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pointed out in reviews of individual papers, not all present new data or analyses. However, the generally high quality of the work and the typologically diverse language data presented make this a thought-provoking book that achieves significant progress in solving some perennially sticky problems.

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**Michael Hammond**, *The phonology of English: a prosodic optimality-theoretic approach* (The Phonology of the World's Languages). Oxford: Oxford University Press, 1999. Pp xvi + 368.

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Now that Optimality Theory (OT) has reached the status of textbook orthodoxy in phonology (see, amongst others, Kager 1999), it is not surprising that Michael Hammond's *the Phonology of English* (henceforth PE), the sixth volume in OUP's series *The Phonology of the World's Languages*, should be subtitled '*a prosodic optimality-theoretic approach*'. Or, at least, the '*optimality-theoretic*' part is not surprising. The '*prosodic*' part is worthy of comment, and we shall return to this point below.

OT has provided a new perspective on several aspects of phonology and is a fertile area for debate, both as to whether the theory is on the right lines at all and, if so, what kind of theoretical devices it needs. Given that such foundational OT texts as Prince & Smolensky (1993) are still not officially published at the time of writing, works such as PE (which to my knowledge is the first volume which confronts OT with a range of data from a single language) are, in principle, welcome.

The book is wide in scope. Hammond writes of the volume: 'the perspective taken is introductory ... I assume no prior knowledge of English

phonology or of OT' (vii) but, also, that PE 'makes a number of novel theoretical proposals within Optimality Theory' (viii). It is intended for both students new to phonology and 'technical OT phonologists' (viii). This gives the book an intriguing multiple aim – to be both monograph and textbook, for English, OT and phonology. Hammond justifies this with the observation that it thus provides 'a unique pedagogical opportunity for students to understand Optimality Theory (since the data are familiar) and a unique opportunity to test this theory (since the data are so complex)' (vii). This is laudable, but it means that PE is in danger of falling between several stools from the outset.

Various details give PE the flavour of an introductory textbook. In places, Hammond explicitly states that he has rejected his own recent analyses in favour of proposals which are 'the least controversial' (269). There are many 'summary' sections in the text and pointers to 'further reading' clearly aimed at beginners. The paucity of references at the book's end (not quite four full pages) further add to the introductory effect.

It is natural to ask how comprehensive PE's coverage of English phonology is. I have already made a point of noting the book's subtitle, and Hammond is frank from the outset that PE only deals with 'distributional regularities in monomorphemic English words' (vii) – although the occasional polymorphemic word slips in, e.g. *who'd* (10), *texts* (37) and *sheds* (63). PE deals with prosody, the 'allowable configurations of consonants, vowels, and phonetic prominence' (vii), that is, with phonotactics and stress assignment.

Given the above, one minor but obvious criticism is that PE does not clearly fit into the series in which it is published. The series foreword claims that each volume 'will offer an extensive treatment of the phonology of one language' (ii) and 'will provide comprehensive references to recent and more classical studies of the language' (ii). PE does not fit well with this description. Its at-times introductory nature and its empirical restriction mean that it is a very different kind of book to, for example, Wiese (1996), which provides an all-inclusive approach to the phonology of German. This criticism would not be serious for a monograph on English prosody and, despite the circumstances of its publication, if PE stands up to inspection on its own criteria, that would be justification enough for its approach. The omissions are sometimes glaring, however, and we shall return to them briefly below.

In what follows I first give a brief discussion of the contents of PE and then turn to other issues relevant to the book. One feature of PE is that ideas which are introduced in early chapters are frequently revised later, often in the light of new data or analyses. I thus endeavour to present the final form of an argument; this is not always easy, however, as there are a few occasions where analyses introduced in early chapters would be affected by points made later, but this is not noted by Hammond in the text.

The contents of PE can be divided in two ways. Certain chapters are chiefly introductory (1, 2 and 5) while others are chiefly analytic (3, 4, 6, 7 and 8); on the other hand, certain chapters deal with phonotactics (3 and 4) and others deal with stress (6, 7 and 8). A final chapter briefly summarizes the key points made and addresses some open empirical and theoretical issues. The book finishes with references, a short subject index and a large word index.

Chapters 1 and 2 include a very brief discussion of the sounds of English and of distinctive features, an introduction to the main characteristics of OT, an introduction to phonotactics, a good overview of various evidence for the syllable and an introduction to moraic theory.

In chapters 3 and 4, Hammond presents copious and extensive tables to exemplify the distributional possibilities of English segments, and develops an OT-based account for these regularities. The approach to the data here is impressively thorough and a wide range of intricate generalisations are brought to light. A few of these are not quite true, however. For example, on pages 118 and 141, Hammond claims that [eps] is an impossible final sequence (where [e] is a tense/long vowel), but this misses *traipse* (presumably [treps] for Hammond) and the tables on page 79 indicate that [dw] and [nr] are non-occurring medial clusters, ignoring *Edward* and *Henry* respectively (PE makes great use of names as data).

