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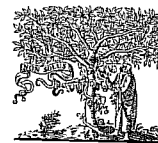
# SOUNDS OF SILENCE: EMPTY ELEMENTS IN SYNTAX AND PHONOLOGY

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## WHY THE PROSODIC HIERARCHY IS A DIACRITIC AND WHY THE INTERFACE MUST BE DIRECT\*

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### 1. INTRODUCTION

Since the 80s, the processing of non-phonological information in phonology has been dominated by two interface theories, Lexical Phonology and Prosodic Phonology. While the former is closely associated with stratal effects that rely on the existence of different affix classes, the latter translates phonologically relevant morpho-syntactic structure into a phonological arborescence that is known as the Prosodic Hierarchy.<sup>1</sup> The Prosodic Hierarchy to date stands unchallenged and is the theory-resident default when phonologists make reference to extra-phonological information. This has not changed in constraint-based environments where prosodic constituency has been taken over with minor adaptations (e.g. Selkirk, 2000, Kiparsky, 2000, Bermúdez-Otero, forth).

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\* I would like to thank two anonymous reviewers whose comments have greatly improved the article.

<sup>1</sup> The relation between the two theories has always been unclear at best: why should morpho-syntactic information be handed down to phonology in two different ways? This question has been discussed by Selkirk (1984:412ss) and Inkelas (1990:37ss), who argue that Lexical Phonology is redundant and has to go. More recently, Distributed Morphology has taken the same position, while Bermúdez-Otero (forth) upholds both devices in a constraint-based environment (see note 28). I discuss this issue at greater length in Scheer (forth).

On the following pages, I show that the Prosodic Hierarchy is as much a diacritic as classical SPE-type boundaries (#, +), if an autosegmental one. Everybody today agrees that diacritics are non-linguistic objects and hence cannot be part of linguistic theory. This line of argumentation has actually contributed to outlaw # and the like; I argue that the Prosodic Hierarchy must be abandoned for the same reason.

A crucial advance made by Prosodic Phonology is the principle known as Indirect Reference according to which phonology cannot directly access morpho-syntactic structure and hence may not mention morpho-syntactic categories in the structural description of rules (or in constraints). The critical argument for Indirect Reference which is repeated over and over in the literature is so-called non-isomorphism: the domain of the string which is phonologically relevant does not necessarily coincide with any morpho-syntactic constituent. Therefore, Prosodic Phonology argues, there must be a translating process whereby a Translator's Office – which is neither part of morpho-syntax nor of phonology – maps morpho-syntactic onto prosodic structure.<sup>2</sup> While the Translator's Office takes morpho-syntactic structure as an input, it modifies it according to its own standards – thereby making it non-isomorphic – before handing it over to phonology in the coat of the Prosodic Hierarchy.

I argue that Prosodic Phonology has reached exactly the right conclusion – but for the wrong reason: non-isomorphism is a mirage that is created by analysis, not by linguistic fact; it appears when one looks at the data through the prism imposed by domains, rather than boundaries. Non-isomorphism evaporates as soon as the same data are interpreted in terms of the latter. On the other hand, a good reason for the existence of the Translator's Office is modularity: different modules do not speak the same language (of the brain, e.g. Jackendoff, 1992 *et passim*), and hence can only communicate through a no-man's land-based translation.

If the Prosodic Hierarchy thus is a domain-created mirage and boundaries turn out to be the correct interface currency, we seem to be requesting a self-contradicting theory, i.e. one where extra-phonological information is represented as *non-diacritic boundaries*. I show that this term does not need to be self-contradictory: its paradoxical flavour stems from the fact that the two essential properties of what is commonly called a "boundary" have never been disentangled. That is, boundaries are 1) local and 2) diacritic. The former seems to imply the latter – and this is exactly what I show to be wrong: there may well be non-diacritic boundaries. In other words, when boundaries were eliminated from phonological theory, the local baby was thrown out with the diacritic bathwater.

<sup>2</sup> I use the term "Translator's Office" throughout the article. It represents the translating device that has been introduced in SPE as the Readjustment Component and hosts Mapping Rules in Prosodic Phonology (but is not assigned any specific label: see for example Nespor & Vogel, 1986:302 where mapping rules sit in a box of their own).

Hence I propose a theory where interface information is handed down locally – in the sense of what is traditionally called sandhi; yet the output of the Translator's Office are only truly phonological objects. A truly phonological object is one that exists in domestic phonology anyway and in absence of any interface-related issue. The result is Direct Interface, i.e. a theory where higher level information does not transit through a diacritic. A welcome effect of this is that different phonological theories, which of course have different domestic vocabulary, make different predictions as to what can be the output of the Translator's Office: only their domestic vocabulary is eligible. Therefore, Direct Interface allows for evaluating phonological theories according to their behaviour at the interface – a new perspective.

The present article is the first published offspring of a larger body of work which is under way. While the result is the theory of Direct Interface that I introduce below, the following pages concentrate on only one existing interface theory – Prosodic Phonology. More discussion regarding the implementation into CVCV, the review of other interface theories since Trubetzkoy's Grenzsignale as well as of more empirical material will only be available in Scheer (forth) (but see the digest in Scheer, 2006). In this sense, it is useful to make the scope of the article explicit: it does not ambition either to provide a complete review of the arguments that have been made in favour of the Prosodic Hierarchy or to propose a reanalysis of all empirical data that have been covered by it. Rather, it concentrates on a central conceptual issue: diacritics do not qualify at any rate; hence if the Prosodic Hierarchy is a diacritic it has to go. All relevant consequences must then be drawn. A conceptual alternative is outlined, i.e. where interface objects are not diacritic. It is implemented in a particular theory, and illustration is provided on the grounds of one single example, the extra-phonological influence on the end of the word. All other aspects of the interface, including the level above the word (i.e. the interaction with syntax), will have to be considered elsewhere. In short, the article is about conceptual competition, rather than about empirical coverage or the reassessment of arguments that have been made previously.

In sections two to five, I critically review Prosodic Phonology, showing that its motivation lied in the will to follow the autosegmental movement which was ambient in the early 80s, rather than in the discussion with boundary theory (section 3). The basic architecture and tenets of Prosodic Phonology are introduced in section 4, where it is also concluded that the Prosodic Hierarchy is a diacritic. Section 5 shows that non-isomorphism is a mirage provoked by an *a priori* in favour of domains. Sections 6 and 7 introduce what I believe are the minimal requirements for a successful interface theory, and section 8 applies the result, Direct Interface, to a particular phonological theory, CVCV (Lowenstamm, 1996, Scheer, 2004). Concluding remarks follow in section 9.

## 2. THE ROOTS OF AUTOSEGMENTAL PROSODIC DOMAINS

The earliest ancestors of Prosodic Phonology are commonly taken to be Liberman (1975) and Liberman & Prince (1977). The central idea of these authors is that segments are dominated by a multi-layered arboreal structure (syllables, feet and words) which expresses rhythmic (linguistically "musical") properties of the linear string and allows to assign relative prominence (strong vs. weak status) to individual chunks.

Based on this line of thought, Elisabeth Selkirk has developed the first model of Prosodic Phonology: she fertilised the autosegmental arboreal idea for the interface of phonology with higher modules, something that was not originally intended by Liberman & Prince (1977).

In Selkirk's early work (Selkirk, 1978, 1980a,b, 1981a [1978], 1981b) and especially in the ground-laying article Selkirk (1981a [1978])<sup>3</sup>, the six-layer prosodic hierarchy which is still in place today was introduced: the syllable, the foot, the phonological word, the phonological phrase, the intonational phrase and the phonological utterance. Selkirk's proposals were influential, and mainstream phonology rapidly integrated them as a major contribution to the general expansion of the autosegmental idea. Her 1984 book (Selkirk, 1984), though, which was advertised in all of her articles since 1978, has finally taken a different turn under the influence of Prince's (1983) grid-only approach: autosegmental prosodic constituency is evacuated altogether in favour of the metrical grid. Nevertheless, it constitutes a landmark of the early period of Prosodic Phonology, also because it assures a bridging function between the linear environment of SPE and the new autosegmental interface – an aspect that is further discussed in the following section. Finally, two years later, Selkirk (1986) returns to prosodic constituency, now arguing for a "peaceful coexistence" between the original prosodic hierarchy and the metrical grid (thus following Liberman & Prince, 1977 and Nespor & Vogel, 1982:226, 1986).

Building on Selkirk's work but mobilising fresh data from languages such as Italian and Greek, Marina Nespor and Irene Vogel have grounded a parallel stream of inquiry: after an exploratory period (e.g. Nespor & Vogel, 1979, 1982, 1983, Napoli & Nespor, 1979, Nespor, 1985, 1986, Vogel, 1982, 1985), their 1986 book (Nespor & Vogel, 1986) concentrates the insights gained. It rapidly became the authoritative reference in Prosodic Phonology, and

<sup>3</sup> This article is commonly quoted as Selkirk (1978), hence as the oldest ancestor of Prosodic Phonology. Since the chronology sometimes matters below, I have added this date in square brackets. Actually, the content of this article was first presented at an Amherst conference in 1978; a manuscript almost identical to the 1981 publication has then been circulated since at least 1980. The first published version, however, is the text that appeared in the proceedings of the Nordic Prosody conference in 1981.

indeed the standard theory of how higher modules communicate with phonology.<sup>4</sup> To day it stands unchallenged: more than twenty years have gone by without any substantial modification of its basic tenets. The best means to judge the impressive success of Prosodic Phonology is the fact that its genuine units – the foot, the phonological word, the phonological phrase, the intonational phrase and the phonological utterance – have started out as theoretical constructions but today are common descriptive categories. Thus, just like for syllables, there may be different opinions on how exactly a phonological word is built and what it encompasses, but its existence is beyond doubt: there is an arboreal structure above the syllable that encodes morpho-syntactic information.

## 3. FROM BOUNDARIES TO DOMAINS: A HISTORICAL CHOICE THAT HAS ALMOST GONE UNNOTICED

### 3.1 What Boundaries Are: Diacritic And Local

The influence of higher modules on phonological processes has always been conceived in terms of boundaries. Vocabulary may have varied a great deal according to the historical period and theoretical preferences (structuralists for example talked about juncture, or transition, disjuncture, schismeme etc.), but the essence of the object that assures the transmission of information has remained the same since the 19<sup>th</sup> century: *diacritic* and *local*.

Boundaries are local because they define the relation between two adjacent morphemes or words. This is the fundamental property that makes them different from domains, which by definition are non-local: they span a number of elements of the linear string, thereby creating labelled clusters. That is, an individual element of the linear string *belongs* to a domain, but it cannot *belong* to a boundary – one cannot even make sense of this expression. On the other hand, a boundary is precisely located in the linear string and can influence only adjacent objects: the one immediately preceding and the one immediately following. It does not make sense to talk about domains that intervene, or are located between two elements of the linear string. Domains, by definition, are non-local, while the very essence of boundaries is to be local.

Boundaries are also diacritic. This is evident as soon as they need to be put down on paper: their body is an arbitrary symbol. This property of boundaries has been long recognised in the

<sup>4</sup> Of course, other authors have also contributed to the early period that has prepared Selkirk (1984) and Nespor & Vogel (1986): among others, Hayes (1989 [1984]) Booij (1983, 1985a,b, 1986) and Neijt (1985). Namely Hayes (1989 [1984]) was influential.

literature (see section 3.3. below, e.g. Pyle, 1972, Rotenberg, 1978), and its undesirable consequences have been pointed out.

I argue that the true difference between boundaries and prosodic domains does not regard their diacritic character. Rather, boundaries have a local action, while domains are non-local objects. This difference, however, seems to have gone unnoticed in the scarce Prosodic Phonology literature that talks about the replacement of boundaries by domains at all.

