>ink* or [bɹ] in *Jim'<u>s</u> <u>br</u>ide*, the phonetic existence of [zdɹ] and [zbɹ] in English does not open the door for the sequences in question to enter the lexicon. It appears that an additional necessary condition for a sequence violating sonority sequencing, or whatever is understood as constituting a licit onset + nucleus unit, and, arguably, violating OCP to become an onset + nucleus sequence in English is to be imported, via loanwords, from a language that already has it. Notice that this appears to be working for Polish, too.

[197] Just for the record: [pj] is found, for example, in *pure*, [pl] in *please*, [pɹ] in *prey*, [tj] in *tune*, [tɹ] in *true*, [kj] in *cure*, [kw] in *queen*, [kl] in *club*, and [kɹ] in *crew*. Word-initial [pw], and [tl] are absent, and so are [spw], and [stl]. Finally, [tw] is found in *twin*, but the corresponding *s*+TR cluster [stw] is not attested. It would be rather suspicious if the reverse were true.

Recall the phonetically palatalised CV units that violate native word-internal palatalisation, discussed in Chapter 3; their phonetic identity exists independently of loanwords, across word boundaries. Still, the phonetic existence of a sequence across the word boundary does not lead to introducing it into the lexicon in an automatic fashion. For instance, [ʥʲi] is a possible sequence at the word boundary in Poznań–Cracow Polish—a example of this may be the phrase *pieniądz i monetaryzm* [ʥʲ i] 'money and monetarism'—and yet [ʥʲi] only remains a potential CV unit in Polish words (see Gussmann 2007: 7). There are no word-internal tokens of the sequence in question. If language contact and loanwords are considered, it becomes clear that [ʥʲi] is not found word-internally because no loanwords containing a necessarily similar sequence have been adopted with [ʥʲi] in Polish. The source of many loanwords in recent years, English has no [ʥʲi] word-internally, so no English loanword is likely to be adopted with [ʥʲi], unlike [ʤʲi]—this is another sequence absent from native Polish vocabulary—which is found in *dżins–y* [ʤʲinsɨ] 'jeans' or *jingiel* [ʤʲĩ̯ɟɛl] 'jingle', obvious English loanwords. One can only hope that in due time Polish is exposed to a language that has [ʥʲi] word-internally, and whose (native) vocabulary is so influential that the necessary loanword is finally found and adopted.

This diversion in the discussion has not been without a reason. This section has shown that there is some regularity concerning consonant clusters in English that can surely be accounted for in descriptive terms, but which presents substantial difficulty for any model whose proponents wish to have any explanatory adequacy. Just because some combinations of consonants are attested in words that do not otherwise exhibit any signs of morphological complexity—there are no affixes to be cut off in order to find the root—it does not mean that the phonological domains in which these occur are exemplars of melodic elegance. Quite the reverse is true. The scarcity of morpheme-final [pt] and [kt] clusters in English, and the absence of their voiced counterparts, viz. [bd] and [ɡd], in the same context, betrays the phonological representations that have them as defective. Similarly, while [spɹ] or [skɹ] are found morpheme-initially, the voiced obstruent variants of these clusters, [zbɹ] and [zɡɹ] are not attested. If one were to believe that the former are really admitted in English by virtue of an exceptional lateral relation between segments—this is the idea behind Kaye's (1992*a*) Magic Licensing—one would also have to conclude that this relation caters for exactly one sound, viz. [s]. Why other fricatives cannot occupy the slot that [s] takes cannot be answered on any well-formedness grounds. However, if phonology is seen as comprising two levels, one operating on abstract representations, the other interpreting those representations, then the mystery of the exceptional consonant clusters in English becomes just a bit less bizarre. All these *s*+C clusters, morpheme-final [pt] and [kt] clusters and, possibly, any non-intervocalic morpheme-internal sequences of two or more obstruents are simply defective, arguably a weaker statement than to call them illicit. If phonology and phonetics were one, these clusters would have no chance of being pronounced in native English. Curiously, however, not only did they enter the language at some point—the timeline is irrelevant for a synchronic study—but have also managed to stay in the language, resistant to deletion, epenthesis or other processes that language universals-oriented linguists would surely want them to have undergone. If the phonology–phonetics interface proposed herein were oblivious to word boundaries (i.e. workspace edges), the analysis would have no answer to the resistance of defective structures to alleged universal tendencies. The approach advocated in this work is clear on workspace edges being a genuine phonological object, to whose presence the phonology–phonetics interface may be sensitive. It has already been shown on the examples of Polish palatalisation (Chapter 3) and voice phenomena (Chapter 4) that there is a good cause for thinking that the component that translates phonological representations into articulatory phonetics is sensitive to edges of the representations. In the context of the defective structures in English—and, possibly, in other languages, too—the idea of edge-sensitive interpretation allows for considering all those sequences as ill-behaved on the morphophonemic level, but systematically present on the phonetic level by virtue of the interface being able to interpret them in an unambiguous manner.

Notice that if the interface responds to the content of workspaces in a such a way that the edge does play a role in the interpretation, then not only is there a chance for explaining, in a principled way, the presence of a few exceptional consonantal combinations in English words—this is opposed to phonetic strings viewed through a word-less perspective—but also, one can hypothesise why some sequences that are not uncommon in what is phonetically an intervocalic context are never found if the flanking vowels do not belong to the same word. Consider [ps] or [gn], for example. If boundaries are not taken into account, these two clusters are nothing special in English. The former is found in, for example, *upset*, *lapse*, *laps* and *drop site*. The latter appears in, for example, *agnostic*, *ignite*, and *big number*. However, once it is checked if the clusters appear in all phonologically relevant positions, it becomes clear that while they occur intervocalically in word-internal contexts, it is only [ps] that may also appear word-finally (where its presence is somewhat exceptional, as has been argued earlier), while neither [ps] nor [gn] are pronounced in word-initial position. Such words as *psychology* or *pseudonym* on the one hand, and *gnu* or *gnostic*, on the other, do not exhibit any phonetic trace of the initial [p] or [s]. That might appear strange, especially that English has no problem in allowing for word-initial pronunciation of [sp] or [spɹ], the latter of which is even more complex than [ps] and [gn], if viewed in segmental terms. It is clear that the failure of English to give phonetic presence to word-initial [ps] and [gn] in full is not due to the phonetic interface's inability to pronounce these clusters, as shown on just the few examples given above, but rather due to the interface's edge-sensitive manner of interpretation, viz. workspace-initial //ps// and //gn// sequences are systematically mispronounced as [s] and [n], in that order.

Against this statement, one will easily notice that pronouncing dictionaries, such as *CEPD*, do list a few words whose pronunciation may allegedly include word initial [ps]; these are *psephology*, *psi*, *Psion*, *psittacosis*, and *psoriasis*. The status of the initial [p] in these is debatable. *ODP*, for instance, seems not to have any instances of initial [ps], except for *psi* and the interjection *psst*, the latter hardly counting as the locus of morphophonological regularity in English. The presence of word-initial [ps] in these words may indicate that two factors are at play: 1) the initial lack of workspace-initial interpretation for //ps//, which led to words being lexically stored without the offending cluster at some point in time (notice that, except maybe for *psst*, all the words listed here are not of the Germanic heritage of present-day English), and 2) the present-day availability of [ps] as workspace-initial interpretation, which has lead to a small number of loanwords being (occasionally or idiolectally) pronounced with initial [ps]. In any case, this adds to the point that phonology and phonetics are distinct entities forming a feedback loop.

The discussion in this section has pointed to the possibility of the lexically-contrastive morphophonological level and the lexically-non-contrastive phonetic level exhibiting systematic mismatches between what they allow as pronounceable phonological objects. Viewed as a system in which the two levels interact with one another, and where each level may and does behave in ways illogical from the point of view of the other level—[spɹ] and [zbɹ] are equally pronounceable, but only the former is found in actual words, while [gn] is only realised in word-internal intervocalic contexts or across word boundaries—phonology loses its overgenerative flavour. Some sound patterns are defective and ill-mannered at the upper level, e.g. [spɹ–], and yet enjoy interpretation. Others appear just as ill-mannered or, conversely, perfectly normal, e.g. [gn–], and yet do not pass the interpretational filter unscathed.

The idea of a systematic mismatch between what is represented on the morphophonemic level and what is interpreted on the phonetic level has been successfully applied to Polish in Chapters 3–5. The present section has recalled the idea in the context of English consonant clusters. The following section will make use of this concept in approaching English regular plurals for a second time.

6.4. Regular plurals: second approximation (correct)

6.4.1. Summary of the findings of the first approximation

The first approximation of the analysis of regular plurals in English (section 6.3) has operated on the false premise that the three attested allomorphs, viz. [s], [z], and [ɪz], are three phonological objects stored in a single lexical entry, all encoded to be realisations of a single morpheme, viz. the plural suffix. The distribution of the three morphs has been analysed along the lines of lexical selection, whereby the morphophonological level of phonology, faced with the task of joining the stem and the plural morpheme, selects and concatenates exactly one of the available morphs based on a constraint ranking (see section 6.3.1). Depending on how good or bad the resultant output of *Join* would be for a given allomorph, the allomorph would or would not be chosen. This approach, however, fails in some cases; recall the mismatch between the candidate found to be the best in the case of the plural form of *six–th*, viz. *[sɪksθɪz], and the attested form, viz. [sɪksθs]. It is problematic for other reasons, too. Not only is it computationally unsound—for each concatenation there are three equally weighed candidate outputs to be evaluated—but it also implies that morphophonology as such does have a say in English plural formation. Should that be true, it should have a grave implication. Namely, if one takes the concatenation of the nominal stem and the regular plural suffix to be so complex an operation, one would have to conclude that more, if not all, instances of morpheme concatenation are performed in the evaluative manner. That would extend not only to regular past tense formation, where [t], [d], and [ɪd] would be allomorphs selected on the same principles as those fleshed out in section 6.3.1, but also to negative polarity prefixes, where the presence of *im–* [ɪm], *in–* [ɪn], and *in–* [ɪŋ] but not that of *un–* [ʌn] would be a matter of evaluation, and, skipping a few other affixes on the way, finally, all (semantically (near-)transparent) compounds would be instances of lexical selection, even if there is hardly any alternative to, for instance, *blackboard* [ˈblækˌbɔːd] in the form of *[ˈblægˌbɔːd], *[ˈblækˌpɔːd], or, perhaps avoiding a cluster of two plosives, *[ˈblækɪˌbɔːd]. Weird as it seems, this overgeneration of evaluation would be quite a logical consequence of allowing for the selection in the case of plurals. The reason for this conclusion is the initial assumption of the present study that phonology does not 'know' morphological categories, such as 'verb,' 'noun,' 'plural,' or 'past.' Should one allow phonology to evaluate the output in the case of plurals—assuming phonology does not recognise the term plural as such, it cannot tell plural formation from, say, compounding—one should logically allow phonology to evaluate the output of every concatenation, even if no lexically-contrastive allomorphy is ever attested, for instance in words formed with *un–* as the negative polarity prefix.

6.4.2. Important observations missed earlier

Luckily, there is a way out from this apparent cul-de-sac. There is an observation that was missed in the first approximation to the analysis of plurals. At face value, it might be trivial. Namely, not only are there only three allomorphs available in regular plural formation, i.e. [s], [z], [ɪz], and no other, but also they appear to have perfectly complementary distribution. There is not a single case of a noun whose plural may be considered regular that would deviate from the pattern shown on the examples in (343), repeated for convenience in (371) below.

(371)

(371a) *ship* [ʃɪp] ~ *ship–s* [ʃɪps]
cat [kæt] ~ *cat–s* [kæts]
clock [klɒk] ~ *clock–s* [klɒks]

(371b) *web* [web] ~ *web–s* [webz]

rod [ɹɒd] ~ *rod–s* [ɹɒdz]

dog [dɒg] ~ *dog–s* [dɒgz]

(371c) *watch* [wɒʧ] ~ *watch–es* [ˈwɒʧɪz]

box [bɒks] ~ *box–es* [ˈbɒksɪz]

(371d) *law* [lɔː] ~ *law–s* [lɔːz]

glow [ɡləʊ] ~ *glow–s* [ɡləʊz]

(371e) *zone* [zəʊn] ~ *zone–s* [zəʊnz]

bell [beɫ] ~ *bell–s* [beɫz]

For regular nouns, there is no instance of a plural form in which [z] would be the plural allomorph following a stem terminated in a voiceless obstruent. Similarly, [s] is not only unexpected, but also actually unattested as the plural morph following vowel-ended stems, and so forth.

A worthwhile exception to the pattern is provided by such nouns as *shelf* or *wife*. In their singulars, they terminate in [f], which, under normal circumstances, should mean their plural forms use [s] as the plural morph, and so they should both end in the cluster [fs]. This is not the case, as both *shelf* and *wife*, quite unexpectedly, form plurals with [z]. Even more unexpectedly, at least for the first approximation to plurals, the stem-final consonant is no longer [f] in the plural forms, but rather emerges as [v]. Thus, the plural of *shelf* [ʃeɫf] is *shelves* [ʃeɫvz], and that of *wife* [waɪf] *wives* [waɪvz]. While this might look as an unexpected failure of the pattern shown in (371), it is not. Recall that the morphophonological level of phonology does not recognise morphological labels, and so is unable to tell a plural morpheme from, for instance, a Saxon genitive, whose allomorphs [s], [z], and [ɪz] bear striking resemblance to those of the plural morpheme. This inability of phonology to recognise morphological categories is confirmed when the genitive forms of *shelf* and *wife* are examined. Contrary to the pessimistic mood brought in by the plural forms, the Saxon genitives are regular with respect to the stem, viz. *shelf's* [ʃeɫfs] and *wife's* [waɪfs], respectively. This clearly relegates the plural forms of *shelf* and *wife*, and such nouns as *knife, life* or *wolf*, too, to the set of lexically-marked exceptions, and partially salvages the first analysis.

