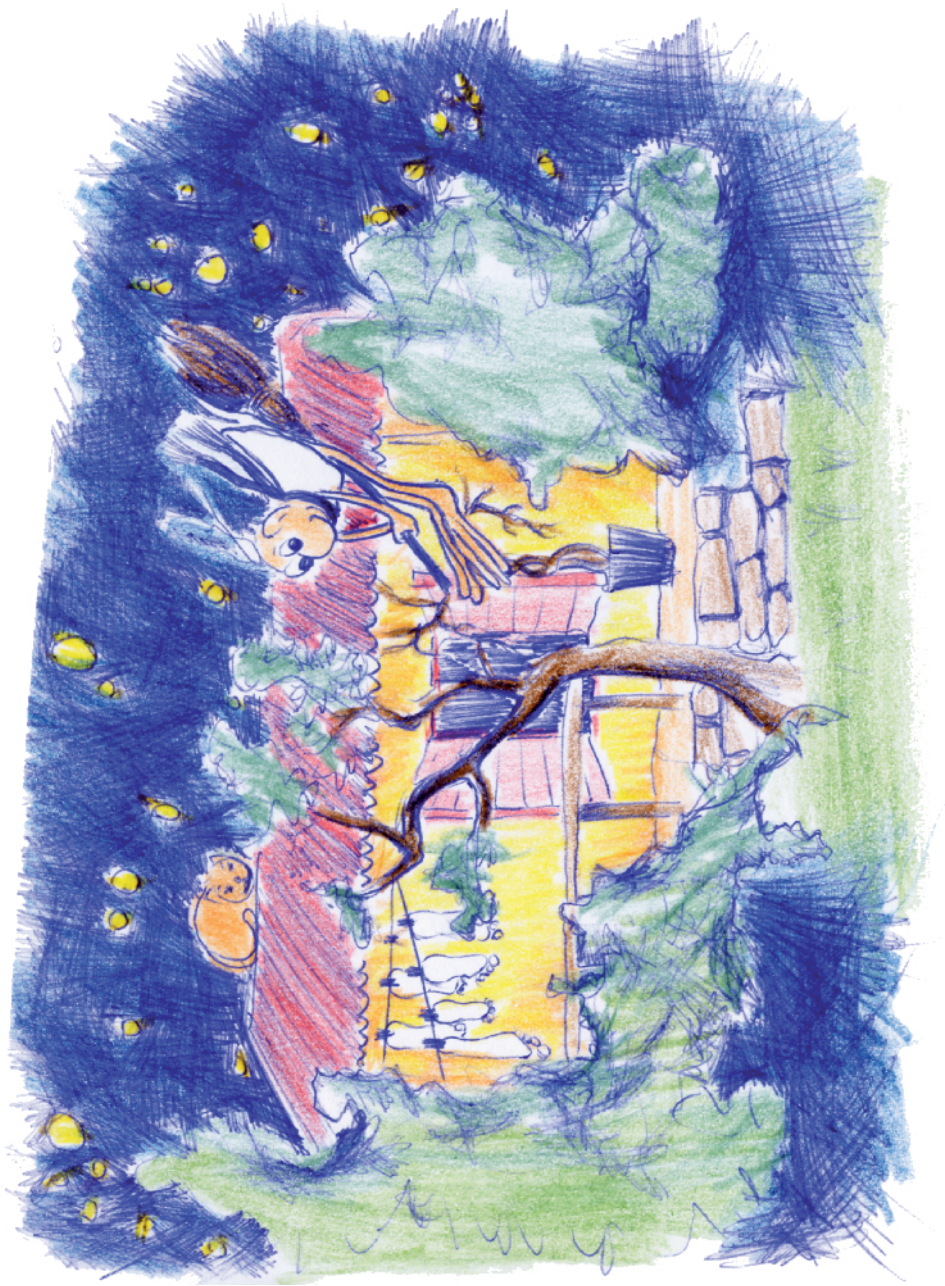


A Guide to Morphosyntax-Phonology Interface Theories



A Guide to Morphosyntax-Phonology Interface Theories

How Extra-Phonological Information is Treated
in Phonology since Trubetzkoy's Grenzsignale

by
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1 Editorial note

This book is a piece of a manuscript that was circulated since October 2008, but (unsurprisingly) turned out to be too long to fit into the covers of a single book. The manuscript ran under the same title as the present book and was designed as the second volume of Scheer (2004a). Back in 2001 when I started working on Scheer (2004a), it was meant to be the third part of it, but in the end had to be outsourced because the project grew hopelessly out of size.

The ancestor of the 2008 manuscript was thus ready in 2003, and it was intended to become Vol.2 of the book that was published in autumn 2004. At the outset of Scheer (2004a), I was naïve enough to believe that "[w]hen this editorial note was written (August 2004), the second volume was almost completed in draft. The constant reference that is made to it here should therefore reflect its divisions quite closely." Little did I know about the fact that the work on the manuscript would take another six years. And that it would end up the same way as the manuscript of Scheer (2004a): too long in order to be published within the covers of a book. The outsourcing thus continued in the way described below, and I hope that the piece which did not make it into the book that the reader holds in hands will really be published as a whole without further subdivision in the future (and earlier than six years from now, i.e. October 2010).

The manuscript dated October 2008 was made of three Parts:

- | | | |
|--|---|-----------|
| 1. Morpho-syntactic information in phonology: a survey
since Trubetzkoy's <i>Grenzsignale</i> | } | this book |
| 2. Lessons from interface theories | | |
| 3. How translation works: Direct Interface and just one
channel | – | Vol.2 |

The book that the reader holds in hands encompasses the first two Parts. It thus proposes a history of the morpho-syntax → phonology interface (in this direction only, Part I), an Interlude that presents modularity from a Cognitive Science perspective, and a catalogue of design properties that a sound theory of the interface should or must not be based on given the lessons from the historical survey, the Cognitive Science background and the current (minimalist) landscape of generative grammar (Part II).

The original Part III exposes my own view of the interface and will (hopefully) make it into an independent book. For reasons explained in the foreword and in §42 below, this further book may be legitimately called

volume 2 of Scheer (2004a), while the present book is a stand-alone piece of work that has only an implicit relationship with Scheer (2004a). Therefore, the forthcoming volume that accommodates the original Part III of the manuscript is referred to as Vol.2 below, while Scheer (2004a) appears as Vol.1.

Beyond the obvious issue regarding the size of the original manuscript (871 pages), the decision to make Part I and Part II a stand-alone book is motivated by the fact that they are thematically independent and theory-unspecific.

Finally, it is worth mentioning that if the present book is largely identical to the aforementioned 2008 manuscript, the feedback from various sides that I have received (see the end of the foreword) and the final revision process have reshaped a number of sections and chapters quite significantly. For example, a piece that was completely rewritten is the history of modularity in GB (§622). Also, topics are now discussed that were absent from the draft, or underexposed: these include Prosodic Morphology (§442), the strange hermaphrodite animal PF (§726), linearisation (§741), the adaptation of Prosodic Phonology to the phase-based environment (§462) and the early history of modification-inhibiting no look-back in the 80s (§293). Thus it may still be worthwhile opening the book for readers who have already struggled with the manuscript.

Foreword

The plot, and how to use the book

The ambition of this book is twofold, corresponding to its two Parts: it first proposes a history of the interface between morpho-syntax and phonology roughly since World War II, and then tries to see where we stand today; the Interlude and its position in the book points to the central role that modularity plays in the generative (and minimalist) architecture of grammar. The questions asked are: what can we learn from previous endeavour? Is the current state of (phonological) theories of the interface really informed of earlier results? Which questions are solved, which ones remain open? Is the current state of affairs compatible with current (morpho-)syntactic theory and especially with the recent phase-based, i.e. interface-based (or even: interface-motivated) environment of the minimalist programme? How could phonological and morpho-syntactic theories of the interface converge (there is no way not to: a consistent theory of grammar must have an interface theory that is compatible with both its input and output)? How can we argue with properties of one for or against theories of the other (intermodular argumentation)?

The book may thus be accessed in three different ways: through a specific theory, through the chronology of events, and thematically. That is, the reader may want to know what a specific theory has got to say regarding the interface, he may follow (a particular period of) the development of the question since Trubetzkoy, or he may use the thematic summaries that structure Part II and the keyword-based access that is offered by the thematic index (both distribute into Part I).

The book is thus devised for a general audience that wants to know about the interface and its history, as much as for more specialized interests that wrestle with intermodular communication both in syntactic and in phonological quarters: one thing that became increasingly clear to me as the book was growing is the fact that syntacticians and phonologists are largely unaware of the interface theories that are developed on the other side, which however may directly impact their work.

In this context, *modularity* will be a key concept that escorts the reader all through the book as a guiding light. On the one hand, it is the basic idea about the architecture of grammar that unites structuralist and generative thinking; on the other hand, it offers an extra-linguistic reference point which sets the cognitive frame of interface theories and is able to

referee them. This contrasts with the (phonological) interface literature where modularity is more or less irrelevant in practice (see §36).

It was mentioned in the editorial note that the book is actually a piece (in fact the lion share) of a manuscript that was originally intended to be the second volume of Scheer (2004a). The two Parts (and the Interlude) that now appear as the present book are the result of the fact that at some point I wanted to make sure that my own view of the interface – Direct Interface – does not reinvent the wheel. Direct Interface (which is introduced in the original Part III, also Scheer 2008a, 2009a,c) is based on the idea that only truly phonological objects can be the output of translation, that is, be representational carriers of morpho-syntactic information in phonology. Unfortunately, this claim had been made in Prosodic Phonology before, where the Prosodic Hierarchy was taken to be "truly phonological" (as opposed to diacritic SPE-type boundaries) (see §§405,690).

In order to find out that the "truly phonological" objects of Prosodic Phonology, i.e. the constituents of the Prosodic Hierarchy, are in fact diacritics in an autosegmental guise, I had to read through the foundational literature of this theory, which dates back to the early 80s. This reading then expanded to other "old stuff", which was growing older and older as I was gaining ground. About five years later, the result is this book on the (history of the) interface.

The Introduction below provides further detail regarding the prisms that are used in the book in order to look at the interface, its structure and the delineation of its object of study. It also explains the kind of historiography that is practised.

The book may thus be described as a kind of necessary prelude to Part III of the original manuscript. This Part III being absent, however, the book acquires a stand-alone virtue: it is thematically consistent, and there is no reference to Government Phonology in general (except of course in the chapter on this specific theory) or to CVCV (strict CV) in particular. The bonds with Vol.1 are thus delicate, if any. Hence the decision, counter to its genesis, to have the book run as an independent item: it is well suited to stand on its own feet, and calling it volume two of Scheer (2004a) would have been inconsistent since the reader would have found no continuation or development of CVCV.

