Review of
de Lacy, Paul (ed.) 2007. The Cambridge Handbook of Phonology. Cambridge: CUP.

Editorial note
November 17th, 2009
The text below is the unabridged version of a review of de Lacy (ed.) (2007) that was published in the Journal of Linguistics
(online Nov 2009 at http://journals.cambridge.org/action/displayIssue?iid=6259544, in print in March 2010; the online version is also available at http://www.unice.fr/dsl/tobias.htm).
Pieces that are absent from the published version are grey-shaded.
The major difference between the published and the unabridged version is the discussion of six additional chapters of the handbook in the latter. These are (section 3.2):
1. The pursuit of theory (Alan Prince)
2. Representation (John Harris)
3. Contrast (Donca Steriade)
4. Morpheme position (Adam Ussishkin)
5. Segmental features (Tracy Hall)
6. Acquiring phonology (Paula Fikkert)

What OT is, and what it is not

Tobias Scheer*

1. Overview
1.1. A handbook of OT (in phonology)

As indicated by the title, the book under review embraces the ambition of representing a field of research, phonology. Handbooks are supposed to stand on the desk of interested people, ready to provide easy and speedy access to the state of the art whenever a question comes up. I think that the book lives up to the promise that is made by handbooks – but regarding Optimality Theory (in phonology), rather than phonology as such. On page 8, Paul de Lacy very carefully argues why the book only contains OT, and he may well have a point: roughly speaking, the book is but a mirror of the field, which is dominated by OT. In a note (29), de Lacy reports that 'from inspecting several major journals from 1998 to 2004, around three-quarters of the articles assumed an OT framework, and many of the others compared their theories with an OT approach'.[1] If the book is thus about phonology, and if phonology today is 75% OT, then 25% of the field is missing. Also, if other theories compare their approaches to OT, the reverse unfortunately is not true. This is the typical relationship between a mainstream and its periphery, or between dominant languages and small neighbours: the latter gets involved with the former, but the dominant mainstream ignores the rest. The Portuguese understand the Spanish, but not the other way round.

The structure of a typical chapter is like this: 'here is the topic at hand, here is the issue that it raises, here is how phonologists have looked at it in the past, and here is how it is done today in OT'. That is, non-OT phonology does appear, often just in references, sometimes set

* Laboratoire Bases, Corpus, Langage (BCL, UMR 6039), Université de Nice - Sophia Antipolis, CNRS ; MSH de Nice, 98 Bd E. Herriot, 06200 NICE. I am indebted to two anonymous JL reviewers, whose comments have greatly helped to improve the article.
1 Rice (2003) has made a similar inquiry, with about the same result.

out in greater detail, but only in the museum department: current research is exclusively represented by OT.[2]

I hasten to add that the OT-only perspective eclipses relevant work in all areas, but may be more or less harmful according to the particular topic considered: some areas are less well covered by non-OT work than others. OT-based work is predominant when it comes to issues such as contrast (but see Charette & Göksel 1994, 1996; Dresher 2003, 2008, 2009; Kaye 2001), markedness (but see Carvalho 2002, 2006; Calabrese 2005; Rice's chapter on markedness is entirely theory-neutral), (phonetic) functionalism (but see Hurch & Rhodes (eds.) 1996, Dziubalska-Kołaczyk 2002), serial vs. parallel computation (but see Idsardi 2000, Baković 2007), reduplication (but see Raimy 2000, Keane 2005, Halle 2008), stress (but see Szigetvári & Scheer 2005), learnability, sonority-driven stress and a few other issues. These are not typical areas of inquiry in rule-based approaches (Vaux 2003, Calabrese 2005, Halle & Matushansky 2006, Raimy & Cairns (ed.) forthcoming), Dependency Phonology (Hulst & Ritter 1999a, Hulst 2005), Government Phonology (Lowenstamm 1996, 2003; Szigetvári 2001; Cyran 2003; Scheer 2004; Kaye 2005; Szigetvári & Scheer 2005; Pöchtrager 2006; Ritter 2006) or Substance-Free Phonology (Hale & Reiss 1998, 2000, 2008; Blaho 2008).

On the other hand, the absence of non-OT work in areas such as syllable structure, sub-segmental structure, acquisition, vowel harmony or the interface with morpho-syntax is much more worrisome. These topics have been well covered in the recent past by a substantial body of non-OT literature that makes significant contributions to the field.

At the end of the day, then, the only impression that the reader has a chance to get is that phonology IS OT, and that OT IS phonology. This, however, is wrong, and the naïve reader will be misled. There is reason to believe that this monoculture is partly due to the exclusively thematic design of the book (on which more below): if people are asked to write about a specific topic (rather than about a specific way to look at a topic), non-mainstream theories may well end up not being represented, depending on the theoretical orientation of the authors chosen.

Apart from this misnomer, i.e. once it is agreed that we are only talking about OT, the book certainly provides everything that the heart of a phonologist could desire (save for a few occasions, on which more below, namely regarding the relationship with morphology that is discussed in section 4.5). It provides a highly efficient and easy-to-access thematic guide to phonological topics, their state of the art and further research tracks for interested non-phonologists. A very felicitous decision made by the editor is to have the spine of the book follow the representational units of phonology on the one hand (part 2 is about prosody, part 3 about segmental phenomena), and its relationship with phonology-external factors on the other (part 4 is on interfaces with phonetics and syntax, part 5 is concerned with issues such as learnability, impaired phonological systems and diachronic development). This thematic architecture is rounded off by the introductory part 1 on conceptual issues, which discusses big and timeless questions that phonologists have thought about and will continue to think about on sleepless nights: markedness, contrast, functionalism, representation and computation (derivation).

In his introductory chapter (8–9), de Lacy singles out the last two items and the trade-off between them as the major intellectual issue that the book addresses: how much of phonology is representation, how much is computation? No doubt he is on the right track: at least since Anderson (1985), looking at phonology through this lens has proven to be insightful and fertile (more on this in section 4.1).

---

[2] There are a number of exceptions to this rule: Harris' chapter on representations, Rice's contribution regarding markedness, Hall's chapter on segmental features, Archangeli and Pulleyblank's chapter on harmony and Bermúdez-Otero's contribution regarding diachronic phonology.

1.2. The historical development of the field

Another point of interest is mentioned in the introduction to the volume ('aims and content'): de Lacy says that 'this book is also not a history of phonology or of any particular topics. While it is of course immensely valuable to understand the theoretical precursors to current phonological theories, the focus here is limited to issues in recent research' (2). In one way or another, handbooks are about the state of the art, a property that automatically prompts the issue of how the present state is different from previous endeavour. The editor seems to shy away from this question, though without reason: almost all the chapters recall the pre-OT history of their topic (typically since SPE). This is indeed necessary, if only because the issue regarding representation vs. computation crops up everywhere: the trend to replace the former by the latter is discussed in chapter after chapter, and its description of course presupposes a minimal introduction to the times when representations were thought to be useful. Also, the introductory chapter by the editor is much concerned with showing in which way OT is different from anything that phonology produced before 1993 (de Lacy opposes OT to 'the dominant theories before OT–SPE and its successors' (13)).

Indeed, pre-OT phonology (which in the book is more or less co-extensive with non-OT phonology) is not considered as something that needs to be argued with. Rather, pre-OT phonology is looked at as a display in a museum: this is what phonology looked like before science moved on; the debate is behind us, and people today have different solutions. Chapters thus simply record that the field – OT in fact – has moved on: they typically do not argue or try to convince the reader that the modern view is correct (de Lacy's own chapter on the influence of sonority and tone on stress and other prosodic structure is a notable exception).

1.3. Ten years ago: John Goldsmith's Handbook of Phonological Theory

The *Handbook of Phonological Theory*, edited by John Goldsmith, appeared in 1995. In the introduction to the present volume, de Lacy acknowledges the obvious comparison: '[p]erhaps this book's most general aim is to fill a gap. I write this introduction ten years after Goldsmith's (ed.) (1995) *Handbook of Phonological Theory* was published' (1). The 1995 handbook not only presented the views of the mainstream (which was Feature Geometry then): the book also contains a chapter on the contrastive merits of skeletal and moraic theory (Ellen Broselow), OT-heralding Prosodic Morphology is introduced in a chapter by John McCarthy and Alan Prince, and Colin Ewen lays out aspects of Dependency Phonology. This list of theories that were around at the time is certainly not complete, and it is also true that the mainstream in 1995 (or during the couple of years before 1995, when the book was in the pipe) was much less monolithically dominant than OT is today.

Nevertheless, the presence of theory-specific chapters in 1995 is indicative of the different design of the two handbooks: as already mentioned, the organization of de Lacy's book is exclusively thematic (his introductory chapter is called 'Themes in phonology'), while Goldsmith's volume is more eclectic: it not only mixes thematically-oriented with theory-oriented chapters, but also features eight chapters on particular languages or language families (Australian languages, Hausa tone, Japanese, French, Slavic, etc.). While de Lacy's approach offers a clearer orientation and a more straightforward mode of access (like a dictionary), Goldsmith's approach encompasses more varied lines of attack (it is also true that there is a price to pay for variety: Goldsmith's book fills 963 pages, against 'only' 687 for its modern cousin).

1.4. A review of OT (in phonology)

A good deal of the synthesizing work that a review is supposed to do has already been done by the editor himself, whose introductory chapter 'Themes in phonology' is an excellent thematic guide to the book, and indeed to OT: trends of the field that the chapters reflect are identified, clear results are documented, topics of ongoing debate are reported, and the historical background (SPE and its successors) is always present. De Lacy is concerned with the substantial amount of (sometimes irreconcilable) variation within OT (e.g. containment vs. correspondence, presence vs. absence of serial elements), and with the fact that OT is in principle compatible with other theories: Declarative Phonology and Government Phonology are mentioned, and Gussmann & Harris (1998) is cited as an example of a combination of GP-representations with OT-computation.[3]

De Lacy's thematic guide to the book is organized around three overarching trends: (i) a trend towards OT (the text in fact is a very complete and up-to-date introduction to OT, including technical aspects such as tableau-drawing); (ii) a trend towards computation (instead of representation); and (iii) a trend towards functionalism, i.e. things that lie outside of grammar: phonetics (or, as Ohala (1972: 289), who is quoted by de Lacy, puts it: 'constraints or tendencies of the human physiological mechanisms involved in speech production and perception'), articulatory ease, perceptual distinctiveness and parsing difficulty.

De Lacy's catalogue is right on target, both regarding the book and the field. The analytic part below therefore follows this line of approach, with a specific focus on the theme that de Lacy singles out among all others, correctly I believe, as the key question: the relationship between representation and computation, also in a historical perspective.

Writing a review of the book thus comes down to writing a review of the state of the art of OT. So if the preceding and the following pages talk about OT, about its internal variation, about its definition (what is the least common denominator of OT?), this is not a matter of choice of the reviewer, but rather an automatic consequence of two things: the fact that the field is indeed largely dominated by this theory, and the content of the book itself. Discussion of the comparative merits and (ir)reconcilability of OT and other approaches, or even the mere presentation of the major tenets of the latter, are not found in the book, and therefore will also be absent from this review.[4]

2. Design properties of the book

2.1. Thematic organization all through

In the introduction to the volume, de Lacy explains that chapters should be readable by upper-level undergraduate students: they are designed to serve as a bridge between textbooks and research articles, which means that some groundwork needs to have been laid by prior reading or by a course in phonology. Recommended textbooks of phonology that can pave the way are Kager (1999) and McCarthy (2002). On page 2, de Lacy explains that there is probably no point in reading the book from cover to cover. While the chapters are of course interrelated on a number of contact points, and also cross-referenced, every item is a self-contained text that provides the state of the art of a particular topic, area or sub-field. In short, it is recommended that the book be used as a dictionary, that is, through a thematic access. It may be confirmed that this is how the book is certainly used best: every effort has been made, and successfully

[3] Gussmann & Harris (1998) actually contains only one timid OT tableau (148). The more recent version of the paper, Gussmann & Harris (2002), offers a richer OT-perspective.