Still, the absolute complementariness of the appearance of [s], [z], and [ɪz] as regular exponents of the plural is puzzling. In fact, if regular nouns were the only type available in English, one would conclude that the distribution of the three allomorphs is done purely phonetic grounds, with no morphophonology involved; [z] follows vowels, sonorants, and voiced obstruents except alveolar and post-alveolar fricatives, [s] follows voiceless obstruents with the same exceptions, and [ɪz] appears elsewhere. One hardly needs to be a phonetician, let alone a phonologist, to figure this out, and the art of regular plural formation is arguably one of the easiest skills for speakers of English. This observation is just another warning light for the initial analysis shown in 6.3. This time, however, the argument is not about computational load or overgeneration. The point is the near-perfect predictability of the plural form just on the basis of what the phonetics of the singular form is. Phonetics that is, not morphophonology.

One more blow for the first approximation comes from another otherwise trivial fact that went AWOL on an earlier occasion. Recall that, phonetically speaking, English does not require all members of obstruent clusters to agree in voice. Consider examples from (340), repeated for convenience in (372) below.

(372)

(372a) *black* [blæk]
board [bɔːd]
blackboard [ˈblækˌbɔːd]

(372b) *Jack* [ʤæk]
jump-ed [ʤʌmpt]
Jack jumped. [ˈʤæk ˈʤʌmpt]

This ability of English phonetics to interpret voice-contoured obstruent clusters has played an important role in the first approximation to the analysis of plural forms. It was precisely the fact that a voiceless obstruent may be followed by a voiced one, or the other way round, that had forced the first analysis to recognise two allomorphs [s] and [z] as partly-independent lexical entities, whose presence in the plural forms of phonetically distinct singular stems was a matter of lexical selection. What the first analysis did not take into account, but what would have doubtlessly saved it from unnecessary complexity is the rather defective distribution of voice contoured obstruent clusters in English. First, consider examples in (373).

(373)

(373a) *Jack saw it.* [ˈʤæk ˈsɔː_]

Bob saw it. [ˈbɒb ˈsɔː_]

John saw it. [ˈʤɒn ˈsɔː_]

Bo saw it. [ˈbəʊ ˈsɔː_]

(373b) *Jack zoomed in.* [ˈʤæk ˈzuːmd_]

Bob zoomed in. [ˈbɒb ˈzuːmd_]

John zoomed in. [ˈʤɒn ˈzuːmd_]

Bo zoomed in. [ˈbəʊ ˈzuːmd_]

(373c) *Butch saw it.* [ˈbʊʧ ˈsɔː_]

George saw it. [ˈʤɔːʤ ˈsɔː_]

(373d) *Butch zoomed in.* [ˈbʊʧ ˈzuːmd_]

George zoomed in. [ˈʤɔːʤ ˈzuːmd_]

As shown in (373), unlike in the regular plural formation, word-initial [s] and [z] is not subject to any distributional restrictions, especially when following any sound of English across the word boundary. The initial [s] in *saw* is free to occur after voiceless and voiced plosives, sonorants, and vowels (in (373a)). More interestingly, there is no [ɪ] or other vowel breaking the cluster [ʧs] formed at the word boundary in *Butch saw it* (in (373c)). The initial [z] in *zoomed* enjoys the same amount of phonetic freedom (in (373b) and (373d)).

So far, the examples in (373) appear to be pointing to the first analysis being correct in ascribing the [s]–[z]–[ɪz] allomorph distribution to phonologically-driven lexical selection. Consider, however, a number of unattested word boundary combinations in (374) below.

(374)

(374a) **Jack* $s_{[+\text{PAST}]}$ *it.*

**Bob* $s_{[+\text{PAST}]}$ *it.*

**John* $s_{[+\text{PAST}]}$ *it.*

**Bo* $s_{[+\text{PAST}]}$ *it.*

(374b) **Jack* $z_{[+\text{PAST}]}$ *in.*

**Bob* $z_{[+\text{PAST}]}$ *in.*

**John* $z_{[+\text{PAST}]}$ *in.*

**Bo* $z_{[+\text{PAST}]}$ *in.*

(374c) **Butch* $s_{[+\text{PAST}]}$ *it.*

**George* $s_{[+\text{PAST}]}$ *it.*

(374d) **Butch* $z_{[+\text{PAST}]}$*in.*

**George* $z_{[+\text{PAST}]}$ *in.*

Not only are the examples given in (374) unattested in English, but indeed they are impossible, provided that the pronunciation of the roots spelled as "s" and "z" is [s] and [z], respectively. Were their respective pronounciations [ɪs] and [ɪz], the examples in (374) would be interpretable, albeit without much semantics. The reason for the impossibility of the nonce verbs in (374) is English not having a single vowelless root in its lexicon. Consonants are not obligatory part of roots; notice the rare example of *awe*, arguably the only non-onomatopaeic root in English that has no lexically-specified consonant, as opposed to, say, *err*, *ore* or *air*. As for vowels, however, their presence is a necessary condition in English word formation. This observation has profound consequences on the present analysis.

Since there is not a single meaningful word in English that does not have a vowel, it entails that there can be no lexical compounds without a vowel. Furthermore, it is utterly impossible to have a word boundary in English that would not be flanked by vowels, with or without consonants in-between. This greatly limits the number of morphophonological contexts in which a lone consonant may appear. In fact, the only grammatical object that may do without a vowel in English is a suffix. This changes the line of analysis quite dramatically.

Notice that of all the available regular plural morphs, i.e. [s], [z], and [ɪz], none of them has a vowel following the consonant. In the case of [s], and [z], there is nothing but a single consonantal sound in the suffix. Thus, regual plural morphs cannot take part in voice countour obstruent clusters of the type shown in (373), let alone those attempted in (374). This further undermines the first approximation at the analysis of English plurals, and it has been shown (section 6.3 and the present section) that, unlike the distribution of word-initial [s] or [z], the distribution of plural allomorphs is complementary.

6.4.3. No allomorph selection

The findings of the previous section lead towards the inevitable conclusion that, as far as the morphophonology of English is concerned, the distribution of the three plural allomorphs [s], [z], and [ɪz], is matter of phonetic interpretation, not an instance of morphophonological selection. There is not a single case of a regular countable noun in English where the pattern sketched in (343) (and repeated in (371)) is broken. Crucial to this pattern is the fact that the [s]'s, [z]'s, and [ɪz]'s in question are all phonetic exponents of a suffix contained, together with the root and intermediate affixes, within a single phonological word. As shown in (373), those [s]'s and [z]'s that do not meet this criterion are not subject to complimentary distribution. This clearly shows that such term as phonological word must be recognised as an object in phonology. As for roots and suffixes being phonological objects—this is a question that lurks at the back of the second approximation to the analysis of regular plurals in English—the situation is clear. The phonological exponents of roots and suffixes are indeed phonological objects. This does not entail, however, that phonology should recognise between roots and suffixes in a systematic way or that it knows the morphosyntactic roles these entities have. Recall that the first approximation found that since there was never a case of the stem assimilating in any way to the plural suffix, the concatenation of the stem and the suffix had to be a closed joint, i.e. one in which the arguments do not interact (Class 2 affixation). Consequently, the fact that the plural allomorph [s] and [z] did not assimilate their place of articulation to the stem led the previous analysis to the mistaken belief that the three allomorphs [s], [z], and [ɪz] were lexically present as three separate phonological representations—their putative CVCV representations have been shown in (359)—and that they competed for being selected as the plural morph on the basis on phonological well-formedness and elegance evaluation. It is now clear that the revised analysis can do without the ternary evaluation and selection, as there is only one phonological object for the regular plural suffix present in the lexicon. It represents the form that occurs in the biggest number of phonetic contexts, viz. what is phonetically the voiced fricative [z]. Whether it is interpreted as [z], [s], or [ɪz] is no longer a matter of morphophonological selection, but a matter of phonetic interpretation.

What remains to be fleshed out is how the phonology–phonetic interface is able to produce three distinct phonetic objects from a single bit of phonological representation. Consider the examples in (375) and (376).

(375) Left-hand argument (one form available): *six* [sɪks]; the portion shown is [_ks]

$$\begin{array}{cccc} C_1 & V_1 & C_2 & V_2 \\ | & & | & \\ \mathrm{k} & & \mathrm{s} & \end{array}$$

(376) Right-hand argument (one form available): [z]

$$\begin{array}{cc} C & V \\ | & \\ \mathrm{z} & \end{array}$$

The first approximation at the analysis was based on the assumption that there were three forms available as the right-hand argument in a stem + [PLURAL] concatenation. The present approach has been a result of the observation that in lexically-contrastive terms, there is just one right-hand argument for this concatenation. Hence, it would appear that the task of phonology is to simply put the two arguments, i.e. (375) and (376), in the correct linear order. This is indeed the case. However, the arguments are not added in exactly the same way as they were in the initial analysis. Consider (377).

(377) Incorrect output of *six* + [PLURAL]; the portion shown is *[_ksz]

$$\begin{array}{cccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 \\ | & & | & & | & \\ \mathrm{k} & & \mathrm{s} & & \mathrm{z} & \end{array}$$

The (portion of the) representation shown in (377) gives no guarantee of being phonetically interpreted as the attested plural of *six*, viz. *sixes* [ˈsɪksɪz]. The reason for this is the existence of two phonological expressions denoting an alveolar fricative in consecutive onsets. Recall that, voice contour notwithstanding, English does not accept geminates domain-internally. Since there are no diacritics marking morphological divisions in (377), the phonology–phonetics interface would have no way of telling that the voiceless fricative under C_2 and the voiced one under C_3 have equal right to be pronounced, and so there is a good cause for stipulating that only one of the fricatives would be pronounced. Thus, the phonetic output is quite likely to be *[ˈsɪks], which clearly is not the pronunciation of the attested plural form.

Still, what has to be taken into account is one of the correct observations made earlier, in the first analysis; neither the stem nor the regular plural morpheme does assimilate to each other in a lexically-contrastive way. The morphological division between the phonological exponents of the two morphosyntactic objects is devoid of any lateral relations between the melodies. Hence, it appears compelling to consider an alternative way of concatenating the arguments. The particular idea is the one signalled in Chapter 5 herein, viz. an empty CV unit put between the arguments of the concatenation. Consider (378).

(378) Correct output of *six* + [PLURAL]; the portion shown is [_ksɪz]

$$\begin{array}{cccccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 & C_4 & V_4 \\ | & & | & & & & | & \\ \mathrm{k} & & \mathrm{s} & & & & \mathrm{z} & \end{array}$$

Although breaking what would be considered a well-formedness condition in a single domain—there must not be more than one empty nucleus in a row, except domain-finally—the representation in (378) has every reason to be pronounceable. Recall the discussion in section 3.3.4, where it has been argued that a workspace-based analysis must recognise the notions of the Strict Cycle and the Derived Environment. Specifically, morphophonological processes not only do not apply at random, but also they do not change representations without having been triggered by specific factors. Conversely, whenever a triggering factor for a process is present in the representation, the process is expected to apply. In GP literature, this obligatory application of processes is captured by Kaye's (1992*b*) Non-Arbitrariness Condition, given earlier in (165) and repeated for convenience in (379).

(379) Non-Arbitrariness Condition (Kaye 1992*b*: 141; his "minimalist hypothesis")

"Processes apply whenever the conditions that trigger them are satisfied."

If one assumes that present-day English phonology bans both 1) sequences of two (and more) non-domain-final empty nuclei, and 2) sequences of two (or more) consonants of the same place and manner of articulation—except for voice specification these are simply geminates—then one may find it reasonable to consider a phonological process in English whereby sequences containing the incriminated bits would, first of all, not be created by means of phonological processing, and, more importantly, any such bits found in existing representations, which equals those potentially found in the lexicon, would be modified so as to remove the offenders. Should that be the case, then both (377) and (378) would be counterfactual. There is every reason, however, only to consider the former as non-existent. In the absence of any morphophonological diacritics, the representation in (377) not only breaks the limit of consecutive empty categories, but also it has little chance of being pronounced without the two fricative, [s] and [z], being reduced to one. This is precisely because the phonology–phonetics interface is not designed to see the derivational history of the phonological words, and so is unable to spot the break between the domain formed by the stem, viz. *six*, and that formed the stem and the plural suffix combined, viz. *six* + *–es*. For the phonology–phonetics interface, the plural in (377) is just as monolithic as a word with no overt prefixes or suffixes is. In this context, it is hardly accidental that there are no instances of the cluster [sz], or [ss], [zs], and [zz], for that matter, in simplex words in English. Even if some lexically-contrastive representations of simplex words did involve a pair of onsets filled with the fricatives in question, such sequences would be invariably pronounced with a single fricative, which is a good argument for considering (377) as being on the wrong track. Another argument is that of (377) not qualifying for being output of phonology should the Non-Arbitrariness Condition hold. The rationale is simple: if three empty nuclei in a row are not allowed in a phonological representation, then such a representation may not be output of phonological processing; presumably, in Kaye's (1995) system, the function *φ* should never build such a configuration when assessing the output of *concat*. This particular argument appears to hold in the case of (378), too; its number of (apparently) unsolicited empty categories is even bigger than it is the case in (377).