This being said, let me explain in which way the book prepares Part III, which will also stand alone, as the true Vol.2 of Scheer (2004a). Again, the bond is Prosodic Phonology and something that may be called *deforestation* (see §42): following the lateral core of Government Phonology, Vol.1

has worked out a lateral analysis of syllable structure, which is traditionally represented by trees. That is, lateral relations among constituents (government and licensing) take over the function of arboreal structure, which is thus eliminated at the syllabic level.

The present book follows up on this by doing away with the arboreal representation of morpho-syntactic information (i.e. the Prosodic Hierarchy), which is shown to be diacritic and hence unwarranted. Phonology, then, is entirely flat: no concatenation of any pieces, no Merge (or other tree-building device), no projection, no trees (trees are also absent below the skeleton if melodic representation is a matter of monovalent primes).

The rationale behind deforestation is twofold. For one thing, the lateral and the tree-based approaches to syllabic structure do the same labour and are therefore mutually exclusive: (at least) one of them must be wrong (see Vol.1:§165). The other reason for deforestation is the fact that in the generative architecture of grammar PF and LF are "merely" interpretational devices: concatenation is the privilege of (morpho-)syntax. Hence PF and LF do not concatenate anything, and if Merge is the universal concatenative engine, it must be absent from phonology. This means that there is no tree-building device, and hence that there are no trees in this module. The absence of trees, in turn, explains why there is no recursion in phonology (see §42).

It was mentioned that Part III of the original manuscript exposes Direct Interface, my own view of how morpho-syntax talks to phonology. Direct Interface draws the consequences from the lessons that are established in Part II: it is introduced as an answer to deforestation, i.e. the need for non-diacritic carriers of morpho-syntactic information in phonology. This programme is supplemented with the discussion of consequences for interface theory (non-computational translation of morpho-syntactic information into phonological objects through a lexical access) and CVCV, as well as with an application to the representation of the beginning of the word in phonology (the so-called initial CV). A brief description of Vol.2 is provided in §49.

While writing the book and preparing the manuscript for print, a number of pieces have been published in form of articles (or are underway). The reader may find it useful to rely on them in parallel since they condense this or that aspect of the book in a reasonably sized stand-alone item. Three articles concern the procedural side of the interface (i.e. cyclic spell-out and the PIC): Scheer (2008c) (on the parallel between the edge of the phase in current syntactic theory and interpretation-triggering affixes in the classical phonological literature: in both cases the sister of actual phase

head is spelled out, see §765), Scheer (2009b) (on the word-spell-out mystery, see §§786,851) and Scheer (2010b) (on the number of computational systems in phonology, see §828).

Another article, Scheer (2008a), is about the diacritic issue: the Prosodic Hierarchy is as much a diacritic as the hashmark (if in an autosegmental guise) and therefore has to go (see §§402,692). Finally, two articles are outsourced from Vol.2 (Part III): Scheer (2009a) and Scheer (2009c) concern external sandhi, the *phonological* motivation of phases above the word level and the question of how the beginning of the word is represented (the initial CV is phase-initial, rather than word-initial).

Finally, a few words are in order regarding ideas and people that were important while writing the book. The treatment of the central issue regarding modularity (actually more in the forthcoming Vol.2 than in the present book) owes to (unpublished work by) Michal Starke and his classes at various EGG summer schools (Novi Sad 2002, Cluj 2004, Olomouc 2006). On another front, the book was written in parallel with Ricardo Bermúdez-Otero's Stratal Optimality Theory (Bermúdez-Otero forth a), a sister project regarding the interface (that is still to appear). Ricardo's book has also a strong historical inclination. Over the years, we entertained a continuous, gentle and critical conversation about our shared interests, and occasionally our diverging views, which has had quite some effect, especially on my understanding of Lexical Phonology. It looks like in the end I will win the race for publication – which means that Ricardo will not have to quote page and section numbers of forthcoming manuscripts.

A number of people have helped improving the book a lot over the six years of work that it took to get to this foreword. Namely the feedback based on the 2008 manuscript was rich and invaluable. Asking people to read 871 pages is very impolite and unrealistic – and it does not make friends. The natural reaction is to shy away when opening the parcel. Three readers were masochistic enough not only to really go through the manuscript from cover to cover, but also to write up pages and pages of detailed comments: Marc van Oostendorp, Diana Passino and Gaston Kočkourek. They are to be thanked in the first place.

Terje Lohndal took the trouble to comment on the pieces of the manuscript that directly deal with syntactic theory (and its history). Since of course I am as ignorant in syntactic matters as a phonologist can be and had to work hard in order to have a remote chance not to utter monkeyshine when it comes to syntax proper, Terje's look at the text through the syntac-

tic lens and the detailed correspondence with him have made the book much less unreadable for syntacticians.

Finally I am also indebted to Grzegorz Michalski, Markéta Ziková, Artur Kijak, Katérina Jourdan and Victor Manfredi for valuable feedback.

Châteauneuf de Grasse, October 2010

3 Introduction

4 1. Procedural and representational communication with phonology

5 1.1. Cyclic derivation and hashmarks

This book discusses how morpho-syntactic information is shipped to and processed by phonology. It has a number of characteristics, which are fleshed out in the introduction below.

The most prominent characteristic of the book, regarding both its organisation and content, is certainly the procedural-representational prism that is used in order to look at the interface and at interface theories. There are two ways for morpho-syntax to bear on phonology: procedurally and representationally. The former is a genuinely generative invention that has come into being in Chomsky *et al.* (1956:75) and was successively known as the transformational cycle, the phonological cycle, cyclic derivation and finally today as derivation by phase (in syntactic quarters). It embodies the insight that (phonological and semantic) interpretation applies successively from the most to the least embedded piece. It will therefore be sometimes referred to as inside-out interpretation in the book.

The other means by which morpho-syntax can influence phonology is through the insertion of a representational object into the linear string that is submitted to phonological computation: morpho-syntactic structure is translated into items which are processed by phonology. This is the traditional interface management which is practised (at least) since the 19th century, and in any case is shared by structuralist and generative thinking: carriers of extra-phonological information in phonology have successively incarnated as juncture phonemes, SPE-type diacritics (# and the like) and the Prosodic Hierarchy, each being the representative of its time. That is, carriers of morpho-syntactic information were (juncture) phonemes when phonemes were the basic currency in phonological theory, they were made segments in SPE (# was supposed to be a [-segment] segment) where the basic phonological units were segments, and finally became autosegmental domains (prosodic constituency) in the early 80s when all areas of phonology were autosegmentalised.

One goal of the book is to show that all objects which were thought of as the output of translation thus far are diacritics and therefore do not qualify (including the Prosodic Hierarchy: recall from the foreword that

this was my original motivation to dive into historiography). Direct Interface, to be introduced in Vol.2 (also Scheer 2008a, 2009a,c), is about the elimination of all diacritics that mediate between morpho-syntax and phonology.

6 1.2. Interface Dualism: both means of talking to the phonology are needed

Following this orientation, the book systematically distinguishes between procedural and representational aspects of the interface. It defends what I call Interface Dualism, i.e. the idea that natural language provides for and uses both channels: theories that try to reduce interface activity to either channel are on the wrong track. The interface landscape as it stands today is structured along this fraction line anyway: roughly speaking, Lexical Phonology (and its modern offspring: DOT, Stratal OT) is *the* procedural theory of the interface, while Prosodic Phonology (and its modern offspring) is *the* representational theory of the interface.

The book shows that the two aspects are complementary, rather than in competition. As we will see as we go along (see the summary in §748), the interplay of procedural and representational means of managing interface phenomena has always been vague, to say the least: typically the question is not even addressed, and phonologists have actually put much effort into not bringing it up. The result is an undetermined peaceful coexistence (don't look at me, so I won't look at you) that was installed in the 80s (see §423, save two punctual attempts at reducing the interface to the representational channel), and is still the diplomatic standard today.

A discussion that defines the rule of the game in order to arrive at a proper division of labour that does away with overlap is certainly warranted: "show me your interface phenomenon, and I tell you whether it is due to procedural or representational activity" would be the ideal situation. The book is not a good place to call for this debate, though, since it does not make any contribution. I have tried to classify interface phenomena (i.e. phonological processes that are influenced by morpho-syntactic information) for several years, at least into three categories: "procedural only", "representational only" and a misty in-between that could be due to either. In the end I have given up on this because of the complexity of the task (see the summary of this issue in §748).

There is just a very broad indication left that is based on the opportunity of intermodular argumentation (on which more in §§17ff): Procedural First. That is, when competing procedural and representational analyses are

empirically equivalent, choose the former because it may make predictions in morpho-syntax that can be controlled independently of phonological evidence (see §316). On the empirical side, the issue is discussed on the occasion of what I call the word-spell-out mystery (chunk-specific phonologies §786, see §22 below), and also in Vol.2 where so-called connected speech (i.e. external sandhi, cases where phonology applies across word boundaries) is examined.

In any event, one day the question will have to be seriously addressed: which interface phenomena are due to procedural activity, against which other phenomena that are the result of representational communication? In absence of a significant contribution, the book can at least call for upgrading the issue on the research agenda.

7 **2. Functional historiography**

8 2.1. Anderson's dualistic legacy: structure and process

The reader will have noticed that the procedural-representational prism which the book uses in order to look at the interface is much like the structure-process opposition that makes the spine of Stephen Anderson's (1985) history of phonology in the 20th century.

Using this prism produces results that strike close to the mark – at least in Anderson's case. Writing at the peak of the representational (auto-segmental) wave and having observed the see-saw movement of phonology between process- and representation-oriented extremes, Anderson just had to extrapolate what comes next: another round of the computational extreme, in revenge to the representational excess. Phonology was thus programmed to produce OT, which entered the scene a couple of years later. Anderson predicted its arrival, but little did he know how extreme this round of "phonology is computational and nothing else" could get: SPE is by far outcompeted. This is certainly not unrelated to the connectionist roots of OT (§529): connectionism knows only computation, objects (symbols) do not exist (§593).

Today there is a strand in OT (still timid but sensible, e.g. Blaho *et al.* 2007) which tries to rebalance the system by making representations (which are not "emergent") independent of constraints, and by crediting them with a true arbitral award (also independent, i.e. which cannot be out-ranked by constraints).