[4] Another factor that has considerably shaped the text below are space restrictions. The present review is a significantly shrunk version of a longer original text.

made, to facilitate ease of thematic access for the reader.

At the outset of his introductory chapter, de Lacy explains that topics have been chosen according to two criteria: "theoretical concerns that have endured in phonology […and] pedagogical reasons (many advanced phonology courses cover many of the topics here)" (p.5).

A comparison of the 25 chapters of de Lacy's with the 32 chapters of Goldsmith's 1995 handbook shows, without surprise, that there is a stable core of phonological topics that will probably still make chapters in further generations of handbooks: markedness, the syllable, (word) stress, tone, intonation, sub-segmental structure, vowel harmony, diachronics, acquisition and the interfaces have a chapter of their own in both handbooks. Most of these topics are timeless because they concern empirical phenomena or other facts about language (interfaces, acquisition).

However, the comparison also confirms the evolution in the concerns of the field that de Lacy sketches in his introductory chapter (see above): on the one hand, the 2007 handbook lacks language-specific and theory-specific chapters that were present in 1995, but also chapters about specific representational (skeletal positions, moras, multiple association) and derivational (the cycle, the organization of grammar, rule ordering) issues. On the other hand, de Lacy's handbook features a number of chapters whose topic is specifically promoted by OT: functionalism, derivations and levels of representation, contrast, morpheme position, reduplication, variation and optionality. Interestingly, although de Lacy's handbook is written from the perspective of OT, not a single of the 25 chapters is concerned with a specific theoretical device: the rule that there are no theory-specific chapters applies to OT as much as to other theories. This pattern is sometimes watered down, though, when chapters are born from an OT-specific concern, but run under a thematic banner. This is the case of Baković' chapter on local assimilation, which essentially shows that the missing solutions of OT's too-many-solutions-problem can be found when one looks for them hard enough.

Finally, the OT-orientation is also responsible for a number of thematic chapters that are absent: it was already mentioned that topics regarding representational issues are not found. There is one outstanding absence, though: no chapter discusses the interface with morphology. Given the strong tradition in this area and the structuring effect of Lexical Phonology for the field, this blank spot comes as a surprise. Part of the explanation may be the fact that OT has a natural tendency to scramble phonology and morphology in the same constraint hierarchy, sometimes even in the same constraint (more on this in section 4.3): there is no point in describing the relationship between two things that are the same.

2.2. The book is fully searchable on its website

Another key to thematic access is the very useful and well-designed website of the book (http://handbookofphonology.rutgers.edu) – a true innovation in publishing that I have come across here for the first time. The website is a subtle compromise between the wish to provide public access to as much of the content of the book as possible, while not ruining its commercial prospects. The result is very convincing: I am very much taken by the facilities offered, the most useful of which (also for doing this review) being the search engine. The book is indeed FULLY searchable, and the software allows for sorting the results by chapter (or reference section). Hits appear together with the sentence in which they occur, and a click provides the broader context. This in fact makes the indexes at the end of the book (by language and subject) by and large superfluous.

The site also offers the possibility to download the complete reference section (1652 entries, in various formats, pdf, doc, rtf, xml, csv and even enl, i.e. the fully-fledged Endnote library), the table of contents, errata (which contain three items as I write, i.e. in November

2008), links to general resources (IPA, Phonoloblog, software, fonts, data bases etc.), the history of the making, an audio interview with René Kager (downloadable mp3), and an interface for reporting errors, suggesting a correction or an addition. Finally, people are asked to send teaching material related to specific chapters to the editor, who may then add them to the site. In addition, each chapter has its own page that provides personal information about the author(s), additional material (e.g. links to relevant software such as Gussenhoven's ToDI, transcription of Dutch intonation, suggestions for further reading), a discussion forum (which, though, was empty for all chapters in November 2008).

2.3. Notes and references: consistent reader-unfriendliness

While the website of the book contributes a great deal to the satisfaction of the reader, the organization of the book itself must have required a lot of effort to achieve consistent reader-unfriendliness. I wonder whether the people who make decisions at Cambridge University Press have ever met anybody who actually prefers to have notes at the end of the article/chapter (or worse: of the book, a solution that the handbook has avoided), rather than at the bottom of the page (endnotes were imposed upon the editor). Or whether they have ever met anybody who goes for sample references at the end of the book, rather than for reference sections at the end of each article/chapter. Commenting on a draft version of the review, Paul de Lacy explained to me that these choices were made in order to save space, which could then be allotted to the chapters: conflating references that appear in several chapters saves a couple of thousand words.

Having a final reference section instead of listing references at the end of each chapter has a practical side, but this is not the major damage. Practically, it renders almost impossible the task of copying a chapter, since in addition of a 20 page text you will have to copy the whole reference section (92 pages in our case). Most people will thus just leave out the references, and then be unable to properly read and use the chapter. This anti-copying effect of course may be sought by the publisher, who may have a point here. What is much more corruptive, though, is the fact that diluting the references of a chapter in a big melting pot violates its intellectual content. Approaching a book or an article typically involves browsing the references before you start to read, or while reading: tell me whom you quote, and I tell you who you are. The body of works quoted by an article is part and parcel of its intellectual content, which cannot be reconstructed from a final reference section.

More of the same: do you know what "Ph" is? Or "Ln"? Or "JCL"? Or "UMOP" etc.? In the reference section, readers have to turn pages, again, in order to understand that what is meant are the journals *Phonology*, *Lingua*, the *Journal of Child Language* and *University of Massachusetts Occasional Papers in Linguistics*. It was inscrutable to me why the full item cannot be displayed in each reference until Paul de Lacy explained to me that this was also in order to comply with space restrictions.

While everybody understands that there needs to be some limitations on length, it is not wise of CUP to practise this kind of iron-hand policy that makes desperate editors become word-counters, and poor readers irked. Unfortunately enough, it seems that books continue to be made in disregard of a simple fact: readers want to get the information that they are after as quickly as possible, that is WITHOUT TURNING PAGES. And it seems that being told off in review after review has no effect on some publishers at all.

3. The book and its chapters

3.1. Different types of chapters

Trying to address all 25 chapters individually in the frame of a review of course is hopeless. Below I comment on clusters of chapters according to some common property (this section), and on ten individual cases (in the following section).

A first general category are true handbook chapters that follow the structure 'here is the phenomenon, here is empirical illustration, here are the generalizations that may be drawn'. Some chapters that follow this model leave it at a largely pre-theoretical presentation, while others provide a supplement along the lines 'here is how the patterns have been analysed in the past and are looked at in current research, and here are the arguments that have been/are exchanged'; this may then be followed by a personal point of view.

The chapters on markedness (Keren Rice) and harmony (Diana Archangeli and Douglas Pulleyblank) fall into the former category, while the latter pattern is represented by the contributions on serial computation and levels of representation (John McCarthy), representations (John Harris), word stress (René Kager), tone (Moira Yip), intonation (Carlos Gussenhoven), dissimilation (John Alderete & Stefan Frisch), the interface with phonetics (John Kingston), reduplication (Suzanne Urbanczyk), diachronic phonology (Ricardo Bermúdez-Otero), variation and optionality (Arto Anttila) and acquisition (Paula Fikkert). All provide an extremely well-informed survey of their respective subject matter. McCarthy's contribution strikes me as particularly valuable: this is the most complete and concise survey of the heatedly debated issue of opacity that I know of.

Another category of contributions explains how their respective topics are dealt with in OT, either with an initial statement that restricts the focus to OT, or without comment. Bruce Tesar's (learnability), Eric Baković's (local assimilation) and Draga Zec's chapters fall into the former category. Baković, for example, states that '[t]he focus of the present chapter is on local assimilation, and in particular on a set of issues that arise in the formal analysis of processes of local assimilation within Optimality Theory' (335).

On the other hand, OT is taken for granted without comment in the contributions by Alan Prince (pursuit of theory), Matthew Gordon (functionalism), Donca Steriade (contrast), Hubert Truckenbrodt (interface with syntax), Adam Ussishkin (morpheme position), and Barbara Bernhardt & Joseph Paul Stemberger (phonological impairment in children and adults).

3.2. Ten individual chapters

1. Prince: The pursuit of theory

Prince's contribution on the pursuit of theory is an excellent reminder that generative theory, like all other scientific endeavour, is about data *and* theory: the Nobel prize-winning competitor is not just the one that covers the largest amount of data or mimics the surface most closely – this is useless if the instrument is not a theory, or if the theory has no content. And it is not data that decide whether a theory is contentful: "[t]he encounter with fact is essential to the validation, falsification, and discovery of theories. But as soon as a theory comes into existence, it must also be encountered on its own terms. A theory cannot even be faced with fact – we cannot do it properly – if we don't know how to construct valid arguments from its premises. [...] Linguistic theory has shown a notable tendency to develop what we have called Free-Standing Theories, those which have an internal structure susceptible to detailed analysis independent of the factual encounter" (p.55f).

Prince thus opposes Free-Standing Theories (FST) to Theories of Data (TOD), which is a way to name the opposition between rational and empiricist endeavour. Prince recalls that

empiricist TOD are always about acquisition, rather than about anything else (Locke's blank sheet, behaviourism, connectionism) and quotes, on the side of FST, Natural Phonology, OT and Halle & Vergnaud (1987). Surprisingly enough, though, SPE is said to be an instance of TOD. This may root in what appears to be a shared desire in OT: 1) to make OT unlike anything that has existed before and 2) to make OT antithetical with respect to SPE (recall de Lacy's formulation, which opposes OT to "the dominant theories before OT - SPE and its successors", p.13). It is difficult to see in which way Halle & Vergnaud (1987) are much different from SPE. Rather, Halle & Vergnaud set out to restore SPE to a large extent: the dominant theory of the 80s, Lexical Phonology, was based on an interactionist architecture of grammar where phonological and morphological computation is interleaved. Halle & Vergnaud offer a non-interactionist alternative that restores the classical generative view according to which all concatenation must be completed before interpretation begins (more recently, Chomsky's 2000 derivation by phase abandoned this tradition, joining the interactionist architecture of Lexical Phonology).

Also, OT follows the footsteps of SPE in a number of respects (see Hulst & Ritter 2000, e.g. regarding overgeneration), and actually roots in connectionism, the archetype of empiricist TOD according to Prince. Paul Smolensky was at the forefront of the development of connectionism in the mid-80s (Smolensky 1987, 1988), and carried the central connectionist idea, PDP (Parallel Distributed Processing), into linguistics, where it was given shape in terms of OT (more on this in section 4.4).