There is a way out of this conundrum. Recall that the discussion on Polish palatalisation and prefixes and prepositions (Chapters 3–5) has pointed to a systematic difference between the way that stems combine with suffixes, and the way they combine with (most) prefixes and prepositions. For suffixes, it has been shown that the two arguments to concatenation interact. This has been exemplified by the pattern of palatalisation found at the stem-suffix morphological break, which is the same pattern found morpheme-internally in native words of Polish. Contrary to this, prefixes and prepositions—the latter behave as being part of their host, which has been shown by their resistance to final devoicing—show the other pattern of palatalisation, the one found at word boundaries, and morpheme-internally in borrowings. This fact has led the analysis to conclude that, except for a small number of cases, the prefix-root morphological break is a non-interacting joint. On the representational side, this lack of interaction between morphemes is ensured by separating their phonological contents via an empty CV, so that no autosegmental morphophonemic feature spread—this is a process bound by Locality when applying to non-suprasegmental properties—takes place at the lexically-contrastive level of phonology. In Polish, this is especially true of morphophonological palatalisation, governed by *I-spread*. (Recall the *s–pij/śp–i–j* minimal pair discussed in section 5.6.) It appears reasonable to think of English non-interacting morphological joints as eligible for the same representational treatment. Thus, the representation shown in (378) is correct in preserving the nature of the morphological break between the nominal stem and the plural morpheme.

To see how the phonology–phonetics interface should react to plural nouns in which the plural morpheme is separated from the stem by the empty CV, consider examples in (380)–(383).

(380) Correct output of *ship* + [PLURAL], viz. [ʃɪps]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
ʃ	ɪ	p				z	

(381) Correct output of *web* + [PLURAL], viz. [webz]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
w	e	b				z	

(382) Correct output of *law* + [PLURAL], viz. [lɔːz]

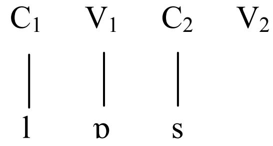
C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
l	ɔ					z	

(383) Correct output of *bell* + [PLURAL], viz. [bełz]

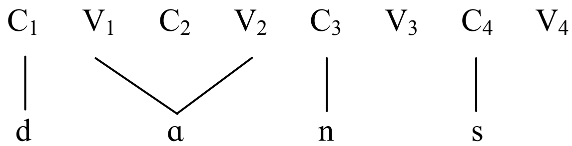
C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
b	e	ł				z	

The phonetic interpretation of the onset present as C_4 in representations (380)–(383) is directly dependent on the interpretation of what precedes it. Notice that each of the representations in this set terminates at V_4, although in principle nothing prohibits the skeleton from extending beyond V_4; for instance, should Saxon genitive be present, it would follow the plural morpheme, separated from the remainder of the representation by another empty CV. As for representations (380)–(383), the phonetic output of C_4 is easy to compute. Firstly, C_4 is always followed by an empty nucleus (V_4), so there is no contentful governor to C_4. Because of this, the onset in question will not be influenced by any melody that would spread onto it from the following V slot. This claim is confirmed by the absolute lack of vowelless (meaningful) words in English, the pronunciation of *and* as [n̩] notwithstanding. Notice that the distribution of the plural morphs [s], [z], and [ɪz] is fully independent of what follows across the word boundary, i.e. across the workspace edge. Moreover, the empty CV occupying C_3 and V_3 will not be interpreted as a phonetic pause, the reason for that being the lack of contrastiveness of pauses in phonological domains. Notice that morpheme-internally, English does not exhibit pauses of lexically-relevant status, and since there are no diacritics in representations (380)–(383), the phonology–phonetics interface has to treat them as if they were monomorphemic. Hence, in the lack of other conditions, the only phonologically-relevant object that may and does influence the interpretation of C_4 is the sound that is pronounced directly before it, i.e. the last sound of the stem. The *phonetic* shape, not the *phonological* representation, of C_4, then, is bound to assimilate to what precedes it. Since domain-internally, there are no clusters in which neighbouring obstruents would disagree in voice, the melody under C_4 emerges as [s] after the voiceless [p] in (380), and as [z] after the voiced [b] in (381). Clearly, not having a contentful governor under V_4 helps C_4 to lose contrast in voice when preceded by other obstruents. That C_4 is underlyingly a voiced obstruent is evident from its interpretation as [z] when preceded by a vowel in (382), and a sonorant in (383). While English accepts the voiceless [s] after vowels and sonorants, too—*loss* [lɒs] and *dance* [dɑːns] are decent examples thereof—such cases, if word-final, are never those in which the [s] in question is an exponent of the plural. Representationally, the difference between (382) or (383) and such words as *loss* or *dance* is evident. Having no overt morphological breaks, the latter two cannot have the empty CV separating the [s] from what precedes it, as shown in (384), and (385).

(384) *loss* [lɒs]



(385) *dance* [dɑːns]



Given that morpheme-internally, there are also instances of [z] following a vowel or a sonorant—*lose* [luːz] and *lens* [lenz] fit in with the pattern—the [s] in (384) and (385) has to be considered as underlyingly voiceless.

A few more words need to be said about the context that has started the present section, viz. *six–es*. It has been argued that the representation in (377) is counterfactual should it stand for the plural of *six*. The reason given earlier was that there was no guarantee that (377) would not be pronounced as, say, *[sɪks] instead of the attested [ˈsɪksɪz]. That conclusion stemmed from the observation that English phonology–phonetic interface is not supportive of geminates. Recall that complex words in which two [s]'s neighbour on one another across a morphological break, such as *dis–similitude*, *dis–satisfaction*, or *dis–service* may be pronounced with [ss] (or a [sː]) just as well as with a single (short) [s]. An important difference between these complex words and the plural of *six* is that unlike the root-initial [s] in the former, the suffixal [z] in the latter has no vowel following morpheme-internally. The existence of pronunciations with a double [s] in the case of *dissimilitude*, *dissatisfaction*, and *disserviceі* makes it clear that in these words the prefix *dis–* and the respective roots are bound in non-interacting (non-cohering, non-cyclic, Class 2) joints. Hence, there is a good cause for considering each of these joints being filled with an empty CV. If the same phonological object is present between the stem and the plural morpheme in *six* +

–*es*, the lack of degemination is almost self-explanatory. Reconsider (378), repeated for convenience in (386).

(386) Correct output of *six* + [PLURAL]; the portion shown is [_ksɪz]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
k		s				z	

It is true that English has no geminates morpheme-internally, in any position. It is also true that if empty CV's do not appear lexically within morphemes, then the relation between the [s] under C_2 and the [z] under C_4 in (386) is never found in morphemes, or minimal domains, to use a different term. Now, consider a situation in which morpheme-internally, there are geminates present in lexical (and phonological) representations, but they are systematically mispronounced by the phonology–phonetics interface. Such putative monomorphemic words are shown in (387) and (388).

(387) Putative monomorphemic *asset*; //ˈasset//

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
	æ	s		s	e	t	

(388) Putative monomorphemic *ass*; //æss//

C_1	V_1	C_2	V_2	C_3	V_3
	æ	s		s	

The words in (387) and (388) stand no chance of being systematically pronounced with more than one fricative. Being monomorphemic, both lack the necessary representational device that occasionally, though not unambiguously, saves the supernumerary [s] in *dissimilitude*, and which ensures that the plural of *six* is always pronounced with the fricative of the plural morpheme in place, viz. an empty CV.

If the stem and the plural morpheme in *six* + –*es* are separated by an empty CV, the resultant representation is distinct enough from (387) or (388) for the phonology–phonetics interface it give the putative cluster [sz] a different treatment. Just as is the case in (380)–(383), what follows the plural across the word boundary is irrelevant; adjacent words come in separate representations or, in other words, they do not share a single skeleton. What is relevant is that the plural has no vowel following the fricative, which makes it a different phonological creature from, for instance, *dissimilitude*, in which the two [s]'s are flanked by vowels of their respective morphemes. Thus, the interface does not drop either of the fricatives in (386), but interprets them as if they were part of a defective domain. Since melodically-complete morphemes are never pronounced with a geminate, the interface is unlikely to produce one in this particular case. Given that the interface knows nothing of the sound that the empty CV is intended to stand for, the more so since there is no such intended sound in the first place, it interprets the empty space by generating an epenthetic, unstressed vowel to break the illicit geminate, which, what is interesting, would otherwise require a voice contour. The resultant [ɪ] in *sixes* [ˈsɪksɪz] is quite systematic, but lexically irrelevant. From the vantage point of the lexically-contrastive level, the phonology–phonetics interface may just as well put a different vowel, which it does, for example, in Australian English, where the epenthetic vowel in plurals is systematically the schwa, i.e. *sixes* is pronounced [ˈsɪksəz]. That within a particular variety of spoken English, the quality of the vowel is stable and predictable only shows that the phonology–phonetics interface is constant in its treatment of one and the same object, in this case, an alveolar or post-alveolar fricative or affricate followed by a vowelless [z] across an empty CV.

It is therefore concluded that the regular plural nouns in English all use a single morpheme, whose phonological exponent is the voiced alveolar fricative [z] if taken out of context. The nominal stem and the plural suffix enter a single representation through a closed joint, i.e. through *Join*(x],[y), whereby the stem and the suffix are separated by an empty CV in the resultant workspace. Thus, representationally, the plural morpheme is always the same phonological object in regular nouns. Its phonetic interpretation is fully dependent on the phonetic shape of the last sound of the preceding stem. There is no lexical selection or candidate ranking. The interpretation is governed by simple principles, and its locality is bound to the stem, and the suffix; the few skeletal slots that span the final consonant of the stem, the intervening CV, and the consonant of the suffix give a sequence of no more than 3 CV's; this is beyond the locality of a minimal domain (see sections 2.5–2.6). The fact that what follows across the word boundary has no effect on the phonetic shape of the plural suffix shows that the phonological word, i.e. a workspace, is indeed a unit whose span is recognised by the phonology–phonetics interface.

6.5. Remark on regular past forms

It appears unnecessary to give as much space to regular past forms of English verb as it has been done in the case of plural nouns. The conclusion on the non-interacting joints between stems and suffixes and the role of an empty CV that has been reached in section 6.4 holds for the present section, too. Therefore, as if to add more evidence to the findings of the present work, this section will briefly sketch the distribution of regular past morphs, and show how this distribution is captured along the lines of the second approximation to the analysis of regular plural nouns.

Most verbs in English have regular past tense markers. These occur as three morphs. Consider examples in (389).

(389)

(389a)	*ship* [ʃɪp] ~ *shipp–ed* [ʃɪpt]
	latch [læʧ] ~ *latch–ed* [læʧt]
	clock [klɒk] ~ *clock–ed* [klɒkt]
(389b)	*web* [web] ~ *webb–ed* [webd]
	dodge [dɒʤ] ~ *dodg–ed* [dɒʤd]
	log [lɒg] ~ *logg–ed* [lɒgd]
(389c)	*loot* [lu:t] ~ *loot–ed* [ˈlu:tɪd]
	allude [əˈlu:d] ~ *allude–d* [əˈlu:dɪd]
(389d)	*thaw* [θɔ:] ~ *thaw–ed* [θɔ:d]
	glow [ɡləʊ] ~ *glow–ed* [ɡləʊd]
(389e)	*zone* [zəʊn] ~ *zone–d* [zəʊnd]
	bell [beɫ] ~ *bell–ed* [beɫd]

Not unlike the plural morpheme, the phonetic interpretation of the regular past takes two forms in which one obstruent appears in two shapes with respect voice, viz. [t], and [d]. Similarly, a form with an epenthetic vowel, viz. [ɪd], is also found. The distribution of these morphs is fully predictable on phonetic grounds. The voiceless [t] follows stems terminating in voiceless obstruents, while the voiced [d] appears after voiced obstruents, as well as after sonorants and vowels. The exceptional form [ɪd] is only found after [t] or [d]. Given the findings of the two analyses of regular plural formations in sections 6.3 and 6.4, it is clear that the phonetic shape of the exceptional form [ɪd] relies on the combination of *No Geminates* and an empty CV present in the phonological representation of a verb in past tense, between the stem and the tense suffix. The distributional data on regular past forms indicate that there is just one lexically-specified past tense morpheme used in these verbs, and that its phonetic shape is [d] if taken out of context.

Building on the second approximation to the analysis of regular plural nouns, the present analysis has no reason to consider the selection-and-evaluation approach, used in the first approximation, to past tense forms. What follows is a few examples of phonological representations of past tensed verbs. Consider representations in (390), (391), (392), and (393).

(390) Correct output of *ship* + [PAST], viz. [ʃɪpt]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
ʃ	ɪ	p				d	

(391) Correct output of *web* + [PAST], viz. [webd]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
w	e	b				d	

(392) Correct output of *thaw* + [PAST], viz. [θɔːd]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
θ		ɔ				d	

(393) Correct output of *bell* + [PAST], viz. [bełd]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
b	e	l				d	

Their similarity to those in (380)–(383) is hardly an accident. From a phonological point of view, there is only one difference, viz. the past tense suffix has a different phonological exponent ([d]) than the plural suffix does ([z]). Its lack of interaction with the stem is evident from such obstruent clusters as [ʤd] in *dodg* + *–ed*, or [ʧt] in *latch* + *–ed*. Neither cluster is found morpheme-internally in native English vocabulary. (The Moroccan placename *Oujda* [uːʤˈdɑː], even though pronounceable, is hardly part of the Germanic heritage of present-day English.) Moreover, the existence of the epenthetic [ɪ] in *allude* + *–d* [əˈluːdɪd] or *loot* + *–ed* [ˈluːtɪd] confirms the presence of an empty CV between the stem and the past tense suffix. Were it absent, the underlying [dd] and [td] would be expected to degeminate, as no monomorphemic word in English terminates in such clusters. Thus, the representation that is phonetically interpreted as the [ˈluːtɪd] of *loot* + *–ed* is the one given in (394).