Anderson's legacy is dualistic in nature: at the end of his book he warns phonologists to believe that representations alone provide access to felicity – but also that the next round of "computation is king" will not be any more successful than preceding attempts to reduce phonology to computation. His words were not marked, and we assisted a computational festival for about a decade. The peak of this cycle may now be behind us, and it seems that here and there representations begin to play a role again that is not controlled by computation. All this notwithstanding, it goes without saying that OT has made a valuable contribution to computational theory and the expression of parametric variation: the study of computation is not objectionable – but the ambition to make it (or rather: the fact of making it) the only thing that determines grammaticality is (see Scheer 2010a).

Rather than oscillating between the procedural and the representational end of the spectrum, one may incline to believe that phonology would be better advised to break out of this cyclic movement. Each generation is reinventing the wheel of the teachers of their teachers – always in a new guise, with different vocabulary and promising that this time the progress will be unequalled. This vicious circle seems to be entirely unimpacted by the fact that Anderson has made the see-saw movement explicit, together with its prejudicial effects.

The aforementioned Interface Dualism thus follows Anderson's footsteps: as much as in phonology proper, both procedural and representational activity is needed at the interface.

Alongside with the request for a sound balance between structure and computation, another dualistic property of adult science is a related point of interest which, unfortunately, characterises phonology less and less in recent years. Representatives of adult science know that the scientific truth is where theoretical prediction (top-down) and empirical data (bottom-up) meet, and that one cannot exist without the other. What we are living through today, however, is a period of empiricist conquest (Katz & Bever 1974 describe the cyclic return of empiricism in linguistics), the present wave being usage-based or even "cognitive" (Bybee 2001, Langacker 1987 et passim). Sciences are characterised by an infantile empiricist period upon inception: "the more primitive the status of a science is, the more readily can the scientist live under the illusion that he is a pure empiricist" (A. Einstein). The problem with linguistics, and specifically with phonology, is that empiricist waves roll ashore every couple of decades.

9 2.2. Historiographic cherry-picking

It is obvious from the preceding that historiographic activity in this book is not an end in itself: it serves a purpose and has a function in a broader argumentation. In this sense, the (hi)story that is told in this book has the same ambition as what traditionally made the motivation of historians: to learn from the past in order to understand the present, and to shape the future. Knowing about the past is a good vaccination against multiple reinventions of the wheel.

The book thus tries to get a handle on present-day interface theories by looking at the past: history is taken as a source of insight into those properties that a correct interface theory should have, and into those that it must not have.

Given this premise, not just any way of telling about past theories of the interface will do. Everything that Part I and Part II (as well as the Interlude) report on is weighed according to its contribution to the demonstration: something is to be shown, and things that are mentioned are somehow relevant in this context. Also, a decision is made how important a given fact, analysis, period, mechanism or theory is according to the goal of the demonstration. This means that something which is taken to be a major fact about the interface may be relegated to a few lines in a sub-section, while some other item may be discussed over a whole chapter even though it does not usually appear as a relevant property of the interface in the literature.

This way of proceeding may be called historiographic cherry-picking. In practice, though, the former situation where a notorious fact is hardly explored does not really occur (I hope): cherry-picking is only done in the frame of a certain ambition at exhaustivity. On the other hand, there are cases of "positive" cherry-picking, i.e. where issues that the interface literature does not (or hardly) talk about are put into the spotlight. Examples include the local (roughly, boundaries) vs. non-local (domain-based, roughly the Prosodic Hierarchy) insertion of representational objects into the phonological string (§706), modularity (§844), selective spell-out (§763) and privativity (§756).

The kind of history that is told is thus not neutral or impartial: it is goal-oriented and functional. Admitting that one does not look at facts like a robot, that one does not try to marshal oneself down to strict neutrality, is but a description of reality: there is no such thing as unoriented and purely factual historiography; those who pretend that history can be told from a strictly neutral vantage point merely try to achieve a rhetorical advantage

that knights their own partial view on the facts with the promise of objectivity.¹

The question is not whether history-telling is partial and oriented or not; the only thing that it is worth bothering is the degree of partiality and orientedness. Everybody has his own, and the kind of bias at work may be very different. Also, the best history is not necessarily the one that is written with the least degree of partiality: Michelet's history of the French Revolution is anything but impartial, but still invaluable today. History is not a concentration of unrelated and uninterpreted facts; it is only history when it makes sense, and sense can only be made by the historian from hindsight.

Science is after insight, rather than after methodological correctness, impartiality or other formal and secondary virtues: this point is constantly made by Noam Chomsky since the 60s (e.g. Chomsky 1965:20). What can be done in order to facilitate the task of the reader is to make biases explicit. This is what is done in this introduction (as much as possible), which identifies the prisms that are used in order to look at the interface.

10 2.3. No "external" history: only scholarly work is used

Finally, a word is in order regarding the fact that the history of interface theories which is presented in this book is only "internal", that is, based on published (or unpublished, but written) scholarly work. Only incidentally will oral information be a relevant source. As far as I can see, there is only one case in point: Kaye's work on parsing cues (§340) and lexical access (§346), which is not available in print (for almost twenty years now).

In no case is any "external" history solicited: who was friends with whom, who broke up with whom because of an unpleasant review, who was the teacher of whom and programmed his pupils to think this or that way, who was married with whom, who studied where, who has which character sketch in the opinion of whom, who wrote which letter or e-mail to whom and so on play no role in the book.

¹ Regarding the history of linguistics, see Koerner (2002a:154f) for a different position that promotes a kind of enlightened positivism ("broad positivism" in Koerner's words), which is close to pure historiography (i.e. tries to show "what really happened"), declines any ambition to explain the present and to act on the future, but admits that there is no absolute objectivity, and that somebody must make sense of the "facts".

Of course, this is not to deny the possibility to gain insight through the study of "external" or social factors, or to assert that they have no bearing on how interface theory developed. They certainly did to some extent. But this is simply not the way I look at the interface in this book: coming to grips with the scholarly record is serious enough a challenge; digging out social factors from oral information would require entirely different techniques of investigation.

11 **3. The syntactic frame: minimalist phase theory**

12 3.1. The inverted T delineates the scope of the book and serves as a referee

An important backdrop of the book is the generative architecture of grammar, the so-called inverted T, which was developed in the 60s (Chomsky 1965:15ff, §§86,623 discuss its genesis at greater length) and since then stands unchallenged in generative quarters (the generative semantics interlude and Jackendoff's parallel alternative lain aside, see §24): a concatenative device (morpho-syntax) feeds two interpretative devices (PF and LF).

We will follow the career of the inverted T and its impact on interface theories in Part I, but the interest is not merely historiographic: the inverted T delineates the scope of the book. That is, theories which follow a different architectural setup are mentioned, but not evaluated (see §§24,720 below). Also, the inverted T in its modern guise, i.e. phase theory, is used in Part II as a measure for the evaluation of interface theories.

Finally, the minimalism-induced biolinguistic programme (initiated by Hauser, Chomsky & Fitch 2002, opposed by Pinker & Jackendoff 2005a,b) that is designed to downplay UG and properties of language that are specifically linguistic (see §§609,633,639) does not fundamentally modify the interface landscape. Even if it were true that the only specifically linguistic property of language is recursion and hence that specifically linguistic mechanisms reduce to Merge and Phase, morpho-syntax would still have to talk to phonology (and semantics), the only difference being that phonology (and semantics) are based on more general cognitive mechanisms that are not specifically linguistic (or even species-specific, see e.g. Samuels 2009a,b).

If thus (what is specific to) language reduces to (certain aspects of) morpho-syntax, the question of language-internal modular structure is certainly obsolete (there is no such thing), but the relations of morpho-syntax with phonology and semantics need to be organised in the same modular

environment as before. The only difference is that PF and LF are not considered linguistic anymore: morpho-syntax will talk to them like it talks to other cognitive modules such as audition and vision.

The sections below discuss in which way the minimalist focus on the interface has turned the interface landscape upside down by making it interactionist and therefore allowing for what I call intermodular argumentation. Also, in necessary anticipation of Part I and Part II, we will see that a number of central properties of current syntactic phase theory have actually been invented in phonology.

Note that all this only concerns the procedural side of the interface: modern phase theory is transparent for representational communication with phonology. The inverted T as such, however, impacts both procedural and representational communication.

13 3.2. Interactionism, selective spell-out and no look-back devices (PIC)

14 3.2.1. When the generative mainstream became interactionist

Since its inception and until 1998/99, the inverted T was supplemented with a proviso which requires that all concatenation be done before all interpretation. That is, the morpho-syntactic derivation is first completed, and the result (S-structure) is then sent to PF and LF in one go (SPE).

An alternative view of the communication between morpho-syntax and LF/PF was formulated in phonology in the early 80s: the backbone of Lexical Phonology, so-called *interactionism*, holds that concatenation and interpretation are intertwined. That is, first some pieces are merged, the result is interpreted, then some more pieces are concatenated, the result is again interpreted, and so on (§146).

While GB-syntax of that time hardly produced any echo, generative orthodoxy in phonology reacted on this violation of "all concatenation before all interpretation": Halle & Vergnaud (1987a) propose a non-interactionist version of Lexical Phonology that restores the interface landscape of SPE on this count as well as on a number of others (§222).

15 3.2.2. Selective spell-out

Halle & Vergnaud (1987a) also promote a new idea: selective spell-out. Since cyclic derivation was introduced by Chomsky *et al.* (1956:75) and formalized in Chomsky & Halle (1968:15ff), interpretation was held to run through the bracketed string (that is inherited from S-structure) from inside out. Roughly (see §103) every morpheme break defined a cycle. Halle & Vergnaud (1987a) dispense with this definition of what an interpretational unit is: they propose to grant cyclic status only to a subset of morpho-syntactic divisions. In other words, some nodes trigger interpretation, others do not.

This is what I call *selective spell-out*, which is exactly how modern syntactic phase theory works: in more familiar terminology, nodes may or may not be phase heads, hence their material may or may not be an interpretational unit. As far as I can see, the phonological heritage is left unmentioned in the syntactic literature since derivation by phase was introduced by Epstein *et al.* (1998:46ff), Uriagereka (1999) and Chomsky (2000a, 2001 *et passim*) (§304).