2. Harris: representations

In his chapter on representations, John Harris is much concerned with a baseline-property of his object of study: the categorical character of representations. Even in deep phonetic and functionalist waters, Harris holds that representations cannot possibly be gradient, or incorporate gradient elements. Gradience, however, is present in constraints in a variety of disguises; Harris observes this fact, but does not comment on it: unlike in representations, gradience is taken for granted in computation. The real question about functionalism, then, is not raised: can there be any gradience in grammar at all? Do we still make a difference between Langue and Parole, between Competence and Performance? If so, isn't Langue/Competence necessarily categorical? If not, i.e. if we go back to pre-Chomskyan and pre-Saussurian thinking where grammatical computation can be non-categorical, why should representations be unable to be gradual?

In documenting the global trend from representation to computation, Harris provides a plausible answer to these questions: representations can be categorical because they do not exist. The world, including grammar, is definitely gradient and computational: categorical objects (a pleonasm) can exist at best as a product of gradient computation. That is, "categorical behaviour is emergent rather than an inherent property of these descriptors" (Harris' conclusion p.137). Rather than about representations, Harris indeed ends up talking about "descriptors" since this is the only role that they can play in a world where all decisions are made by constraint interaction: representations "still have an important heuristic value as descriptors to be used in the building and experimental testing of models of phonological grammar" (p.137). In other words, representations are decoration: they may help the linguist to picture the result of constraint interaction – but they have no impact on grammar at all. This perspective is indeed consistent with OT, where the *only* means of determining grammaticality is constraint interaction. This trope for a world that is exclusively computational is inherited from connectionism, where the only thing that determines the output of a neural network are the combined effects of activation levels of neurons (more on this in sections 4.2-4.4). Neurons themselves, i.e. the objects, are perfectly colourless

(content-free in connectionist terms): they do not have any internal structure, they are not inherently distinct from one another and hence cannot contribute anything to the output.

3. Steriade: contrast

The deconstruction of the foundations of modern linguistics is also reported by Donca Steriade in her chapter on contrast: the reality of segments in mental representation was called into question as much as the existence of a clear cut between what is contrastive and what is not (p.140). The chapter provides a good overview of the two main instruments that are used in order to describe phonemic inventories: dispersion and feature economy (Kingston's contribution on the interface with phonetics also offers an informed survey).

The chapter also promotes another idea that opens the way for a (belated) reconciliation with structuralism: "it is […] inaccurate to say that constraints on alphabets […] only apply to define the underlying inventory: some of these constraints are persistent (Myers 1991) and prohibit the same feature combinations throughout much or all of the derivation" (p.145f). This is killing two birds with one stone: the same choices are responsible for static systemic properties as much as for properties of computation. That is, the structuralism-ignoring generative doctrine according to which phonological processes are exclusively context-driven is abandoned: they may also depend on the phonemic system in which they live.

This idea is also expressed by so-called Licensing Constraints in Government Phonology (Charette & Göksel 1994,1996, Kaye 2001, which go unnoticed in the chapter). Finally, Steriade does not mention a core structuralist insight regarding contrast: the systemic pressure which is issued by phonemic systems may cause readjustments of the system when its equilibrium happens to be disrupted by an external (typically "phonetic") event: this is what Martinet's (1995) push- and drag-chains are about.

4. Zec: the syllable

Draga Zec's chapter on the syllable is strange. The author repeatedly presents private opinions as consensual scientific truth, also that the reader gets only a very fragmentary and one-sided picture of syllable structure.

Zec's first private decision is that instead of simply stating, like other authors, that she will only be concerned with OT approaches to the syllable, she feels the need to add that '[p]honological representations in general, and the syllable in particular, are best characterized in output-oriented frameworks' (161). The next private decision is that moras, rather than x-slot- or constituent-based theories, are the correct representational units. Zec does not even bother to mention that there is an alternative: the reader is handed representations with moras and has to live with them for quite a number of pages before he or she comes across the first hint at the existence of the constituent-based alternative in note 12 on page 174, where s/he is informed that there is something like a 'timing component originally posited in phonological theory'. A few pages later (176–177), a brief comparative discussion with constituent-based theories is proposed, but as elsewhere in the book, it is as if one were visiting a museum: here is what people thought in ancient times ('the immediate predecessor of the moraic representation'). The reader is thus led to believe that nobody works with syllabic constituents anymore, and that there is a consensus in favour of moraic representations. Neither of these is the case, which means that the chapter leads the naïve reader to believe in a myth. Clearly, the reviewing procedure, especially in a handbook context, has failed here to do its job.

But even within the moraic approach, Zec proposes strange views without discussion or comment. In classical moraic theory, in languages where coda consonants are not moraic, they are attached to the vocalic mora (e.g. Hayes 1989, Bickmore 1995). Zec's reader, however, never even hears about this option: the only thing that he comes across, without comment, are coda consonants that are attached directly to the syllable node (172, 175f.).

Another issue is some strange terminological choices, which will bewilder readers who are familiar with the topic, and mislead those who are not. For example, on pages 172–173 Zec talks about 'perspicuity' when she means sonority, and uses 'perspicuous' instead of sonorous, evidently because the concept of sonority is only introduced on page 177 (and then consistently used thereafter). Zec also speaks of an 'appendix' when she means weightless codas. In a book with a partly pedagogical function, this opens the way to confusion: the appendix was once assumed to be a syllabic constituent that hosts extrasyllabic consonants (e.g. Kiparsky 1979, Halle & Vergnaud 1980). Finally, Zec occasionally mixes up classical syllabic constituents and moras: '[t]he nuclear node is construed as a mora, and represented as μ' (172).

Another remarkable statement is this: 'because of its representational nature the syllable is most adequately characterized in output-oriented frameworks' (166). In the context of the discussion of rule-based approaches, what Zec probably intends is to make the point that conspiracies, i.e. variable actions that have the effect of satisfying a given output restriction (Kisseberth 1970), are also found for syllabic patterns. The whole book, however, is a witness of the OT-induced trend to replace representations by computation, while non-output-oriented frameworks like Government Phonology or Substance-Free Phonology maintain representations as sovereign entities, against this trend. It is thus at best confusing to read that the representational character of syllables predestines them for being dealt with by the theory that systematically eliminates representations.

A strange feature of the chapter, but this time not of this chapter alone, is the fact that the author engages in dialogue only with SPE, in this case regarding subsegmental representations. That is, the amorphous list of SPE features is considered to be the backdrop of the discussion. The entire autosegmental period of the late 1970s and 1980s, where features acquired an autosegmental organization in Feature Geometry, is simply left unmentioned.

Finally, the core of syllable structure – co-occurrence restrictions – is presented as if the chapter had been written in the mid-1970s: the author seriously writes, without comment, that 'if more than one consonant is allowed in a margin, there is in principle no limit to the number permitted' (164). This is the outdated principle of syllabification before instruments like extrasyllabicity and empty nuclei entered the scene: at the beginning of the word, syllabify all consonants into the onset until you hit the first vowel, no matter what the sonority slope. This predicts that there could be languages with unlimited word-initial clusters such as #fdkltrnktx. Zec does not mention extrasyllabicity or empty nuclei, which is quite an achievement in a handbook chapter on syllable structure. The reader is better advised in Harris's chapter (on representations), which covers the full range of representations and hence has only a single section on syllables: here he learns about the existence of empty nuclei (134 – though not about how they work or why they exist). It should be noted that if empty nuclei are traditionally associated with Government Phonology, they were not invented in this framework (see Anderson 1982, Spencer 1986), and today they are used in almost all theoretical quarters, e.g. Kiparsky (1991), Burzio (1994), Oostendorp (2005); Hulst & Ritter (1999b) provide an overview.

5. Gussenhoven: intonation

Gussenhoven's chapter on intonation is a finely written piece of handbook literature: on the basis of initial presentation of data, generalizations are made, which are then examined through the lens of existing accounts. For some reason, though, Gussenhoven does not mention a number of issues related to intonation that are critical for the present and past debate. For one thing, the Prosodic Hierarchy is mostly absent from the chapter. Weightier than this, though, is the absence of discussion regarding the relationship of intonation with syntax. Intonation is an important, most certainly the most prominent, contact point of

phonology and syntax (two items out of a large body of literature are Bresnan 1971 and Adger 2007). For example, the principle of phonology-free syntax (Zwicky & Pullum 1986) was called into question precisely on the grounds of intonation (e.g. Szendrői 2003). Also, intonation is so largely syntax-driven that its truly (or exclusively) phonological character may be called into question (Wagner 2005). Finally, intonation is a remarkable phonological phenomenon because it has been argued to be recursive in nature (Ladd 1986). Recursion, however, is supposed to be the privilege only of morpho-syntax because only this module in the generative architecture of grammar has the privilege of concatenation: phonology and semantics merely interpret. Recursion also lies at the heart of the recent large-scale debate between Hauser et al. (2002) and Pinker & Jackendoff (2005a, b) on the design properties and phylogenetic evolution of the language faculty. Unfortunately, the reader does not learn about all this.

6. Truckenbrodt: the syntax-phonology interface

Most of the topics mentioned regarding intonation are touched upon in Truckenbrodt's chapter on the interface with syntax (but no cross-reference is made with Gussenhoven's chapter). While Truckenbrodt discusses focus and recursion, the juicier implications for general design properties of grammar and particularly its modular character go unmentioned: the reader does not encounter the issues of phonology-free syntax and the morpho-syntactic privilege of recursion. This may be related to the OT-trope that scrambles everything into one, i.e. where phonetic, phonological, morphological and even syntactic constraints are interspersed in the same constraint hierarchy (more on this in section 4.3).

Truckenbrodt's chapter follows this trend: in the area of the interface with syntax, the modularity-guaranteeing principle of Indirect Reference, which was paramount in the 1980s (Selkirk 1984, Nespor & Vogel 1986), is not even mentioned. Indirect Reference bans direct reference to morpho-syntactic categories from phonological computation (phonological rules then, phonological constraints now): phonology does not know what a DP or an adjunct is, and if these bear on phonology, they must be translated into phonological vocabulary (the Prosodic Hierarchy) before phonological processes can make reference to them. In the 1980s, Prosodic Phonology was competing with so-called direct syntax approaches (e.g. Kaisse 1985, Odden 1987), which promoted rules such as 'X becomes Y in the context Z, but only if Z belongs to an adjunct (as opposed to an argument)'.

A consequence of Indirect Reference was that mapping, i.e. the process that creates (phonological) prosodic constituency on the basis of morpho-syntactic structure, was necessarily done in modular no-man's land, i.e. outside of both morpho-syntax and phonology: mapping looks at morpho-syntax in order to create phonological structure, which is then inserted into the phonology.[5] The fact is that constraint-based mapping, which in OT has replaced the original rule-based mapping, turns back the wheel: it overtly and systematically violates modularity and Indirect Reference. That is, the constraints ALIGN and WRAP, which do the work of mapping, are interleaved with regular phonological constraints in the same constraint hierarchy and make constant reference to things like roots, DPs, adjuncts, etc. In other words, OT does mapping IN the phonology and thereby restores direct reference.[6]

---

[5] This is true for all layers of the Prosodic Hierarchy that are exclusively top-down constructions, i.e. down to the Prosodic Word. The two lowest layers, syllables (or morae) and feet, are bottom-up constructions and therefore not the result of mapping.