The conclusion, then, is that the fundamental change of perspective regarding the kind of object that carries interface information has not received serious attention: the diacritic and the local character of boundaries have never been disentangled. I show below (section 3.3) that boundaries have been thrown over board on the sole grounds of their diacritic character (their bad aspect). Local intervention (their good aspect) has been eliminated on the same occasion. Contrary to this evolution, I argue that we need a local *and* non-diacritic intervention of higher modules in phonology.

### **3.2 Prosodic Phonology Is A Child Of Autosegmentalism: Boundaries Are Ugly, Domains Are Beautiful**

Prosodic Phonology was born in the early 80s when the autosegmental idea turned the hitherto linear theory upside down. I aim at showing below that Prosodic Phonology is a direct consequence of the trend away from linear SPE towards autosegmental structure. That is, domains are the result of the application of autosegmentalism to the interface.

Elisabeth Selkirk has been working on the influence of morpho-syntactic structure on phonology since the early 70s, mainly on the grounds of French liaison (Selkirk, 1972 *et passim*). Assisting the advent of autosegmentalism, it seemed clear to her that the interface with higher modules needed to join the move: a situation where all areas of phonology (syllable structure, internal structure of segments) except its upper interface were progressively autosegmentalised would have been strange. As is shown by the quote below, Selkirk clearly identifies the elsewhere winning arboreal approach as the motor for the introduction of domains at the outset of her 1984 book.

"The syllables of phonological representation are arranged in some kind of hierarchical organization. [...] By 'hierarchical organization' we mean, very roughly speaking, the organization of the units of phonological analysis into layers, vertically arranged on the same plane. [...] This conception of phonological representation as having its own hierarchical structure(s) demands a radical rethinking of the relation between syntax and phonology. [...] Thus the interpretation question – the question of the mapping between

phonological representation and syntactic representation – takes on a much greater importance than in the standard theory, and has an entirely different quality to it. It must be viewed as a characterization of the relation between the syntactic hierarchy, on the one hand, and the phonological hierarchy (or hierarchies), on the other." Selkirk (1984:7s)

Therefore,

"the junctural properties of sentences should be somehow represented 'suprasegmentally' rather than as the segmental boundaries of the standard theory. [...] Thus the theory of phonological representation that we will advocate here eliminates segmental boundary elements altogether." Selkirk (1984:8)

Selkirk's description of the transition from boundaries to domains is valuable since the historical break at hand has remained by and large unreflected in the Prosodic Phonology literature, where the existence of domains (the Prosodic Hierarchy) is usually taken for granted without discussion.

In the first sentence of their book, Nespor & Vogel (1986) for example merely state their disagreement with the linear SPE system that uses boundaries. They then go on talking about domain theory without making any argument regarding the transition.

"In early generative theory, phonology was characterized by a linear organization of segments and a set of phonological rules whose domains of application were implicitly defined in terms of the boundaries of the surface morpho-syntactic constituent structure. [...] It is our contention that this view of phonology is fundamentally inadequate. [...] The subsystem [of phonology] we will be concerned with in the present study is the prosodic subsystem, and in particular, the theory of domains." Nespor & Vogel (1986:1)

Hence in 1986 boundaries are not considered a serious competitor anymore: the only status that they are granted is that of a strange archeological object. Since the transition from boundaries to domains is a fundamental break in phonological culture, I have read through the early Prosodic Phonology literature (i.e. until 1986) in order to find out whether this critical issue has received serious discussion at all.

### **3.3 The (Absence Of) Discussion Of Boundaries In The Prosodic Phonology Literature**

The early Prosodic Phonology literature falls into three categories: most of the time the issue regarding boundaries is not mentioned at all; sometimes boundaries are declared inadequate

without argument but referring to other articles; finally, arguments against boundaries are made in just a few texts. The detail of the two former categories is discussed in Scheer (forth).

The latter category offers two (and only two) arguments: independent motivation of domains and the diacritic status of boundaries. Regarding the former, Selkirk (1980a:126ss, 1984:8ss) argues that domains are independently motivated by stress, rhythm and musical aspects of speech since Liberman (1975) and Liberman & Prince (1977). Boundaries, on the other hand, are unable to encode these properties. The former thus allow for a unified encoding of both interface information and stress/rhythm/musical aspects, while the latter multiplies representational devices.

Let us first address stress and its associated prosodic category. For one thing, it is not true that Liberman & Prince (1977) (or any of their followers for that matter) offer a uniform representation of stress: they build a tree based on weak/strong oppositions, but then from this arboreal structure derive the metrical grid, which is responsible for stress clash (*thirtéen* vs. *thirteen men*). Also, the unifying perspective holds only if arboreal structure is indeed the correct way of representing stress. This, however, is far from being obvious since Prince's (1983) grid-only approach that has generated a debate whether stress should be encoded by feet or by the grid. Still another option is explored by Scheer & Szigetvári (2005) who develop unified representations for the syllable and stress which are lateral, rather than arboreal or grid-based (so-called CVCV, on which more below in section 8).

Finally, it may not be a correct move to grant identical representations to things that are different in kind. Stress is a domestic property of phonology that, unlike those phonological phenomena for which prosodic domains are needed, owes nothing to any extra-phonological information. Were there no interface, feet would still exist, while the five higher levels of the Prosodic Hierarchy would not. Just like syllables, feet are a bottom-up construction and not, like higher prosodic categories, objects that are created by top-down mapping. Hence the Prosodic Hierarchy is a mix of heterogeneous phonological objects, rather than a homogeneous arboreal representation. This has been pointed out by Rice (1990:292 note 3) and actually admitted by Nespor & Vogel (1986:109). In this light, it is worth wondering whether ontologically distinct categories should be represented by identical devices. Inkelas (1990) for example says no: it is not right to have properly prosodic constituency only from the word level on – the Prosodic Hierarchy ought to be extended to smaller units (hence the title of her dissertation "Prosodic Constituency in the Lexicon"). Unifying just in order to unify may thus not be a good idea when the objects to be unified are fundamentally different.

This is even more so when rhythm and musical properties of speech are considered. Since Hayes (1984:69), rhythm is regarded as an emanation of metrical poetry and music, rather than of the linguistic system, and it happens to have an outgrowth in language. Lying outside of the linguistic module, then, linguistic theory must not attempt at representing it. This view has been followed by all subsequent work including Nespor & Vogel (1986) and Selkirk (1986): since communication between cognitive modules requires translation, the metrical grid and rhythm are the result of a secondary mapping from the Prosodic Hierarchy onto grids, which lie outside of linguistics.

It thus appears that the unification argument either involves properties which according to subsequent work must not be unified, or may indeed be unified with non-arboreal structure. Unification with non-arboreal phonological representations is indeed the purpose of Direct Interface, to be introduced below: anything that comes down from the Translator's Office must be a truly phonological object, i.e. one that exists for domestic phonological reasons which have got nothing to do with the interface. [labial] for example qualifies, but the "prosodic word" does not.

The other argument, made by Selkirk (1980a,1986), Booij (1983,1985a) and Szpyra (1989), concerns the diacritic character of boundaries. Selkirk (1986:376) quotes Rotenberg (1978:16), who in a chapter called "Against Boundaries" indeed makes very convincing arguments: phonology can only interpret phonological objects (just as syntax syntactic objects and semantics semantic objects), not bananas or pink panthers (see section 5.2). His text actually echoes Pyle (1972), who had already used this line of reasoning. Thus it is certainly correct to call on Rotenberg as a voice against boundaries – but not in order to promote competing domains. Rotenberg tells us nothing at all when comparing the merits of boundaries and domains.

The case of Selkirk (1980a:126ss) is similar: she reviews the arguments made by Pyle (1972) regarding the overgeneration that boundaries introduce (as all the rest of SPE). Indeed, boundaries allow for formulating obnoxious rules that for sure lie outside of what natural language can do. The reason is as before: the only identity that one could think of for boundaries at the time was diacritic, and arbitrary symbols have not the same properties as linguistic objects. Hence this is but another version of the diacritic argument.<sup>5</sup>

Selkirk then goes on to consider a more serious competitor: McCawley's (1968) idea that boundaries define the domain of rule application, and that different boundary strengths

<sup>5</sup> The diacritic-overgeneration issue is usually brought up when the historical evolution from boundaries to prosodic constituency is described in more recent (overview) literature, e.g. Inkelas & Zec (1995:537s).

determine different domains. Obviously, this is the simple translation of autosegmental domains into linear vocabulary – or rather, the new autosegmental perspective is the translation of McCawley's (1968) proposal. If both are just notational variants, the new prosodic hierarchy is certainly in trouble. At this point, Selkirk (1980a:128) says that "the relations among boundaries that are captured in the strength hierarchy must be stipulated in the theory. They do not follow from anything inherent to the notion of boundary in the theory". This is certainly true – but does the layering of prosodic constituents follow from anything in the theory of domains? Prosodic constituents exist because the related facts exist, and their size adapts to whatever is found out there. Hence just as much as boundary strength, domains merely record what happens.<sup>6</sup>

Finally, Szpyra (1989:11,182s) and Booij (1983:268s, 1985a:34) only offer some more variation of the diacritic argument.

In sum, thus, the major break with phonological practice since the 19<sup>th</sup> century has only been a topic of discourse in very few sources. Two arguments are made: one offers a true advantage of domains over boundaries but entirely depends on how stress is represented (the arboreal solution is not the only option). The other militates against diacritics in linguistic theory – exactly the right thing to do. Unfortunately, domains are also diacritics, if in an autosegmental coat. This is demonstrated in section 4.3 below.

#### 4. INDIRECT REFERENCE, MAPPING AND THE BUFFER

For the time being, though, let us admit the existence of domains. The present section introduces the founding statement of Prosodic Phonology (Indirect Reference), the consequences thereof (the existence of a Translator's Office as well as of mapping rules) and the way in which the various devices interact. This actually comes down to presenting the list of the classical issues in generative interface theory. The central claim, Indirect Reference, irradiates phonological thinking since SPE (as much as the phonological cycle, which is not a first class topic in Prosodic Phonology). I recall below in section 5 that Indirect Reference is

<sup>6</sup> Hayes (1989 [1984]:203ss) makes a similar point. He argues that boundary-based theories must make two independent stipulations in order to capture the facts: 1) if a phonological rule can apply across one kind of boundary, it can also apply across all "weaker" boundaries; 2) if a rule applies before or after one kind of boundary, then it also applies before or after all "stronger boundaries". Domain-based theories, on the other hand, need only one stipulation that does the same job, i.e. the Strict Layer Hypothesis. This, however, eludes the non-monolithic character of the Strict Layer Hypothesis which has been pointed out for example by Inkelas (1990), Itô & Mester (1992) and Ladd (1986,1997). Considering this, Selkirk (1996) admits that the SLH<sub>i</sub> is but a cover term for a heterogeneous set of four primitive component constraints. Hence Hayes' argument may well turn out to be counter-productive if four constraints are needed in order to capture the generalisations that are handled by two principles in boundary theory.

just as relevant today as it was in the 70s and 80s: as long as grammar is thought of in terms of modules, it is a necessary property of any interface theory.

#### 4.1 Indirect Reference And The Buffer: Morpho-Syntactic Structure In A Diacritic Coat

Indirect Reference holds that morpho-syntactic structure is invisible to the phonology. Phonological processes cannot make direct reference to higher level categories. Indirect Reference is present since the earliest incarnations of Prosodic Phonology and germane to all of its versions.<sup>7</sup>

If it is true that phonology has no direct access to morpho-syntactic categories, higher level information needs to be transformed into items that are part of the phonological world. This translation is done by so-called mapping rules, whose input is the morpho-syntactic structure (and also what I call the Black Box, on which more below). They return the arboreal constituent structure of Prosodic Phonology, which lies inside the phonological module.