This is also true for interactionism: Epstein *et al.*'s (1998:46ff) Spell-out-as-you-Merge (see §776), Uriagereka's (1999) multiple spell-out and Chomsky's derivation by phase make the generative interface architecture interactionist, exactly along the lines of Lexical Phonology: first you do some concatenation, then some interpretation, then some more concatenation etc. For (extra-linguistic) reasons of computational economy regarding the limited availability of active memory, a costly cognitive resource (e.g. Chomsky 2000a:101, 2001:15, see §305), modern phase theory applies the interactionist world view. Here again, thus, the phonological origin of the idea went unnoticed as far as I can see (let alone the anti-interactionist reaction of generative orthodoxy that was mentioned above).

16 3.2.3. No look-back devices (the PIC)

The book also closely follows the footsteps of a question that is intimately related to selective spell-out and interactionism: critical for current syntactic phase theory is a device which guarantees that previously interpreted strings do not burden further computation – in Chomsky's terms, strings that are returned from interpretation are "frozen" and "forgotten" when concatenation resumes. It is only this kind of no look-back device that brings home Chomsky's promise of active memory economy.

No look-back devices are around in generative thinking since Chomsky's (1973) Conditions on Transformations. Their offspring – until its recent revival in the guise of the Phase Impenetrability Condition (PIC) – was essentially phonological (e.g. Mascaró's 1976 and Kiparsky's 1982a,b Strict Cycle Condition). No look-back devices are designed to prevent computation to consider "old" strings. Depending on their precise formulation, however, they may have very different effects, which correspond to the thing that the analyst wants the computation to be unable to do. We will see that Chomsky's modern "freezing" no look-back, the PIC, is quite different from its 1973 version, and like interactionism and selective spell-out has a phonological precedent (§287).

17 3.3. Intermodular argumentation

18 3.3.1. The intermodular potential of interactionist phase theory

The interactionist perspective paves the way for what I call *intermodular argumentation*. In contrast to GB, where the completed morpho-syntactic derivation was merely dumped into PF (and LF) with a "good bye and don't come back", phase theory establishes a two-way pipe between the morpho-syntactic and the phonological (and semantic) modules. Actors on both ends are not free anymore to do what they want: their theories and analyses may make predictions on the other end.

This is what Procedural First is based on (recall this notion from §6): while a particular syntactic or phonological analysis makes predictions on the other end of the pipe when the communication is procedural, representational communication does not offer this opportunity. That is, the translation of morpho-syntactic into phonological vocabulary is necessarily arbitrary and therefore never makes predictions on the other end of the pipe (§850, also Vol.2).

The intermodular potential of phase theory, however, has not received much attention thus far. Syntacticians use Phase Impenetrability for syntax-internal purposes, and phase theory evolves at high speed without taking into account what happens when the parcel spends time on the phonological side. On the other hand, phonologists have barely acknowledged the existence of phase theory, let alone taken into account the predictions that it makes on the phonological side.

I argue that intermodular argumentation provides stronger evidence than what can be produced by modular-internal reasoning: it offers the

maximal degree of independent assessment that linguists can expect without leaving their discipline. Be it only for that reason, the new interactionist architecture that the minimalist perspective brought about is a good thing to have: after a long period of more or less waterproof coexistence, syntacticians and phonologists can talk again about things that do not concern the weather or job openings.

Intermodular argumentation shines through on various occasions in the book; the different strands are then bundled in the conclusion of Part II (§841).²

19 3.3.2. Phase theory is the bridge that forces syntax and phonology to converge

The existence of a single and interactionist spell-out mechanism that relates the morpho-syntactic and the phonological derivation puts pressure on both ends of the pipe that ships pieces back and forth: it is hard to see how the respective devices could not be identical.

An obvious example is the fact that the pieces which are exchanged must be the same: ideally, thus, we will find phonological and syntactic evidence for the same phase boundary. This question is discussed in Vol.2: while evidence sometimes converges (e.g. for the CP), phonologically motivated chunk delineation typically remains unechoed on the other side (e.g. the word), and vice-versa (e.g. DP) (see Scheer 2009a,c).

This of course does not mean that the general idea is wrong; it just points to the possibility that there are phases which do not leave traces on either side of the pipe. While this is certainly not what linguists want to hear (we expect phases to leave traces), it is an empirical question that needs to be sorted out, and the diagnostics that I am able to apply are of course hopelessly incomplete. That is, in the best case my conclusion will turn out to be wrong: every phase boundary that is based on either phonological or morpho-syntactic evidence will be found to leave traces in both phonology and syntax at least in some language.

But phase theory has still a long way to go before this kind of question can be addressed, if only because it is far from being stabilised on the syntactic side. Phase theory, and especially the question how phasehood is defined, are high-ranking items on the research agenda of syntacticians, and

² Three pieces of the book that revolve around this idea are also published separately: Scheer (2008c, 2009b, 2010b).

the literature therefore produces a blooming variety of options, alternatives, extensions and refinements of Chomsky's (2000a et passim) original take according to which only vP and CP are phases. It is not easy for a phonologist to keep track of this field which evolves at high speed (probably syntacticians are puzzled as well), but I did my best to find out about the general direction, which is clearly towards the atomisation of phasehood, i.e. the recognition of smaller and smaller chunks that are granted phase status (see §771).

Obviously, it is difficult to hunt down phonological evidence for syntactic phases if the set of what counts as a syntactic phase is constantly moving.

20 3.4. Focus on the spell-out mechanism(s?)

21 3.4.1. Minimalist interface orientation: spell-out marshals both morpho-syntax and phonology

The study of the mutual intermodular conditioning of morpho-syntax and phonology slowly shifts interest away from actual morpho-syntactic and phonological computation. Instead, the spell-out mechanism comes to stand in the spotlight. This is but to be expected in a modular perspective where morpho-syntax, phonology and semantics are input-output systems that carry out computation, but are blind for what happens before or after their activity.

In this context, the following questions arise: is Phase Impenetrability a property of phonology? Or of morpho-syntax? Does phonological computation decide to ignore "old" strings? And if so, does morpho-syntax single out exactly the same "old" strings that are to be "forgotten"? This is not very likely a scenario. Rather, the central mechanism where interpretational units (i.e. phases) are defined, and where decisions about Phase Impenetrability are made, is the device that is responsible for shipping: the spell-out mechanism.

This means that things which have been (or are) thought of as properties of morpho-syntax or phonology may turn out to be properties of the spell-out mechanism. Cases in point are interactionism, Phase Impenetrability and the phase edge (spell out your sister!, see §765, Scheer 2008c). Altogether six devices are discussed in §851 that could be common to morpho-syntax and phonology, or rather, which characterise the spell-out mechanism that itself is common to both modules.

During the discussion of what it takes for an intermodular argument to bite, an old question crops up that is not likely to be solved tomorrow: we would need to know whether morphology and syntax are the same or two distinct computational systems. On this depends the possibility of having more than one spell-out mechanism: if morphology and syntax are independent, each could come with its own spell-out mechanism. In this case, there would be no guarantee that the properties of the spell-out of morphemes (interactionism, Phase Impenetrability etc.) are the same as what is encountered for the spell-out of words. If on the other hand morphology is just the lower piece of syntax, there can be only one spell-out mechanism, which means that intermodular predictions are much more precise (see also the word-spell-out mystery discussed next and Scheer 2009b).

22 3.4.2. The word-spell-out mystery

Examples where the cyclic spell-out of *morphemes* leaves phonological traces are commonplace: stress placement in [[párent] hood] and [parént-al] for instance is a direct function of the fact that the root is a phonologically relevant domain in the first case, but not in the second. The same structure [[A] B], however, does not appear to have any impact on phonology if A and B are words, rather than morphemes. As a matter of fact, the literature (on external sandhi) does not document any cases where the contrast between [[A] B] and [A B] produces a phonological effect when A and B are word-sized or larger chunks.

This appears to be truly mysterious: hierarchical structure is certainly not the privilege of pieces that are smaller than words. On current minimalist assumptions (interactionism), morpho-syntactic structure is sent to phonology piecemeal (derivation by phase). Could a situation then be imagined where phonology is sensitive to chunk size? That is, where it reacts under the piecemeal fire of morphemes, but simply ignores the fact that it is also hit by successive waves of words?

The default assumption is certainly that an interpretational system is sensitive to its input conditions, and in any case there is no reason for one particular chunk size (morphemes) to provoke a phonological reaction, while another chunk size (words and larger items) leaves phonology unimpacted. This is what I call the *word-spell-out mystery* (see §§786,851).

The classical solution in phonology was developed by Lexical Phonology, where an on/off switch for cyclicity is proposed for morphology and syntax (which are then of course independent computational systems):

cyclic interpretation (i.e. piecemeal fire) is turned on for the interpretation of morphemes (lexical phonology), but off when words are computed (postlexical phonology).

Some doubt may be reasonably entertained whether the empirical situation is really what the literature describes (i.e. that there are no cases where the cyclic spell-out of words leaves phonological traces). In case it turns out to be true, though, that phonology is insensitive to the cyclic spell-out of words, it is hard to see how chunk-specific phonologies (i.e. distinct computational systems that process distinct pieces according to their size) could be escaped.

§794 explores a solution that does not rely on two distinct computational systems where an on/off switch regulates phonological computation. Rather, the on/off switch is on Phase Impenetrability. That is, the spell-out mechanism decides whether old strings are or are not submitted to phonological computation: if they are not, a PIC-effect is encountered (i.e., a phonological trace of cyclic spell-out is produced); in case they are, no PIC-effect is observed. This configuration derives what is called postlexical phonology in *Lexical Phonology*: word sequences get away without any phonological trace of cyclic derivation.

23 3.4.3. We need to know more about the spell-out mechanism

The bottom line of all this is that the book raises a number of questions, but hardly provides any answers. The questions, however, are valuable I think, because they confront syntacticians with phonological issues that all of a sudden may become vital for them. This is what intermodular argumentation is about.

The same holds true for the status of spell-out, which is a question that emerges as this introduction is written: as far as I can see, the generative literature has not worked out very detailed accounts of how spell-out actually works, what it does, what it is unable to do etc. One result of the book is certainly that the spell-out mechanism is the central piece of interface theory: much depends on its properties – and on its status. It can hardly be just some appendix to the syntactic derivation, as it is sometimes thought of. Spell-out must be able to read morpho-syntactic vocabulary and structure, and – on the assumption that interpretation is chunk-specific – to operate a distinction between different chunk sizes.

The question, then, is whether this "intelligent" behaviour requires the spell-out mechanism to be a computational system in its own right

which, in a modular perspective, amounts to saying that it is a module. This would come close to the architecture of Prosodic Phonology (§379) and the Jackendoffian picture (Jackendoff 1997, 2002) where an interface module mediates between the three modules of the inverted T (see Vol.2 for the latter). It may thus be the case that the procedural side of the interface coin provides evidence for an "intelligent" mediator à la Jackendoff. This is precisely what Michal Starke (and Vol.2) argue against based on the evidence of the representational side of the coin: One-Channel Translation holds that the transformation of morpho-syntactic into phonological vocabulary is done through a lexical access, rather than through computation (see §49 below).