[6] A reviewer correctly points out that modularity and Indirect Reference may also have been violated in rule-based work of the 1980s in cases where analysts integrated mapping rules into the post-lexical component of phonology. The difference with OT, though, is that these earlier violations were then the responsibility of individual phonologists, whereas the modularity-violation in OT is systematic and inherent in constraint-based mapping: for the time being OT has not set up a modularity-respecting perspective on mapping (this is

Maybe this is the right way to go: maybe Prosodic Phonology was all wrong, maybe there is no modularity, maybe all is the same – the trouble is that this move, which undermines the foundations of generative linguistics, is done without discussion, as if it were self-evident, as if syntax and phonology had always been blended. The OT literature is not eloquent regarding the systematic scrambling of phonology and morpho-syntax (Yip 1998 is an exception) which, in addition to ALIGN and WRAP, is also done by so-called Interface Constraints (Anttila 2002, e.g. FAITH-root and FAITH-affix). Unfortunately, the reader learns nothing at all about these issues (not even their existence), which lie at the very heart of generative interface theory.

Truckenbrodt's chapter is thus in line with the OT scene where the non-modularity of grammar, which is incompatible with the generative approach, is by and large taken for granted without discussion (more on this in section 4.3).

7. Ussishkin: morpheme position

Ussishkin's chapter on morpheme position, which comes next after Truckenbrodt's, illustrates the same pattern: it inquires on "the extent to which phonology has an influence on morpheme position" (p.457) given the classical case of Semitic-style non-concatenative morphology, but also Tagalog-style "infixation". The issue is real and interesting: how could phonological properties condition the concatenative behaviour of morphology regarding either the well-formedness of a particular sequence of morphemes (selectional properties) or the exact location of a morpheme in the linear string? The question of phonology-sensitive morphology was held to be the touchstone for Zwicky & Pullum's aforementioned phonology-free syntax (which says that this should be impossible). The competing view was Lexical Phonology's interactionist architecture of grammar (i.e. what today is known as derivation by phase, cf. Chomsky 2000 et passim), which allows for phonology-sensitivity of morphology while fully preserving modularity. Hargus & Kaisse (eds.) (1993) contains a number of relevant contributions to the question.

Like Truckenbrodt, Ussishkin provides an empirically well-informed overview of his subject matter, and of the way it is handled in OT. But like Truckenbrodt's reader, Ussishkin's has no chance not to understand that grammar is non-modular: McCarthy & Prince's (1993) Generalized Alignment that Ussishkin argues for is the same alignment device that was discussed above, i.e. which does mapping (with explicit reference to morpho-syntactic categories) *in* the phonology. In such an environment where phonological and morpho-syntactic instructions are scrambled in the same constraint hierarchy (actually in the same constraints), the question whether phonology may bear on morphology of course does not arise: the answer is obviously positive. Hence there is no need for any specific discussion – but that this perspective abandons modularity needs to be mentioned and eventually discussed, in order for the reader to be able to make up his mind whether he is ready to buy alignment-scrambling at the cost of leaving generative grounds.

A last word on Ussishkin's chapter, an important element of which is the non-concatenative morphology of Semitic languages and, in its vicinity, templatic effects. The only thing that the reader comes across in this area is McCarthy's (1979) initial autosegmental approach, and implementations thereof in OT. The OT perspective is introduced like this: "[m]ore recent work within current models can be found in Bat-El (1989, 1994, 2003) and Ussishkin (2000, 2005)" (p.463). On the following page, templatic effects are explained in a word-based perspective (item-and-process) that, unlike the classical and the autosegmental morpheme-based approach (item-and-arrangement), does not grant any autonomous status to the (typically triconsonantal) root. This is presented as the received way of looking at non-

---

consistent with the fact that modularity is not a concern in OT: it is violated without discussion).

concatenative morphology, and the reader is not told that there is something like an analytic tradition of about 1200 years that has a different view on templatic effects. This tradition is also represented in current research: for example, evidence regarding the psycholinguistic reality of the consonantal root is adduced by Prunet et al. (2000, 2008).

8. Hall: segmental features

Hall's chapter on the internal structure of speech sounds (segmental features) is a unique occasion to mourn the absence of OT. Indeed, the reader does not come across a single constraint or tableau in this chapter. At its outset, Hall says that "the goal of this chapter is to provide a summary of the current status of segmental features" and adds that "although the emphasis is on the features themselves, the article also includes discussion of the relationships proposed involving two or more features in Feature Geometry" (both quotations p.311). The chapter then indeed reviews feature by feature, and the discussion is organised according to feature families that are typically dominated by the same node in Feature Geometry (major class features, laryngeal features, manner features, place features). The discussion of every feature family is concluded by feature matrices where segments and features open a space that is filled with pluses and minuses (or a sign indicating the presence of a privative feature), and an appendix provides large summary-matrices that contrast all speech sounds.

The flavour that the chapter exhales is by and large a true reflect of the direction that the study of subsegmental properties has taken in OT: we are basically back to an amorphous set of SPE-type features that are considered by themselves in absence of any relationship that they could entertain: *DORSAL, *LABIAL and the like are enough to get where you want in OT. The programme – or at least, the effect – is thus to basically throw Feature Geometry over board, since this theory developed the SPE-system in making features autosegments, which are grouped according to the concept of natural class (as opposed to the amorphous SPE-list). The page-long feature matrices at the end of the chapter look very much like what we know from SPE, and quite unlike Feature Geometry (e.g. Clements & Hume 1995). We are thus simply facing another off-spring of the general trend in OT to undo (autosegmental) representations, which are replaced by pure computation. The derepresentationalisation below the level of the segment amounts to doing away with Feature Geometry, or rather, like elsewhere, to eventually maintain graphic charts, which however are only decoration and do not play any role in the real decision-making that is done in the constraint chamber.

The trouble is that the reader is not told: he does not learn that some time ago Feature Geometry stood up in order to marshal amorphous SPE feature matrices by autosegmental representations, and that OT returns to amorphous lists of features, replacing the geometric structure by computation that is based on the pattern "star [feature]". Also, the reader does not see any of the associated computation, nor does he learn that the features that are reviewed one by one are actually identical with the lion's share of OT-subsegmental computation. One could argue that talking about segmental primes and their use in computation are two separate things, and that Hall's chapter covers only the former. This would then have to be made explicit (which is not the case), and one would expect another chapter to cover subsegmental computation (which is not the case either). But anyway, such a divide does not appear to be workable, since features (and especially their geometric structure) are by and large the result of the analysis of phonological processing.

In sum, then, the reader is confronted to a strange situation: the chapter fully conveys the anti-representational trend in OT where subsegmental "structure" boils down to SPE-type lists of amorphous feature matrices, but this move is not made explicit (also recall de Lacy's systematic opposition between OT and "the dominant theories before OT - SPE and its successors", p.13).

Another issue is the fact that the chapter seems to elude the OT-based literature on segmental structure: the literature quoted is by and large pre-OT Feature Geometry of the 80s and 90s, while the book on segmental phonology in OT edited by Linda Lombardi in 2001 (Lombardi 2001) is absent from the record (it is not quoted as a whole, nor any of the papers that it contains). In the introduction to her book, Lombardi (2001:3) for example provides a very honest, lucid and in my opinion correct statement of the fact that representations are useless and interchangeable in OT as we know it: "[t]he 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."

Taking quite a different point of view in the introduction to a book called "Distinctive Feature Theory" that he edited in 2001, Hall (2001:1) writes: "[a] consequence of the shift away from representational questions […] is that there is at present much uncertainty concerning certain fundamental questions pertaining to […] phonological representations […]. With respect to features, the most obvious question […] is: What featural representations (e.g. feature geometry, underspecification) are necessary in a phonological theory?" (see also Clements 2001:71). Here and elsewhere, Tracy Hall has thus actively contributed to the debate regarding the elimination of representations in sub-segmental analysis, and it is unfortunate that this does not leave any trace in his handbook chapter.

Another concern is privativity, i.e. the idea that oppositions are better represented by the presence vs. absence of a melodic prime, rather than by its permanent presence, but in two distinct disguises, plus and minus. While the binary view is classical since Jakobson and SPE, the privative alternative was introduced by Anderson & Jones (1974) and then worked out in Dependency Phonology, Government Phonology and Particle Phonology. A form of the privative idea has also made its way into binary systems under the header of underspecification (e.g. Archangeli 1988), where features are made privative on a case-by-case basis, but remain always present as such (it is only their value that may be absent). Hall discusses underspecification and indicates that a given feature may be more or less well suited for a privative status: while [spread glottis] and [constricted glottis] for example are good candidates for privativity (because their negative values are not manipulated by phonological processes), [voice] is rather not (since [-voice] appears to be sometimes active in rules/constraints) (p.317f). The fact that the introduction of privativity into binary systems formally allows for ternary oppositions (the value of a feature may be plus, minus, or absent) is not discussed.

Finally, there is an issue that has always been a concern in privative approaches, but is very much absent from binary feature theory: overgeneration. The goal of Jakobsonian and SPE feature theory was to offer a means of *describing* speech sounds. The fact that the primes and their free combinatory predict a significant number of items that no language makes use of was not a concern. The arboreal structure of Feature Geometry cuts down the generative power of the system, but this was not a goal (nodes express natural classes), and overgeneration still floods the banks. Privative primes do much better (though not well) regarding overgeneration because something that is not there cannot be combined. Overgeneration was a constant motivation for the design of subsegmental structure especially in Government Phonology, where the initial set of ten primes was drastically reduced during the 90s, to only five primes in the most radical version of the system (Kaye 2001, Pöchtrager 2006). This research programme has produced a number of insights that are relevant for sub-segmental analysis of whatever obedience: for example, there is good evidence to the end that nasality and voicing are in fact the same thing, and that low tone may also be an emanation of the same prime (Ploch 1999, Botma 2004, Nasukawa 2005).

The trouble is that the only encounter that the reader has with the privative idea is in terms of underspecification: privativity appears as a mere sub-option in an overall world where binarity is consensual. Theories that are based on a purely privative system of melodic representation are mentioned in a paragraph on page 313 (Dependency Phonology, Government Phonology), but only to indicate that they will not be discussed for lack of space. This decision regarding space management is not a felicitous one: in sub-segmental analysis, the *first* decision that the analyst has to make is about binarity vs. privativity. Privativity is a completely different world-view, rather than a sub-choice in a binary system. That is, the privative approach does not reduce to the presence or absence of some melodic prime: concomitant to privativity are primes of a size that is significantly bigger than the size of binary features: I, A and U, core privative primes, represent distinct tongue body positions, and also enjoy an independent pronunciation. In order to learn about the existence of privative primes and how they work, the reader has to consult Harris' chapter on representations, which is much broader in scope, but finds enough space to provide basic information about the privative idea, just as it offers information about syllable structure that Zec' much more narrow-scoped chapter does not mention.

9. Bermúdez-Otero: diachronic phonology

Ricardo Bermúdez-Otero has written a chapter on diachronic phonology which is not at all what one would expect from the title – and this is all to the good in the context of a handbook chapter that is supposed to show what diachronic reasoning can contribute to phonological theory. In the concluding sentence of the chapter, the author says that while looking at the subject matter the way he did, 'one realizes that diachronic phonology provides us with a unique window on the nature of the mind' (516). So how does this work?

