

REVIEW ARTICLE

What OT is, and what it is not¹

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Paul de Lacy (ed.), *The Cambridge handbook of phonology*. Cambridge: Cambridge University Press, 2007. Pp. x + 697.

I. OVERVIEW

I.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’.² 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

[1] I am indebted to two anonymous *JL* reviewers as well as to Paul de Lacy, whose comments have greatly helped to improve the article.

[2] Rice (2003) has made a similar inquiry, with about the same result.

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 out in greater detail, but only in the museum department: current research is exclusively represented by OT.³

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, *in press*; 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 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 *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

[3] 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 & Pulleyblank's chapter on harmony and Bermúdez-Otero's contribution regarding diachronic phonology.

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).

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 (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.⁴

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), 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.⁵

2. DESIGN PROPERTIES OF THE BOOK

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 on 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.

[4] 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.

[5] 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.

It can be confirmed that this is how the book is certainly used best: every effort has been made, and successfully made, to facilitate ease of thematic access for the reader.

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.

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 (the same goes for the strange journal-title abbreviations used, e.g. 'Ln' for *Lingua*). 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, 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.

3. THE BOOK AND ITS CHAPTERS

3.1 *Different types of chapters*

Below I comment on clusters of chapters according to some common property (this section), and on four individual cases (in the following section). These have been selected (out of a number of others which could not make it into the abridged version of the review) according to their relevance for

section 4, in order to have at least one critical and one positive review of individual chapters, and also according to my own current interests, which revolve around the interface with morpho-syntax.

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 & 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 (Moiria 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 Stemmer (phonological impairment in children and adults).

3.2 *Four individual chapters*

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 from 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.

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, Chomsky & Fitch (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.

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.⁶ 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

[6] 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.

words, OT does mapping in the phonology and thereby restores direct reference.⁷

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.

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

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

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.⁸ 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.

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

[8] 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.

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 $A \rightarrow B / C$), 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 bedeviled 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,⁹ 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 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

[9] 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'.

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 (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-cyclicality 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.¹⁰

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

[10] 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).

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 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 endowment: 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.¹¹ 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

- Adger, David. 2007. Stress and phasal syntax. *Linguistic Analysis* 33, 238–266.
- Anderson, Stephen. 1982. The analysis of French shwa: Or, how to get something for nothing. *Language* 58, 534–573.
- Anderson, Stephen. 1985. *Phonology in the twentieth century*. Chicago: University of Chicago Press.
- Anttila, Arto. 2002. Morphologically conditioned phonological alternations. *Natural Language & Linguistic Theory* 20, 1–42.
- 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. In Jacques Durand & Francis Katamba (eds.), *Frontiers of phonology*, 119–148. London & 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.
- Bresnan, Joan. 1971. Sentence stress and syntactic transformations. *Language* 47, 257–281.
- Broekhuis, Hans, Norbert Corver, Riny Huybregts, Ursula Kleinhenz & Jan Koster (eds.). 2005. *Organizing grammar: Studies in honor of Henk van Riemsdijk*. Berlin: Mouton de Gruyter.
- 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*. 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. In Ivan Fónagy, Yuji Kawaguchi & Tsunekazu Moriguchi (eds.), *Prosody and syntax*, 157–174. Amsterdam: John 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 Henryk Kardela & Bogdan

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

- Szymanek (eds.), *A Festschrift for Edmund Gussmann*, 29–56. Lublin: University Press of the Catholic University of Lublin, 1996.]
- 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 (ed.), 65–88.]
- Chomsky, Noam. 2000. Minimalist inquiries: The framework. In Roger Martin, David Michaels & Juan Uriagereka (eds.), *Step by step: Essays on Minimalist syntax in honor of Howard Lasnik*, 89–155. Cambridge, MA: MIT Press.
- Chomsky, Noam, Morris Halle & Fred Lukoff. 1956. On accent and juncture in English. In Morris Halle, Horace Lunt, Hugh McLean & Cornelis van Schooneveld (eds.), *For Roman Jakobson: Essays on the occasion of his sixtieth birthday*, 65–80. The Hague: Mouton.
- Churchland, Patricia. 1993. Can neurobiology teach us anything about consciousness? *The American Philosophical Association* 67.3, 23–40.
- Cyran, Eugeniusz (ed.). 1998. *Structure and interpretation: Studies in phonology*. Lublin: Folium.
- Cyran, Eugeniusz. 2003. *Complexity scales and licensing strength in phonology*. Lublin: Catholic University of Lublin.
- Dinsmore, John (ed.). 1992. *The symbolic and connectionist paradigms: Closing the gap*. Hillsdale, NJ: Lawrence Erlbaum.
- Dresher, Elan. 2003. Contrast and asymmetries in inventories. In Anna-Maria di Sciullo (ed.), *Asymmetry in grammar*, vol. 2: *Morphology, phonology, acquisition*, 239–257. Amsterdam: John Benjamins.
- Dresher, Elan. 2008. The logic of contrast. In Freidin et al. (eds.), 359–380.
- Dresher, Elan. In press. *The contrastive hierarchy in phonology*. Cambridge: Cambridge University Press.
- Dziubalska-Kolaczyk, Katarzyna. 2002. *Beats-and-binding phonology*. Frankfurt am Main: Peter Lang.
- Fodor, Jerry. 1983. *The modularity of the mind*. Cambridge, MA: MIT Press.
- Fodor, Jerry & Zenon Pylyshyn. 1988. Connectionism and cognitive architecture: A critical analysis. In Steven Pinker & Jacques Mehler (eds.), *Connections and symbols*, 3–73. Cambridge, MA: MIT Press.
- Freidin, Robert, Carlos P. Otero & Maria Luisa Zubizarreta (eds.). 2008. *Foundational issues in linguistic theory: Essays in honor of Jean-Roger Vergnaud*. Cambridge, MA: 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. In Cyran (ed.), 139–162.
- 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 dysfunctionism: Current trends in phonology. *Linguistic Inquiry* 31, 157–169.
- Hale, Mark & Charles Reiss. 2008. *The phonological enterprise*. Oxford: Oxford University Press.
- Halle, Morris. 2008. Reduplication. In Freidin et al. (eds.), 325–357.
- 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.
- 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. In Broekhuis et al. (eds.), 252–262.
- Hulst, Harry van der & Nancy Ritter. 1999a. Head-driven phonology. In van der Hulst & Ritter (eds.), 113–167.