A split into computational mediation on the procedural, but lexical transmission on the representational side does not look like a viable architectural option. The alternative is to conceive of a spell-out mechanism that is non-computational, but still able to distinguish different chunk sizes (if these are really empirically relevant, i.e. if the word-spell-out-mystery turns out to be empirically correct).

At this point I give up speculating: this is as far as the venture of the book takes the reader. What is for sure, though, is that the spell-out mechanism, its precise attributions and its eventually modular status deserves to be upgraded on the research agenda. Work in this area is done for example by Idsardi & Raimy (forth) and Samuels (forth), as well as in Tromsø by Michal Starke and colleagues.

That the mechanism which is responsible for the shipping of pieces between morpho-syntax and phonology is understudied is also shown by the muddy waters that people (well... syntacticians) usually refrain from naming and describing when they talk about "PF": it is obvious that PF is distinct from phonology (a lot of things are supposed to happen "at PF" and to be "phonological" that are truly miraculous for poor phonologists); at the same time, the minimalist perspective on language issues a strong demand to outsource important labour into some ill-defined intermundia that is neither narrow (morpho-)syntax nor phonology (clean syntax, dirty PF/phonology, see §§30,726).

24 **4. Definition of the object of the study**

25 4.1. The book is only about interface theories that follow the inverted T

The discussion of the inverted T model in §12 has an appendix, which is what we turn to now. The book is about the interface of morpho-syntax and phonology. The title, "How morpho-syntax talks to phonology", however, is explicit on a restriction: communication is only considered in one direction. Eventual phonological influence on morpho-syntax lies beyond the scope of the study.

This of course does not mean that it is not mentioned. Relevant discussion around the principle of phonology-free syntax is provided in §412 (also §§253,645) and actually produces a robust empirical generalisation that is significant in a modular perspective: melody (i.e. phonological objects below the skeleton) and morpho-syntax are entirely incommunicado – there is no conditioning in either direction (§660). Beyond that, the bearing of phonology on morpho-syntax is only relevant in this book for the sake of completeness, and insofar as it makes a contribution to the interface management in the other direction.

The same is true for two other restrictions of the scope of the book: interface theories that do not follow the inverted T, and the kind of intermundia where objects of wonder such as PF movement and deletion of entire sentences are supposed to occur. These cases are discussed in §26 and §30, respectively.

The core of the inverted T is syntactico-centrism: there is only one device where pieces are glued together (morpho-syntax or, if morphology is independent, morphology and syntax); this device exchanges pieces with two interpretational systems, where they are assigned a meaning (LF) and a pronunciation (PF). Morpho-syntax has the privilege of Merge and Phase, i.e. the ability to concatenate pieces and to talk to other modules (Hauser *et al.* 2002). Thus LF and PF do not concatenate anything: they only interpret what they receive.

There are (at least) two currently entertained approaches to the interface which propose a different scenario: theories of representational continuity between morpho-syntax and phonology (and semantics), and the parallel-construction model. The former is the strand of HPSG and related work (§513), the latter is developed by Ray Jackendoff (1997 *et passim*).

26 4.2. Interface theories that lie beyond the inverted T model

27 4.2.1. Theories where everything is scrambled: HPSG

HPSG and Jackendoff's parallel model are not at the same distance of the Chomskian inverted T: HPSG was generative at some point, but today is quite distant from Chomskian linguistics and generative concerns. An important factor of division is the architecture of grammar and the interface of morpho-syntax with phonology: HPSG denies that there is any.

In HPSG, representations are monostratal. This means that they are fully informed of morpho-syntactic, semantic and phonological information, which is available at any point in the derivation (actually, talking about a derivation is improper because of monostratalism). In practice, thus, terminals and nodes of the "syntactic" tree carry phonological information, to the effect that there is no need for lexical insertion or for any procedural or representational communication between morpho-syntax and PF/LF: everything is one big tree, and all information is continuously available.

The issue (or rather: one issue) that HPSG has with the generative approach is thus about modularity: there are no modules in the HPSG landscape. This, in turn, means that there can be no interface: an interface requires two distinct entities that communicate. In a fully scrambled everything-is-one environment, though, no such entities can be identified. HPSG may thus talk about the relationship of morpho-syntax and phonology, but hardly about any interface.

The phonological affiliate of HPSG is Declarative Phonology (Scobie 1996, Coleman 2005). The book discusses the HPSG-based work of Orgun (1996a et passim) on one occasion (§512), but only for the reasons mentioned, i.e. in the interest of completeness and contrast with some other demonstration.

28 4.2.2. OT and its connectionist endowment: a programmed trope for scrambling all into one

In this context, OT needs to be mentioned as well. Like HPSG, OT has a natural tendency to scramble everything into one big constraint hierarchy (see §523). Of course there are many different degrees of scrambling also among OT practitioners, but the tendency is towards a single grammatical space where anti-derivationalism is enforced globally (see Scheer 2010a).

The most visible result of this trope is anti-cyclicity, i.e. the denial of inside-out interpretation (see §464). Other diagnostics for OT's misty (and largely unreflected) relationship with modularity are the customary and uncontradicted violations of Indirect Reference (i.e. the prohibition to make reference to untranslated morpho-syntactic categories, see §377), the fact that mapping (of morpho-syntactic into phonological categories) is done *in* the phonological constraint hierarchy (ALIGN and WRAP are interspersed with purely phonological constraints) and the common occurrence of constraints whose formulation combines phonological and morphological instructions.

It is suggested in §529 that this scrambling trope is a consequence of the other half of OT's genetic code: it is certainly true the OT is a generative theory, but it is also true that its central tool, constraint interaction and parallel assessment of competitors, was conceived in direct reference to connectionism, the theory that competes with modularity for the description of the cognitive architecture (see §§36,586 below). Paul Smolensky is one of the founders of OT *and* of connectionist theory (e.g. Smolensky 1987, 1988a). Connectionism, however, is the polar opposite of generative and rational thinking: it is empiricist, anti-symbolic and anti-modular (see §§588,598).

Knowing about the connectionist roots of OT thus helps to understand the extreme computational orientation of phonology in the past decade and a half that was discussed in §7. It is sometimes rightly recalled that OT is a theory of constraint interaction, not of constraints. This means that OT does not supply any substance itself: there are genuine vocabulary items in structuralism (phonemes), SPE (segments) and autosegmental theory (autosegmental structure), but there are no OT-specific representational items. OT uses whatever representational material comes the way, and may well produce the same result with entirely different (and mutually incompatible) vocabulary.³ It is difficult not to establish a direct relationship between the fact that OT is a purely computational theory where representations make no sovereign contribution to the definition of grammaticality (which is decided by constraint interaction alone, see Vol.1:§309) and its content-free connectionist prototype.

³ For example, Lombardi (2001:3) writes with respect to melodic representation: "the tenets of OT, regarding constraint violability and ranking, make no particular claims about phonological representations. We could, for example, do OT with any kind of feature theory: SPE feature bundles or feature geometric representations, privative or binary features, and so on."

The trouble is that modularity is one of the deepest layers of generative thinking (see §§603,623). Two souls alas! are thus dwelling in the breast of OT, and the sparks of their encounter may be observed at the interface.

29 4.2.3. Jackendoff's parallel model: all modules are structure-building

Unlike HPSG, Jackendoff's parallel model (which is described at greater length in §722) represents an alternative to the inverted T within the generative paradigm. Morpho-syntax, semantics and phonology are modules, which means that there *is* an interface just like among the modules of the inverted T: procedural and representational communication needs to be organised between entities that do not speak the same language (of the mind).

At variance with the inverted T, however, all modules are granted the ability to build structure, i.e. to glue pieces together. Morpho-syntactic, semantic and phonological structure is built in parallel, and information is exchanged among modules at any time in the derivation when this is necessary for the construction on any of the three sides. This architecture has consequences for the communication among modules: beyond procedural and representational communication, it allows for additional types of interaction. Bendjaballah & Haiden (e.g. 2003a,b, 2007) for example argue that the parallel construction in the three modules is homomorphous, i.e. equally advanced, and that this is controlled for by constant communication among them.

30 4.3. PF, an androgenic intermundia

31 4.3.1. The minimalist dustbin: clean syntax, dirty phonology

The heart of the minimalist programme is the ambition to clean syntax from everything that is not "perfect" in the Chomskian sense, i.e. that is not motivated by interface requirements ("bare output conditions"), or by a general condition on computational efficiency. This direction is the source of the notorious interface-orientation of minimalist syntax, of which we have seen an effect in §11: the interface has become interactionist, and phase theory paves the way for intermodular argumentation. This is certainly all to the good.

The other side of the coin, however, is the creation of a kind of intermundia where things are unloaded that syntacticians do not want to accommodate in syntax, but which are not phonological either. In the current environment, one is well advised to add that "phonological" in this context refers to what phonologists call phonology: there is a fair amount of confusion in PF-oriented syntactic quarters where PF and phonology are used as synonyms. Typically, what syntacticians call phonological when they talk about PF-outsourced syntactic operations has got nothing to do with phonological computation (§731): there is an ill-defined, minimalism-born intermundia between spell-out and vocabulary insertion on the upper and phonological computation on the lower end.

Until the mid-90s, the PF of the inverted T model was more or less coextensive with phonology; minimalism has shrunk syntax and pumped up PF, which is now made of phonology plus "something else". This murky additional workspace obeys rules that are quite different from what is known from anywhere else: locality conditions are different from syntax (§580), it violates modularity by simultaneously accessing morpho-syntactic and phonological vocabulary (§738), and it operates with a strange notion of hierarchy where the nodes of the PF tree are the projections of nothing – at least not of the terminals, which are phonological (see §747 for a summary).

§726 inquires on the properties and the internal structure of PF, as well as on the phenomena that PF is supposed to handle. Things that syntacticians want to make PF responsible for include head movement (Chomsky 1995a, chapter 4), various kinds of ellipsis (e.g. Merchant 2001) and clitic placement (e.g. Bošković 2001). Typically, what PF is expected to do is to make things disappear: "delete at PF" (see §§732f).