(394) Correct output of *loot* + [PAST], viz. [ˈluːtɪd]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5
l		u		t				d	

6.6. Remarks on *–ing*: first exposition

In the inventory of English suffixes, the progressive aspect suffix *–ing* [ɪŋ] groups with the regular plural suffix and the regular past tense suffix in its lack of interaction with the stem to which it attaches. This is shown in (395).

(395)

(395a)	*ski* [skiː]	*ski–ing* [ˈskiː.ɪŋ]
	buy [baɪ]	*buy–ing* [ˈbaɪ.ɪŋ]
	do [duː]	*do–ing* [duː.ɪŋ]
	enjoy [ɪnˈʤɔɪ]	*enjoy–ing* [ɪnˈʤɔɪ.ɪŋ]
	vary [ˈveəɹi]	*vary–ing* [ˈveəɹi.ɪŋ]
(395b)	*loot* [luːt]	*loot–ing* [ˈluːtɪŋ]
	ship [ʃɪp]	*shipp–ing* [ˈʃɪpɪŋ]
	lack [læk]	*lack–ing* [lækɪŋ]
	gloom [gluːm]	*gloom–ing* [gluːmɪŋ]
	sing [sɪŋ]	*sing–ing* [ˈsɪŋɪŋ]

The pattern in (395a) is not particularly telling, as a vowel hiatus is not an impossible thing in English morphemes. What is worthwhile is that in, for example, *ski–ing* the vowel sequence [iː.ɪ] is not found morpheme-internally, and the resistance of either vowel to reduce to nought is a good indicator of the type of the morphological joint present in the right-hand examples in (395). The suffix *–ing* emerges as the same morph in all phonetic contexts, i.e. after vowels (in (395a)) and consonants, irrespectively of the obstruent/sonorant division (in (395b)). Additionally, the vowel of the suffix is invisible to word stress. Word forms containing *–ing* as the last vowel-carrying suffix have the same main stress placement as their *–ing*-less relatives. (Basically, it is due to their stress-neutrality, rather than the lack of melodic interaction, that English affixes of the *–ing* type have been known as Class 2 affixes since Siegel's (1974) work.) Finally, it is evident that the KIT vowel is lexically part of the suffix; it is not epenthetic. Should it be otherwise, it would be hard to explain why the vowel emerges in all contexts, especially those that do not require an epenthetic vowel. Recall the phonetic contexts for the plural allomorph [ɪz] and the past tense allomorph [ɪd]. These are alveolar and post-alveolar fricatives and affricates for the former and alveolar plosives for the latter. If the triggering factor for epenthetic vowels is the refusal of the phonology–phonetics interface to pronounce geminates that are not flanked by vowels word-internally, then a truly epenthetic KIT vowel in the suffix *–ing* would only be pronounced when the stem terminated in the velar nasal [ŋ] or, given that English does not have two nasal consonants in a row morpheme-internally, when the stem terminated in any nasal consonant. This is clearly not the case.

As has been argued for regular plural forms and for regular past forms, in sections 6.4 and 6.5, respectively, what is needed for a non-interacting suffix to enjoy pronunciation that is not influenced by the stem in a contrastively-relevant way, phonetically-triggered assimilation notwithstanding, is that the stem and the suffix are separated by an empty CV in the morphophonological representation. Thus, the representation for the word form *ski-ing* may take the form shown in (396).

(396) Correct output of *ski* + *–ing*, viz. [ˈskiː.ɪŋ][198]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5	C_6	V_6
s		k		iː					ɪ	ŋ	

At first, the representation in (396) may appear to have an excessive number of empty categories. Potentially, C_4 and V_4 might be got rid of, and the stem and the suffix would still be separated, to give unambiguous phonetic interpretation. This appears to be confirmed by a number of cases in which the presence of the vowel KIT coming from the *–ing* suffix gives the same, in contrastive terms, interpretation of the consonant that precedes it as when the vowel and the consonant are part of a root. Consider examples in (397).

(397)	*loot–ing* [ˈluːtɪŋ]	*tingle* [ˈtɪŋɡɫ̩]
	shipp–ing [ˈʃɪpɪŋ]	*ping* [pɪŋ]
	lack–ing [lækɪŋ]	*king* [kɪŋ]
	gloom–ing [ɡluːmɪŋ]	*mingle* [ˈmɪŋɡɫ̩]

There is no reason to suspect that the words in the right-hand column of (397) have their initial consonant separated from the vowel KIT by means of an empty CV. Since there is no morphological break between these sounds, their phonological expressions should occupy consecutive slots on the skeleton. It would appear, then, that unlike in the case of the regular plural morpheme and the regular past tense morpheme, both morphemes being underlyingly vowelless, in the case of *–ing*, the empty CV is not required and

[198] The representation shown here is correct in showing the type of morphological break present between the stem and the suffix. However, it does not show the correct underlying composition of the suffix itself. The underlying representation of the velar nasal [ŋ] is discussed in section 6.7.

when present is indeed superfluous. No doubt, that would not destroy the analysis altogether, but would be a bit problematic. It would mean that the distribution of empty CV's is not down solely to the manner in which two morphophonological objects combine—that is: a CV for non-interacting joints, no CV otherwise—but also depends on the melody of (at least) one of the arguments to concatenation, which is sadly reminiscent of the first approximation to the analysis of regular plurals (recall section 6.3 and its counteranalysis in section 6.4). This is, however, too early a conclusion. Consider examples in (398).

(398)	*sing–ing* [ˈsɪŋɪŋ]	**ngil* [ŋɪl]
	bring–ing [ˈbɹɪŋɪŋ]	**nging* [ŋɪŋ]
	bang–ing [ˈbæŋɪŋ]	**ngip* [ŋɪp]

The nonce words of the sort found in the right-hand column in (398) may be thought up ad lib. None of them is a possible word in English, as the velar nasal [ŋ] displays absolute defiance to appear morpheme-initially. This peculiar property of [ŋ] has already been analysed in GP terms, so that the present analysis only needs to make a short diversion to summarise the findings on [ŋ], and to return to the progressive suffix in order to show how the phonological nature of [ŋ] bears on the status of the empty CV between the stem and the suffix.

6.7. Excursus: the defiant nature of the velar nasal

From a GP vantage point, the distribution and the phonological nature of the velar nasal [ŋ] in English has been analysed by Gussmann (1998).[199] In short, the distribution data point to a clear relation between the position of (underlying) //ŋ//, //ŋk// and //ŋg// within a phonological domain, and their phonetic occurrence. Consider examples in (399) (adapted from Gussmann 1998: 104).

[199] Pre-GP sources that discuss the velar nasal include *SPE*, and Halle — Mohanan (1985).

(399)

(399a)	*finger* [ˈfɪŋgə]	*mango* [ˈmæŋgəʊ]
	angry [ˈæŋgɹi]	*anchor* [ˈæŋkə]
	bungalow [ˈbæŋgələʊ]	*wrinkle* [ˈɹɪŋkḷ]
(399b)	*hunk* [hʌŋk]	*hung* [hʌŋ]
	wink [wɪŋk]	*wing* [wɪŋ]
	sink [sɪŋk]	*sing* [sɪŋ]

It appears that of the three objects, only //ŋk// enjoys distribution both domain-medially and domain-finally, while //ŋg// is absent domain-finally and //ŋ// domain-medially. Importantly, none of the words (399) has any phonetically-overt affix, and so they need to be taken as being single (non-nested) domains. In such a context, the distribution of //ŋk// is the least controversial. Phonetic [ŋk] is found in domain-medial and domain-final positions alike.[200] As for //ŋ// and //ŋg//, a peculiar relation holds between the two objects. It appears that the phonetic realisations of these are in perfectly complementary distribution. Phonetic [ŋg] is not found morpheme-finally, whereas a [g]-less [ŋ] is only ever found in that particular context.

Gussmann's analysis makes the correct claim the phonetic domain-final [ŋ] and the phonetic domain-medial [ŋg] must be instantiations of the same phonological expression. The correctness of the claim is evident when looked at from the perspective of morphophonological contrast. Within a phonological exponent of a morpheme, [ŋ] and [ŋg] never give lexical contrast between one another. Still, they both give contrast when put against [ŋk]. As is visible in (399), if [ŋ] and [ŋg] are instantiations of a single phonological object, that object is in contrastive parallel distribution with [ŋk].

The analysis put forward in Gussmann (1998) combines the above observation with that about the total absence of [ŋk] and either [ŋ] or [ŋg], as realisations of a single object, in morpheme-initial position. The key to Gussmann's discovery is the distributional parallel between the [ŋ]–[ŋk]–[ŋg] complex and the other two nasal + plosive cluster types, viz. the bilabial [mp]–[mb], and the alveolar [nt]–[nd]. Consider examples in (400) below.

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[200] That no [ŋk] is ever found morpheme-initially is not puzzling if one takes the Sonority Sequencing Generalisation and the like to be valid observations about language; a cluster of a nasal followed by a plosive is arguably one of falling sonority, and hence its absence at the left margin of morphemes in English should not raise any suspicion.

(400)

(400a)	*antic* [ˈæntɪk]	*dandle* [ˈdændḷ]
	banter [ˈbæntə]	*random* [ˈɹændəm]
	enter [ˈentə]	*under* [ˈʌndə]
(400b)	*lint* [lɪnt]	*bond* [bɒnd]
	mint [mɪnt]	*hand* [hænd]
	paint [peɪnt]	*round* [ɹaʊnd]

The alveolar clusters are found both domain-medially and domain-finally, as shown in (400a) and (400b), respectively. The bilabial clusters do not have that much freedom. Consider examples in (401).

(401)

(401a)	*ample* [ˈæmpḷ]	*ambush* [ˈæmbʊʃ]
	dimple [ˈdɪmpḷ]	*cucumber* [ˈkjuːkʌmbə]
	limpid [ˈlɪmpɪd]	*chamber* [ˈʧeɪmbə]
(401b)	*lamp* [læmp]	*lamb* [læm]
	limp [lɪmp]	*limb* [lɪm]
	dump [dʌmp]	*dumb* [dʌm]

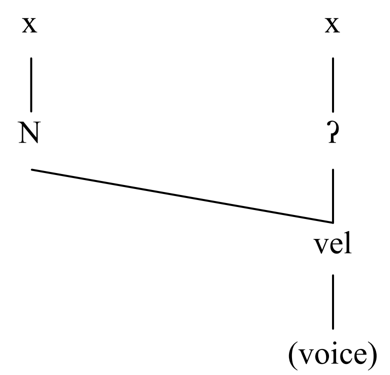
Distributionwise, [m] and [mb] pair with [ŋ] and [ŋg] in that the cluster is not pronounced domain-finally. (The somewhat privileged position of [nd] is perhaps puzzling, but it is not the issue of the present discussion.) In lexically-contrastive terms, [m] and [mb] are close to [ŋ] and [ŋg] in their complementariness. There is one glitch, though. Consider examples in (402).

(402)

(402a)	*mother* [ˈmʌðə]	*nothing* [ˈnʌθɪŋ]	*[ŋ]ever [ˈŋevə]
(402b)	*emerald* [ˈemɹḷd]	*energy* [ˈenəʤi]	**e*[ŋ]*emy* [ˈeŋəmi]
(402c)	*bum* [bʌm]	*bun* [bʌn]	*bu*[ŋ] [bʌŋ]

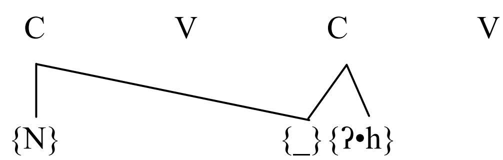
As shown in (402), unlike the velar nasal, the bilabial nasal pairs with the alveolar nasal in being found, without the plosive, in all the relevant contexts, viz. domain-medial, domain-final, and even domain-initial. The velar nasal does not appear anywhere except domain-finally. Clearly, the consonant has a rather defective distribution pattern. In fact, Gussmann's analysis shows that the representational nature of [ŋ] as such is defective. Given that the nasal only surfaces when followed be a velar plosive or when terminating a domain—a rather disjunctive context, it seems—Gussmann (1998) uncovers the underlying structure of [ŋ] to be a complex phonological expression, the one shown in (403).

(403) (S)GP representation of [ŋ] in English (adapted from Gussmann 1998: 105)

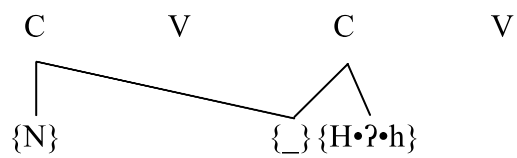


The structure depicted in (403) is effectively the cluster //ŋk// or //ŋg//, depending on the voice specification. The nasal part of the cluster shares its place of articulation with the plosive, which in this case if specified for velarity. (In a more GP-technical manner: the velarity of the plosive is marked through the empty head; recall that velarity does not have a corresponding GP element in the inventory used in the present work.) A CVCV-ised form of (403) is split into [ŋ] (or [ŋg]), given in (404), and [ŋk], shown in (405).