I call this output the buffer (or sponge) because it is located in the phonological module but has no phonological origin nor carries any phonological information.<sup>8</sup> Prosodic constituency only takes stock of morpho-syntactic structure, which therefore becomes visible to the phonology. In other words, the buffer is the instrument of Indirect Reference: phonological rules that are sensitive to morpho-syntactic information make reference to the representative of higher modules in phonology, not to morpho-syntactic categories themselves.

#### 4.2 The Buffer And Its Construction Workers: Mapping Rules And The Black Box

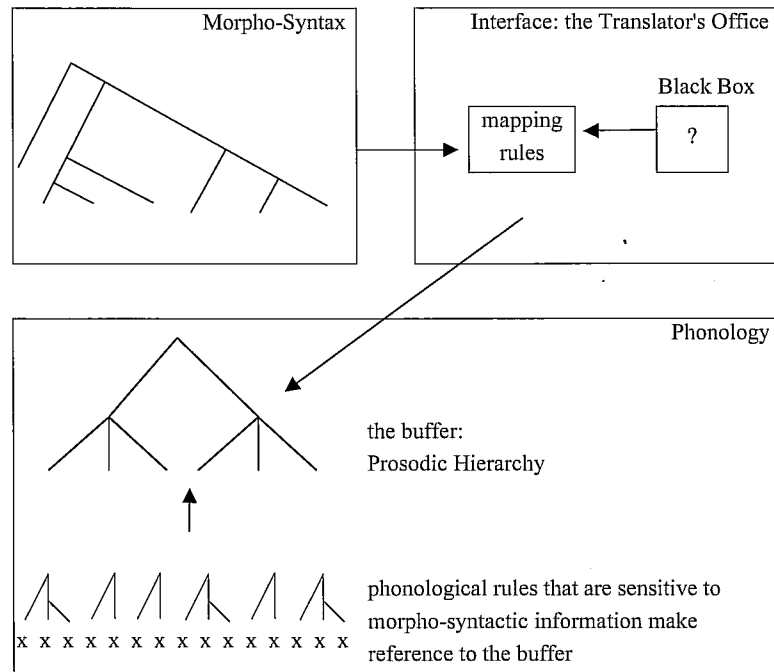
Let us now look at the place of the buffer in the overall architecture of Prosodic Phonology. Consider table (1) below.

<sup>7</sup> Theories that disagree with this statement are called Direct Syntax approaches. They are most prominently represented by Kaisse (1983,1985) and Odden (1987,1990); space restrictions preclude further discussion.

<sup>8</sup> As far as I can see, the only phonological information that has been claimed to sometimes contribute to the definition of prosodic constituency is the length of items in the linear string. A case in point is discussed in section 5.5, showing that the evidence is not conclusive, and that the literature offers alternative analyses which are based on morpho-syntactic factors, rather than on length.



(1) general architecture of Prosodic Phonology



The buffer is created by mapping rules, which do their job on the grounds of two sets of information: the output of morpho-syntax and what I call the Black Box. The existence of such a Black Box is absolutely crucial for Prosodic Phonology since it is a consequence of the only argument that makes the buffer necessary, so-called non-isomorphism. As we will see in section 5.3, Prosodic Phonology holds that the domains to which phonological rules make reference sometimes do not match any morpho-syntactic division: phonological and morpho-syntactic domains may be non-isomorphic. Since the objects that phonological rules make reference to thus do not always exist at the end of morpho-syntax, they need to be created by a translating mechanism, the mapping rules. Mapping rules make sovereign decisions in order to eventually rearrange the morpho-syntactic input – this is the source of non-isomorphism. It is these readjustment decisions that I call the Black Box. Also, this label refers to the mystery that is associated with readjustment: linguists do not really understand the particular grouping of

morpho-syntactic units (which are called phonological phrasing in Prosodic Phonology) that is relevant for the phonology.<sup>9</sup>

Finally, a historical point is in order: it is not difficult to see that all major concepts used in Prosodic Phonology have already been proposed by Chomsky & Halle (1968). The readjustment rules of SPE appear as mapping rules in Prosodic Phonology. Also, the idea that phonology does not make direct reference to the output of the syntactic component is explicit in SPE.<sup>10</sup>

"It appears that the syntactic component of the grammar generates a surface structure  $\Sigma$  which is converted, by readjustment rules that mark phonological phrases and delete structure, to a still more superficial structure  $\Sigma'$ . The latter then enters the phonological component of the grammar." Chomsky & Halle (1968:9s)

At least in some cases, say Chomsky & Halle, phonology is unable to make direct reference to morpho-syntactic structure  $\Sigma$ . Rules then target a readjusted surface structure  $\Sigma'$  which is the true input to the phonology. The motivation for this take is given on pages 371s of SPE: exactly what is called non-isomorphism in the vocabulary of Prosodic Phonology (more on this in section 5.3). The real contribution of Prosodic Phonology, then, is to have made Indirect Reference systematic: while SPE allows for direct reference to morpho-syntactic structure when isomorphism is encountered and recurs to readjusted  $\Sigma'$  only in case of need (non-isomorphism), Prosodic Phonology proposes to systematically create a readjusted  $\Sigma'$  (the Prosodic Hierarchy), even if direct reference would be possible.

**4.3 The Buffer Is A Diacritic – An Autosegmental Diacritic**

Vogel & Kenesei (1990:344) review the arguments in favour of Indirect Reference. One point they make is historical: all interface theories have been indirect thus far, so there is probably

<sup>9</sup> Morpho-syntactic conditions on mapping have been seriously investigated mostly in the 80s and early 90s where case studies have tried to evidence cross-linguistic regularities. This has often been done upon the inspiration of Selkirk's (1986) end-based mapping theory: see, among others, Neijt (1985) on Dutch, Cowper & Rice (1987) on Mende, Vogel (1988) on Hungarian, Condoravdi (1990) on Greek. Nevertheless, mapping is still poorly understood, and rules appear to be inflational as much as anarchic: no relevant pattern seems to emerge. This foggy part of the theory has been carried over to OT, where mapping is not any better understood, and empirical studies have turned away from morpho-syntactic conditions in order to look at other factors such as focus, topic and eurhythm (Selkirk 2000).

<sup>10</sup> Dresher's (1996:41ss) overview article for example mentions this fact, while the Prosodic Phonology literature typically (but not always) presents Indirect Reference as a genuine achievement, sometimes even as an improvement over SPE (sic), e.g. "In an SPE-type model of phonology, the only way of representing the domains of a phonological rule is in terms of morphosyntactic constituents, the implicit claim being that such constituents are, in fact, the only domains in which phonological rules may apply" Vogel (1986:59). More sources of this kind are collected in Scheer (forth).

something to this approach. They namely single out SPE as a predecessor of Indirect Reference.

"Working within the SPE framework, Selkirk [1972] modifies the original proposal by showing that at least in certain types of phonological phenomena, interaction between the two components is only indirect. Word boundaries (#'s) inserted into a string on the basis of syntactic structure determine where external sandhi rules apply. Phonological rules thus do not directly 'see' syntactic structure, but rather access only strings of segments and boundaries." Vogel & Kenesei (1990:344)

Hence the equivalence between #s and the modern prosodic arborescence is not only obvious; it is claimed and turned into an argument by representatives of Prosodic Phonology.

The same line of reasoning is found in the overview article by Inkelas & Zec (1995), who call p-structure the level of representation that mediates between morpho-syntax and phonology and explicitly identify boundaries as the ancestor of its more recent prosodic incarnation.

"An early version of p-structure was proposed in SPE and developed in subsequent work (Selkirk, 1972,1974; Rotenberg, 1978). According to this view, domains of phonological rules are expressed in terms of phonological boundary symbols, generated by rules. [...] Far more constrained is the 'prosodic' view of p-structure. Under this view, p-structure occupies a level with its own hierarchical organization and a high degree of autonomy." Inkelas & Zec (1995:537s)

If, thus, prosodic constituency is but a more advanced version of boundaries that presents a number of advantages, it must have the same formal properties as its predecessor. The two quotes clearly show that prosodic constituency, just as hatch-marks, is a diacritic: it serves no other purpose than replicating the phonologically relevant morpho-syntactic information in the phonology. Although proponents of Prosodic Phonology are prompt to point out that boundaries are odd because they are diacritic and hence arbitrary, nobody ever examines the status of the buffer in this respect, even when it is advertised as the direct surrogate of arbitrary boundaries.

That the Prosodic Hierarchy is a diacritic may also be seen when comparing its birth and life with boundaries. Just as these, it is the output of the translational process that takes place in the Translator's Office. Just like these, the Prosodic Hierarchy is a UFO in the phonological module: it is injected for the exclusive purpose of storing extra-phonological information. Domestic phonology, i.e. the one that runs without any extra-phonological conditioning, does not accommodate either boundaries or prosodic constituency. Finally, just like boundaries, the units of the Prosodic Hierarchy are arbitrarily chosen and named: "ω" (the phonological word),

"φ" (the phonological phrase) etc. are not any less arbitrary than "+" and "#". For some reason, however, people always point out the arbitrariness of the typewriting symbol "#", but do not react when talking about omegas.

Saying that an omega is only shorthand for a real linguistic object, the phonological word, does not help either: the same may be said about + and # – only that a regular scientific-sounding terminology has never been introduced for these objects. And of course, pointing out that omegas and phis represent certain stretches of the linear string which coarsely correlate with morpho-syntactic divisions does not make them less arbitrary. For one thing, this merely shows that their only purpose is to replicate morpho-syntactic structure in phonology. But more importantly, the same may be said about boundaries – and actually *has* been said about boundaries (by McCawley, 1968: see section 3.3): + and # represent two different boundary strengths, the latter dividing larger chunks of the linear string. If more boundaries are added to the list, they may also be correlated with increasing chunks of the linear string that coarsely represent morpho-syntactic divisions.

A formal definition of the term "diacritic" must rely on its status as a stranger in the environment where it acts: in module X, something is a diacritic that serves no other purpose than stocking and restoring information from other modules that is needed for the computation in module X. To all extents and purposes, "#'s and "omegas" meet this condition: they are non-phonological intruders in the phonological world whose only purpose is to store extra-phonological information.

And they are necessary in order to fulfil the promise of Indirect Reference. For some strange reason, though, #s are stigmatised as arbitrary diacritics, while omegas are sold as "truly phonological objects" (e.g. Selkirk, 1984:32,409s, Nespor & Vogel, 1986:27ss,110ss). For example, Nespor & Vogel (1986:3) call boundaries "pseudo-phonological terms" and argue that phonology should only be able to refer to truly phonological objects (just as syntax can only make reference to truly syntactic objects). This is certainly a position that one can only haste to applaud: diacritics do not qualify. Only it did not occur to Nespor & Vogel (1986), no more than to any of their followers as far as I can see, that the Prosodic Hierarchy is a pseudo-phonological object as well.

Reading through the literature, I could only find one voice that clearly identifies the buffer for what it is. Without surprise, this voice comes from the quarters of the direct syntax approach (see note 7) where of course no buffer is needed: Kaisse (1990:128) calls attention to the redundant and diacritic character of prosodic constituency, pointing out that the direct syntax

option "does not require the postulation of constituents that are needed only to describe the sandhi phenomena in question."

It thus appears that there is just one difference between the usual diacritics and omegas: the former are linear and local, while the latter are autosegmental, hence non-local units. Therefore the progress since SPE does not concern the Indirect Reference to morpho-syntax, nor the diacritic notation of phonologically relevant morpho-syntactic units; rather, it comes down to a change from a linear to a non-linear perspective on the action of higher level information. This, then, takes us back to what I believe is the historical *raison d'être* of Prosodic Phonology (section 3.2): a general antipathy against linear objects, which arose in the general movement that autosegmentalised the entire phonological space in the early 80s – and was consequently applied to the interface as well.

The linear vs. non-linear debate in the realm of interface theory is worthwhile – unfortunately it has never been led. I argue below that only a linear perspective is viable: when transmitted through the representational channel (hence not using the phonological cycle, see sections 7.2 and 7.5), higher level information has a local action, exactly in the tradition of what is known as sandhi. Only this information must not materialise as a diacritic.