- Hulst, Harry van der & Nancy Ritter. 1999b. Theories of the syllable. In van der Hulst & Ritter (eds.), 13–52.
- Hulst, Harry van der & Nancy Ritter (eds.). 1999c. *The syllable: Views and facts*. Berlin & New York: Mouton 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, 337–350.
- 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. In Katarzyna Dziubalska-Kolaczyk (ed.), *Constraints and preferences*, 251–268. Berlin & New York: Mouton de Gruyter.
- Kaye, Jonathan. 2005. ‘GP, I’ll have to put your flat feet on the ground’. In Broekhuis et al. (eds.), 283–288. Berlin: Mouton de Gruyter.
- Keane, Elinor. 2005. Phrasal reduplication and dual description. In Bernhard Hurch (ed.), *Studies on reduplication*, 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, D. Robert. 1986. Intonational phrasing: The case for recursive prosodic structure. *Phonology* 3, 311–340.
- Langacker, Ronald. 1987. *Foundations of Cognitive Grammar*, 2 vols. Stanford, CA: Stanford University Press.
- Lombardi, Linda. 2001. Introduction. In Linda Lombardi (ed.), *Segmental phonology in Optimality Theory: Constraints and representations*, 1–9. Cambridge: Cambridge University Press.
- Lowenstamm, Jean. 1996. CV as the only syllable type. In Jacques Durand & Bernard Laks (eds.), *Current trends in phonology: Models and methods*, 419–441. Salford, England: European Studies Research Institute (ESRI).
- Lowenstamm, Jean. 2003. Remarks on mutae cum liquida and branching onsets. In Stefan Ploch (ed.), *Living on the edge: 28 papers in honour of Jonathan Kaye*, 339–363. Berlin & New York: Mouton de Gruyter.
- 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.
- 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* (special issue) 11, 209–235.
- Oostendorp, Marc van. 2003. Ambisyllabicity and fricative voicing in West-Germanic dialects. In Caroline Féry & Ruben van de Vijver (eds.), *The syllable in Optimality Theory*, 304–337. Cambridge: Cambridge University Press.
- Oostendorp, Marc van. 2005. The first person singular in Dutch dialects. In Leah Bateman & Cherlon Ussery (eds.), *Thirty-fifth Annual Meeting of the North East Linguistic Society (NELS 35)*, 1–12. Amherst, MA: Graduate Linguistic Student Association (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.
- Pöchtrager, Markus. 2006. *The structure of length*. Ph.D. dissertation, University of Vienna.

- Prince, Alan & Paul Smolensky. 1993. Optimality Theory: Constraint interaction in generative grammar. Ms., Rutgers University & University of Colorado (ROA version August 2002).
- 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, MA: MIT Press.
- Rice, Curt. 2003. OT, 10 years later. Presented at the PFC [Phonologie du Français Contemporain] 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. In Iggy Roca (ed.), *Derivations and constraints in phonology*, 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, MA: 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. Forthcoming. *How morpho-syntax talks to phonology: A survey of extra-phonological information in phonology since Trubetzkoy's Grenzsignale*. Berlin: Mouton de Gruyter.
- Scheer, Tobias. In press. Generative phonology and its evolution. In Bert Botma, Nancy Kula & Kuniya Nasukawa (eds.), *The Continuum companion to phonology*. London: Continuum.
- Selkirk, Elisabeth. 1984. *Phonology and syntax: The relation between sound and structure*. Cambridge, MA: 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. Cambridge, MA: MIT Press.
- Spencer, Andrew. 1986. A non-linear analysis of vowel-zero alternations in Polish. *Journal of Linguistics* 22, 249–280.
- Stillings, Neil, Steven Weisler, Christopher Chase, Mark Feinstein, Jay Garfield & Edwina Rissland. 1995. *Cognitive science: An introduction*. Cambridge, MA: 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*. Ph.D. dissertation, MIT.
- Yip, Moira. 1998. Identity avoidance in phonology and morphology. In Steven Lapointe, Diane Brentari & Patrick Farrell (eds.), *Morphology and its relation to phonology and syntax*, 216–246. Stanford, CA: CSLI Publications.
- Zwicky, Arnold & Geoffrey K. Pullum. 1986. The principle of phonology-free syntax: Introductory remarks. *Ohio State University Working Papers in Linguistics* 32, 63–91.
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