The reader will not come across any discussion of famous sound laws, the neogrammarian claim of exceptionless of rules, structuralist push- and drag-chains or generative rule elimination/adjunction/reordering (or the constraint-based equivalent thereof). Nor is analogy (in its classical or modern guises), the regularity-disrupting rival force of sound laws, considered. Rather, Bermúdez-Otero offers an extremely well-documented and exquisitely argued piece of handbook literature that tackles the fine mechanics of sound change. Is innovation gradient or categorical? (answer: both); why is it that some sound changes are gradient, while others are categorical? (answer: the innovation does not take place in the same grammatical module); how can we explain lexical diffusion, i.e. an innovation that does not affect all words in the same way? (answer: by joint bottom–up (phonetic, pragmatic, sociological) and top–down (grammatical) pressure); does the existence (at least in some cases) of a non-arbitrary relationship between the (token-)frequency of words on the one hand, and their participation in innovation as well as their phonetic properties on the other hand, imply that change is always gradual? (answer: no); or does this imply that phonetic detail (exemplar 'clouds') needs to be recorded in the lexicon? (answer: no); in so-called 'secondary split', do allophones remain after the loss of their conditioning environment because they have already been entered into the lexicon, or are they entered into the lexicon because of the loss of their conditioning environment? (answer: the latter); do unconditioned lexical splits typically arise in situations of contact between different dialects or languages? (answer: probably yes); what is the life-cycle of an innovation as it ages?

Bermúdez-Otero's contribution is one of the few in the book that, while fully responding to the function of providing an overview, argues for a particular world view. His goal is to show that all the gradual, non-linguistic, non-systematic, unpredictable properties of language that come from phonetics, eventual teleological pressure, sociological conditions or statistical distribution – in short, what has been known since Saussure as parole – are NOT an argument against the existence of a langue. Quite to the contrary, the author shows that critical

properties of sound change – and specifically of the kind that is irregular, unpredictable, lexically non-uniform, etc. – can only be accounted for if a modular architecture is assumed, i.e. if at least one module – the phonological version of Saussure's langue – is self-contained and fully independent of parole. Bermúdez-Otero works with a perfectly classical three-level model: bare phonetics (coarticulation, aerodynamics, etc., not under cognitive control, not part of the grammar), systematic phonetics (where phonetic implementation rules are active, under cognitive control, part of the grammar) and phonology (where phonological rules are active). Phonological rules are symbolic and categorical, while phonetic rules are gradient (Kingston's chapter on the interface with phonetics follows much the same lines).

Quite unexpectedly, the only place in the book where the reader comes across a discussion of the place of phonology in the architecture of grammar is in this chapter on diachronic phonology (rather than in the chapter on the interface with syntax, for example). I argue below that this is actually less surprising than it might seem at first sight, since OT is prone to the aforementioned scrambling trope that mixes phonetic, phonological, morphological and even syntactic instructions in the same constraint hierarchy and/or constraint without batting an eye. This may also explain why, unlike Goldsmith's handbook, there is no chapter on the architecture of grammar: people these days simply do without. This does not mean that any argument is made against the generative modular structure; rather, modularity is simply abandoned without comment.

It would be erroneous, though, to conclude that the scrambling trope for indistinction is a necessary property of OT: the chapters by Bermúdez-Otero, Alderete & Frisch (on dissimilation) and Anttila (on variation and optionality) demonstrate that this is not the case. While being committed to OT, these authors maintain a perfectly modular structure, which expresses dualistic thought, as opposed to the monistic/empiricist non-modular perspective.[7] Respecting modularity or not is a private decision made by every individual OT analyst, not by OT itself. This notwithstanding, sections 4.3 and 4.4 below discuss the reasons why OT as a whole manifests a modularity-violating drift.

10. Fikkert: acquiring phonology

A pervasive aspect of Fikkert's chapter on acquisition is a specific contribution of her subject matter to the debate regarding representations. An inescapable question in acquisition is what and how children lexicalize when they start to build a lexicon. Acquisitionists thus pay particular attention to input forms, and what "they share is the assumption that stored representations are fairly detailed" (p.552). This, however, is in conflict with a key design property of OT, Richness of the Base, which disallows restrictions on the input. As a consequence, in the OT perspective, "the reason why children do not produce words like adults do is solely due to differences in the child's phonology" (p.552). On page 547, Fikkert points out that this output orientation where all explanation is due to constraints on output form and the input-output relation is an in-built representation-killer: one important function of representations is to make lexical representations distinct, a conception that is incompatible with the OT-requirement of lexical indistinctness.

Fikkert therefore concludes that "the question how phonological representations of words are stored in the mental lexicon is underresearched in OT" (p.552), and Tesar in his chapter on learnability echoes this observation: "[l]earning the content of underlying forms is less well understood than the other issues addressed in this chapter" (p.572). The crux is "the strong mutual dependence between the lexicon and the constraint ranking" (Tesar, p.572): children need to know one in order to establish the other, and as Fikkert points out, this hen-

[7] Two more cases in point that uphold an explicitly dualistic/modular approach are the chapters by John Kingston (on the interface with phonetics) and Paula Fikkert (on acquisition). The commitment of these authors to OT, however, is not made explicit.

and-egg problem may quickly ruin previous effort: "A change in underlying representations in the course of development can have dramatic consequences for the constraint ranking, particularly for the interpretation of faithfulness constraints" (p.554).

4. What OT is, and what it is not

4.1. Representation vs. computation: a non-linear evolution

As mentioned in the introduction, de Lacy singles out three key issues in the current evolution of the field, and also in the book: OT, functionalism, and representations vs. computation. Let us start by looking at the last of these. Anderson (1985) used the (im)balance between representations and computation as a lens to look at the history of phonology in the 20th century. He detected a regular see-saw movement between theories that stand far to one side of the spectrum, and others that approach the opposite extreme. Also, the two phenomena are in an inverse proportional relationship: when one goes up, the other goes down.

A correct prediction of Anderson's suggests that the oscillation between representations and computation is indeed a valid instrument for understanding what the swarming come-and-go of terminology, theories, concepts and schools is all about. Writing at the representational peak of the 1980s, Anderson (1985) extrapolated that phonology was standing at the dawn of a new computational, hence anti-representational round. Here is the last sentence of his book (350).

> "If current attention to the possibilities of novel sorts of representations leads to a climate in which the importance of explicit formulation of rule-governed regularities disappears from view, the depth of our knowledge of phonology will in all likelihood be poorer for it. We hope that this book has demonstrated that neither a theory of rules nor a theory of representations constitutes a theory of phonology by itself."

Little did he know how right he was, i.e. how far to the computational extreme OT would take phonology a couple of years later. Intimately intertwined with this movement, though not co-extensive with it, is the anti-derivationalism of the second half of the 1980s: the field rapidly rejected the (logical and chronological) ordering of phonological instructions, and gave birth to a number of theories that marched under the anti-derivational banner: Declarative Phonology, Government Phonology, OT (see Scheer forthcoming).

Despite this record, de Lacy takes the movement between the representational and the computational orientation to be linear, i.e. going from the former to the latter. This is certainly true if one considers just the latest twist of the field, i.e. from the autosegmental 1980s to computation-oriented OT. But the movement is already see-saw, rather than linear, if one zooms out until SPE, which also stood on the far computational end. Despite this, de Lacy divides the (recent) history of phonology into two opposing periods and approaches: OT and 'the dominant theories before OT–SPE and its successors' (13). This suggests the linear perspective of a science that is making steady progress: the version n+1 of phonological theory is more advanced than the version n, which in turn strikes closer to the mark than version n–1. As is shown by Anderson and the simple example of SPE, unfortunately this is not true for the balance between representations and computation, any more than it is, alas, for phonology as a whole.

It would indeed be nice if phonology, like mature science, could be said to be on a linear trajectory from less to more knowledge, in a cumulative movement that builds on and learns from the experience and errors of the past. That this is the case for phonology is the message that the reader will take home when putting the book back on the shelf. I fear, though, that this will sow illusion.

One of the things that de Lacy aims to show in his introductory chapter is that OT is fundamentally distinct from anything that was done in phonology before 1993. The claim that

the evolution of its representational and computational aspects is linear contributes to this agenda. However, globally and locally as regards representation/computation, there is reason to doubt that OT is truly like no other phonological theory, in particular like none of its predecessors. Hulst & Ritter (2000) present a number of aspects in which OT follows in the footsteps of SPE. Overgeneration is one case in point: since the formulation of constraints is not constrained (just as the values of A, B and C are not constrained in the SPE rewrite-system A → B / C), anything and its reverse can be a phonological process. As in SPE, then, the task of distinguishing between occurring and non-occurring patterns must be shifted to a mechanism that is independent of the theory.

4.2. The computation-promoting trope

Another question is WHY theories go down the representational or the computational road. When autosegmental representations were developed, the motivation was clear: gain of insight (tone spreading, the possibility of characterizing the coda disjunction __{#,C} as a single phonological object) and the promise of an efficient instrument against the plague of overgeneration which bedevilled SPE (as mentioned, SPE rules could describe all occurring and non-occurring phonological events). In his introduction to the volume, de Lacy examines the question why the field has progressively replaced representations by computation under the lead of OT. The answer that is given is more or less that representations have been eliminated because their function CAN be taken over by computation: 'OT has allowed the burden of explanation to move from being almost exclusively representation-based to being substantially constraint-based' (24). The question why there SHOULD be such a movement, however, is left unanswered: we do X not so much because we want to do it and have good reasons, but simply because we CAN do it.

It will not take long to understand that the rationale behind this is the fact that OT is a theory of constraint interaction, not of constraints. Particular representations are interchangeable,[8] and the choice of a representation NEVER makes any difference. This is because the only location in OT where grammaticality is assessed is the constraint chamber. Hence whatever items of the representational furniture of the 1980s are used, they are mere decoration: they do not contribute any sovereign arbitral award to the process that determines grammaticality. Drawing representations that are neither primitive (they 'emerge' from constraints) nor have anything to say regarding grammaticality (e.g. a line-crossing chart could be the winner if all other candidates violated a higher-ranked constraint) is a very relative way of talking about representations. Representations that deserve this name (i) are not necessarily the result of computation; (ii) can be ill-formed and in this case make the derivation crash: ill-formedness cannot be outranked, and its arbitral award is not in competition with computation. De Lacy writes that '[i]n summary, much of the burden of explanation has shifted from representational devices to constraint interaction. However, many of the representational devices that were developed in the 1980s remain integral to current phonological analyses' (25). The devices mentioned are of the decorative kind: holdovers of the 1980s that never have the last word.

Coming back to the question of why computation has been promoted and representations demoted under the lead of OT, the answer is arguably the simple fact that OT is a theory of computation – not more, but not less either. Hence the natural tendency to

[8] In the introduction to the book on segmental structure that she edited, Lombardi (2001:3) for example provides a lucid statement of the fact that representations are unimportant and interchangeable in OT as we know it: '[t]he 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'.

promote what it is competent for: computation. The progressive elimination of representations, then, is but a side-effect of the computational trope: we do it this way because we CAN do it like this. We cannot do it the representational way because a tacit decision was made to the end that the ONLY thing that determines grammaticality is constraint interaction.

This proviso, however, does not follow from OT itself. OT is a theory of parallel computation, and parallel computation does not make any claim regarding how much of the explanative pie is computational: the view that the figure is 100% has established itself without discussion or comment and today is part and parcel of OT. Yet it is just one possible attitude. Another view is expressed in a small but growing body of literature to which Marc van Oostendorp has contributed a good deal (e.g. Oostendorp 2002, 2003, 2005, 2006), and which is condensed in Blaho, Bye & Krämer (eds.) (2007). This volume challenges the concept of Freedom of Analysis because you ought not to be free to do what you want with representations. In terms of classical OT grammar, this means that there are restrictions on GEN, which produces only a subset of logically possible candidates.