## 5. GOOD AND BAD REASONS FOR INDIRECT REFERENCE

### 5.1 The Buffer Appears To Be Redundant: It Needs A Real Good Motivation

Prosodic Phonology supposes that the phonology is burdened with extra arboreal structure plus the relevant mapping rules. It is also clear that this load serves no other purpose than the one it was created for: to make morpho-syntactic structure available inside the phonological module; the buffer is an interface and nothing else.<sup>11</sup> By contrast, the competing solution that makes direct reference to morpho-syntactic categories (e.g. Kaisse, 1985, see note 7) achieves the same result without any additional structure or computation.

<sup>11</sup> It is true that the Prosodic Hierarchy has also been used for purposes that concern only domestic phonology. For one thing, this can only be done once the Prosodic Hierarchy has been created, and its genesis is due to interface reasons alone. Also, if diacritics do not qualify and hence the Prosodic Hierarchy has to go, I must claim that any analysis of domestic phonological phenomena which uses prosodic constituency is misanalysis. One case in point is Rubach's (1997 et passim) account of so-called trapped consonants in Polish (see Scheer, 2004:§240, in press), which he argues are extrasyllabic (even in the middle of words). On Rubach's analysis, these consonants end up being directly attached to the Prosodic Word. One suspicious feature of this scenario is the existence of extrasyllabic consonants in the middle of morphemes (in violation of the Peripherality Condition, e.g. Clements, 1990:290, Hayes, 1995:57s). Also, a wrong prediction is made to the effect that some natural language could allow for three, five, eleven or a hundred extrasyllabic consonants in a row: since nobody has ever defined any co-occurrence restrictions for segments that are attached to Prosodic Words (obviously because this is also in violation of the Strict Layer Hypothesis), any number of consonants should be able to be accommodated.

A bare assessment of both directions will thus disqualify Prosodic Phonology without any hesitation: why having a significant amount of additional structure and extra computation without any need? It is thus absolutely vital for Prosodic Phonology to be able to dismiss the obvious objection (made for example by Kaisse, 1985:156 note 1, 110 note 1, Kaisse, 1990:128s) according to which the only effect of the Prosodic Hierarchy is to invent unnecessary and redundant objects. In other words, the question why phonology should be unable to directly refer to morpho-syntactic structure must be answered.

### 5.2 A Good Reason: Modularity

Modularity (Fodor, 1983 et passim) is certainly the first thing to be thought of. Indeed, the modular structure of grammar implies that a module cannot see what is going on in another module: we are talking about autonomous and ontologically distinct entities which do not take into account the categories of other modules or even their existence.

The ontological gap between phonology and morpho-syntax grounds the principle of phonology-free syntax (among many others, Zwicky & Pullum, 1986, Miller *et al.*, 1997) which has become the standard view of the macro-landscape regarding modular identities. In its strong version, it observes that syntax, semantics and morphology are deaf for any phonological information: there is no syntactic, morphological or semantic process that has a phonological conditioning. For example, there is no syntactic movement on record that would be triggered only if, say, the candidate begins with a labial. The same holds true for all other categories that are relevant in phonology such as palatality or occlusion. A weaker version of phonology-free syntax distinguishes between melody (i.e. phonological objects located below the skeleton) on one hand and syllabic as well as prosodic properties on the other. Indeed, if the inability of melody to bear on higher modules is an undoubted fact, syllabic and prosodic properties have been argued to condition morphological and syntactic processes (e.g. Inkelas & Zec, 1990,1995, Szendrői, 2003).

Hence at least melody is entirely invisible for higher modules. One is thus founded to say that there is a deep ontological gap between phonology and the other modules. That this gap is actually deeper than the one that may exist between any other two linguistic modules appears when considering how these are communicating. That is, number, person, animacy, quantification, aspect and so forth are categories that are used, understood and processed by syntax as much as by morphology and semantics. In this sense, thus, syntax, semantics and morphology speak the same language. Much unlike phonology, which of course does not know what number, person etc. are (this argument is due to unpublished work by Michal Starke).

In sum, thus, we face a situation where two macro-modules, morpho-syntax and semantics on one hand, phonology on the other, are incommunicado. We do know for sure, however, that there is communication among them: at least top-down, i.e. where phonology receives orders from higher modules. Obviously, then, this supposes a Translator's Office where the morpho-syntactic language is translated into the phonological idiom. Poor phonology could not possibly react on an order issued in the morpho-syntactic language: it would not understand what it is told. Only phonological objects can have a phonological effect.

On a more general note, this is a central point in Jackendoff's work: a module can only understand its own language (of the brain), and two different languages cannot coexist within the same module.

"Mixed' representation[s] should be impossible. Rather, phonological, syntactic and conceptual representations should be strictly segregated, but coordinated through correspondence rules that constitute the interfaces." Jackendoff (1997:87ss)

If implicitly and timidly on most occasions, modularity and the fact that phonology does not speak the same language as other modules has been invoked in the Prosodic Phonology literature (e.g. Selkirk, 1984:32,409ss, Nespors & Vogel, 1986:27ss,110ss). Typically, modularity is hinted at when the Prosodic Hierarchy is compared with boundaries: Nespors & Vogel (1986:3) for example call boundaries "pseudo-phonological terms" and argue that phonology should only be able to refer to truly phonological objects (just as syntax can only make reference to truly syntactic objects).

As far as I can see, on no occasion, however, is modularity explicitly used in order to sustain Indirect Reference. The only argument invoked – over and over again in the literature (e.g. Selkirk, 1980a:110,1981a [1978], Nespors & Vogel, 1982:226, Nespors & Vogel, 1986:37ss, Hayes, 1989 [1984]:201, Nespors, 1985, Neijt, 1985:180, Booij, 1985b:149) – is non-isomorphism, a bad argument as we shall see in the following section.

### 5.3 A Bad Reason: Non-Isomorphism

Non-isomorphism builds on the observation that in some cases, the domains to which phonological rules make reference are not co-extensive with any morpho-syntactic domain. Or, in other words, some phonological rules make reference to information that does not exist in the morpho-syntactic surface structure. Therefore, the argument goes, there need to be a readjusting mechanism that further transforms the output of morpho-syntax in such a way that the divisions needed for phonology are created. This job is done by the mapping rules whose

output, the buffer, provides the adequate target for the reference of all phonological rules that are sensitive to morpho-syntactic information.

The argument based on non-isomorphism has been made since Selkirk's (1981a [1978]) very first article and runs through the entire Prosodic Phonology literature. Let us thus look at the empirical basis of non-isomorphism.

Nespors & Vogel (1986, all through the book: 4s,34ss,124ss etc.) are very conscious that their theory stands and falls with non-isomorphism. They therefore devote a lot of ink to making the argument, which is illustrated by empirical evidence from various languages. Two cases are discussed below. They are chosen on account of their significance and notoriousness: one, the *cat-rat-cheese* example, goes back to Chomsky & Halle (1968:371s) and since Nespors & Vogel (1983:130ss,1986:57s) has become the standard argument which is always repeated in the literature when non-isomorphism is recalled (e.g. Vogel & Kenesei, 1990, Nespors *et al.*, 1996, Drescher, 1996:42); the other, "phonology over sentences", also runs through the literature until today. We will see that neither argument bites.

Compare the major syntactic divisions of the sentence under (2) with its intonational structure under (2).

- (2) a. This is [the cat that caught [the rat that stole [the cheese]]]  
 b. [This is the cat] [that caught the rat] [that stole the cheese]

The two lines of division do not coincide. Hence, goes the argument, whatever drives phonology to decide that the intonation is as under (2), it is not the output of the syntactic module. There is no node in the syntactic tree that uniquely dominates every intonational span of the sentence, nor could syntactic theory evolve in a way so to achieve this goal. Hence the relevant intonational structure must be created outside of the syntax by some interface: the mapping rules.

The second argument targets another unmodifiable property of syntactic structure: the fact that two sentences are not dominated by any node. Hence it is impossible to describe a phonological event at the break of two sentences in terms of domains: the domain within which it applies, a string encompassing two sentences, cannot be expressed in terms of syntactic arborescence.

A relevant phonological process presented by Nespors & Vogel (1986:4s) is linking *r* in English (which has gained much attention in the OT literature, e.g. Halle & Idsardi, 1997). In certain

non-rhotic varieties such as Received Pronunciation, etymological *r* remains unpronounced utterance-finally and before consonant-initial morphemes and words (*mothe\*[r]*, *mothe\*[r]ly*, *my mothe\*[r] comes*), but appears before vowel-initial morphemes and words if the intervening boundary allows for the linking effect (*mothe[r]ish*, *my mothe[r] is coming*). The critical fact for the demonstration at hand is that linking *r* may also appear at the break of two sentences, as shown under (3) below (examples are from Nespor & Vogel, 1986:4s,46s, data and argument are developed at length in Vogel, 1986).

- (3) a. There's my mothe[r]. I've got to go.  
 b. There's my mothe\*[r]. I've got two cats.

Nespor & Vogel contrast (3) where the *r* may be linked with (3) where according to them no *r* may be pronounced. The difference, they say, is of semantic kind: the semantic relation between the two sentences under (3) is close; by contrast the greater semantic distance under (3) prohibits the appearance of the linking *r* in otherwise identical conditions.

Nespor & Vogel (1986) conclude that phonology makes reference to a domain which does not exist in syntax. The relevant structure must therefore be constructed by the interface mechanism, i.e. the mapping rules. That is, *r* is only linked within a phonological utterance, and too much semantic distance does not allow a single phonological utterance to span two sentences.

#### 5.4 Domain Abuse I: There Is No Argument When Phonology Refers To Boundaries Instead Of Domains

The argument built on non-isomorphism is certainly correct – but only if it is taken for granted that phonological rules make reference to domains, rather than to boundaries. That is, (non-)isomorphism in the Prosodic Phonology literature is always understood as a comparison between domains: morpho-syntactic and phonological. While it is certainly true that morpho-syntactic organisation is arboreal, absolutely nothing entitles us to assert *a priori* that the aspect of its structure which is projected into the phonological module are non-local domains, rather than local boundaries.

We are thus invited to look at the same facts through the glasses of local boundaries that have been left unconsidered in the Prosodic Phonology literature. The effect is quite striking: non-isomorphism evaporates. In the sentence under (2) for example, intonational units simply begin with every CP. Hence it is enough to say that the intonation-building mechanism starts a new unit every time it hits the phonological translation of the CP-boundary. Intonational and

syntactic structure are thus perfectly isomorphic, and no extra constituency on the phonological side is needed.

The same holds true for the case of linking *r*: the point made by Nespor & Vogel relies on the absence of a domain that encompasses two sentences. If boundaries are the unit to which phonological rules make reference, however, no sentence-spanning domain is needed: the contrast observed stems from the different boundaries that separate the two sentences at hand and denote their variable semantic relationship.

When going through the evidence that has been produced in order to support non-isomorphism (among many others, Selkirk, 1981a [1978], 1981b, 1984:27s, 1986, Nespor & Vogel, 1982, Nespor, 1985, Hyman, *et al.* 1987, Rice, 1987, Vogel & Kenesei, 1987, Nespor & Vogel, 1986:36ss, Nespor *et al.*, 1996:7), the result is always the same: the regularity which is formulated in terms of domains can as well be described with boundaries and then of course turns out to be perfectly isomorphic: boundaries necessarily correspond to some morpho-syntactic division. Thus case after case, non-isomorphism turns out to be an artefact of the domain-inclined analysis, rather than a fact about the relation between phonology and morpho-syntax.