(404) CVCV-ised [ŋ] or [ŋg] in English



(405) CVCV-ised [ŋk] in English



Given that what is phonetically [ŋ] or [ŋɡ] is the same object in morphophonemic terms, viz. (404), and that its phonetic distribution is conditioned by its position within a phonological domain, the present work faces the following issue. In a model in which the unit of phonetic interpretation is a morphophonological-lexical workspace, and where the internal bracketing of workspaces is not marked by phonetically-ambiguous diacritics, the phonology–phonetics interface cannot tell a domain-medial //ŋɡ// from a domain-final //ŋɡ//, except when the latter coincides with a workspace-final //ŋɡ//. To see that this is actually an issue for English morphophonology, consider the distribution of //ŋɡ// in (406).[201]

(406)

(406a)	*long* [lɒŋ], adj.
	long–er [ˈlɒŋɡə]
	long–est [ˈlɒŋɡɪst]
(406b)	*long* [lɒŋ], v.
	long–er [ˈlɒŋə]
	long–ing [ˈlɒŋɪŋ]

There can be no doubt that (406) contains a pair of homographs, viz. *longer*, whose pronunciation is systemically different. The comparative of *long* the adjective has a workspace-medial [ŋɡ], while the noun derived from *long* the verb has only a single workspace-medial [ŋ]. Crucially, both phonetic objects are manifestations of underlying //ŋɡ//, which in both cases is domain-final, as the morphological divisions in both words are easy to trace. It would appear that there are two suffixes *–er* in English and that their presence gives complementary phonetic interpretation of the domain-final //ŋɡ//. This claim is well supported by the fact that the lexical categories of the two *longer*'s in (406) are different. One *–er* is clearly an adjectival, comparative suffix, whilst the other *–er* is an agentive nominal suffix. On the phonetic side of the story, it looks as if the adjectival suffix formed an open joint with the stem, while the nominal suffix is clearly separated from the stem with a closed joint. No other possibility seems available in the present model, since phonology proper cannot tell an adjectival suffix from a nominal

[201] The examples: *longer* the comparative, and *longer* the noun, have been pointed out to me by Edmund Gussmann (p.c.)

suffix; recall that morpholexical labels such as ‘noun’ or ‘adjective’ are untranslatable into phonological features.

It should be stressed that were it not for the modular–separationist approach of this work, the current issue might just as well be analysed along more conservative, *SPE*-like lines or using lexical strata, like Halle and Mohanan (1985) did. Given that there are two distinct *–er* suffixes, one might postulate that the adjectival suffix undergoes Class 1 affixation, the other affix Class 2 affixation. Class 1 and Class 2 affixations being performed at different strata in LP, the joints would be subject to different rules. (Theoretical implication of Halle and Mohanan’s analysis, especially its explanatory power with respect to //ŋg//, has been pondered on in section 2.5.)

The advantage of the current model is the ability to abstract away from what a particular suffix sounds like when pronounced as part of a word—both *–er*’s sound identical—and to focus on what difference the presence of either suffix makes for the interpretation of the stem. In the case of the two *–er*’s the distinction is clear. The nominal suffix does not interact with the stem, and pairs with the progressive aspect suffix *–ing* (recall examples in (395)ff.) Conversely, the adjectival suffix integrates with the stem, so that the resultant domain (and workspace) is phonetically indistinguishable from a monomorphemic workspace. The underlying //ŋg// is pronounced in the same way as in morphologically-indivisible words, such as *finger* or *anger*. Clearly, then, in the absence of phonetically-dubious diacritics, the phonological representations of words containing the nominal *–er* and those containing the adjectival *–er* must be systematically distinct, so that the phonology–phonetics interface is able to tell those //ŋg//’s that sit on an open joint, and consequently give [ŋg], and those that sit on a closed joint, resulting in [ŋ]. Effectively, this representational distinction boils down to the presence of absence of an empty CV between phonological exponents of the relevant morphemes, an issue discussed further in the next section.

6.8. Remarks on *–ing*: the role of the empty CV

It has been found in section 6.6 that the progressive aspect suffix *–ing* does not interact with the stem to which it is attached. Earlier on, the same pattern was found to be the case with the regular plural suffix (see section 6.4) and the regular past tense suffix (see section 6.5). The previous section has added the observation that of the two *–er* suffixes in English, one falls into the same morphophonological phenomenology as the other three suffixes just mentioned, whereas the other *–er* behaves as if it were part of the stem, namely it forces an underlying //ŋg// to be pronounced in the same way as domain-medial //ŋg//'s in monomorphemic words.

The respective sections devoted to the plural and to the past tense have argued that the manner in which the suffixes in question are pronounced—the interpretation of both the plural and the past tense suffixes is always motivated by the phonetic shape of the stem with which they form a workspace—is due to the presence of an empty CV between the stem and the suffix. Part of the reasoning behind those conclusions was the conditional presence of an epenthetic vowel, [ɪz] in the case of the plural, and [ɪd] in the case of the past tense, which was triggered on phonetic grounds (see relevant sections for details). In the case of *–ing*, however, the vowel in the suffix has been found to be underlying, not epenthetic (see section 6.6). Thus, one argument for maintaining the presence of an empty CV between the stem and the suffix has been lost. Nevertheless, the major argument has survived. Just like the regular plural morpheme and the regular preterite morpheme, the progressive morpheme never influences, in any phonologically-relevant way, the shape of the stem to which it attaches. One can always virtually cut off the morpheme to get an untouched stem. This also applies to the agentive nominative *–er* suffix. Given this fact, it is concluded that the progressive aspect suffix *–ing* is attached to the stem by means of a closed joint, and that the representational manifestation thereof is an empty CV. Thus, the representation for the word form *ski–ing* may indeed take the form shown earlier in (396), and repeated for convenience in (407).

(407) Correct output of *ski* + *–ing*, viz. [ˈskiː.ɪŋ][202]

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5	C_6	V_6
s		k		iː					ɪ	ŋ	

[202] Following the original example, (396), the representation shown here does not show the correct underlying composition of the suffix *–ing* as such.

The presence of the empty CV may now explain the relevant difference between the phonological representations that give *long, long–er* (the comparative), *long–er* (the experiencer noun), and *long–ing*, shown in (408), (409), (410), and (411), respectively.

(408) *long* //lɒŋg// [lɒŋ]

C_1 V_1 C_2 V_2 C_3 V_3

l ɒ {N} {_}{ʔ•h}

(409) *long*+ –*er*$_{adj}$ //lɒŋg//+//ə// (open joint) [ˈlɒŋgə]

C_1 V_1 C_2 V_2 C_3 V_3

l ɒ {N} {_}{ʔ•h} ə

(410) *long*+ –*er*$_{n}$ //lɒŋg//+//ə// (closed joint) [ˈlɒŋə]

C_1 V_1 C_2 V_2 C_3 V_3 C_4 V_4 C_5 V_5

l ɒ {N} {_}{ʔ•h} ə

(411) *long*+ –*ing* //lɒŋg//+//ɪŋg// (closed joint) [ˈlɒŋɪŋ]

C_1 V_1 C_2 V_2 C_3 V_3 C_4 V_4 C_4 V_4 C_6 V_6 C_7 V_7

l ɒ {N} {_}{ʔ•h} ɪ {N} {_}{ʔ•h}

Essentially, the complementary distribution of [ŋ] and [ŋg] is down to the presence of a contentful nucleus bound in a CV sequence with the onset carrying the '{_}{ʔ•h}' part of the cluster //ŋg//. Such a nucleus will only be in the same CV iff it is part of the same morpheme or it neighbours onto the onset across an open joint. The latter situation is depicted in (409). The former is shown in (412) below.

(412) *anger* //æŋɡə// [ˈæŋɡə]

C_1 V_1 C_2 V_2 C_3 V_3

æ {N} {_}{ʔ•h} ə

Despite their different morphological composition—*long–er* is divisible into smaller domains, while *anger* is not—the representations in (409) and (412) are identical in terms of there being a contentful companion to C_3, whereby the underlying //ŋɡ//, composed of the melodies lexically specified under C_2 and C_3, is pronounced as [ŋɡ]. Thus, the phonology–phonetics interface does not need to—in fact, the current model assumes it cannot—see the derivational history of a given workspace in order to give contextual interpretation of underlying //ŋɡ//'s. Table 7 below summarises the contexts and the interpretations of //ŋɡ//.

Position of //ŋɡ// inside a workspace	before a contentful nucleus[203]	elsewhere
Phonetic interpretation	[ŋɡ]	[ŋ]

Table 7: Distribution of phonetic interpretations of (word-internal) //ŋɡ// in English

A rather welcome effect of defining interpretative contexts for //ŋɡ// along the lines of Table 7 is the fact that the condition for neither of the two phonetic variants of //ŋɡ//, viz. [ŋɡ] and [ŋ], makes use of the notions 'domain-medially' and 'domain-finally' (or 'workspace-medially' and 'workspace-finally'). Therefore, the phonology–phonetics interface may and does interpret the underlying cluster in question solely based on what

[203] The context "before a contentful nucleus" includes underlying //ŋɡ//'s followed by liquids, which may be syllabic or pronounced with a schwa if nothing follows workspace-internally, except across an empty CV. Examples include *angry* [ˈæŋɡɹi] vs. *anger* [ˈæŋɡɹ̩] (or [ˈæŋɡɚ]) (both forms are found in rhotic accents of English only), and *angler* [ˈæŋɡlə] vs. *angle* [ˈæŋɡɫ̩] (or [ˈæŋɡəɫ]). Examples do not include, for instance, *kinglike* [ˈkɪŋlaɪk] (*[ˈkɪŋɡlaɪk]) or *songwriter* [ˈsɒŋɹaɪtə] (*[ˈsɒŋɡɹaɪtə]). It appears a common assumption in GP literature—see references in Scheer (2004: 302)—that those liquids that are syllabic are representationally bits of melody attached to an onset and a nucleus (either the following or the preceding one, depending on a particular analysis). If this is the preceding nucleus, then a syllabic liquid meets the context 'before a contentful nucleus' for the interpretation of //ŋɡ//'s. The issue of exactly which GP elements of a syllabic liquid are attached to the nuclear slot and what makes them interpretable as a syllabic liquid or the schwa and not any other vowel—recall GP elements available for vowels are a subset of those available for consonants—is surely interesting, but outside the scope of the present work.

follows within a given workspace. It is hardly controversial to consider the workspace-final context, as in, for example, *sing* //sɪŋg// [sɪŋ], as being anything but 'not before a contentful nucleus,' as there is no melody following the underlying //g// in the relevant representation. What follows across the workspace boundary is irrelevant. In the phrase *sing it*, for that matter, the phonetic interpretation of the word-final //ŋg// of *sing* is simply [ŋ], as the initial vowel of *it* may never be in the same CV as the underlying velar plosive. (It is not even part of the same workspace, unless *it* is taken to be an enclitic of *sing*, in which case both words may enter a single workspace, but there will be an empty CV separating them.)

It is concluded that if a closed joint is done representationally by means of separating the arguments—in this case, these are the stem and the progressive aspect suffix *–ing*—with an empty CV, the resultant representation, even though devoid of morpholexical labels, guarantees the possibility of the arguments being phonetically analytic, even though there is no systematic pause to be pronounced between them, as they both are part of the same workspace.

6.9. Remarks on Class 1 and Class 2 prefixes

English prefixes have not been given much attention in this work so far. Not unlike suffixes—where two distinct suffixes *–er* have been recognised—English prefixes fall into two categories, which, following Siegel's (1974) analysis, are dubbed Class 1 and Class 2 prefixes. From the point of view of the present work, the most interesting difference between these types is the behaviour of prefix-final nasals when followed by a plosive of the root, arguably most evident on prefixes of negative polarity. As it happens, English has two phonetically-similar negative prefixes, viz. *in–* and *un–*, other prefixes, such as *non–*, notwithstanding. The former appears in a variety of guises, for instance, as [ɪm] in *im–possible, im–peccable,* or *im–balance*, as [ɪŋ] in *in–cureable, in–credulous,* or *in–glorious*, and as [ɪn] in *in–tangible, in–tolerable* or *in–digestion*. The latter has only one relevant variant, viz. [ʌn], as in *un–pack, un–balance, un–told, un–dock, un–cap* or *un–glue*. This is a somewhat oversimplified picture, though. Phonetically speaking, *un–* may and does occasionally emerge as [ʌm] when attached to a root beginning with a labial plosive, while the form [ʌŋ] is not uncommon when the root starts in a velar plosive. The other prefix is different in that its phonetic form is always influenced by the left edge of the root. The labiality of the nasal in the negative *in–* is not optional but obligatory whenever the root begins with a labial plosive, while a root beginning in a velar plosive will always influence the nasal of the prefix in question to be velar.