In his introduction to the volume, de Lacy argues, correctly in my opinion, that there is no such thing as a single unified theory of OT. Rather, 'there is an OT framework and many OT sub-theories' (21). The book in general, and de Lacy's introduction in particular, are an excellent means to get an up-to-date picture of how the 'OT framework' is implemented in all its bourgeoning variety – but it does not allow the reader to identify the contours of this OT framework itself. The question is what the least common denominator of all versions of OT is. The idea that OT is a complete theory of grammar has been tacitly entertained since its inception. Versions of OT that place restrictions on GEN, however, show that this view of OT is overstated: OT is not a theory of grammar; it is just a theory of a piece of grammar, namely computation. As Anderson observes, it takes more than just computation to make a grammar.

The least common denominator of OT, then, is parallel (as opposed to serial) computation that is done on the basis of ranked and violable constraints. That is, anybody who does parallel computation with ranked and violable constraints is doing OT, and whoever does a different kind of computation is not doing OT. All the rest is free and a matter of choice of the analyst, who may or may not be a generativist, may or may not be a functionalist, may or may not assume a modular architecture, may or may not be representationally oriented, may or may not believe in the virtue of serial ordering of phonological (and/or grammatical) events (see below), may use this or that representational system, and so forth.

4.3. The scrambling trope

Unlike unconstrained GEN or Richness of the Base, there is reason to believe that the aforementioned scrambling trope is also a genuine property of OT. A pervasive tendency of OT is to make distinct things indistinct – that is, to put them in the same constraint hierarchy, to intersperse them and to assess them all in one go. John Kingston in his chapter on the interface with phonetics is explicit not only on this fact, but also on the causal relationship between the move from serial to parallel computation and the everything-is-the-same programme: '[r]eplacing serial derivation by parallel evaluation removes the barrier to phonetic constraints being interspersed among and interacting with phonological constraints' (432). Whoever interleaves gradient phonetic constraints with categorical phonological constraints has left Saussurian and Chomskyan territory behind, where phonology is a symbolic system that works on discrete vocabulary. Kingston clearly identifies the alternatives: '[f]uture research will determine whether phonological and phonetic constraint evaluation are a single, integrated process, as advocated by Steriade and Flemming or instead sequential, as advocated by Zsiga' (431).

Kingston's quote also hints at the answer to the question why OT is prone to the scrambling trope: because the modular alternative is serial. If phonology and phonetics are two distinct modules, one works with the output of the other, that is, BEFORE the other. Exactly the same scenario is played out at the other end of phonology, i.e. at its interface with morpho-syntax. As already mentioned (regarding Truckenbrodt's chapter), here as well current – and largely unreflective – OT practice is to briskly interleave phonological and morphological or even syntactic instructions. Modularity is systematically violated by direct reference to morpho-syntactic categories in ALIGN-, WRAP- and so-called interface constraints (on which more below), and it is not even uncommon to come across single constraints whose formulation blends phonological and morphological instructions.

As before, the reason for this indistinction-trope is the rejection of any kind of serial mechanism. Since Chomsky, Halle & Lukoff (1956: 75), the communication between morpho-syntax and phonology in generative theory has been cyclic. Inside–out interpretation is a fundamental insight, and it is necessarily serial: a string of the kind [[[A] B] C] is computed in such a way that first A is assessed, then AB, and finally ABC. Today Chomsky's (2000 et passim) derivation by phase is built entirely on this kind of serial communication with LF and PF. In OT, however, the commitment to non-serialism has prompted the rejection of cyclic derivation altogether (e.g. Kager 1999: 277), a position that is incompatible with generative thinking in general, and with current syntactic theory in particular. In order to avoid derivational inside–out interpretation, OT has produced an anti-cyclicity literature (which has an important intersection with the anti-opacity literature) that proposes alternative, strictly parallel ways of communicating with morpho-syntax: co-phonologies, indexed constraints, Output–Output faithfulness and the aforementioned interface constraints.

The diagnostic thus appears to be clear: the commitment to non-serial computation is the driving force behind the scrambling trope of OT. Despite this built-in tendency, however, adhering to modular-destructive indistinction in grammar is a personal choice of the analyst, not an inevitability. That is, those who argue with anti-derivationalism in order to set up a single constraint hierarchy where phonetic, phonological, morphological and even syntactic constraints are interleaved are making a category mistake: derivation and computation are not the same thing (see Scheer in press).

OT is committed to parallel COMPUTATION, and in generative theory the unit where computation takes place is precisely the module. Grammar is made of several modules, each with its own kind of computation that works on distinct vocabulary (domain specificity). Hence nothing stands in the way of a perspective where all linguistic computation is perfectly parallel, but distributed over distinct and serially ordered computational systems (which may also loop back as in the classical interactionist architecture of Lexical Phonology, revived today in current minimalism as derivation by phase). Crucially, then, communication among modules is not grammatical computation. It is only when non-derivationality is imposed on the entire grammar that the scrambling trope appears. Nothing is wrong with cyclic derivation or the existence of a phonetic module whose input is the output of phonology, so long as one has not decided that the grammatical architecture as such must be non-derivational. This, however, is a personal choice, not a choice that follows from OT.

4.4. Two souls are dwelling in the breast of OT

Why would such a non-derivational choice be made in the first place? Generative thinking takes the opposite position: the generative inverted T model, where LF and PF interpret the result of morpho-syntactic concatenation, is derivational in kind. Given its self-understanding as a generative theory, isn't it strange, then, that OT is so largely prone to the scrambling trope and the extension of parallel computation to the entire grammatical architecture? A relevant

piece of information in this context is that the generative background is only one half of the 'genetic code' of OT: connectionism is the complement. Parallel Distributed Processing (PDP) is the heart of connectionism (Rumelhart et al. 1986). Paul Smolensky, who was at the forefront of the development of connectionism in the late 1980s (Smolensky 1987, 1988), then carried the idea into linguistics, where it has been incarnated as OT.

In cognitive science, connectionism is opposed to the classical theory of the mind; the latter is represented by Fodorian modularity, which among other things builds on the fact that all biological systems are modular in nature (Fodor 1983). While the classical approach is rooted in the serial Turing/von Neumann model of computation that was developed in the 1950s and applied in a number of areas such as computer science, anthropology, psychology and (Chomskyan) linguistics (see Gardner 1985), connectionism promotes parallel computation (e.g. Stillings et al. 1995: 63ff.). Beyond this key property, however, there are some more bones of contention that derive from the connectionist claim that the mind works like the brain.[9]

The basic computational units of the brain are neurons, which have multiple interrelations with other neurons. Mimicking this architecture, in connectionist models every neuron is stimulated by its input neurons, and the sum of these stimuli defines its activation level. Since neurons in the brain carry out computations of various sorts but do not seem to be physiologically predestined for a specific task, connectionism holds that they are not specialized for this or that computation: neurons are colourless, and computation is content-free (whereas modularity is built on the insight that there are specialized computational systems). Connectionist computation therefore cannot be based on a domain-specific vocabulary that is specific for computational systems, as is the case for modularity: any neuron can compute anything, and activation levels are the universal (and only) language that neurons understand. Connectionism is thus non-symbolic (for an overview, see e.g. Fodor & Pylyshyn 1988, Dinsmore 1992).

Finally, since distinctions can only be expressed in terms of activation levels, there is no distinction between storage and computation. In linguistics, this claim is taken up by the most closely allied model, Langacker's Cognitive Grammar (Langacker 1987), which rejects the distinction between a lexicon and a computational system ('the list/rule fallacy', e.g. Bybee 2001: 20f., more on this parallel in Scheer forthcoming).

Of course, OT does not endorse all of these claims: OT does work with symbolic vocabulary, and it does make a distinction between the lexicon and the computational system. In their discussion of the relationship between OT and connectionism, Prince & Smolensky (1993: section 10.2) explicitly recognize a symbolic level of representation. The locus of connectionist non-symbolic computation, then, is an intermediate level between the symbolic level and the physiologically neural functioning of the brain. This conciliatory position that rejects reductionism (the denial of the mind as an independent level of analysis) has been defended by Paul Smolensky since his earliest work (Smolensky 1987, 1988) and down to the present day (Smolensky & Legendre 2006).

Nevertheless, in practice OT shows clear remnants of the non-commitment to the symbolic world. Like connectionism, OT is content-free in the sense that it is a theory of constraint interaction, not of constraints: OT is not committed to, nor does it develop, any specific representational vocabulary (representations are interchangeable, see section 4.2). The scrambling trope of OT is also a connectionist inheritance: connectionist computation is parallel and ALL-PURPOSE, as opposed to serial and specialized computation on the modular side. The interrelation of these two properties is precisely what Kingston's observation (section 4.3 above) is about: OT has a natural tendency for indistinction because it is

[9] In the purest reductionist implementation, there is no difference between mind and brain at all: the existence of the mind is simply denied (e.g. Churchland 1993).

committed to parallel computation. In other words, its connectionist roots are at odds with its generative endowment, which calls for a modular architecture.

The question is thus whether the cherry-picking of items in the densely interrelated network of the connectionist bag is viable. Prince & Smolensky (1993, section 10.2) reject basically all tenets of connectionism save one, parallel computation. Parallel computation is represented by the two Ps in PDP (Parallel Distributed Processing), but Prince & Smolensky do not address the question of the D ('Distributedness'), which is anti-modular. Kingston's observation is that the D appears to be a direct consequence of parallel computation, which also tends to be all-purpose: as a mate of the two Ps, the D is constantly affecting OT practice (albeit without explicit discussion) and has induced the scrambling trope, i.e. the creeping dissolution of modular contours. The same holds true for content-free computation, which first made representations irrelevant and interchangeable, and is now dissolving them in computation.

The conclusion, then, is that parallel computation has probably entered the generative paradigm with some additional empiricist baggage that Prince & Smolensky (1993) did not really want to have on board, and the question for further study is whether a theory can be designed that upholds the rationalist and anti-empiricist core of generative grammar while implementing constraint-based and parallel computation.

That one can resist the scrambling trope is shown by the fact that there exist derivational versions of OT: DOT (Rubach 1997 and elsewhere), Stratal OT (Kiparsky 2000, Bermúdez-Otero forthcoming). These have shrunk the scope of the anti-derivational claim, which in these approaches applies only to computational systems (note that McCarthy's 2007 OT-CC is different in that here derivational elements are imported INTO the phonological computation; hence McCarthy gives up on anti-serialism altogether).

4.5. Consequences for the Handbook: where is morphology?

The two tropes concerning computation and scrambling conspire to produce a surprising result for a handbook of phonology: the relationship with of phonology with morphology remains by and large unexamined. It was already mentioned that the reader has to go to the chapter on diachronic phonology in order to even be presented with the question of the position of phonology in the architecture of grammar. While two specific morphological issues are addressed in Part IV on Internal Interfaces (morpheme position (Ussishkin) and reduplication (Urbanczyk)), the core of the phonology–morphology interface is confined to three pages of discussion on cyclicity in McCarthy's chapter on derivations and the levels of representation. The reader may even feel that morphology has been purposefully avoided: there are two interface chapters, one on the relationship of phonology with syntax (Truckenbrodt), the other with phonetics (Kingston), but no equivalent for morphology is found.