Syntacticians seem to use "PF" as a magic word – pronounce it and get rid of your trouble. It may be reasonably asked whether anything is gained when a clean syntax is bought at the expense of an ill-defined buffer that emerges out of the blue and where established principles of linguistic analysis do not hold. Dumping displeasing things into PF is not analysing or solving them, and being allowed to analyse them with all kinds of ad hoc mechanisms (fission, fusion etc., the most exotic animal of the PF zoo being PF movement, §§574,738) that are unheard of elsewhere may turn out to be a remedy that is worse than the disease.

32 4.3.2. Syntax, morphology, PF

On this backdrop of a minimalism-born buffer between narrow syntax and phonology, the book is only about the interface of "narrow phonology" with morpho-syntax. The PF intermundia does not appear in interface theories because it is too recent. It is therefore absent from the discussion in Part I (except in the chapter on Distributed Morphology) and appears only in Part II (§726). Of course the book does not try to find out exactly which pieces of morpho-syntax are narrow syntax and which pieces belong to the PF intermundia: this issue is debated by a large body of syntactic literature.

Interface theories are phonologically oriented (they describe the influence of morpho-syntax on phonology, not the reverse), and they are made by phonologists (with Distributed Morphology being half an exception); like these, the book thus trades with morpho-syntax as a whole without participating in the debate about the division of labour between narrow syntax and PF.

The situation is a little different for another question that is much debated in the syntactic literature, i.e. whether syntax and morphology are a single computational system or two distinct modules. This issue escorts the reader through a good deal of the book: it was brought to the forefront of interface discussion by Lexical Phonology (lexical vs. postlexical phonology, §153) and is the bone of contention for Distributed Morphology (§533). It also plays a central role in the aforementioned word-spell-out-mystery (§§786,851).

33 4.4. Modularity is the touchstone

It is not the case that the preceding pages are devised to evaluate the theories and mechanisms mentioned. They just explain what the book is about, and what it does not consider. Those theories and devices that are not in its focus may or may not be interesting or correct: the book does not argue about that, even though my personal view may shine through on occasion.

There is one criterion, though, that is applied to all theories and devices discussed: following the generative tradition, the book is committed to the modular architecture of the mind, and hence of language (modularity as a principle of cognitive organisation is introduced at length in the Interlude §586, also §36 below). We will see that various generative theories have been at odds with modularity in various ways over time (see §702 for a summary). This notwithstanding, modularity is considered a necessary

property of a correct interface theory: a law is not invalidated because it is disobeyed here and there.

Among the theories and devices quoted, HPSG and PF movement are definitely incompatible with modularity, but Jackendoff's parallel architecture or the outsourcing-created intermundia are not. That is, it could turn out that the modular architecture of language is not syntactico-centric, i.e. that PF and LF also enjoy the privilege of concatenation.

Finally, modularity also automatically draws a red line between the book and functional approaches to language. These may have rule systems much along the lines of modular computational systems,⁴ but will always allow for extra-grammatical forces such as ease of articulation and communicative success to bear on grammar. A module, however, knows only its own law and carries out computation in complete absence of any external influence.

34 **5. Trying to get an independent handle on the interface**

35 **5.1. Intermodular argumentation, history**

Like other theories, interface theories are built on data and on a conceptual background. The book of course moves along these lines. In addition, however, the book tries to get a handle on interface theories by three independent referees: its historical approach, modularity and intermodular argumentation.

The historical work indeed affords a certain degree of independence from individual interface theories and fashions: it allows making generalisations and discovering patterns that are not usually mentioned in the literature (and it also affords not to go in circles or to reinvent the wheel). Some examples were already mentioned in §9: local (roughly, boundaries) vs. non-local (domain-based, roughly the Prosodic Hierarchy) insertion of representational objects into the phonological string (§706), selective spell-out (§763), no look-back devices (the Strict Cycle Condition in its various brands, today Phase Impenetrability) (§287), privativity (§756).

The historical strategy is complemented by two other instruments: intermodular argumentation and modularity. The former was already men-

⁴ Cast in Natural Phonology, the Beats and Binding model of Dziubalska-Kołaczyk (2001b, 2002) for example is a lateral approach to syllable structure: bindings are (bidirectional) relations among adjacent segments..

tioned in §§17ff (see the summary in §841): it correlates the behaviour of phonology-oriented interface theories with the requirements of current syntactic phase theory and thereby achieves an independent judgement.

For example, if minimalist interface orientation and the strive for computational economy is on the right track, it must apply to all components of grammar. Active memory must thus be unburdened in phonology as much as in syntax: phonological computation must also be able to "forget" strings that have already been interpreted (Chomsky 2001:12f is explicit on this, see §306). This means that Phase Impenetrability must be active in phonology, and that interface theories which do not use this device at all such as Lexical Phonology (for the management of affix class-based phenomena) are on the wrong track (see §828).

36 5.2. Modularity

37 5.2.1. Generative grammar deeply roots in modularity, but is often offended

The third independence-fostering instrument is modularity. It was already mentioned in §33 that modularity is used as a referee for interface theories in the book: the cognitive system is modular in nature (and it does not matter for interface theory whether PF and LF are language-specific or language-unspecific modules, the latter option being entertained by the biolinguistics programme, see §§12,633,639). Morpho-syntax and phonology are distinct modules that carry out computation on the basis of domain specific vocabulary. Since they are incommunicado by themselves, their communication needs to be organised: modularity requires interface activity (§650).

Modularity is one of the deepest layers of generative thinking (see §623), and its presentation in the Interlude reflects its central status: in the 50s, Noam Chomsky participated in the development of the general computational paradigm (Turing - von Neumann, see §603) that underlies much modern science and grew into the standard paradigm of how the mind works (Cognitive Science). On the grounds of Artificial Intelligence and 19th century faculty psychology (F-J Gall's phrenology, see §§601f), the modern formulation of modularity is due to Fodor (1983). Language takes a prominent place in Fodor's book, which has grown out of a class co-taught with Chomsky.

Despite the fact that modularity is so deeply rooted in generative thinking, it is not a loss of time to recall all this – and to *apply* the modular referee to phonological and interface theories. This is one thing that I had to

learn while reading through the literature: modularity usually appears in introductory classes to linguistics and in first chapters of linguistic or phonological textbooks – but then disappears from the radar. It is not uncommon for theories to explicitly subscribe to the modular architecture of the mind in general and of language in particular, but then to live in overt violation of modularity. The list of modularity-violating generative interface theories (something that should be a contradiction in terms) is examined in §702: since SPE through so-called direct syntax approaches in the 80s up to OT, Distributed Morphology (PF movement), and the misty PF-intermundia that results from the minimalism-driven outsourcing of phenomena into PF (§726), different theories violate modularity in different ways and for various reasons.

38 5.2.2. Modularity in the history of generative grammar: the GB-interlude of syntax-internal (nested) modules

A related aspect of the problem is the narrowly linguistic horizon that generative linguists typically have when they talk about modularity. The bridge with Cognitive Science does not accommodate much traffic: linguists may not know what it takes to be a cognitive module, what its properties are, how it works, how it is defined, how it is detected and so forth.

§622 traces back the history of modularity in generative grammar. Since his earliest writings (LSLT, Chomsky 1955-56), Chomsky has described the functional units of grammar as computational input-output devices that work on a proprietary vocabulary (even though he used the terms of the time, which may be unfamiliar today and blur identification) (§623). This was condensed into the inverted T model in *Aspects* (Chomsky 1965), and the inverted T where a central concatenative device (morpho-syntax) feeds two interpretative devices (PF and LF) is the baseline of generative thinking up to the present day (§629).

Until GB, the generative architecture was thus made of three computational systems which had all modular characteristics and were described as such (see for example the quote from SPE in §613), but were not called modules. This word became a standard in Cognitive Science only with Fodor's (1983) ground-laying book, which emerged from a class that Fodor and Chomsky co-taught in fall 1980.

The major innovation of the new development in generative grammar that Chomsky was about to introduce then (and which was launched in written form in Chomsky 1981, 1982) was entirely based on the modular

idea, and now used the word *module*: the central idea of Government and Binding is to cut syntax down into six sub-systems, or sub-theories (theta theory, government theory etc.). This move was supposed to provide a handle on syntactic complexity, which was out of reach, Chomsky argued, if approached with a single system. In GB, syntax is thus viewed as the result of the interplay of a number of fairly simple basic systems whose workings the linguist can hope to understand (§628).

This left the general architecture with a kind of nested structure, and quite tacitly so: the focus was on the GB-subtheories, or modules, and the macro-modules of the inverted T, as well as their relationship with the GB-modules, were left without much discussion. A fair question is thus what kind of status a nested modular structure has, and indeed whether GB-subtheories qualify as cognitive modules in the Fodorian sense in the first place (§632). Also, the existence of two types of quite different units that are called modules (the endpoints of the inverted T and GB-subtheories) was a source of confusion and puzzlement outside of generative quarters (§634).

Finally, the minimalist (and biolinguistic) turn brought generative grammar right back to where it started in the 60s: GB-modules are done away with, and the inverted T is more important than before in an environment where syntax is shaped according to interface-induced pressure (§637).

39 5.2.3. The refereeing potential of modularity lies waste

It was mentioned that modularity in generative grammar was typically considered in a narrowly linguistic (or even syntactic for the GB period) perspective. I have come across two concrete cases that are directly related to this issue, i.e. where an obvious argument from the properties of cognitive modules was left unmobilised in debates where it would have made a decisive contribution.

One is the quarrel that opposed so-called direct syntax approaches to Prosodic Phonology in the 80s (see §407). The founding statement of Prosodic Phonology is the principle of Indirect Reference which says that phonological rules cannot make direct reference to morpho-syntactic categories; rather, morpho-syntactic information needs to be translated into phonological objects (the Prosodic Hierarchy) in order to be able to bear on phonological computation.

This is the exact description of a modular relationship: modules cannot look into other modules because they would not understand their idiom. They can only communicate through translation (§650). As far as I can see, though, the modular argument is entirely absent from the debate: although Fodor (1983) was contemporary, it was not used by defenders of Indirect Reference (instead, the decisive argument was taken to be so-called non-isomorphism, which turns out to be a non-argument, see §416).

The other case in point where the modular referee was not called upon is interactionism: Lexical Phonology introduced this way of piece-meal communication in the 80s, but even under anti-interactionist fire (see §222) did not use the argument that the interactionist architecture is the only way to reconcile inside-out interpretation (i.e. cyclicity, to which everybody subscribes) with modular requirements (more on this in §680).