In sum, prosodic constituency and the claim that phonological rules make reference to domains is a self-fulfilling promise: once domains exist, the argument based on non-isomorphism can be made to the effect that we need the Prosodic Hierarchy. Non-isomorphism disappears if phonological rules make reference to boundaries.<sup>12</sup> Since non-isomorphism is the only argument for the buffer, the entire parallel world of prosodic constituency turns out to be superfluous. On top of that, there is reason to believe that boundaries, the interface currency from time immemorial, have not been abandoned for the sake of any good reason, but because they exhaled an unpleasant linear smell (section 3.2). Hence it is certainly worth a try to reinstall boundaries in their rights. The question, then, is how to eliminate the typical diacritic essence of boundaries while continuing their local action.

<sup>12</sup> Of course, this does not mean that phonology makes direct reference to morpho-syntactic categories (such as CP). The debate here is between local boundaries and non-local domains. Both are the output of the Translator's Office and hence respect modularity. Also, it is useful to recall that the issue discussed is quite distinct from the question of how exactly the mapping mechanism works: traditionally, the input of mapping rules have been domains of the morpho-syntactic arborescence, but Selkirk (1986) has proposed a mechanism which is based on the edges of morpho-syntactic constituents (end-based mapping). Hence one could say that Selkirk uses boundaries, rather than domains. This distinction, however, is irrelevant for the current discussion since on any count the *output* of the mapping mechanism is a version of the Prosodic Hierarchy. The whole point, though, is to show that non-isomorphism evaporates when local boundaries are used *in the phonology*.

### 5.5 Domain Abuse II: Theoretical Units Are Confused With Descriptive Categories

The best witness of the success of Prosodic Phonology is probably the fact that the units of the Prosodic Hierarchy have by and large acquired the status of descriptive categories. This is true in general for conversations among phonologists: the morpho-syntactic distance of two units across which some phonological process applies is commonly identified by its prosodic translation ("X applies within a phonological word"), rather than by its morpho-syntactic properties. This way of looking at sandhi phenomena is so deeply rooted in the field that boundaries are not even mentioned, let alone considered. A typical example is the first sentence of Vogel & Kenesei (1987):

"When a phonological rule applies across words, it is necessary to be able to specify across which types of words it may apply and across which it may not, or in other words, within which domain it applies." Vogel & Kenesei (1987:243)

Equating "applies across words" with "applies within a domain" without discussion has unfortunate consequences: basic empirical generalisations may be missed. Below I discuss one case in point where the undue usage of domains as a descriptive category introduces a bias into the analysis.<sup>13</sup>

Nespor & Vogel (1986:42ss) examine a process in Spanish whereby the nasal of a nasal-obstruent cluster that straddles a word boundary may come to agree in place with the obstruent. They provide two examples where homorganisation goes into effect when the two words in question are a verb followed by an object NP, and a verb followed by an adjective, respectively. From this, Nespor & Vogel conclude that the domain of application of the homorganisation rule is "within the VP". They then introduce additional evidence that appears to violate this generalisation: there is no homorganisation between an object NP and a following preposition. Their conclusion, then, is that Spanish provides further support for the otherwise well established pattern according to which phonological processes are more easily blocked when their domain of application, the VP in this case, is long (i.e. contains many words).

This analysis may be correct, but in order to tell we would need to examine the case of an object NP-Prep boundary that does not make the VP too long. If this is not possible, the matter may not be decided since the blocking effect may either be due to the length of the VP or to the object NP-Prep boundary. In any event, declaring that the domain of application of a rule is the

<sup>13</sup> This notwithstanding, most of the work in Prosodic Phonology that I have come across proceeds in a way that is methodologically sound, i.e. by first establishing the list of boundaries which have a (non-)blocking effect in regard of some phonological process, and then converting this list into the categories of the Prosodic Hierarchy.

VP without having tested all possible VP-internal boundaries is confusing boundaries – the only descriptive unit that is given to the analyst – and domains, a derived category.

Hence there is reason to believe that the alleged length sensitivity of phonological phrasing which wanders through the literature since Nespor & Vogel (1986) is an artefact of the domain-biased analysis, rather than an empirical fact. This is of some relevance for the demonstration that the Prosodic Hierarchy is a diacritic. Recall from section 4.1 and note 8 that the only phonological factor which has been claimed to participate in the construction of prosodic constituency is precisely the length of morpho-syntactically identical strings. If this were true, the Prosodic Hierarchy could not be said to be a purely morpho-syntactic buffer.

Four comments are in order here. For one thing, it is *never* the case that the alleged "short" and the alleged "long" portions of the string are morpho-syntactically identical. This is precisely the flaw in the analysis of Nespor & Vogel (1986) that was pointed out above: the "longer" string has also more internal morpho-syntactic structure; hence these additional boundaries, not length, could well be responsible for the effect observed.<sup>14</sup>

This is precisely what Wagner (2005a,b) shows for intonational units: following the question "who was at the party?", the answer "[Morgan and Joey]" is just one intonational unit, while the answer "[Morgan] or [Joey and Ronny]" bears two intonational spans. Contra Watson & Gibson (2004,2005) who hold that the probability of the existence of a boundary depends on the size of the constituents that are adjacent to it, Wagner shows that "length" is responsible for nothing at all – its alleged effects are due to the (recursive) syntactic structure of the "long" items.

Anyway on a more general note, if one were to choose between a theory where all phonological phrasing is done on purely morpho-syntactic grounds and another one where mapping is 98% morpho-syntactic and 2% size-dependent, the latter will surely not win the linguists' heart.

Second, it is not clear in which way "size" is a phonological category. Of course phonology has no means to know how long a word or a morpheme is. Phonology is unable to count such

<sup>14</sup> The same holds true at the morphological level. When I talked this issue over with Ricardo Bermúdez-Otero, he brought up the following contrast: in the frame "... requires us to think again about these issues", a phrase-initial NP subject such as "contemporary thought" is less likely to constitute a separate intonational phrase than "contemporary antidisestablishmentarianism". He concludes that size matters and tends to cut identical objects into smaller prosodically relevant portions. Now the thing is that *antidisestablishmentarianism* and *thought* may be identical on the syntactic side – they are certainly not morphologically speaking. Hence nothing guarantees that it is size, rather than the additional internal structure, which produces the effect. A test case would be two monomorphemic items with very different length.

things. And "size" is nothing that is known in domestic phonological quarters: there is no phonological process, say palatalisation, vowel harmony or the like, that depends on the length of something. Hence if anybody decides on what is long and what is short, it is surely not the phonology. The only instance that can make such a decision is the Translator's Office.

Third, alleged size restrictions always seem to concern either the phonological phrase or the intonational phrase. There is no good reason why this should be so: if mapping may be size-sensitive, this option should at some point be visible at all levels of the Prosodic Hierarchy.

Finally, the original size-based generalisation has long been reanalysed in the literature either along the lines discussed, or according to eurythmic properties of speech. Ghini (1993) is at the origin of the latter line of thought, while Sandalo & Truckenbrodt (2002) for example argue for the former solution (the authors use a constraint WRAP-XP which requires that each XP be contained in a phonological phrase, thereby exploiting the additional structure of "long" items).

In sum, thus, there is little evidence for and yet less appeal to analyses where the "phonological" property of length contributes to the construction of prosodic constituency.

## 6. CONCLUSION SO FAR: TRANSLATION YES, BUFFER NO

The foregoing discussion may be summarised like this: we need a Translator's Office, but the buffer has to go.

The Translator's Office must be located in modular no-man's land (i.e. neither in morpho-syntax nor in phonology), and it makes sovereign decisions (which are still poorly understood: mapping). Prosodic Phonology thus did exactly the right thing – introducing Indirect Reference as a major principle of the interface architecture, installing a Translator's Office and mapping rules – but for the wrong reason. Non-isomorphism is a non-reason: it exists only if way is given to the unsupported *a priori* that non-local domains are the operative interface currency; it evaporates when higher level information is supposed to be handed down through local intervention at the seam between morphemes or words. The reason that really enforces the existence of Indirect Reference, the Translator's Office and mapping is modularity and the concomitant fact that phonology does not speak the same language as syntax, morphology and semantics. That is, any direct transmission of morpho-syntactic information to the phonology would simply remain without effect since it could not be interpreted.

The traditional interface currency, boundaries, has been evacuated in favour of domains with no good reason and hardly any discussion, in any event in absence of contrastive

argumentation comparing the merits of both options. The diacritic argument levelled against boundaries was made in the erroneous belief that the alternative, domains, are non-diacritic. Diacritics are to be done away with, that much is for sure. If in an autosegmental coat, the Prosodic Hierarchy is a diacritic as much as SPE-type boundaries – hence both have to go.

The key to the problem, then, is the fact that the diacritic character of boundaries is but one aspect of their identity. It has constantly been confused with the property that really sets them apart from domains: their local action. The question thus is how a local intervention of higher modules can be achieved without appealing to diacritic objects.

## 7. DIRECT INTERFACE

There are different ways of influencing the course of phonology: procedurally and representationally. The former is not under focus in this article; it is currently represented by competing implementations of the phonological cycle (heirs of Lexical Phonology and Phase theory). Direct Interface is concerned with the latter: it defines 1) how extra-phonological information is shipped into the phonology, 2) where precisely this information can land and 3) what it may consist of.

Direct Interface is theory-neutral with respect to phonological theories. It defines a general frame for the interface, to which individual phonological theories may respond in various ways. Different theories have different vocabulary and promote different representational objects – they therefore make different predictions as to what is a possible interface event. Thus an appreciable effect of Direct Interface is that phonological theories may be evaluated according to their behaviour at the interface. Other interface theories such as SPE, Lexical Phonology or Prosodic Phonology do not offer this opportunity because their heart is to impose precise properties that cannot vary across candidate phonological theories: "#", levels, brackets, prosodic constituents and the like – in short, a diacritic. Rather than imposing some interface vocabulary to all competing phonological theories, Direct Interface works with whatever the theories offer – precisely because it outlaws diacritics and could not process any non-domestic object.

### 7.1 No Mediation: Only Domestic Phonological Objects Can Be The Output Of The Translator's Office

As indicated by its name, Direct Interface holds that there is no intermediate unit between the Translator's Office and phonology: neither # nor omega nor any other diacritic. The output of

the Translator's Office are only truly phonological units. Since the Prosodic Hierarchy has been erroneously sold as such, it is necessary to precisely define this notion.

- (4) A truly phonological object is a unit that is needed for the purpose of domestic phonology and in absence of any issue related to extra-phonological information.

The objects that qualify are of course theory-dependent, but things such as "labial", "palatality", "association line" and so forth will probably be consensual across models. Obviously, neither # nor omegas qualify as a truly phonological object since they are introduced only when reference to extra-phonological information needs to be made. By contrast, domestic phonology such as a trivial palatalisation does not need to recur to #s or omegas. That #s and omegas are no phonological animals is also obvious from the fact that they are created outside of the phonology, i.e. in the Translator's Office, and without contribution of any phonological information.

### 7.2 Representational And Procedural Labour Of The Translator's Office

Another question is how labour is divided between the representational and the procedural action of the Translator's Office. There is good reason to believe that the interface acts on phonology along both of these lines. The Translator's Office, then, has two means of impacting phonology.

- (5) Actions that the Translator's Office may take
- a. representational  
it may send down an object to the phonology. This object is a truly phonological unit and will be inserted at the boundary of two morphemes or words. Its action therefore is only local.
  - b. procedural: chunk submission  
it may decide to submit only a chunk of the total linear string to the phonology, and to repeat this action several times with variously sized chunks (from smaller to bigger, climbing up the morpho-syntactic tree). Every time phonology receives some chunk, it assigns phonological interpretation to it. Obviously, chunk-submission is not local in character.

The point of view taken under (5) is the one of Phase theory and Distributed Morphology. It is incompatible with interactionism, the heart of Lexical Phonology, which procedurally

interleaves word formation and phonological interpretation.<sup>15</sup> Interactionism violates the generative architecture of grammar according to which all concatenation precedes all interpretation (inverted T model). It is also irreconcilable with basic modular requirements, which include so-called encapsulation: modules have no access to intermediate stages of the computation of other modules. Interactionism, however, does phonological interpretation before the morphological computation has come to an end.