It is important to stress that the agreement in the place of articulation between the right edge of the negative prefix *in–* and the left edge of the root is limited to nasal + plosive combinations only. For different combination, the agreement is rather optional. For instance, when the root begins with a labial fricative, as in *in–fallible*, the nasal is the alveolar [n] or the labiodental [ɱ]. Still, the distribution of the two variants is not governed by any rules of complementary distribution (recall the distribution of the regular plural and the regular past tense morphemes); rather, the labiodental nasal is nothing but an effect of regressive POA assimilation, found not only across prefix–root boundaries, but also across words, as in, for example, *ten fingers* [ˌteɱˈfɪŋgəz]. This is not of lexically-contrastive importance; it is merely contextual variation at the phonology–phonetics interface. Similarly, the assimilation of the nasal //n// in *un–* to the labial plosive in *un–pack* [ʌmˈpæk] or to the velar plosive in *un–glue* [ʌŋˈɡluː] is no different to POA assimilations across the word boundary, as in *ten boys* [ˌtemˈbɔɪz] or *ten girls* [ˌteŋˈɡɜːɫz]. In any case, while the realisation of the nasal in the negative *un–* is subject to variation, that of the nasal in the negative *in–* is not. Clearly, then, there a good reason to think the two prefixes do not form the same type of joint in the representations of the respective prefixed word forms.

An alternative way of thinking would be to consider the two prefixes *in–* and *un–* as having a different phonological expression responsible for the phonetic realisation of the nasal. This is not totally unwarranted. Given that the nasals of the two prefixes differ in their susceptibility to POA assimilation, one might think of *un–* as having the nasal fully specified for coronality, while *in–* would have the nasal unspecified for the place of articulation. When joined with the root, the former would remain phonologically coronal, while the latter would get its place specification from the left-edge plosive of the root, possible via feature spread. However, this approach has two major drawbacks.

Firstly, it cannot explain why it is only in the presence of a plosive that the nasal in *in–* assimilates POA in a systematic fashion.[204] Recall that the allegedly unspecified nasal of *in–* may fail to become labial in the presence of a labial fricative in *in–fallible*, which is pronounced [ɪɱˈfæləbl̩] or [ɪnˈfæləbl̩]. It might be the case that nasals only receive POA specification from plosives (or nasals). Nevertheless, should that be true, one would need to notice that if fricatives fail to transmit their POA specification onto preceding nasals—this seems an otherwise well grounded assumption, as monomorphemic nasal + fricative combination need not agree in POA, as in *anther* [ˈænθə] or *hamster* [ˈhæmstə]—then an otherwise unspecified nasal should, at least under the set of GP elements used herein, emerge as a velar, since it is only velars that do not bear any place-defining elements.[205]

Secondly, the putative underspecified nasals are not lexically-contrastive with the three already available ones, viz. the labial, the alveolar, and the velar. An underlyingly underspecified nasal pronounced as, say, a velar before a velar plosive never gives a lexical contrast with a fully specified velar nasal followed by a velar plosive. Thus, there is no excuse for introducing plurality without necessity, as Occam would have it.

A less grievous consequence of allowing for nasals unspecified for POA to be part of phonological representations would be recognising two phonologically distinct prefixes *in–*. One is the negative polarity prefix discussed in this section. The other is the directional prefix *in–*, as in *in–put* [ˈɪnpʊt] (as opposed to *out–put*) or *in–crease* (the noun) [ˈɪnkɹiːs] (as opposed to *de–crease*). The nasal of the directional prefix may stay alveolar or it may assimilate its POA to the following consonant. Clearly, this is not the case with the negative *in–*. Notice that the present work has already encountered a similar situation in the case of the two suffixes *–er* (see section 6.8). Not a single time has it been claimed that the underlying representations of the two *–er*'s are different. On the contrary, section 6.8 has found that the difference in the phonetic behaviour of these is caused solely by the way in which these suffixes join their respective morphophonological bases. Namely, the comparative adjectival *–er*, as in *long–er* [ˈlɒŋɡə], is attached via an open joint, so that its vowel finds itself in a single CV with

[204] Notice that even though roots with nasal stops should have the same effect on prefixes, the result of assimilation would be a nasal geminate, bound to degeminate at the phonology–phonetics interface.

the underlying //g// of the stem, effectively giving a representation undistinguishable from a monomorphemic word. The experiencer nominaliser *–er*, as in *long–er* [ˈlɒŋə], is attached via a closed joint, which results in an empty CV separating the suffix and the stem, effectively leaving the two as partly independent objects within a single workspace. When compared to the prefixes discussed in the present section, the morphophonological behaviour of the two *–er*'s yields the following conclusions.

Firstly, the two prefixes *in–* are phonologically identical. The directive prefix is attached to the root via a closed joint, so that there is an empty CV between the prefix and the root. This is illustrated in (413).

(413) *in–+put* //ɪn//+//pʊt// (closed joint) [ˈɪnpʊt] (or [ˈɪmpʊt])

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5
	ɪ	{N•A}				p	ʊ	t	

The negative prefix is attached via an open joint, resulting in the nasal and the plosive contracting a place-sharing relation that is part of melodic completeness of phonological domains in English. This is shown in (414).

(414) *in–+balance* //ɪn//+//bæləns// (open joint) [ɪmˈbæləns] (*[ɪnˈbæləns])

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5	C_6	V_6
	ɪ	{N}		{U}{ʔ•h}	æ	l	ə	n		s	

The place-sharing relation contracted between the nasal under C_2 and the plosive under C_3 is a direct consequence of the prefix and the root being mutually visible during the concatenation. The output of that operation, viz. the workspace illustrated in (414), conforms to the same elegance requirements that morphologically-simplex words do. This is not the case with the other negative prefix, i.e. *un–*, whose concatenation with the root is done with both arguments mutually invisible, and which pairs with the directional *in–*, shown in (413). For the sake of exposition, this is illustrated in (415).

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205 It should be stressed that this particular conclusion is theory-specific. Scheer (2004), for instance, takes alveolar consonants to be underlyingly placeless. Hence, in Scheer's take on elements in CVCV, an unspecified nasal would be in fact alveolar, which is the case with *in–fallible*.

(415) *un–+balance* //ʌn//+//bæləns// (closed joint) [ʌnˈbæləns] (or ([ʌmˈbæləns]) (the portion shown is [ʌnˈbælə_])

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4	C_5	V_5	[…]
	ɪ	{N•A}				{U}{ʔ•h}	æ	l	ə	[…]

The free variation in the interpretation of the nasal of *un–* in (415) and the lack thereof for *in–* in (414) is a direct consequence of type of morphological joint between the respective prefix and its root, resulting in the nasal forming an elegant place-sharing relation with the plosive, in (414), or not forming any relation at all, in (415).

6.10. English affixes : concluding remarks

The current chapter has investigated the ways in which a few selected affixes join their roots or stems. Two patterns have been described and analysed. The behaviour of the regular plural morpheme and that of the regular past tense morpheme—both are suffixes—has been analysed as instances of non-interacting concatenations. The fact that their allomorphs, [s], [z], and [ɪz] for the former and [t], [d], and [ɪd] for the latter, occur in mutually exclusive contexts, conditioned solely by the phonetic shape of the stems to which they attach, has lead to the conclusion that on the lexically-contrastive phonological level each of the morphemes is a single phonological object, and that there is no lexical selection of any allomorphs during the concatenation. The distribution of their allomorphs is lexically-non-contrastive and is governed solely by the phonology–phonetics interface. The other conclusion regarding the two suffixes concerns the absolute lack of any contrastively-relevant influence they have on the stems to which they attach. This has given rise to the claim that their concatenation is done via closed joints, where neither of the arguments to the concatenation causes modification of the other. Finally, the lack of any degemination of two [s]'s, [z]'s, [t]'s, and [d]'s, depending on which suffix is concerned after a stem with the same final consonant, has lead to the conclusion that the closed joint character of the morphological division between the stem and the suffix is representationally reflected by means of an empty CV.

The same non-interacting pattern has been argued for the progressive aspect suffix *–ing*. In this case, additional evidence has been found to support the claim about the presence of an empty CV in the phonological output of closed joints. Namely, the phonetic distribution of the underlying //ŋg//, viz. [ŋg] or [ŋ], has been shown to coincide with the presence or absence of a contentful nucleus acting as the governor to the voiced velar plosive. Since the suffix *–ing* is vowel initial—it has been shown that its vowel is not epenthetic—the conclusion has been that indeed a closed joint must result in an empty CV separating the arguments of the concatenation.

The other pattern, viz. the interacting one, has been found among English prefixes. Two morphemes of negative polarity have been investigated, *in–* and *un–*, of which the former has been argued to enter concatenation with a root via an open joint, resulting in a place-sharing relation whenever the root starts with a plosive. The same relation has been shown to hold for monomorphemic words in English. The latter prefix has been shown to join its roots via a closed joint, and it has been argued once more that this type of concatenation leaves an empty CV in the phonological representation. Evidence has been found in the form of pronunciations of words prefixed with *in–* the negative prefix, *un–*, and *in–* the directive prefix, whereby prefixes separated from the root with an empty CV may and do show variation in terms of their place of articulation, while *in–* the negative prefix has no variability and its nasal always agrees in POA with the plosive of the root.

7. English linking and intrusive [ɹ]

The current chapter—the reader is kindly asked to excuse its brevity—concentrates on a matter irrelevant of morphophonology. In order to provide evidence from English for the lexically-non-contrastive nature of the phonology–phonetic interface, and, in a way, for the existence of the interface as such, this chapter contemplates the phonetic distribution of the post-alveolar (central) approximant [ɹ] in English.

7.1. Distribution of [ɹ]

The peculiar status of [ɹ] has already been signalled in passing, specifically in a few side remarks in Chapter 6. Consider the examples in (416).

(416)

(416a)	*car* [ˈkɑː]	*(the) car is (there)* [ˈkɑːɹɪz]
	arm [ˈɑːm]	*armour* [ˈɑːmə]
	rover [ˈɹəʊvə]	*anger* [ˈæŋɡə]
(416b)	*car* [ˈkɑːɹ]	*(the) car is (there)* [ˈkɑːɹɪz]
	arm [ˈɑːɹm]	*armour* [ˈɑːɹmɚ]
	rover [ˈɹəʊvɚ]	*anger* [ˈæŋɡɹ̩]

The pronunciations shown in (416a) are typical of so-called non-rhotic accents of English, especially the so-called Received Pronunciation (RP), which is the variety of English analysed in the present work. Those in (416b) are typical of rhotic accents, for instance the so-called General American, a variety which perhaps is not found in real life, but which has made its way into English pronouncing dictionaries.[206] The difference in the phonetic distribution of //r// is clear. The non-rhotic accents will only pronounce an underlying //r// when directly before a vowel, which, importantly, need not be part of the same word, as shown in *(the) car is (there).* The rhotic varieties pronounce all underlying //r//'s.

At face value, the pattern is simplistic. It would suffice to say that while for rhotic accents the phonology–phonetics interface has no variability, and no conditions are looked for during interpretation. For non-rhotic accents, however, a minor complication would be the following. When faced with a //r//-ended word, the interface has to look ahead and assess if the first sound of the next word is a vowel. Notice that this is only a complication on the part of the interpretive component, not a complication for the analysis. English linking [ɹ], as this phenomenon is also known, is highly reminiscent of Poznań–Cracow Voicing, dwelled upon in nauseating detail in Chapter 4. Recall that this type of voicing is only effective across the word boundary on the condition that the relevant words are pronounced without a pause. The same applies to linking [ɹ]. If there is a pause between *car* and *is*, the phrase exemplified in (416a) is pronounced [ˈkɑː | ɪz], i.e. without even a trace of the liquid. Thus, a simplified rule for the interpretation of //r// in non-rhotic accents may be stated as in Table 8.

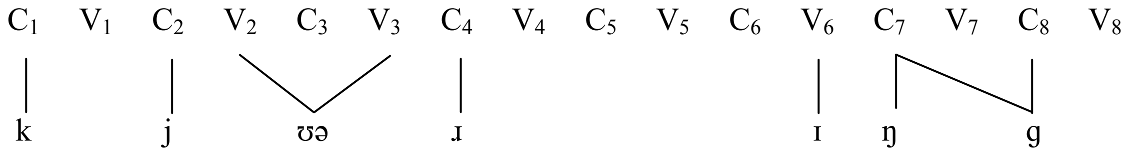
Position of //r//	when followed by a vowel (within or across the workspace)	elsewhere
Phonetic interpretation	[ɹ]	*ϕ*

Table 8: Distribution of phonetic interpretations of //r// in RP

Viewed in this way, the phonetic presence or absence of [ɹ] in RP is in perfect isolation from morphophonology. Notice that the condition for the pronunciation of [ɹ] is defined in phonetic terms. Empty CV's or workspace edges separating //r// from a vowel are ignored. Consider (417).

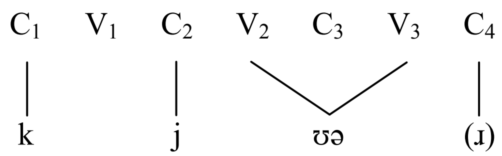
[206] Maciej Baranowski (p.c.), Dennis Preston (p.c.), Clive Upton (p.c.), and J.C. Wells (p.c.) have all assured me such a thing as "General American" is not a real spoken variety of English. Nevertheless, a

(417) *cure+–ing* //kjʊə//+//ɪŋg// [ˈkjʊəɹɪŋ][207]

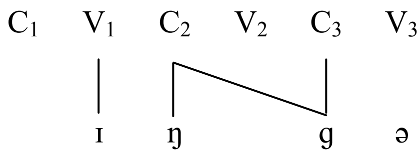


The empty CV in (417) reflects the closed joint between the stem (*cure*) and the suffix (*–ing*). (The way in which *–ing* is concatenated has been discussed in sections 6.6 to 6.8.) During the phonetic interpretation, the empty categories V_4 to C_6 are skipped, as these have no systemic interpretation, silence being lexically-non-contrastive. In the same way, linking [ɹ] operates across workspaces, for instance between the two shown in (418).