40 5.2.4. Introduction to (Fodorian) modularity

The point that intermodular argumentation offers the maximal degree of independence from phonology within the realm of grammar was already made. Modularity takes this independence one step further: it is able to referee linguistic theories from outside of grammar. Language is modular, and the computational systems that contribute to it (whether specifically linguistic or not), as well as their communication, are subjected to the same requirements as modules that compute other cognitive functions.

The modular referee is thus taken seriously in this book: modularity will contribute its arbitral award to every issue. This of course is mainly done in Part II where theories are evaluated. In order to prepare the discussion, modularity is introduced from a Cognitive Science perspective in the Interlude (§586): where it comes from (phrenology, F-J Gall's faculty psychology), where it stands in the philosophical landscape (it is rational/mentalist), which is its competitor (empiricist connectionism), which are the issues at stake (e.g. symbolic vs. content-free), how modules are identified (double dissociation, domain specificity), examples of modular analyses of other cognitive functions (e.g. the number faculty), its application to language, the predictions it makes and the requirements it issues.

41 5.2.5. Structuralist and generative modularity

Finally, it is interesting to observe the convergence of structuralist and generative thinking in regard of modularity: §692 shows that translation (of morpho-syntactic into phonological objects), an important consequence of modularity, was actually invented by structuralism, where it was enforced by Level Independence (see also §72).

Just like generative theory, but without any cognitive background, structuralist Level Independence considers morpho-syntax and phonology two distinct ontological entities that are incommunicado as such. The structuralist-generative unity further adds to the weight of the modular argument.

42 6. Deforestation

43 6.1. The core of Government Phonology: lateral, rather than arboreal syllable structure

It was mentioned in the foreword in which way the book is related to Vol.1. The project of Vol.1 is to build a lateral alternative to the traditional arboreal conception of syllable structure: Vol.1:§165 explains at length in which way replacing arboreal structure by lateral relations (government and licensing) is the core of the research programme of Government Phonology. In a nutshell, the idea is that the syllabic position of a segment is not defined by a constituent to which it belongs (and whose status is itself defined by the arboreal relations that it entertains with other constituents), but by lateral relations that hold among constituents.

For example, a consonant does not show characteristic coda behaviour because it belongs to a constituent "coda" whose mother is the rhyme; rather, coda behaviour is due to the fact that relevant consonants occur before a governed empty nucleus which is unable to provide support (licensing). This explains why coda consonants are weak, rather than strong (while the weakness of the coda constituent does not follow from anything).

Standard Government Phonology (Kaye *et al.* 1990) introduced the lateral project, but ran out of breath half-way: the result is a hybrid model where lateral relations cohabit with arboreal structure that is left over from the traditional tree-based approach. On many occasions, lateral and arboreal structure do the same labour, which is an intolerable situation for

sure (this was correctly observed by Takahashi 1993 early on, see Vol.1:§208): either syllable structure is lateral or it is arboreal – it cannot be both. Hence if the lateral project is worth being explored at all, it must be applied all the way down. This is what Lowenstamm's (1996) idea is about: arboreal syllable structure is done away with altogether (constituents reduce to a strict sequence of non-branching onsets and non-branching nuclei), and lateral relations alone define syllabic positions. Vol.1 works out the conditions of these premises.

44 6.2. The lateral project leaves no place for arboreal prosodic constituency

The result at the end of Vol.1 is a (fully) lateral theory of phonology – or rather, of syllable-related phonology. For there are other areas in phonology where arboreal structure is traditionally assumed: below the skeleton for the representation of melody (Feature Geometry), above the skeleton for the representation of morpho-syntactic information (the Prosodic Hierarchy). While privative melodic representations (Anderson & Jones 1974 and ensuing applications in Dependency Phonology, Particle Phonology and Government Phonology) provide a non-arboreal alternative for the former, the Prosodic Hierarchy stands unchallenged in the latter area.

The question is thus whether a scenario is viable where arboreal structure is absent from all areas of phonology except for the representation of morpho-syntactic information. This ties in with Lowenstamm's (1999) idea that morpho-syntactic information can be represented by an empty CV unit, i.e. a *non-arboreal* object that is inserted *locally* into the linear string. Also, the initial CV is part and parcel of the Coda Mirror (Ségéral & Scheer 2001, 2005, 2007, 2008, Vol.1:§§83,110).

There is thus reason to question the arboreal standard of representing morpho-syntactic information: if it is represented in terms of objects that are inserted into the linear string rather than by prosodic constituency, phonology as a whole has a non-arboreal perspective. But there is also positive evidence that pleads against the Prosodic Hierarchy, which turns out to be a diacritic upon closer inspection (§402, Scheer 2008a). If diacritics do not qualify, this is reason enough for the Prosodic Hierarchy – and hence for the arboreal representation of morpho-syntactic information – to be counted out.

On this backdrop, Direct Interface, which is introduced in Vol.2 (also Scheer 2008a, 2009a,c), is an attempt to make the representation of morpho-syntactic information 1) non-arboreal, 2) local and 3) non-diacritic. It

completes the deforestation of phonology by doing away with the last piece of traditional arboreal structure. The historical inquiry of this book is a consequence of Direct Interface: it was mentioned in the foreword that by looking at the history of interface theories I originally wanted to make sure that I am not reinventing the wheel. The causal chain of the book thus runs from the inception of the lateral project in the late 80s over Vol.1 to the deforestation of phonology, Direct Interface (Vol.2) and the history of interface theories (this book).

It is therefore useful to expose this link in the introduction of the book: even though Direct Interface is only introduced in Vol.2, and although the discussion of Prosodic Phonology (§360) and the local (i.e. non-arboreal) vs. non-local (i.e. arboreal) perspective on the insertion of representational carriers of morpho-syntactic information (§687) can stand alone, the reader should be given the means to follow the global project and the role that is played by the chain link of this book.

In this perspective, the following section shows that the deforestation of phonology is also independently motivated: the phenomena that are expected to result from arboreal structure (such as recursion) are absent from the record.

45 6.3. Recursion and other expected consequences of trees are absent in phonology

Part and parcel of the inverted T model is that only morpho-syntax has the privilege of concatenation: phonology and semantics merely interpret; they are not equipped for gluing pieces together. In the minimalist environment, concatenation is the result of Merge. This operation is thus available in morpho-syntax, but not in phonology and semantics.

Phonological theories, however, have always relied on tree-building devices, at least since autosegmental structure is used. While feature geometric trees are lexically specified, syllabic and prosodic arborescence is assumed to be the result of online tree-building activity, today as much as in the past. A classical example are syllabification algorithms, which build arboreal syllable structure on the basis of the segmental properties of the lexically unsyllabified linear string.

It is true that phonological trees do not involve any concatenation of pieces (they are built on a pre-existing linear string): this is what makes them different from morpho-syntactic trees. As a consequence, though, phonological and morpho-syntactic trees are not the same thing. Hence if

any, the phonological tree-building device is different from morpho-syntactic Merge. Accommodating distinct Merge_{m-synt} and Merge_{phon} in grammatical theory of course ruins the minimalist ambition, which counts on only one universal piece-gluing (and hence tree-building) device.

But there is more reason to believe that a tree-building phonological Merge cannot be the correct scenario. Neeleman & van de Koot (2006) show that trees of whatever kind have certain formal properties that make predictions on the type of phenomenon that should be found in a tree-bearing environment. These include projection, long-distance dependencies and recursion. Neeleman & van de Koot (2006) demonstrate that phonological phenomena do not display any of these properties. They therefore conclude that the presence of trees in phonology overgenerates: arboreal structure predicts things that are absent from the record.

46 6.4. The lateral project predicts that phonology is non-recursive

The same point can also be made from the other end. There is no phonological equivalent to multiple phrasal embedding, where the only limit on the number of recursions is set by performance restrictions (see §803 for examples, also from morphology).

The absence of recursion has long been recognised as a major difference that sets phonology apart from morpho-syntax. Everybody knows about the fact, which is undisputed,⁵ but still begs the question: there must be a reason why phonology is not recursive. Nespor & Vogel (1986) for example make the difference explicit, but leave it at that.

⁵ The phonological part of the recent literature on recursion which was generated by Hauser *et al.*'s (2002) idea that recursion (and hence Merge) could be restricted to narrow syntax often falls prey to the confusion between recursive *phenomena* and the *analysis* thereof: recursion is a phenomenon whose existence is established by pre-theoretical and pre-analytic properties, not by analyses that happen to use recursive constructions. The existence of the latter does not document recursion in phonology, but merely the fact that some analysts use recursive constructions. In syntax and morphology, recursion is a phenomenon whereby you can keep repeating the same type of item indefinitely until grammar-external limits regarding memory etc. are reached. Nothing of that kind has ever been reported from phonology. More on this confusion in §803.

- (1) "In relation to the difference between the morpho-syntactic and prosodic hierarchies, it should be noted, furthermore, that the two differ not only in the way they divide a given string into constituents. They also differ with respect to depth. That is, since the rules that construct the phonological hierarchy are not recursive in nature, while the rules that construct the syntactic hierarchy are, the depth of phonological structure is finite, while the depth of syntactic structure is, in principle, not finite." Nespor & Vogel (1986:2)

What Nespor & Vogel say is that there is no particular reason why syntactic rules are recursive, but phonological tree-building rules are not. In other words, the absence of recursion in phonology is accidental in their system: phonological rules happen not to be recursive, but could well be.

By contrast in a phonology where trees are absent altogether because interpretational devices have no access to the tree-building device Merge, the absence of recursion is predicted. This is because recursion is formally defined as a node that is dominated by another node of the same kind: if a computational system is unable to build trees, there can be no domination at all, and hence no recursive phenomena (this was also pointed out in the foreword to Vol.1; further discussion is provided in §§802ff).

The absence of recursion in phonology is thus predicted by the lateral project and its concomitant elimination of trees.

47 7. Structure of the book and of Vol.2

48 7.1. How to access the book: the story, its relation with current syntactic theory and its thematic guide

As was mentioned, the book falls into two parts and an Interlude. Part I is historiographic: it reviews structuralist and generative interface thinking chronologically, but also proceeds theory by theory. The Interlude (§586) introduces modularity, the rationalist theory of the (human) cognitive system that underlies the generative approach to language (but is also incarnated by structuralism through Level Independence, see §692). It was explained in §36 in which way modularity is a key concept of the book.

Part II serves two functions: it distils lessons from the review of interface theories on the one hand (a how-to is provided at the outset in §656), and locates the interface debate in the landscape of current minimalist syntax on the other hand.