In times when Lexical Phonology was the standard model of phonology and could hardly be challenged as such, Halle & Vergnaud (1987) have already proposed a non-interactionist "version of Lexical Phonology", an enterprise that amounts to squaring the circle since it does Lexical Phonology without the lexicon. Later on the classical generative model has found its modern incarnation in the skin of Distributed Morphology (Halle & Marantz, 1993, Marantz, 1997), which rejects the lexicon and interactionism.

### 7.3 Direct Interface, SPE And Distributed Morphology

The small body of work devoted to phonology in Distributed Morphology (e.g. Marantz, 1997, Marvin, 2002) so far has tried to treat all phenomena with the only instrument provided by phase theory, that is (5). This is certainly necessary, but not sufficient. Interface activity does not boil down to the phonological cycle: some representational device is also needed. Interface Dualism is in place since SPE, where boundaries covered the representational part, while the phonological cycle managed procedural matters. I thus believe that SPE was basically right and just needs to be amended in one respect: the representational items that are shipped off to the phonology must not be diacritic.

On this count, then, phonology is stupid and boring: there is absolutely nothing fancy going on in the phonological module: no concatenation, no ordered application of processes, no reranking of constraints – just interpretation.<sup>16</sup> The only thing that phonology is able to do is to interpret whatever is stuck into its space. This may be compared to the process that takes place when a piece of composite material is dipped into a chemical bath: based on the ingredients of the piece and the properties of the bath, a chemical reaction goes into effect which ennobles the original piece and makes it apt for life in the real world. The architect of the ingredients of the

<sup>15</sup> Interestingly, modern constraint-based versions of Lexical Phonology such as Bermúdez-Otero (forth) do not necessarily hold up interactionism, which shows that Stratal OT for example is more than just OTed Lexical Phonology.

<sup>16</sup> Rich and interesting phonology such as Stratal OT and DOT (Derivational OT, Rubach 1997 et passim) which accommodate the phonological cycle (in the form of reranking) are redundant: phase is needed in morpho-syntax anyway, so why should there be a domestic phonological means to do the same job again?



piece, of its size and of the timing of its dipping is the Translator's Office. It cannot alter the pieces that come from the (morpho-syntactic) factory, but it may rearrange them, add some ingredients at given locations (morpheme and word breaks); also, it decides which piece is dipped into the bath, and how many times this is repeated.

#### 7.4 Modularity and OT

Let us now take a brief look at how the interface is managed in OT. It appears that the contours of the basic modular architecture, whose existence is a minimal requirement for (generative) theories of the interface, are blurred, to say the least. Some authors offer radical solutions where modules simply cease to exist: Russell (1999) for example proposes that all syntactic, morphological and phonological constraints are scrambled in one single constraint ranking and assess candidates in parallel. But less radical versions also scramble things: for example, the absence of any constraint on the formulation of constraints (in prose) has led to constraints that it will be difficult to call either phonological or morphological – they are both at the same time. In such an environment, then, it is not clear anymore what Indirect Reference means because it cannot be determined where modular demarcations run. The creeping evaporation of modularity in OT is sometimes made explicit in the literature as for example by Yip (1998) in the quotation below. However, it does not seem to provoke either much echo or concern in the field.

"These results make it hard to identify a clear dividing line between morphology and phonology. What is more, they go much further to blur the distinction than does the interleaving of phonology and morphology found in lexical phonology. In lexical phonology, each component has its own character: the entities are different, and the rules are different. In Optimality Theory, this is not necessarily the case. Alignment is the most striking example. Alignment appears to play a role in pure morphology, in pure phonology, and at the interface." Yip (1998:219)

The specific issue that Yip addresses is indeed interesting: all versions of OT have taken over the Prosodic Hierarchy from the 80s.<sup>17</sup> In a constraint-based environment, then, mapping is done by two basic constraint families, ALIGN and WRAP (McCarthy & Prince, 1993, Truckenbrodt, 1999)<sup>18</sup>. These, however, are part of the constraint ranking that is responsible for domestic phonological matters and assesses candidates in parallel fashion. The conflict with

<sup>17</sup> Including Stratal OT which in the OT landscape tries to uphold modularity most cautiously: Bermúdez-Otero (forth:43ss) for example attempts at limiting the access of phonology to morpho-syntactic information to a minimum.

<sup>18</sup> As well as by other constraints that manage the internal properties of the Prosodic Hierarchy and information regarding focus, topic and eurythmy (Selkirk, 1996,2000).

modularity is timidly pointed out by Yip in the above quote: mapping could not possibly take place *in* the phonology; it is necessarily done in the Translator's Office. In other words, Prosodic Phonology has developed a perfectly sound division of labour in modular terms: mapping is done outside of the phonology; the output of this operation, the Prosodic Hierarchy, is sent down into the phonological module (cf. (1)). OT then has taken over the output of this operation, but destroyed its modular architecture at the same time: the Translator's Office has been annexed by the phonology. This is impossible if modularity makes any sense at all.

Also, this move entails an overt violation of Indirect Reference since ALIGN and WRAP constraints, from inside the phonology, make constant reference to morpho-syntactic categories such as DP etc. Hence even in Stratal OT where modularity is taken seriously, what is really done is Direct Syntax (see note 7). Bermúdez-Otero's (forth) position according to which Indirect Reference is a fundamental property of grammar that must be absolutely respected, except by some constraints, can hardly be called consistent. Either Indirect Reference is respected or it is not; "Indirect Reference with a little Direct Syntax" does not make sense.

In sum, thus, OT seems to slowly move to a non-modular organisation of grammar. By any standards, this appears to be incompatible with the deepest layer of generative principles.

#### 7.5 Restrictions On Representational Intervention

After this excursus into the larger landscape, let us return to the focus of the article: the representational intervention of morpho-syntax in phonology (5). It follows from the discussion that its essence is local: only objects that are adjacent to the morpho-syntactic boundary at hand can be targeted. Locality of intervention also means that no phonological process makes reference to any domain or span of the string (of the kind "process X applies only within the domain Y, e.g. the Prosodic Word, but not across Y-boundaries"). Note that the insertion of objects into the linear string does not guarantee the absence of reference to domains by itself: recall from the discussion of Selkirk (1980a) and McCawley (1968) (section 3.3) that linear boundaries, when coming in pairs as in SPE, may give rise to statements such as "process X applies only within the domain delineated by boundary Y".

Direct Interface never inserts two items of the same kind at the beginning and at the end of morphemes, and hence is unable to reintroduce domains through the back door. The fact that the Translator's Office never introduces the same object at the edge of morphemes is a direct consequence of the non-diacritic character of boundaries: unlike with diacritics, there is a causal relationship between the inserted object and the phonological effect. Therefore, all interface phenomena that have a representational solution are due to the action of *one* inserted

object, not two. It follows that spans of the string are irrelevant for the computation of interface events that are managed representationally (they are of course critical for procedural chunk-submission (5)).

Logically, then, for any given sequence of two morphemes (or words) which enclose a boundary, the Translator's Office may intervene on three different objects: 1) the last item of morpheme one, 2) the first item of morpheme two and 3) the empty space that lies between them.

It is true that the notions "last item" and "first item" may be interpreted in various ways, and this depends on the particular phonological theory used (since we are talking of phonological items). Under (7) and (8) below I adopt an all-purpose autosegmental representation that is as unmarked as possible and has good chances to be shared by all current theories. It should be kept in mind, however, that this is just for expository reasons: any specific content of a particular phonological theory may have its proper definition of "first and last item of a morpheme". Note, however, that – quite obviously – the minimal requirement for a representational intervention in phonology is the existence of domestic phonological representations. This looks like a trivial statement, but the status of representations is not clear at all in some versions of OT where computation is king and representations only decoration that cannot contribute any sovereign and unoutrankable arbitral award (see Scheer, 2003, 2004:§309). On this count, then, I take the "first phonological item" of a morpheme to be its first syllabic constituent together with all melodic material that it dominates. The "last phonological item" has the symmetric definition.

Behind this restriction is an observation that every phonologist has made: the kind of phonology that is observed at morpheme edges is quite different from the kind of phonology that is encountered in the middle of morphemes. This seems to be a robust cross-linguistic generalisation (among many others, Rubach & Booij, 1990, Broselow, 2003). Moreover, the edge-interior asymmetry is not just of any kind: phonology is always "regular", "normal", "unmarked", "clean" in the middle of morphemes, while it is all the opposite at edges (but both edges do not introduce the same anomalies, cf. Scheer, 2004:§§89ss,377). This precisely follows from the locality of higher intervention: phonology is "left alone" inside morphemes, but must compose with extra-phonological law at morpheme edges.<sup>19</sup>

<sup>19</sup> Structuralists badly abused boundaries in making them non-local: since juncture phonemes were supposed to be regular phonemes (which of course is as wrong as saying that they are [-segment] segments, the analogous take of SPE, something that Pyle, 1972 has pointed out), they had to be able to be freely distributed over morphemes. Hence just as any other phoneme, # could appear right in the middle of a morpheme. This opportunity was then coupled with the strive towards economy (the fewer phonemes the better phonology) and has produced Harris' (1951:87) absurd analysis of German: final devoicing being active in this language, a /d/ in final position, that is before the phoneme /#/, comes out as [t]. If the sequence /d#/ thus appears as [t], there is no need for an

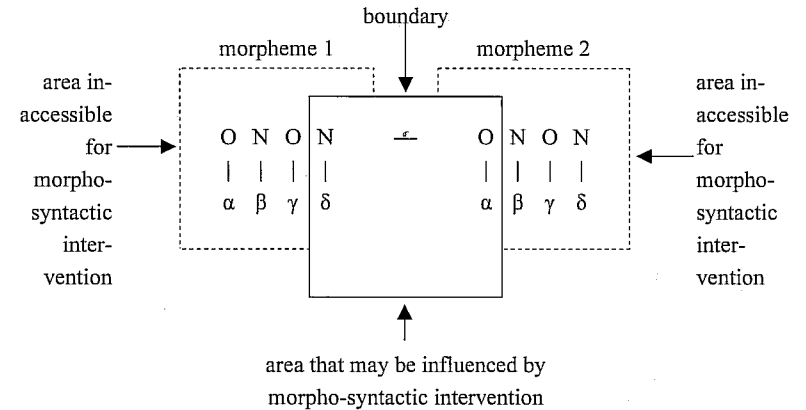
- (6) the edge-interior asymmetry is due to locality of higher intervention
  - a. phonological law alone governs the phonological behaviour inside morphemes.
  - b. both regular domestic phonological law and extra-phonological law (i.e. the representational output of the Translator's Office) determine the phonological behaviour of morpheme edges.

In case of conflict, the extra-phonological law "wins".

That higher intervention at edges supersedes domestic phonological law in case of conflict is logically necessary: otherwise higher intervention would have no effect at all.

With all this borne in mind, the table under (7) fleshes out what locality means in a minimal representational environment: it delineates the zone where the output of the Translator's Office can come down on phonology in order to change its regular domestic course.