(418) *cure* //kjʊə// [kjʊə(ɹ)]



Inga //ˈɪngə// [ˈɪŋgə]



The phonetic interpretation of *cure Inga* is, unsurprisingly, [ˈkjʊəˈɹɪŋgə], even though in morpholexical terms, the two words are unrelated, hence not part of the same workspace.

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variety of North American English devoid of overt regional features is what is used as the 'General American' variety in *CEPD*, *LPD*, and *ODP*.

[207] The place-sharing relation between intramorphemic nasal + plosive sequences has been discussed in section 6.7. The true phonological nature of [ʊə] before [ɹ] will be signalled in section 7.3.

7.2. A different [ɹ]

The choice of //r// in the present writing is not accidental. Potentially, one might just as well approach the distribution of the lateral approximant in RP. Contrary to General American, where all occurrences of //l// are supposed to be the velarised alveolar approximant [ɫ], RP distributes the non-velarised [l] and the velarised [ɫ] in a straightforward fashion. The formed only appears before vowels and before the palatal approximant [j], within and across words, while the latter appears elsewhere. The distribution is largely complementary—occasional variation at word boundaries is negligible—and not relevant lexically. There is a reason, however, to concentrate on //r// rather than look for more complementary distribution among English consonants. (One might think of aspirated voiceless plosives, partially devoiced voiced obstruents, and devoiced sonorants after voiceless obstruents, all instances of phonology–phonetics interaction, not worth much attention at the morphophonological level.) The non-rhotic accents have a rather peculiar feature of not only restricting the pronunciation of [ɹ] where it is underlyingly present, but also of pronouncing [ɹ] where it is not warranted by the lexical representation.[208] Consider examples in (419).

(419)	*law* [ˈlɔː]	*law and order* [ˈlɔːɹənˈɔːdə]
	draw [ˈdɹɔː]	*drawing* [ˈdɹɔːɹɪŋ]
	media [ˈmiːdi.ə]	*media attention* [ˈmiːdi.əɹəˈtenʃn̩]
	via [ˈvaɪ.ə]	*via e-mail* [ˈvaɪ.əˈɹiːmeɪɫ]
	seesaw [ˈsiːsɔː]	*seesaw accident* [ˈsiːsɔːˈɹæksɪdənt]
	bra [bɹaː]	*bra extender* [ˈbɹaːɹɪkˈstendə]
	saw [sɔː]	*saw interest* [ˈsɔːˈɹɪntɹəst]

There is a good reason to believe that the excessive pre-vocalic [ɹ], dubbed intrusive [ɹ], which is found in *law*, *drawing*, *media* and other left-hand words in (419) is not underlyingly present in the words given. This belief comes in part from the fact that, in

[208] See, for instance, Wells (1970; 1982), Pullum (1976), Broadbent (1991), Harris (1994), McMahon — Foulkes — Tollfree (1994), Gick (1999), Jensen (2000), McMahon (2000*a*,*b*), Uffmann (2007), and Cruttenden (2008: 305–306) for discussion and further references.

general, rhotic varieties of English do not exhibit this superfluous [ɹ].[209] Additionally, even though phonology and orthography may sometimes be only distantly related—*cupboard* (pronounced [ˈkʌbəd], not *[ˈkʌpˌbɔːd]) is just one example—it is worth noting that intrusive [ɹ] corresponds to no letter in standardised spelling. This should not come as a surprise, since rhotic varieties of English, lacking the vowel-conditioned pronunciation of //r//, can, in principle, pronounce all the R's found in spelling.

Importantly, non-rhotic Englishes, RP in particular, are not uniform in the distribution of intrusive [ɹ]. First, the common perception of this phenomenon is that it only ever appears between vowels on the condition that the first vowel is no closer than the schwa, effectively excluding any [i]-like or [u]-like vowel in English from being followed by intrusive [ɹ].[210] The openness of the second vowel is irrelevant. As shown in (419), it may be a fairly close vowel (e.g. [ɪ] or [uː]) or a fairly open vowel (e.g. [ɔː] or [æ]), too. The exclusion of intrusive [ɹ] after close vowels has nothing to do with morphophonology. Rather, whenever there is a vowel hiatus where the first vowel is close-mid or close—whether it is a monophthong or a close-mid or close-ended diphthong is irrelevant—an intrusive dorsal approximant may and does occasionally appear. Specifically, the front approximant [j] resolves the hiatus when preceded by an [i]-like vowel, and the back approximant [w] fills the break after an [u]-like vowel, as in *play again* [ˈpleɪ(j)əˈgen] or *no other* [nəʊˈ(w)ʌðə], respectively. The distribution of the hiatus fillers is thus complementary, and lexically non-contrastive. Still, the fillers are not always present when the context of a vowel hiatus is met. An alternative to an intrusive approximant, [j], [w], or [ɹ], is found in the glottal plosive [ʔ]. All the phrases given in (419) may take alternative pronunciations with the glottal plosive, as shown in (420).

(420) *law and order* [ˈlɔːɹənˈɔːdə] or [ˈlɔːʔənˈ(ʔ)ɔːdə]
drawing [ˈdɹɔːɹɪŋ] or [ˈdɹɔːʔɪŋ]
media attention [ˈmiːdi.əɹəˈtenʃn̩] or [ˈmiːdi.əʔəˈtenʃn̩]
via e-mail [ˈvaɪ.əˈɹiːmeɪɫ] or [ˈvaɪ.əˈʔiːmeɪɫ]

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[209] Wells (1982: 505ff) notes that New York English, historically non-rhotic, but becoming an increasingly rhotic accent at that writing, also has intrusive [ɹ].

[210] This statement is by no means falsified by Hay and Maclagan's (in prep.) data on intrusive [ɹ], which appears to be emerging after the MOUTH vowel in New Zealand English. In RP, the vowel in question is [aʊ], and unlikely to be followed by intrusive [ɹ] at all. In NZE, however, the quality of the phonological

seesaw accident [ˈsiːsɔːˈɹæksɪdənt] or [ˈsiːsɔːˈʔæksɪdənt]

bra extender [ˈbɹaːɹɪkˈstɛndə] or [ˈbɹaːʔɪkˈstendə]

saw interest [ˈsɔːˈɹɪntɹəst] or [ˈsɔːˈʔɪntɹəst]

There is little support for considering the glottal plosive as underlyingly present in any of the phrases in (420). The sound in question is hardly a morphophoneme of English in the traditional sense. (If it were, one would find it hard to explain why it may occasionally co-occur, especially outside so-called Refined RP—this is a term used in Cruttenden (2008)—with phonetic realisations of three distinct morphophonological objects, viz. //p//, //t//, and //k//, specifically in post-nuclear positions in stressed syllables.[211]) If the glottal plosive as such is not a lexically-contrastive object, it must be concluded that in the case of intrusive [ɹ] a set of three approximants and the glottal plosive constitute parallel sets of phonetic realisations of what in morpholexical terms is a zero. The phonological object that [j], [w], [r] or [ʔ] realise in their respective contexts is lexically void. Therefore, it need not be part of any morphophonemic representation.

7.3. Morpholexical context sensitivity of intrusive [ɹ]

Section 7.2 has argued that intrusive [ɹ] is not a phonetic realisation of any underlying //r//. If this is true, then it appears interesting to investigate the morpholexical contexts in which this non-underlying [ɹ] occurs. Cruttenden (2008) provides a scale of the decreasing likelihood of [ɹ]'s occurrence:

> (a) The insertion of /r/ is obligatory before a suffix beginning with a vowel, where the /r/ is historically justified.
> (b) The insertion of /r/ is optional, though generally present, before a following word beginning with a vowel, where the /r/ is historically justified.
> (c) After [ə], even an intrusive /r/ (i.e. historically unjustified) is generally used before a following word, e.g. *vanilla essence* /vənɪlər `esəns/, *vodka and tonic* /vɒdkər ən `tɒnɪk/.
> (d) After /ɑː/ and /ɔː/, an intrusive /r/ is often avoided before a following vowel, e.g. *nougat and chocolate* /nuːgɑːr ən `ʧɒklɪt/, *straw in the wind* /strɔːr ɪn ðə wɪnd/.
> (e) The insertion of intrusive /r/ before a suffix is often strongly stigmatised, e.g. *strawy* /`strɔri/ [sic], *gnawing* /nɔːrɪŋ/ [sic] (Cruttenden 2008: 306).

MOUTH has been found drifting towards a diphthong with a non-close offglide, viz. [ɛə] (p. 21), which confirms the phonetic—not morphophonological—condition for hiatus breaking via [ɹ].

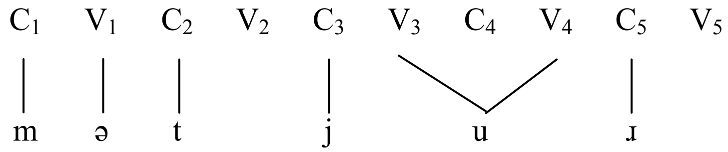
211 See, for instance, Cruttenden (2008: 178–181) for details.

Provided Cruttenden's data are real, the scale indicates that somehow RP speakers make more or less conscious distinction between not only phonetic—[ɑː] and [ɔː] are clearly distinct from [ə]—but also morpholexical contexts, morpheme boundaries and word boundaries being a different kettle of fish in the present model.[212] The accuracy of the data or rather the sociolinguistic flavour they have—'stigmatised' is not a phonological feature after all—is not the question. In general, there is no a priori reason for which social factors could not bear on the phonology–phonetics interface (but not necessarily on the morphophonological level). Speakers may use intrusive [ɹ] in different contexts, or they may not use it at all; it is not lexically-contrastive anyway. The real question is whether the five contexts given in Cruttenden's work can be unambiguously traced in morpholexical representations, so that the phonology–phonetics interface can distinguish between them all. This is doable.

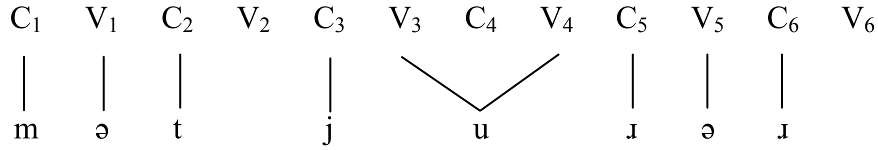
To begin with, contexts (a) and (b) have already been signalled in section 7.2. In structural terms, the difference between (a) and (b) is simple. Words falling under both contexts all have a phonological expression responsible for the pronunciation of [ɹ] in their lexical representations. In the case of words that have //r// before a suffix, its position with respect to morpholexical structure is workspace-medial, which can be recognised by the phonology–phonetics interface as the onset carrying //r// being followed either by a contentful nucleus or an empty VC followed by such a nucleus. This distinction has been discussed in section 6.8, where interacting and non-interacting suffixes were argued to cause the respective structures to arise during morpheme concatenation. Recall that two suffixes *–er* have been discussed, one a comparative adjectival suffix, the other an agentive nominalising suffix. The former is interacting, as has been shown on the example of *long* ~ *longer* [ˈlɒŋgə], while the latter is non-interacting, hence *long* ~ *longer* [ˈlɒŋə]. When applied to a //r//-ending stem, for instance *mature*, the two suffixes result in the set of representations shown in (421), (422), and (423) below.

[212] Some counterarguments to Cruttenden's scale come from the fact that Wells (1970), Pullum (1976), Jensen (2000), and Uffmann (2007) only discuss word-final intrusive [ɹ], not mentioning its word-internal occurrences across morphological divisions. McCarthy (1993), McMahon — Foulkes — Tollfree (1994), Gick (1999) and McMahon (2000*a*,*b*) are aware of the intermorphemic intrusive [ɹ], but do not signal any conspicuous differences in its occurrence in comparison to the interlexical one. On the other hand, Wells (1982: 222–227) not only recognises the intermorphemic intrusive [ɹ], but also points to the difference in its occurrence in comparison to the word-final intrusive [ɹ].

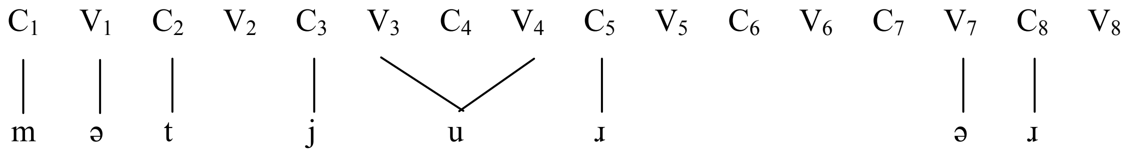
(421) *mature* //məˈtjuːr// [məˈtjʊə][213]



(422) *mature+–er*$_{adj}$ //məˈtjuːr//+//ər// (open joint) [məˈtjʊəɹə]



(423) *mature+–er*$_{n}$ //məˈtjuːr//+//ər// (closed joint) [məˈtjʊəɹə]



Since the two suffixes are concatenated be means of different joints, *mature–r* the comparative of *mature*—it is not a matter of phonology that the semantics of *mature* makes its suffixed comparative (and superlative) rather unusual—is representationally distinct from *mature–r* the agentive of *mature*, i.e. 'one who brings to maturity,' for instance 'one who looks after Scotch until it matures.' Unlike in the case of //ŋg//, discussed in sections 6.7 and 6.8, the phonetic realisation //r// is not connected to empty CV's being present or absent at morphological boundaries as long as there is a contentful nucleus following somewhere within the same workspace, not separated from //r// by a contentful onset.