Regarding the latter, Part II introduces to ongoing debate in syntax that is by and large absent from (traditional, but also more recent) interface theories: linearisation is discussed in §741, the blown-up PF area into which minimalism outsources a whole lot of mechanisms that were previously syntactic and are still not phonological (despite the P of PF) is examined in §726, and §771 reports on phasehood in current syntactic thinking.

Regarding the former, answers to the following questions are sought: which ideas are theory-resident? In which different guises does a given idea appear over time? Which are the mechanisms that have survived the verdict of time? Which empirical generalisations emerge? Which are the watershed lines that separate interface theories into different camps? Which are the questions that interface theories are constantly after? Which ones are solved, which ones remain pending?

Part II is thus a thematic guide to Part I: instead of approaching the interface period by period and theory by theory, relevant topics are addressed across periods and theories, which are accessed by systematic cross-reference for each issue. Also, Part II to a certain extent abandons the journalistic style that is used as much as possible in Part I: the goal now is to evaluate, to assess and to tell good from bad, correct from incorrect, plausible from implausible, successful from unsuccessful, rather than to report.

This setting inevitably introduces a certain amount of repetition: like Vol.1, the book is not expected to be read from cover to cover. The reader will rather enter the book by looking up what a specific theory proposes (access by theory), what was on the research agenda at a given point in time (chronological access), or how theories deal with a specific phenomenon or generalisation (thematic access). Repetition and cross reference are necessary in order to keep the information level constant for all types (and points) of access, but it is true that for the cover-to-cover reader this produces an annoying amount of repetition.

49 7.2. Vol.2: Direct Interface, One-Channel Translation and their application to CVCV

At the end of this introduction, it may be useful for the reader to be able to get an idea of what Vol.2 looks like. Much more than this book, it is analytic in the sense that it draws conclusions from the historical survey on the representational side: how is translation (of morpho-syntactic information into phonological objects) organised, and what does its output look like?

Vol.2 falls into two theory-unspecific and two theory-specific chapters. Chapter one introduces Direct Interface, the idea that is at the origin of the overall project on the interface and defines what the output of translation looks like (it must be non-diacritic). Chapter two is about how this output comes into being, i.e. the translational process itself. Following (unpublished) work by Michal Starke, it is argued that there is only one source of phonological material that enters phonological computation, no matter whether it represents morpho-syntactic or lexical information: the lexicon.

One-Channel Translation contrasts with all previous approaches to translation, which systematically distinguish between morphemic and non-morphemic information: the former is what morphemes are made of, and everybody agrees that it comes into being through lexical (or vocabulary) insertion when morpho-syntactic structure is converted into a phonological string. The latter is what I call boundary information, i.e. morpho-syntactic properties that materialise in phonology in form of representational objects, but do not ride on morphemes: since SPE, hashmarks and more recently prosodic constituents are born through a specific mapping mechanism that is computational in kind. Starke's alternative does away with computational translation: it makes boundary information originate in the lexicon as much as morphemic information. The result is a uniform translation of morpho-syntactic into phonological material through a lexical access.

These two chapters are theory-unspecific in the sense that they define the design properties of a correct interface theory: they do not make any statement about specific phonological theories. What they do allow for, though, is the evaluation of competing phonological theories according to their behaviour at the interface. Traditionally, a uniform interface vocabulary that is shared by all individual phonological theories mediates between these and morpho-syntax: juncture phonemes, hashmarks, the Prosodic Hierarchy. Hence whatever variation competing phonological theories produce will be neutralised and invisible at the interface.

By contrast in the perspective of Direct Interface, different phonological vocabulary that is proposed by different phonological theories makes contrasting predictions when it acts as the output of translation; also, anything cannot be the output of translation anymore since only objects qualify that make a good lexical entry (One-Channel Translation).

Chapters three and four then apply Direct Interface and One-Channel Translation to the particular phonological theory that I am committed to, Government Phonology in general and CVCV in particular. It is only this last half of Vol.2 that bridges over to Vol.1. Chapter three modifies the lateral theory of phonology as it stands at the end of Vol.1 according to the

requirements of the interface, i.e. Direct Interface and One-Channel Translation (see also Scheer & Ziková *forth*). Shaping linguistic theory according to interface requirements of course is a very minimalist thing to do – unlike in syntax-centred minimalism, however, here it is phonology that is shaped by the interface.

Finally, chapter four shows the interface-readjusted system at work: the initial CV has been around in Government Phonology and CVCV for quite some time now (Lowenstamm 1999), and it has produced a reasonable amount of empirical work. It is shown that only syllabic space passes the filters that are defined by Direct Interface and One-Channel Translation: it is therefore the only possible output of translation. In CVCV, syllabic space reduces to CV units, which are thus the only possible carriers of morpho-syntactic information.

On this backdrop, a case study is undertaken which reviews the empirical evidence for the initial CV and inquires on the modalities of its management. The parameterisation of the initial CV is discussed namely in the light of its behaviour in connected speech, i.e. where phonology applies across word boundaries. This chapter is about the only place in Vol.2 that is data-oriented, i.e. where genuine empirical generalisations are made.

Part I

Morpho-syntactic information in phonology: a survey since Trubetzkoy's Grenzsignale

Chapter 1

50 The spectrum: what morpho-syntactic information can do to phonology

51 1. Boundaries have a triggering, a blocking or no effect

We start the historical survey of interface theories with a non-historical chapter that introduces the classification of interface events which is proposed by Kenstowicz & Kisseberth (1977:83ff, 1979:407ff). Their system is particularly useful because it is pre-theoretical and a priori covers all logically possible situations. It will be constantly referred to as we go along, and it offers a rationale that the reader may use when encountering particular analyses in a specific theoretical environment.

According to Kenstowicz & Kisseberth, morpho-syntactic divisions may have three and only three phonological effects. These are shown under (2) below.

- (2) possible effects of morpho-syntactic structure on phonology
given two morphemes M_1 and M_2 , their concatenation may
 - a. have no effect at all:
phonology works as if there were no morpho-syntactic division, i.e.
as if the sequence of sounds were mono-morphemic.
 - b. block
a process that would apply if the morpho-syntactic division were not there.
 - c. be a condition
on the application of a process that would not go into effect if the
morpho-syntactic division were not there. These cases are known as
derived environment effects.

Kenstowicz & Kisseberth provide rich material for the illustration of the three situations. Let us consider a prototypical representative for each of them. (2a) is trivial: it corresponds to what is sometimes referred to as a

"late rule", a "rule of phonetic implementation".⁶ At the word level, a typical example would be the aspiration of English voiceless stops that occurs word-initially (*p^hólitics*, where an acute accent indicates stress) and before stressed vowels (*p^holit^hician*), but is not sensitive to any eventual morpheme boundaries inside the word: it applies across the board.

But there are also less surface-oriented processes where morpheme boundaries may be ignored by the phonology. Namely, this is the case for affix class-based phenomena (§§163,166) where a given class of morphemes follows this pattern, while another class imposes a phonological trace of the concatenation. For example, the division in *parént-al* is phonologically invisible (stress is as penultimate as in the mono-morphemic *párent*), while the boundary in *párent-hood* is phonologically relevant: the computation of stress only takes into account the first portion of the word.

52 **2. Blocking and triggering effects: illustration**

53 2.1. Process-blocking boundaries: French gliding

In order to illustrate boundaries that block processes, let us look at a typical case of the suffix-prefix contrast where a process applies across the "weak" suffix boundary, while it is blocked by the "strong" prefix boundary.

In French, the hiatus created by a vowel-final stem and a vowel-initial suffix is resolved by the insertion of a glide in case the stem-vowel is high. The glide in question is a copy of the high vowel, thus producing the sequences [ij-V], [uw-V], [yq-V] (see Dell 1976:109, Selkirk 1972:385ff). Table (3) below offers illustration.

(3a) shows that the glide does not belong to the lexical information of the roots in question: they appear with their final vowel when suffixed by a zero personal ending. There is no glide in the lexical representation of the vowel-initial suffixes under (3b) either, as evidenced by their vowel-initial appearance after consonant-final stems. Under (3c), however, a glide appears when a hiatus is produced by the concatenation of a vowel-final stem and a vowel-initial suffix. Note that the quality of the suffixal vowel, as well as the kind of suffix added, is irrelevant. This behaviour contrasts

⁶ While implementing the same idea of the phonological inertness of morpho-syntactic boundaries, the notion of postlexical rules known from Lexical Phonology (see §153) is different since it is bound to a particular chunk size: it applies only to strings that are larger than words.

with the situation encountered in identical phonological circumstances but where the hiatus is created through the assembly of a prefix and a stem, as under (3d). No glide may break up the hiatus here: *[bi-j-anyɛl] "bi-annual".

(3) French gliding

- a. the stem does not contain any glide: inflected forms with zero endings

je lie	[li]	I relate
je loue	[lu]	I rent
je sue	[sy]	I sweat

- b. vowel- initial suffixes do not contain any glide: C-final stems (*chant*- "to sing")

chant-er	[ʃāt-e]	-e infinitive
chant-ez	[ʃāt-e]	-e 2pl pres
chant-ais	[ʃāt-ɛ]	-e 1sg pret
chant-a	[ʃāt-a]	-a 3sg passé simple

- c. concatenation of a V-final stem and a V-initial suffix

	-er inf.	-ais 1sg	-ons 1sg	-a 3sg passé
	-ez 2pl pres	pret	pres	simple
li-er	[li-j-e]	[li-j-ɛ]	[li-j-ɔ̃]	[li-j-a]
lou-er	[lu-w-e]	[lu-w-ɛ]	[lu-w-ɔ̃]	[lu-w-a]
su-er	[sy-q-e]	[sy-q-ɛ]	[sy-q-ɔ̃]	[sy-q-a]

- d. concatenation of a V-final prefix and a V-initial stem

bi-annuel	[bi-anyɛl]	bi-annuel
anti-existential	[ãti-ɛksistãsɛl]	anti-existential
anti-alcoolique	[ãti-alkoolik]	anti-alcoholic
archi-ondulé	[aχfi-ɔ̃dylɛ]	very undulated
archi-ennuyeux	[aχfi-ãnyɥijø]	very boring

Hence the prefix boundary blocks glide-insertion. Since all prefixes behave like that, and all suffixes allow gliding to go into effect, the conclusion that is commonly drawn ranks the boundaries: suffixation creates a "weak" boundary that allows the vowels on both sides to see each other, while prefixation involves a "strong" boundary that blurs visibility.

54 2.2. Process-triggering boundaries: obstruent voicing in Puyo Pongo

Let us now look at a process that applies only if a (specific) morpho-syntactic division separates the agent and the patient of the phonological