- (7) higher level intervention is local: definition of its zone of influence I

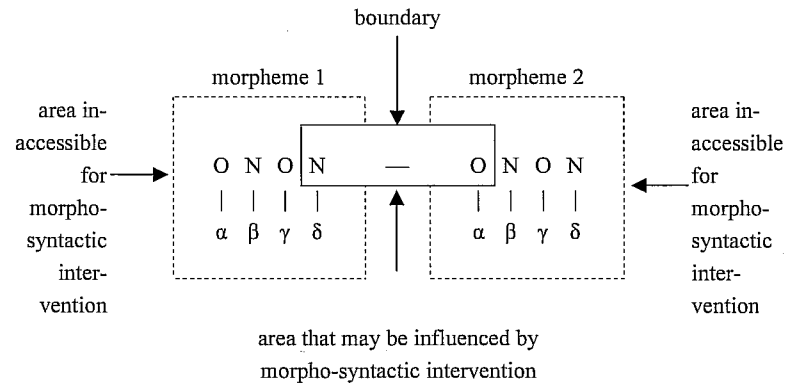


But this is not all: we already know from the brief discussion of phonology-free syntax in section 5.2 that nobody has ever seen any melodic property conditioning a morphological or a syntactic process. Recall that while there is debate whether phonological properties located

independent phoneme /t/ anymore: a word like *Teil* [tʰajl] "piece" will be /d#ajl/. Hence grammar can do away with all voiceless phonemes, something that was considered a major descriptive advance. Juncture phonemes, which were thus regular phonemes but did not have anything to do with juncture anymore, were abused in this way for example by Trager (1962:19s) and Hill (1954). No present-day linguist would allow for phonological representatives of morpho-syntactic divisions to be estranged from any morpho-syntactic control. In other words, higher levels must not be able to govern into morpheme-internal phonology – they can only influence the phonology at morpheme edges.

above the skeleton can bear on morpho-syntax, melody is definitely out of business. This is also true for conditioning in the opposite direction: nobody has ever seen a morpheme that normally ends in *-p*, but before a certain morpheme turns, say, into *-s*. In case melodic changes are encountered at morpheme breaks, phonologists always suppose the existence of a local melodic source, a floating palatal agent for example. On the other hand, phonotactic and suprasegmental effects are plethoric at the edge of morphemes: extrasyllabicity, extraprosodicity, the restriction of word-initial clusters to obstruent-sonorant sequences, the allowance for heavy clusters at the right edge (e.g. English *sixths* [sɪksθs]) are just a few examples. It is therefore perfectly reasonable and consensual to formally exclude the area below the skeleton from the possible target zone of higher level intervention: whatever the representational output of the Translator's Office, it can only land at or above the skeleton. The table under (8) identifies the area that is left for higher level intervention when both locality and melody restrictions are combined.

(8) higher level intervention is local: definition of its zone of influence II



We have now reached the end of the introduction to the general properties of Direct Interface. It is useful to recall that Direct Interface is theory-unspecific: any particular phonological theory can run in its frame. Different representational vocabulary germane to competing theories, then, will make different predictions as to the effects observed upon extra-phonological conditioning. This is a welcome effect since it allows for assessing the comparative merit of phonological theories.<sup>20</sup>

<sup>20</sup> I show in Scheer (forth) that this is not just lip-service: had the absurd consequences of SPE-type boundaries that have been pointed out by Pyle (1972) and Rotenberg (1978) for example been taken seriously, phonologists would have been forced to change the then current phonological theory. That is, the outlandish behaviour of # at the interface would have enforced the conclusion that segments, of which # was supposed to be a sub-species (#

For example, there is reason to believe that interface theory must be able to express the fact that representational action at the interface may use various agents: only one type of boundary will not do. In SPE for instance, # is distinct from ## and +, and Prosodic Phonology has recast this linear distinction in terms of different layers of the Prosodic Hierarchy. Therefore phonological theories whose vocabulary does not offer distinct objects that could be inserted into the phonological representation do not fare well. Note that regarding this issue Direct Interface itself is not responsible for the competition with existing interface theories. Rather, the expression of distinct boundaries is a matter of the expressive power of individual phonological theories. As is shown under (12) below, CVCV has exactly four distinct ways of expressing boundary contrasts.

## 8. DIRECT INTERFACE IN CVCV

This section applies Direct Interface to a particular phonological theory, CVCV. Or rather, it opens a small window on how CVCV works at the interface and what kind of prediction it makes (recall the scope of the article as defined in the introduction). Space restrictions indeed allow for only a stenographic introduction of CVCV and how some of its tools are used in Direct Interface. The matter is introduced at greater length in Scheer (forth).

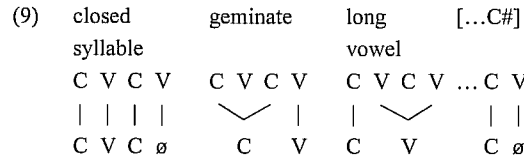
### 8.1 Background: CVCV

CVCV is an offspring of Government Phonology (Kaye *et al.*, 1990, Harris, 1994). The central idea of this theory is the lateralisation of structure and causality: instead of the familiar syllabic arborescence, lateral relations among constituents are responsible for the effects observed. CVCV takes this line of reasoning to its logical end: it holds that syllabic constituency boils down to a strict sequence of non-branching Onsets and non-branching Nuclei in all languages.<sup>21</sup> There are no Codas and no Rhymes, and the minimal syllabic unit that may be 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 (9) below.<sup>22</sup>

was a [-segment] segment), are not the adequate interface currency. In other words: there must be something else than just segments in phonology – (auto)segmental representations.

<sup>21</sup> CVCV has been proposed by Lowenstamm (1996); relevant references are, among others, Scheer (2004), Scheer & Szigetvári (2005), Szigetvári (1999), Cyran (2003).

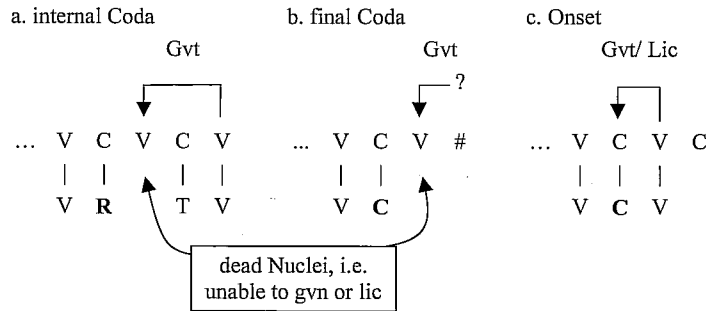
<sup>22</sup> Obstruent-liquid sequences (i.e. branching Onsets) are laid aside: space restrictions preclude their discussion (Scheer, 2004:§14 and Ségéral & Scheer, 2005 introduce the matter more carefully). On the following pages, T is shorthand for any obstruent, R for any sonorant; Onsets are transcribed as "C", Nuclei as "V".



In traditional approaches, syllabic arborescence assures the function of binding together different constituents, thereby identifying their grouping into higher units. In the option shown under (9), this function is shifted onto lateral relations that are assumed to hold between constituents: Government and Licensing. Effects that are usually attributed to the fact that a given segment belongs to this or that syllabic constituent stem from the configuration regarding Government and Licensing that it is involved in.

Let us illustrate this perspective by just one example, Coda phenomena. Coda phenomena are effects that are triggered by Codas and either appear on the Coda itself (lenition, devoicing etc.) or on the preceding vowel, in which case they are usually called closed syllable effects (vowel shortening, nasalisation etc.). The former situation is depicted under (10) below.<sup>23</sup>

(10) the Coda in CVCV: a consonant that occurs before a governed empty Nucleus



In classical approaches, the Coda disjunction  $\_ \{#,C\}$  is reduced to a non-disjunctive statement by saying that consonants in word-final and pre-consonantal position belong to a specific constituent, the Coda. In CVCV, Coda consonants (10) occur before a governed empty

<sup>23</sup> The question mark at the origin of the arrow under (10) is a matter of higher level intervention, to be explained shortly.

Nucleus (unlike Onset consonants, cf. (10)).<sup>24</sup> The difference between both descriptively equivalent statements is the causal relation between the relevant environment and the observed phenomenon. We know that Codas are weak since their hosts are prone to all kinds of lenition. On the Coda account, however, this observation has no explanation: there is no reason why Codas, rather than Onsets, should be weak. By contrast, the fact that objects are weak before empty, rather than before contentful Nuclei, has an obvious explanation: empty Nuclei cannot support their Onset because they are governed and hence unable to dispense Licensing.

Licensing is thus a supportive force. Government, on the other hand, has opposite properties: it inhibits the segmental expression of its target, for example in vowel-zero alternations where the alternating Nucleus cannot be vocalised in case it is governed. Also in the representations under (10) where the governed Nuclei do not host vowel-zero alternations. Another property of all lateral relations, i.e. Licensing and Government alike, is that they are only regressive (head-final).

In CVCV, Licensing is thus responsible for Coda phenomena: only phonetically expressed Nuclei have lateral actorship, i.e. are able to govern and license. Therefore under (10) the Coda consonant is unlicensed (and ungoverned), while the Onset consonant under (10) is licensed (and governed; see the Coda Mirror, Ségéral & Scheer, 2001,2005, on the interleaving of both lateral forces).

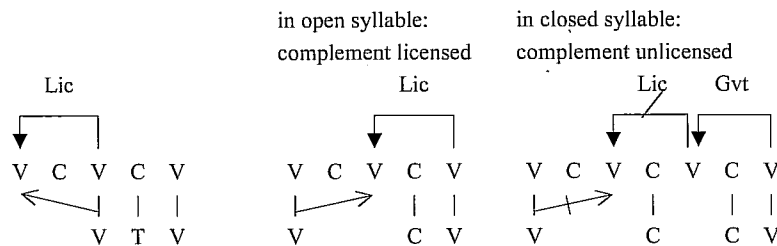
Like phenomena that affect the Coda itself, Coda effects which concern the preceding vowel are also due to Licensing: looking back at (10), vowels in closed syllables, i.e. those preceding the boldfaced Coda consonants under (10), are followed by a governed empty Nucleus, while vowels in open syllables as under (10) stand before a contentful Nucleus. Since governed empty Nuclei are unable to dispense any lateral force, the preceding Nucleus will be unlicensed (and ungoverned). In other words, Coda effects on Codas are due to (the absence of) Nucleus-to-Onset Licensing, while closed syllable effects stem from (the absence of) internuclear Licensing.

Finally, the functioning of long vowels in CVCV needs to be introduced before we can look at the interference with interface information. In some languages long vowels are always long no matter whether they stand in open or in closed syllables (e.g. German, Somali); in others, they shorten in closed syllables (or short vowels lengthen in open syllables, which comes down to the same, cf. Tonic Lengthening in Italian), as e.g. in Turkish and Icelandic. In CVCV, long vowels are a single chunk of melody which is associated to two Nuclei: one is the head, the other the complement (Scheer, 2004:§218). The head, however, can spread onto its

<sup>24</sup> Although there are no Codas in CVCV, I continue to use the familiar vocabulary for descriptive purposes.

complement only if this complement is licensed. As is shown under (11) below, stable long vowels are stable because they are head-final and hence "self-licensors": their complement is always licensed. Alternating long vowels, on the other hand, are left-headed, which means that their complement may or may not be licensed according to the situation on their righthand side.

- (11) a. non-alternating long vowel: head-final, i.e. a self-licensor  
 b. alternating long vowel: head-initial, i.e. needs support from the right



In closed syllables, the complement of alternating long vowels thus remains unlicensed because it occurs before a governed empty Nucleus (which is unable to license). In this case, the empty CV unit is lost: it fails to be governed as well. By contrast, the head melody may spread in open syllables because the complement occurs before a sound licensor.