By definition, workspace-final //r//'s are not followed by contentful nuclei within a single representation. Should a vowel follow a //r// across the workspace edge, it is a different context for the phonology–phonetics interface. Thus, the phrase *more in–come* [ˈmɔˈɹɪnkʌm] is representationally two separate objects, as shown in (424).

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[213] This and the subsequent figures assume that the diphthong [ʊə] before //r// is //uː// underlyingly (and morphophonologically). This stems from the fact that in RP no word is pronounced with an [uː] before an underlying word-final //r//, which would doubtlessly betray its presence in the form of linking [ɹ], conditions permitting.

(424) *more in–come* //mɔːr//+//ɪnCVkʌm// [ˈmɔːˈɹɪnkʌm]; the portion shown is [ˈmɔːˈɪnk_][214]

C_1 V_1 C_2 V_2 C_3 V_3] [C_1 V_1 C_2 V_2 C_3 V_3 C_4 […]

m ɔː ɹ ɪ n~ŋ k […]

Recall from section 6.9 that the directional prefix *in–*, unlike the negative polarity prefix *in–*, is non-interacting, hence the empty CV in *in–come*. Clearly, while the representations in (422) and (423) have their //r//'s in different contexts, they are both different to the context given in (424). The analysis has just shown that Cruttenden's contexts (a) and (b) are representationally reflected in the model endorsed herein.

As for the remaining three contexts, they all share the condition of the [ɹ] in question not being present in underlying representations. This gives a clear distinction between contexts (c), (d), and (e) when compared to (a) and (b). Between one another, the former are divisible into two sets. Contexts (c), and (d) go together in that they both concern word boundaries, while context (e) alone touches upon morphological boundaries within words. In the case of word-final intrusive [ɹ], since standalone words do not form single workspaces, the very edges of consecutive workspaces submitted to the phonology–phonetics interface for interpretation act as the trigger for the presence of word-final [ɹ] or the lack thereof. Thus, the two workspaces shown earlier in (424) are systematically different ontological entities from single workspaces, such as those given in (422), and (423). Still, as the aforementioned examples concern words with underlying //r//, they need counterparts with non-underlying [ɹ] for comparison. Consider (425).

(425) *via e-mail* //ˈvaɪ.ə//+//ˈiːmeɪl// [ˈvaɪ.əˈɹiːmeɪɫ]; the portion shown is [ˈvaɪ.əˈɹiː_]

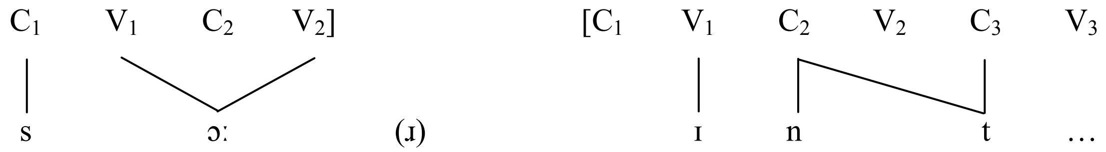
C_1 V_1 C_2 V_2 C_3 V_3] [C_1 V_1 C_2 V_2

v aɪ ə (ɹ) iː

[214] If there is a word-initial empty CV in English, then the final /r/ of *more* is separated from *income* by a workspace edge and the extra CV in *income* as such. There is no morphophonological lateral relation between the initial //ɪ// of *in–come* and the final //r// of *more*.

The left-hand word in (425) has no //r// in its morphophonological representation.[215] The optional presence of [ɹ] in the phrase given may be sensitive to two factors. Firstly, a workspace boundary separates the final schwa from the first pronounceable phonological expression of the following word, which happens to be a vowel, so that a vowel hiatus is imminent. The phonology–phonetics interface may break the hiatus with a glottal plosive or with an intrusive [ɹ]; this is optional. Secondly, the quality of the vowel preceding the hiatus is mid central, which for the interface is a different object than [ɑː] or [ɔː]. Thus, example (425) illustrates Cruttenden's context (c). Now compare (426).

(426) *saw interest* //sɔː// //ˈɪntrəst// [ˈsɔːˈɹɪntɹəst]; the portion shown is [ˈsɔːˈɹɪnt_]



All things being structurally equal—there are two separate workspaces in (425) and in (426)—the phonetic value of the pre-hiatus vowel in (426) is more open than the schwa, a condition to which the phonology–phonetics interface may be sensitive, so that, assuming the reality of Cruttenden's (2008: 306) scale, the hiatus is less likely to be resolved via intrusive [ɹ] here than in (425). Still, the presence of a superfluous [ɹ] in both (425) and (426) is a matter of phonetic interpretation in the context of the workspace boundary, so that while (425) illustrates context (c), (426) depicts the environment to which context (d) applies.

Against all the previous cases, notice there are two possible structures in a workspace in which a vowel-ended stem is followed by a vowel-starting suffix. The joint between the two morphemes can be open or closed, resulting in a seamless skeleton or a skeleton broken up with an empty CV, respectively. Both cases must be accounted for. Recall the discussion on suffixes in section 6.8. It has been argued that of the two suffixes *–er* that were discussed, the adjectival suffix is interacting, while the agentive suffix is non-interacting. Hence, a noun in which a stem is followed by the

[215] The parenthesized "ɹ" in the representation denotes a [ɹ] that may appear during the phonetic interpretation—another candidate is the glottal plosive [ʔ]—but which is not part of the morphophonemic structure. This work does not venture to explain what makes [ɹ] appear in the phonetic matter, though; the

comparative *–er* should exhibit no empty CV at the joint. This is the case with *raw–er* in (427).

(427) *raw+–er*$_{comparative}$ //rɔː//+//ər// (open joint) [ˈɹɔːɹə]

C_1 V_1 C_2 V_2 C_3 V_3 C_4 V_4

ɹ ɔː (ɹ) ə ɹ

Unlike the agentive *–er*, the progressive *–ing* is a non-interacting suffix, which has been argued in sections 6.6, and 6.8. Thus, a (phonologically–phonetically) similar base joined with *–ing* will have an empty CV, as illustrated in (428) below.

(428) *yaw+–ing* //jɔː//+//ɪŋg// (closed joint) [ˈjɔːɹɪŋ]

C_1 V_1 C_2 V_2 C_3 V_3 C_4 V_4 C_5 V_5 C_6 V_6

j ɔː (ɹ) ɪ ŋ g

The two structures being different, they have the same effect on the interpretation of the vowel hiatus, both of them fitting context (e). As Cruttenden's (2008: 306) puts it, the insertion of [ɹ] in the contexts exemplified in (427) and (428) is "strongly stigmatised." Nevertheless, the two representations are unlike (421)–(426) in that they have a workspace-internal vowel hiatus which may but need not be resolved via intrusive [ɹ].

As has been just shown, Cruttenden's five environments of intrusive [ɹ]'s likelihood are all decipherable from distinct morpholexical environments. Unlike in the case of //ŋg//, discussed in section 6.8, the distribution of extraneous [ɹ] is not sensitive to the structural distinction between open and closed joints. Still, it might be sensitive to the difference between vowel hiatuses occurring workspace-internally and at workspace edges. It should be stressed that the latter context is a real entity for the phonology–phonetics interface, and that this conclusion echoes that of Chapter 4. Notice that intrusive [ɹ] bears a very clear resemblance to Poznań–Cracow Voicing; the voicing is lexically non-contrastive, and results in phonologically voice-neutral obstruents—there

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matter lies outside English representational morphophonemics, as viewed herein. However, see Harris (1994) for a GP-based analysis.

is no {L} element on non-voiced obstruent in Polish—being realised phonetically as if they were underlyingly specified as voiced. Intrusive [ɹ] manifests as lexically-absent //r// appearing phonetically in exactly the same contexts where underlying //r// is ever pronounced in non-rhotic accents. The optionality and the graded likelihood of its occurrence—workspace edges are clearly favoured over workspace-internal cases—point to the boundary between consecutively-pronounced workspaces as a triggering factor. It also provides evidence for an intermediary between the morpholexically contrastive level of high phonology, and phonetic actualisation, in the flesh of the phonology–phonetics interface.

Conclusion

This work has presented an unorthodox approach to phonology, whereby phonology as a module of the faculty of language comprises two levels: morphophonemic and phonological–phonetic. This distinction largely follows the lexical and post-lexical split-component architecture of Lexical Phonology, albeit viewed from a different perspective. What has been proposed is that the morphophonemic level of language is based on workspaces built from abstract autosegmental representations, whose building blocks are neither *SPE*-type feature matrices, nor features used in Sagey's (1986) feature geometry. Rather, these are monovalent primes used in Government Phonology, whose phonetic interpretation is cued not only by paradigmatic relations between primes defining particular autosegments, but also—perhaps, more importantly—by syntagmatic relations between primes defining adjacent autosegments on a phonological skeleton. In a way, this work has pushed Gussmann's (2007) treatment of the latter notion to a logical end. The rationale behind postulating this type of phonological analysis has been fleshed out in Chapter 1, with emphasis on the deficit of explanatory power of phonological theories of the past.

Chapter 2 has presented the architecture of Workspace Phonology, the model endorsed in this work. Attention has been paid to show in which respect the new proposal differs from the two theories on which it is based, viz. Lexical Phonology (inter alia, Kiparsky 1982*a*,*b*, Booij — Rubach 1984, 1987, Mohanan 1982, 1986) and CVCV (Scheer 2004 et seq.) (built on Government Phonology).

Chapter 3 has discussed the morphophonemic and phonological–phonetic aspects of palatalisation in Polish. Attention has been paid to stress the difference between the morphophonemic side of the process—here attributed to the operation *I-spread*, which only works at the morphophonemic level of Polish phonology—and the phonological–phonetic side of the process, which is independent of morphophonemic considerations, and concerns language-specific limitations on the phonetic actualisation of Polish. An excursus on the notions of the Strict Cycle and Derived Environment has been included to show how these notions—central to Lexical Phonology, but almost non-existent in mainstream Government Phonology—translate into the theory proposed in this work. The analysis of palatalisation as such has provided some explanation as to the cause of the systematic duality of Polish palatalisation, and dared to speculate what factors allow foreign vocabulary to be used in Polish even if it contains non-native (non-Slavic) word-internal syntagmatic morphophonemic relations. The discussion has pointed to the validity of the split-component approach to phonology.

Chapter 4 has discussed voice phenomena in Polish phonology, with emphasis on the so-called Poznań–Cracow Voicing. It has been shown that Government Phonology is unable to give a satisfactory answer to the question why this phenomenon is attested at word boundaries, but not at word-internal morphological boundaries, let alone in morpheme-internal contexts. It has been postulated that the word boundary is a phonological object that can be expressed without recourse to *SPE*-like diacritics (so-called [–segment] segments), which is in the spirit of CVCV. Poznań–Cracow Voicing has been demoted to the interpretive component, in which the word boundary—expressed as a break between linearly-ordered morphophonemic representations—acts as the trigger for the process. Furthermore, dialectal variation in the treatment of voice on word-final obstruents (Warsaw Polish vs. Poznań–Cracow Polish) has been shown to be a matter of phonetic interpretation, not a matter of morphophonemic representation.

A discussion on voice phenomena and, more importantly, palatalisation at prefix–root and preposition–host boundaries in Polish, given in Chapter 5, has pointed to yet another diacritic-free representational object in Polish morphophonemics. It is a domain breaker, in the form of an empty CV—an object inherited from CVCV, inexpressible in *SPE* or LP, unless via a diacritic or through stratal cyclic derivation—which is a representational reflex of Class 2 (non-cohering, non-cyclic, non-interacting) morpheme concatenation. As words are argued to be contained within morphophonemic workspaces, the discussion on Polish prefixes and prepositions has pointed to a way of accounting for the two patterns of word-internal palatalisation in Polish representationally, rather than through multistratal word formation, where given rules are ascribed to apply at selected strata. The analysis has shown that Polish prefixes and preposition need not be dependent on the ordering of affixes that flank the root—

suffixes before prefixes, or the other way round—as the morphophonemic effect of each affixation can be expressed by means of morphophonemic representations alone.

English affixes, with emphasis on the Class 1 vs. Class 2 distinction, have been discussed in Chapter 6. The distribution of the allomorphs of the regular plural has been shown to be a matter of phonetic interpretation of one morphophonemic object, rather than an instance of lexical selection. Attention has been paid to show the premises on which this conclusion is drawn. It has also been shown that distributional data on English provide evidence for the feasibility of the particular split-component approach to phonology presented in this work. The remainder of the chapter has concentrated on representational distinction between Class 1 and Class 2 affixation, whereby the empty CV—used for Polish in Chapter 5—has been shown to be a viable object for the morphophonemics of English, too. An excursus on the distribution of [ŋ] and [ŋg] in the Received Pronunciation variety of spoken English has pointed to the duality of underlying //ŋg//, which is somewhat parallel to the duality of palatalisation in Polish, both phenomena having similar representational reflexes.

Finally, Chapter 7 has pondered over the distribution of the post-alveolar central approximant [ɹ] in English, with emphasis on so-called intrusive [ɹ]. The analysis has shown representational differences between contexts in which intrusive [ɹ] appears with a ranked probability. The empty CV and the word boundary have made an appearance once more, adding to the body of evidence for the model of phonology that this work has proposed.

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