This is certainly a serious shortcoming of the book's design. There is a long-standing tradition in phonology that attempts to come to grips with morphological matters, whose most elaborated expressions in generative quarters are Lexical Phonology (for serial aspects related to the cyclic processing of complex strings) and Prosodic Phonology (for representational aspects). Both are absent from the book, as is the sizeable body of OT literature that has developed related tools such as Output–Output constraints (analogy), Paradigm Uniformity and the selection of output bases, to name just a few. Also, subjects such as affix classes (English class 1 vs. class 2) and phonologically driven allomorph selection, which have played and continue to play an important role in the discussion, are not covered.

Facing this situation, an anonymous reviewer of the present article writes the following:

> "These deficiencies in the coverage of the morphology–phonology interface constitute another symptom, I think, of the problem diagnosed in this article: namely, OT abuse (the mistaking of OT for a complete theory of phonology). When imperialistic OT phonology arrives at the interface of phonology with morphology, it does not pause to ask what morphology is or what morphologists have to say about it, but blithely proceeds to impose home-grown (and self-serving) solutions on interface problems."

This seems to me an apt description of the way in which OT deals with morphology, and of the footprint thereof in the book.

4.6. Functionalism and gradience vs. autonomous and self-contained langue?

Finally, regarding the trend towards the inclusion of functional, phonetic, statistical and gradient factors in grammar (another footprint of the scrambling trope) that de Lacy documents in his introduction, the following observation is instructive: the four chapters of the book that explicitly address the question of the place of these factors in grammar (Kingston's on the interface with phonology, Alderete & Frisch's on dissimilation, Bermúdez-Otero's on diachronic phonology and Fikkert's on acquisition) all conclude that parole is certainly a factor in language – but not in langue. That is, those authors who are most intimately concerned with the study of gradience and functional factors conclude that grammar must be modular, and that there is a self-contained grammatical core which follows no rule but its own. The last sentence of Alderete & Frisch's chapter, for example, states that 'even the most gradient and statistical model requires some sort of categorical underpinning to account for phonological generalizations' (398).

These four contributions are at variance with common practice in OT, where langue and parole are scrambled without discussion of the architectural and/or modular issue. Gordon's chapter on functionalism provides an overview of the practice of encoding or not encoding gradience in constraints, but the question whether gradience in constraints is itself a good or a bad thing to have, and what its implications are in a generative perspective, is not discussed.

The treatment of gradience and functional factors thus shows that OT as such is agnostic in this area as well: building parole into langue and hence leaving Saussurian/Chomskyan ground is a personal choice of the analyst. The trend to do so, though, is promoted by the scrambling trope that OT has inherited from its connectionist endowment.

5. Conclusion: a lot of things that OT is not

At bottom, then, what is OT? It is NOT a theory of representations (there are no genuine OT representations). It is NOT a theory of the architecture of grammar (most versions fall prey to the anti-modular scrambling trope, but there are also modular implementations). It is NOT a complete theory of grammar (there are versions of OT that subtract certain decisions from the constraint chamber, for example by transferring them to representations and/or restrictions on GEN). It is NOT an anti-derivational theory (only computation must be parallel; the communication among computational systems may well be serial). It is NOT a theory of the lexicon (there are versions of OT where Richness of the Base plays no role, i.e. where lexical entries may or even have to be specific in one way or another, cf. Blaho et al. 2007). It is NOT a functionalist theory (building functionalist content into constraints is a private decision made by the analyst).

OT is a theory of computation which holds that computation is parallel, and that it is based on ranked and violable constraints. All the rest is a matter of private decision, which however is oriented by the two tropes which belong to the theory's genetic endowement: the trope for scrambling and for being content-free. Both embody an invitation to expand OT's competence: to relationships among computational systems and to representations. And both

expansions are unwarranted: OT is not a theory of grammar, and OT cannot replace representations by (parallel) computation. Computation needs something to work on, and this something must be ontologically independent: rather than being a function of computation ('emergent'), representations must exist in their own right and contribute a sovereign (i.e. unoutrankable) arbitral award to the definition of grammaticality.

The scope and self-understanding of OT thus needs to be shrunk: rather than BEING the grammar, OT is just a piece of it, namely the grammatical device that defines how computation works. All other pieces – the lexicon, representations, the general architecture – are subject to independent assessment and choice.

In his introductory chapter (14ff.), de Lacy reviews the advantages of parallel over serial computation: a better way of handling ordering paradoxes, global conditions, conspiracy.[10] This is where the debate between OT and theories of serial computation should lie, and this is what OT has contributed to the field. All other debates must be conducted independently. It is unfortunate that the field of phonology, and hence its reflection in the handbook, gives the appearance of being empiricist, functionalist, representation-unfriendly and non-modular as a consequence of OT. Poor OT is not responsible for any of these properties, even if it has to struggle against its genetic predisposition for the indiscriminate promotion of indistinction and computation.

References

Items followed by the mention WEB are available at http://www.unice.fr/dsl/tobias.htm.

Adger, David 2007. Stress and Phasal Syntax. Linguistic Analysis 33: 238-266.

Anderson, John & Charles Jones 1974. Three theses concerning phonological representations. Journal of Linguistics 10: 1-26.

Anderson, Stephen 1982. The analysis of French shwa: or, how to get something for nothing. Language 58: 534-573. WEB.

Anderson, Stephen 1985. Phonology in the Twentieth Century. Chicago: University of Chicago Press.

Anttila, Arto 2002. Morphologically conditioned phonological alternations. Natural Language and Linguistic Theory 20: 1-42.

Archangeli, Diana 1988. Aspects of underspecification theory. Phonology 5: 183-208.

Baković, Eric 2007. A revised typology of opaque generalizations. Phonology 24: 217-259.

Bermúdez-Otero, Ricardo forthcoming. Stratal Optimality Theory. Oxford: Oxford University Press.

Bickmore, Lee 1995. Accounting for Compensatory Lengthening in the CV and moraic frameworks. Frontiers of Phonology, edited by Jacques Durand & Francis Katamba, 119-148. Londres & New York: Longman.

Blaho, Sylvia 2008. The syntax of phonology. A radically substance-free approach. Ph.D dissertation, University of Tromsø.

Blaho, Sylvia, Patrick Bye & Martin Krämer (eds.) 2007. Freedom of analysis? Berlin: Mouton de Gruyter.

Botma, Bert 2004. Phonological Aspects of Nasality. An Element-Based Dependency Approach. Ph.D dissertation, University of Amsterdam.

Bresnan, Joan 1971. Sentence stress and syntactic transformations. Language 47: 257-281.

Burzio, Luigi 1994. Principles of English stress. Cambridge: Cambridge University Press.

Bybee, Joan 2001. Phonology and Language Use. Cambridge: Cambridge University Press.

Calabrese, Andrea 2005. Markedness and Economy in a Derivational Model of Phonology.

[10] The expression of parametric variation might have been added, though it is true that this is not anything that is covered by ordered rules.

Berlin: Mouton de Gruyter.
Carvalho, Joaquim Brandão de 2002. Formally-grounded phonology: from constraint-based theories to theory-based constraints. Studia Linguistica 56: 227-263.
Carvalho, Joaquim Brandão de 2006. Markedness gradient in the Portuguese verb : How morphology and phonology interact. Prosody and Syntax, edited by Ivan Fónagy, Yuji Kawaguchi & Tsunekazu Moriguchi, 157-174. Amsterdam: Benjamins.
Charette, Monik & Asli Göksel 1994. Vowel Harmony and Switching in Turkic languages. SOAS Working Papers in Linguistics and Phonetics. 4: 31-52. Also in Kardela, Henryk, Bogdan Szymanek (eds.), A Festschrift for Edmund Gussmann, 29-56. Lublin 1996: University Press of the Catholic University of Lublin. WEB.
Charette, Monik & Asli Göksel 1996. Licensing constraints and vowel harmony in Turkic languages. SOAS Working Papers in Linguistics and Phonetics 6: 1-25. Also in Cyran, Eugeniusz (ed), Structure and Interpretation. Studies in Phonology, 65-88. Lublin 1998: Folium. WEB.
Chomsky, Noam 2000. Minimalist inquiries: the framework. Step by Step. Essays on Minimalist Syntax in Honor of Howard Lasnik, edited by Roger Martin, David Michaels & Juan Uriagereka, 89-155. Cambridge, Mass.: MIT Press.
Chomsky, Noam, Morris Halle & Fred Lukoff 1956. On Accent and Juncture in English. For Roman Jakobson. Essays on the occasion of his sixtieth birthday, edited by Morris Halle, Horace Lunt, Hugh McLean & Cornelis van Schooneveld, 65-80. The Hague: Mouton.
Churchland, Patricia 1993. Can Neurobiology teach us anything about consciousness? Proceedings and Addresses of the American Philosophical Association 67.3: 23-40.
Clements, George 2001. Representational economy in constraint-based phonology. Distinctive Feature Theory, edited by Tracy Hall, 71-146. Berlin, New York: Mouton de Gruyter.
Clements, George & Elizabeth Hume 1995. The Internal Organization of Speech Sounds. The Handbook of Phonological Theory, edited by John Goldsmith, 245-306. Oxford: Blackwell.
Cyran, Eugeniusz 2003. Complexity Scales and Licensing Strength in Phonology. Lublin: KUL.
Dinsmore, John (ed.) 1992. The symbolic and connectionist paradigms: closing the gap. Hillsdale: Erlbaum.
Dresher, Elan 2003. Contrast and asymmetries in inventories. Asymmetry in Grammar, Volume 2: Morphology, Phonology, Acquisition, edited by Anna-Maria di Sciullo, 239-257. Amsterdam: Benjamins.
Dresher, Elan 2008. The Logic of Contrast. Foundational Issues in Linguistic Theory. Essays in Honor of Jean-Roger Vergnaud, edited by Robert Freidin, Carlos P. Otero & Maria Luisa Zubizarreta, 359-380. Cambridge, MA: MIT Press.
Dresher, Elan 2009. The contrastive hierarchy in phonology. Cambridge: Cambridge University Press.
Dziubalska-Kołaczyk, Katarzyna 2002. Beats-and-binding phonology. Frankfurt am Main: Lang.
Fodor, Jerry 1983. The modularity of the mind. Cambridge, Mass.: MIT-Bradford.
Fodor, Jerry & Zenon Pylyshyn 1988. Connectionnism and cognitive architecture: a Critical analysis. Connections and Symbols, edited by Steven Pinker & Jacques Mehler, 3-73. Cambridge, Mass.: MIT Press.
Gardner, Howard 1985. The Mind's New Science: A History of the Cognitive Revolution. New York: Basic Books.
Goldsmith, John (ed.) 1995. The Handbook of Phonological Theory. Oxford: Blackwell.

Gussmann, Edmund & John Harris 1998. Final Codas: why the west was wrong. Structure and Interpretation. Studies in Phonology, edited by Eugeniusz Cyran, 139-162. Lublin: Folium. WEB.

Gussmann, Edmund & John Harris 2002. Word-final onsets. UCL Working Papers in Linguistics 14: 1-42.

Hale, Mark & Charles Reiss 1998. Formal and Empirical Arguments concerning Phonological Acquisition. Linguistic Inquiry 29: 656-683.