**8.2 Predictions Made By CVCV Regarding The Interface**

The previous section has illustrated the following properties of CVCV: a) syllable structure is entirely managed by Government and Licensing; b) the minimal syllabic entity is a CV unit, i.e. an Onset followed by a Nucleus; c) morphemes begin with an Onset and end in a Nucleus. This rather restrictive list exhausts the instruments that CVCV uses above the skeleton. That is, CVCV ambitions to account for all supra-skeletal phenomena (syllable structure, stress, see Scheer & Szigetvári, 2005, extrasyllabicity and so forth) with just the CVCV structure, Government and Licensing.<sup>25</sup> Therefore, the same set of restricted tools is all that can be used in order to manage the processing of interface information (recall from section 7.5 that only units above the skeleton can be manipulated by higher level intervention). In other words, a

<sup>25</sup> Also, melodic effects such as lenition are controlled by Government and Licensing alone (Ségéral & Scheer, 2001, Scheer, 2004:§110). This advanced minimalism is an important argument in favour of CVCV.

prediction is made to the effect that the Translator's Office can have four and only four outputs:<sup>26</sup>

- (12) possible outputs of the Translator's Office in CVCV
- a. modification of the syllabic space: insertion of an empty CV unit
  - b. manipulation of the lateral actorship of Nuclei
    1. make a final empty Nucleus (FEN) a good governor: "FEN, you are a good governor"
    2. make a final empty Nucleus (FEN) a good licensor: "FEN, you are a good licensor"
  - c. make FEN governed: "FEN, you are governed"

By the same token, the following are non-events because of the inherent properties of CVCV: "FEN, you are licensed" and "first Onset, you are a good governor/ a good licensor". Indeed, there is no empirical effect associated with the fact that a FEN is licensed or not (while there is an effect of it being governed or not, to be discussed shortly). Also, only Nuclei are the source of Government and Licensing in CVCV; therefore the first Onset of a morpheme cannot be made a good governor or a good licensor.

The insertion of a CV unit as under (12) may have various effects according to the context and the domestic phonological patterns at play. For example, if there is a general gemination process, the arrival of a CV unit allows this process to go into effect at the boundary where it is inserted. If on the other hand the language features a hiatus-breaking glide epenthesis, the insertion of a CV in the middle of the hiatus blocks epenthesis because the two vowels that constitute the hiatus will not be adjacent at the syllabic level anymore.<sup>27</sup> Yet on other occasions, an inserted CV may trigger epenthesis because it provides space: French consonants that appear at derivational boundaries such as in *numéro-t-er* "to number" are a case in point (Pagliano, 2003). The best studied instance of this type of higher level intervention, however, is the equation "# = CV": the phonological identity of the beginning of the word is a CV unit in those languages that have the typical Indo-European restrictions on word-initial clusters (#TR-only) (Lowenstamm, 1999, Scheer, 2004:§102, 2007, Seigneur-Froli, 2003,2006 Scheer & Ségéral, forth).

<sup>26</sup> Marc van Oostendorp has pointed out to me that there is actually a fifth possibility: when ungoverned or unlicensed, initial Onsets may be made governed or licensed qua higher level intervention. The consequences of this additional possibility need to be computed.

<sup>27</sup> This is the case in French: compare suffix-created hiatuses like in /li-a/ → [lija] "to tie, past" with their prefix-created peers as in *anti-aloholique* [ãtiãkoolik] where no glide may appear (e.g. Dell, 1972).

Let us now look at (12). As all other empty Nuclei, final empty Nuclei must have a reason to be empty: they need to be governed. Since they are final, however, there is nobody to their right that could provide Government. This is why they have been declared exceptional in Standard Government Phonology, where FEN are said to be "parametrically licensed" (Kaye, 1990). The origin of the Government (or Licensing) that they are subject to, however, is not mentioned. Since FEN cannot be empty for domestic phonological reasons, the source can only be extra-phonological: the Translator's Office. The parametric variation at hand concerns the ability for a language to have consonant-final words: some languages do (e.g. English), others do not (e.g. Italian). FENs of languages with consonant-final words are thus governed "by morphology", while higher modules leave phonology alone in languages like Italian where FEN, following purely domestic law, cannot exist.

When the Translator's Office overrides domestic phonological law and declares FEN good governors as under (12), the language in question can have word-final consonants, but also word-final clusters (of falling and equal sonority: RT#, TT#, RR#). Clusters enclose an empty Nucleus which thus needs to be governed. In a word such as English *fact* /fæktət/, then, two empty Nuclei in a row can only be well-formed if the latter governs. Since the FEN is unable to govern qua domestic phonological law (recall that only contentful Nuclei are lateral actors), it has acquired governing ability through the intervention of the Translator's Office: "you are a good governor". By contrast, higher levels leave phonology alone in languages where final clusters are excluded: domestic law assures that FEN cannot govern.

The crossing of the two parametric choices mentioned opens a fourfold parametric space, of which one option is irrelevant: 1) languages with final consonants but without final clusters (FEN are governed, but cannot govern); 2) languages with final consonants and final clusters (FEN are governed and can govern), 3) languages that have neither final consonants nor final clusters (FEN are ungoverned and hence necessarily contentful, which means that they are able to govern anyway).

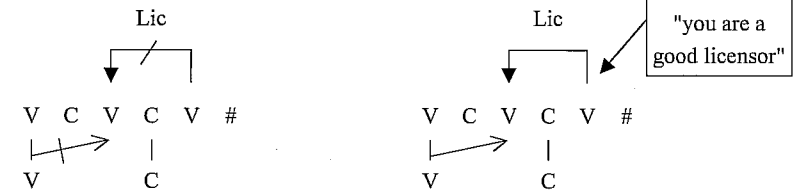
Finally, let us turn to the licensing abilities of final empty Nuclei. Qua domestic phonological law, FEN cannot license. If they receive this potential from the Translator's Office, the effect is twofold: 1) word-final consonants will cease to be Codas because they are now licensed (recall that Codas are unlicensed and ungoverned); 2) vowels in word-final closed syllables (i.e. those occurring before word-final consonants) cease to stand in a closed syllable since they are now licensed (recall that vowels in closed syllables are unlicensed and ungoverned). If a head-initial long vowel occurs in this position, it may be long because its complement will now be licensed.

In sum, thus, a binary parametric situation is predicted: in any given language, either word-final consonants behave like true Codas (i.e. are paired with internal Codas) and vowels before word-final consonants show regular closed-syllable behaviour, or final consonants do not behave like Codas (hence part company with internal Codas) and vowels before word-final consonants behave like if they stood in open syllables. This is precisely the pattern that is observed in natural language: no language seems to be on record where final consonants behave like true Codas, but vowels before final consonants display open syllable behaviour; or where final consonants behave like non-Codas, while vowels before final consonants show closed syllable behaviour.

L-vocalisation and closed syllable shortening may illustrate the variation described by this pattern. The former process occurs in both internal and final Codas in Brazilian Portuguese and Serbo-Croatian, while it is only observed in internal Codas in Old French (e.g. Bourciez, 1926:240ss). On the vocalic side, closed syllable shortening is observed either in both internal and final closed syllables (Turkish, Czech), or only in final closed syllables (Icelandic, e.g. Gussmann, 2002:157ss, the processes at hand are illustrated in Scheer, 2004:§§526,532). Table (13) below shows how the intervention of the Translator's Office alters the regular domestic course of phonology in Icelandic, but leaves domestic Turkish and Czech phonology undisturbed.

(13) languages with vs. without Closed Syllable Shortening before word-final consonants

Turkish \*VVC#: domestic phonological law rules alone, no higher intervention  
 Icelandic VVC#: higher order "FEN, you are a good licenser"



Yet another massive cross-linguistic generalisation is predicted by Direct Interface: while the behaviour of final Codas and of vowels in final closed syllables is variable, there is no variation word-internally. That is, internal Codas are always true Codas, and vowels in internal closed syllables show only closed syllable behaviour. In other words, languages where final consonants are true Codas while pre-consonantal consonants do not behave like Codas do not

exist any more than languages where vowels in final closed syllables behave according to their label, whereas their peers in internal closed syllables act like if they stood in open syllables.

The non-existing patterns cannot be generated because morpheme-internally phonological law rules alone (section 7.5). It is only at morpheme edges that a binary variation is produced by the fact that higher levels may or may not intervene. In classical approaches, this generalisation is captured by extrasyllabicity and the so-called Peripherality Condition (see note 11) which stipulates that extra-X objects (extrasyllabic, extramoraic, extraprosodic, extrapedal etc.) can only occur at word-(morpheme-) edges. The difference between the two solutions is that the latter has got nothing to do with the interface: for some mysterious reason, extrasyllabicity occurs only at edges, and this must be stipulated. By contrast in *Direct Interface*, rather than being accidental, the pattern follows directly from a property of the interface. It is quite obvious that the former scenario misses the point: edges of morphemes are special not because they are edges, but because they are the parts of morphemes that are adjacent to and influenced by boundaries – hence by extra-phonological information.

## 9. CONCLUSION

On the foregoing pages, I have tried to present the theory of *Direct Interface*, and to show what happens when it is implemented in CVCV. Everything that has been said is at best incomplete: only one stream of generative interface thinking has been examined (Prosodic Phonology), some aspects of *Direct Interface* could not be addressed (e.g. privacy<sup>28</sup> as well as what I call the direct effect<sup>29</sup>), and its implementation into CVCV could only concern one of the four (or five) possible outlets of the Translator's Office.

Finally, current theories of the interface, which most of the time are constraint-based incarnations of Lexical Phonology or Prosodic Phonology (or both), could only be addressed superficially. As far as I can see, all versions of OT do mapping inside the phonology (section 7.4). This is a violation of the basic modular architecture of grammar: the Translator's Office necessarily stands in modular no-man's land; transferring it into the phonology blows up the phonological module.

<sup>28</sup> Privacy holds that only those parts of morpho-syntactic information that are phonologically relevant are projected into the phonology. By contrast, non-privacy systems send down all of morpho-syntax, including useless information. Chomsky *et al.* (1956), Kaye (1995) and *Direct Interface* are privacy, while SPE, Prosodic Phonology and modern OTed incarnations of the latter are not.

<sup>29</sup> Unlike real phonological objects, diacritics do not make predictions: anything and its reverse can happen at the beginning of an omega or after a #. By contrast, the presence of a CV unit makes precise predictions regarding its effect (see Scheer, 2004: §88).

It has been argued on the foregoing pages that the Prosodic Hierarchy is a diacritic, and that diacritics have no place in phonological theory. The major point of the article, however, is quite independent of the diacritic issue: following neogrammarian, structuralist and generativist thinking since the 19<sup>th</sup> century, I argue that the correct interface currency are local boundaries, rather than autosegmental domains.<sup>30</sup>

A prediction that follows from the locality of representational intervention is that any phenomenon that requires reference to some span of the linear string (rather than to a given point at some morpho-syntactic division) cannot be managed representationally (see (5)). All span-relevant interface phenomena are necessarily a matter of procedural transmission (see (5)). Note that in the past there was no clear line of division between representational and procedural management of the interface. Hence the prediction at hand appears to be rather strong. For example, span-relevant phenomena are commonly managed representationally in Prosodic Phonology where three kinds of rules are known: domain-span, domain-juncture and domain-limit rules (Nespor & Vogel, 1986:77). Shifting the burden from representational devices such as the Prosodic Hierarchy to procedural instruments is also the direction taken by Wagner (2005a,b) regarding intonation. That the management of intonation is syntactic, rather than phonological, also appears to be a fair bet when considering that it appears to be the only interface phenomenon which requires recursion (see the literature since Bresnan, 1971); recursion, however, is unheard of in phonology. All in all, thus, the prediction regarding the split between procedural and representational management of interface phenomena requires the reanalysis of much that has been done in reference to the Prosodic Hierarchy – a promising challenge.

Coming back to the representational question of the article, it appears that the local potential of boundaries was thrown out with the diacritic bathwater in the early 80s. What we need is a discussion that has never taken place: is the action of the Translator's Office local or not? It has been shown in section 8 that a local *and* non-diacritic intervention is possible. If the preceding pages contribute to engage the debate regarding the locality of higher level intervention, they will have been worthwhile (writing and reading).

<sup>30</sup> An anonymous reviewer points out that Drescher (1994) also goes down this road, arguing that a highly articulate seven-layered prosodic structure offers much more opportunity for intervention in phonology than is necessary to cover the "properly" phonological phenomena, i.e. those concerning segmental alternations. This is certainly true; in the end, however, Drescher maintains an impoverished Prosodic Hierarchy.

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**PART 2:**  
**PAPERS ON SYNTAX**