Hale, Mark & Charles Reiss 2000. Substance Abuse and Dysfunctionalism: Current Trends in Phonology. Linguistic Inquiry 31: 157-169.

Hale, Mark & Charles Reiss 2008. The Phonological Enterprise. Oxford: OUP.

Hall, Tracy 2001. Introduction: Phonological representations and phonetic implementation of distinctive features. Distinctive Feature Theory, edited by Tracy Hall, 1-40. Berlin, New York: Mouton de Gruyter.

Halle, Morris 2008. Reduplication. Foundational Issues in Linguistic Theory. Essays in Honor of Jean-Roger Vergnaud edited by Robert Freidin, Carlos P. Otero & Maria Luisa Zubizarreta, 325-357. Cambridge, MA: MIT Press.

Halle, Morris & Ora Matushansky 2006. The Morphophonology of Russian Adjectival Inflection. Linguistic Inquiry 37: 351-404.

Halle, Morris & Jean-Roger Vergnaud 1980. Three-dimensional phonology. Journal of Linguistic Research 1: 83-105.

Halle, Morris & Jean-Roger Vergnaud 1987. An Essay on Stress. Cambridge, Mass.: MIT Press.

Hargus, Sharon & Ellen Kaisse (eds.) 1993. Studies in Lexical Phonology. New York: Academic Press.

Hauser, Marc, Noam Chomsky & Tecumseh Fitch 2002. The faculty of language: what is it, who has it, and how did it evolve ? Science 298: 1569-1579.

Hayes, Bruce 1989. Compensatory Lengthening in Moraic Phonology. Linguistic Inquiry 20: 253-306.

Hulst, Harry van der 2005. Why phonology is the same. Organizing Grammar. Studies in Honor of Henk van Riemsdijk, edited by Hans Broekhuis, Norbert Corver, Riny Huybregts, Ursula Kleinhenz & Jan Koster, 252-262. Berlin: Mouton de Gruyter.

Hulst, Harry van der & Nancy Ritter 1999a. Head-Driven Phonology. The syllable, Views and Facts, edited by Harry van der Hulst & Nancy Ritter, 113-167. Berlin, New York: de Gruyter.

Hulst, Harry van der & Nancy Ritter 1999b. Theories of the syllable. The Syllable, Views and Facts, edited by Harry van der Hulst & Nancy Ritter, 13-52. Berlin, New York: de Gruyter.

Hulst, Harry van der & Nancy Ritter 2000. The SPE-heritage of Optimality Theory. The Linguistic Review 17: 259-289.

Hurch, Bernhard & Richard Rhodes (eds.) 1996. Natural Phonology: The State of the Art. Berlin: Mouton de Gruyter.

Idsardi, William 2000. Clarifying opacity. The linguistic review 17: 337-550.

Kager, René 1999. Optimality Theory. Cambridge: Cambridge University Press.

Kaisse, Ellen 1985. Connected Speech. The interaction of Syntax and Phonology. London, New York: Academic Press.

Kaye, Jonathan 2001. Working with licensing constraints. Constraints and Preferences, edited by Katarzyna Dziubalska-Kołaczyk, 251-268. Berlin & New York: Mouton de Gruyter. WEB.

Kaye, Jonathan 2005. "GP, I'll have to put your flat feet on the ground". Organizing Grammar. Studies in Honor of Henk van Riemsdijk, edited by Hans Broekhuis,

Norbert Corver, Riny Huybregts, Ursula Kleinhenz & Jan Koster, 283-288. Berlin: Mouton de Gruyter.
Keane, Elinor 2005. Phrasal reduplication and dual description. Studies on Reduplication, edited by Bernhard Hurch, 239-261. Berlin: Mouton de Gruyter.
Kiparsky, Paul 1979. Metrical Structure Assignment is Cyclic. Linguistic Inquiry 10: 421-441.
Kiparsky, Paul 1991. Catalexis. Ms., Stanford University.
Kiparsky, Paul 2000. Opacity and cyclicity. The Linguistic Review 17: 351-365.
Kisseberth, Charles 1970. On the functional unity of phonological rules. Linguistic Inquiry 1: 291-306.
Ladd, Robert 1986. Intonational phrasing: the case for recursive prosodic structure. Phonology 3: 311-340.
Langacker, Ronald 1987. Foundations of Cognitive Grammar, 2 Vols. Stanford: Stanford University Press.
Lombardi, Linda (ed) 2001. Segmental phonology in Optimality Theory. Constraints and Representations. Cambridge: Cambridge University Press.
Lowenstamm, Jean 1996. CV as the only syllable type. Current trends in Phonology. Models and Methods, edited by Jacques Durand & Bernard Laks, 419-441. Salford, Manchester: ESRI. WEB.
Lowenstamm, Jean 2003. Remarks on mutae cum liquida and branching onsets. Living on the Edge. 28 papers in honour of Jonathan Kaye, edited by Stefan Ploch, 339-363. Berlin, New York: Mouton de Gruyter.
Martinet, André 1955. Economie des changements phonétiques. Berne: Francke.
McCarthy, John 1979. Formal problems in Semitic phonology and morphology. Ph.D dissertation, MIT. PubliéeàNewYork1985:GarlandPress.
McCarthy, John 2002. A Thematic Guide to Optimality Theory. Cambridge: Cambridge University Press.
McCarthy, John 2007. Hidden Generalizations: Phonological Opacity in Optimality Theory. London: Equinox.
McCarthy, John & Alan Prince 1993. Generalized Alignment. Yearbook of Morphology 1993, edited by Geert Booij & Jaap van Marle, 79-153. Dordrecht: Kluwer. Abridged version in McCarthy, John (ed.) 2004. Optimality Theory in Phonology, 451-463. Oxford: Blackwell.
Myers, Scott 1991. Persistent rules. Linguistic Inquiry 22: 315-344.
Nasukawa, Kuniya 2005. A Unified Approach to Nasality and Voicing. Berlin: Mouton deGruyter.
Nespor, Marina & Irene Vogel 1986. Prosodic Phonology. Dordrecht: Foris.
Odden, David 1987. Kimatuumbi phrasal phonology. Phonology 4: 13-26.
Ohala, John 1972. How to represent natural sound patterns. Project on Linguistic Analysis (Berkeley) 16: 40-57.
Oostendorp, Marc van 2002. The phonological and morphological status of the Prosodic Word Adjunct. Linguistische Berichte, Sonderheft 11: 209-235.
Oostendorp, Marc van 2003. Ambisyllabicity and Fricative Voicing in West-Germanic Dialects. The Syllable in Optimality Theory, edited by Caroline Féry & Ruben van de Vijver, 304-337. Cambridge: Cambridge University Press.
Oostendorp, Marc van 2005. The first person singular in Dutch dialects. Proceedings of the Thirty-Fifth Annual Meeting of the North East Linguistic Society, edited by Leah Bateman & Cherlon Ussery, 1-12. Amherst, MA: GLSA.
Oostendorp, Marc van 2006. A theory of morphosyntactic colours. Ms., Meertens Instituut.
Pinker, Steven & Ray Jackendoff 2005a. The faculty of language: what's special about it ?

Cognition 95: 201-236.
Pinker, Steven & Ray Jackendoff 2005b. The nature of the language faculty and its implications for the evolution of language (Reply to Fitch, Hauser and Chomsky). Cognition 97: 211-225.
Ploch, Stefan 1999. Nasals on my mind. Ph.D dissertation, SOAS, London.
Pöchtrager, Markus 2006. The structure of length. Ph.D dissertation, University of Vienna. WEB.
Prince, Alan & Paul Smolensky 1993. Optimality Theory. Constraint Interaction in Generative Grammar.
Prunet, Jean-François, Ali Idrissi & Renée Béland 2000. The mental representation of Semitic Words. Linguistic Inquiry 31: 609-648.
Prunet, Jean-François, Ali Idrissi & Renée Béland 2008. On the mental representation of Arabic roots. Linguistic Inquiry 39: 221-259.
Raimy, Eric 2000. The phonology and morphology of reduplication. Berlin: Mouton de Gruyter.
Raimy, Eric & Charles Cairns (ed.) forthcoming. Architecture and Representations in Phonological Theory. Cambridge, Mass.: MIT Press.
Rice, Curt 2003. OT, 10 years later. Paper presented at the PFC conference Phonologie et phonétique du français: données et théories, Paris, 11-13 December.
Ritter, Nancy 2006. Georgian Consonant Clusters: The complexity is in the structure, not in the melody. The Linguistic Review 23: 429-464.
Rubach, Jerzy 1997. Extrasyllabic consonants in Polish: Derivational Optimality Theory. Derivations and Constraints in Phonology, edited by Iggy Roca, 551-581. Oxford: Clarendon.
Rumelhart, David E., James L. McClelland & the PDP Research Group (eds.) 1986. Parallel Distributed Processing: Exploration in the Micro-Structure of Cognition. 2 vols. Cambridge, Mass.: MIT Press.
Scheer, Tobias 2004. A Lateral Theory of Phonology. Vol.1: What is CVCV, and why should it be? Berlin: Mouton de Gruyter.
Scheer, Tobias in press. Generative phonology and its evolution. The Continuum Companion to Phonology, edited by Bert Botma, Nancy Kula & Kuniya Nasukawa. London: Continuum.
Scheer, Tobias forthcoming. How morpho-syntax talks to phonology. A survey of extra-phonological information in phonology since Trubetzkoy's Grenzsignale. Berlin: Mouton de Gruyter.
Selkirk, Elisabeth 1984. Phonology and Syntax: The Relation between Sound and Structure. Cambridge, Mass.: MIT Press.
Smolensky, Paul 1987. Connectionist AI, symbolic AI, and the brain. Artificial Intelligence Review 1: 95-109.
Smolensky, Paul 1988. On the proper treatment of connectionism. Brain and Behavioural Sciences 11: 1-74.
Smolensky, Paul & Geraldine Legendre 2006. The Harmonic Mind. From Neural Computation to Optimality-Theoretic Grammar, 2 Vols. Cambrdige, Mass.: MIT Press.
Spencer, Andrew 1986. A non-linear analysis of vowel-zero alternations in Polish. Journal of Linguistics 22: 249-280. WEB.
Stillings, Neil, Steven Weisler, Christopher Chase, Mark Feinstein, Jay Garfield & Edwina Rissland 1995. Cognitive Science. An Introduction. Cambrdige, Mass.: MIT Press.
Szendrői, Kriszta 2003. A stress-based approach to the syntax of Hungarian focus. The Linguistic Review 20: 37-78.

Szigetvári, Péter 2001. Dismantling syllable structure. Acta Linguistica Hungarica 48: 155-181.

Szigetvári, Péter & Tobias Scheer 2005. Unified representations for the syllable and stress. Phonology 22: 37-75.

Vaux, Bert 2003. Syllabification in Armenian, Universal Grammar, and the Lexicon. Linguistic Inquiry 34: 91-125.

Wagner, Michael 2005. Prosody and Recursion. PhD. dissertation, MIT.

Yip, Moira 1998. Identity Avoidance in Phonology and Morphology. Morphology and its Relation to Phonology and Syntax, edited by Steven Lapointe, Diane Brentari & Patrick Farrell, 216-246. Stanford: CSLI Publications.

Zwicky, Arnold & Geoffrey Pullum 1986. The Principle of Phonology-free Syntax: introductory remarks. Ohio State University Working Papers in Linguistics 32: 63-91.