Hammond's account of phonotactics develops the approach adopted by Prince & Smolensky (1993) for languages with simple onsets. PE extends this basic approach to account for the more complex clusters of English using a range of constraints. These either forbid configurations of segments in certain syllabic positions (e.g. \*ONSET/ŋ forbids [ŋ] in onsets), or in linear sequence (e.g. \*[sr], with other constraints, forces underlying /sr/ to surface as [šr]).

The constraints conspire to force a quite intricate pattern of syllable structure. The analysis is especially complex for intervocalic consonants, involving ambisyllabicity for single consonants after lax vowels and various patterns of affiliation to the left or right for intervocalic clusters, partly forced by MAX-CODA 'affiliate as many consonants to the left as possible when there is more than one' (134). This interacts with a family of constraints which require a specific number of moras to be assigned to various types of segments, a general constraint on the number of moras allowed in a syllable ('Trimoraic maximum (3μ) – syllables can contain no more than three moras' (136)) and a large family of constraints which instantiate the sonority hierarchy; together they capture a wide range of generalisations as to what is a possible word in English. There is also a special stipulation to account for sonority-violating sC clusters: 'Meta-constraint for [s] – constraints involving [s] are not subject to derived ranking' (98), where 'derived ranking' is a device introduced as part of the formalization of the sonority hierarchy to predict possible clusters (and the ranking of the constraints which allow them) from the sonority of the clusters' constituent parts.

The intricacy of the account can be seen in the following: Hammond remarks that only coronal consonants can follow [aw] and [ɔy], absolutely when word final and with certain caveats word-medially. He accounts for this with a constraint which requires three moras to be assigned to the two diphthongs, one constraint which assigns one mora to coronal coda consonants and another constraint which assigns one mora to non-coronal consonants. These latter two constraints are ranked differently, so that the coronal constraint can be violated. Together with MAX-CODA and the well-known ONSET, these would force any non-occurring sequence to contain more than three moras, which is ruled out by  $3\mu$ . The precise ranking of M-PARSE ‘words are pronounced’ (51) makes it better not to allow any overt output for certain inputs than an output which violates higher-ranked constraints (such as  $3\mu$ ).

The constraints formulated in these chapters generally seem successful in generating all and only the possible words of English (although some non-occurring sequences are claimed to be absent due to the statistical infrequency of certain segments). There are problems, however. In chapter 6, partly to account for the lack of aspiration of stops in what looks like the onset of stressless syllables (e.g. for the [t] in *vanity*), Hammond proposes the constraint NOONSET ‘a stressless syllable has no onset’ (226) which causes *vanity* to syllabify as [vænət.i]. However, this also causes words like *coypu* to syllabify as [k<sup>h</sup>ɔyp.u] (transcription without aspiration of [p] from page 121) which would violate  $3\mu$  and thus should not be pronounceable. This criticism could doubtless be neutralized by the invention of a new constraint or the re-ranking of old ones, but this is one reason why Hammond should have provided a final summary of all constraints used in the book and their ranking. The lack of any such summary is a distinct deficiency.

Chapter 5 introduces the notions of stress and the foot, again with a range of psycholinguistic and other evidence. Chapters 6, 7 and 8 provide a great deal of detail regarding the possible stress patterns for English monomorphemic words, and address the difference between the stress patterns found in nouns and those found in verbs and adjectives, the distribution of schwa (‘all schwas are derived and nonmoraic’ (206)), the distribution of full vowels in stressless syllables, and these chapters provide PE’s third and final analysis of aspiration. They also illustrate the necessity of ambisyllabicity for Hammond’s analysis and the claim that ambisyllabicity is in fact covert gemination as ‘phonological gemination need not be mirrored with phonetic length’ (218). It is unclear how this fits in with the derived gemination in words such as *unnecessary* (with [n:]); of course, Hammond does not discuss this because PE only deals with monomorphemic words.

For the analysis presented in PE to work, it is also necessary for Hammond to make the following assumptions: verbs such as *scavenge*, *balance* and *harvest* are ‘examples of true nouns’ (252) and adjectives such as *frequent*, *brilliant* and *honest* are morphologically complex (with the

suffixes [-ənt] and [-əst] as bound lexical morphemes of the ‘cranberry’ sort – this is because of the consonant clusters in their unstressed final syllable). To account for the difference in patterning of nouns compared to verbs and adjectives, Hammond assumes the mechanism of ‘catalexis’, i.e. a final ‘invisible or catalectic syllable’ (277) which is suffixed to all otherwise monomorphemic verbs and adjectives. Hammond provides some interesting evidence for this analysis and shows how it fits with the constraint ranking developed for nouns, but he does not discuss how such ‘invisible’ elements can be implemented in surface-oriented OT or how faithfulness to this emptiness is enforced.

Hammond is at pains, in places, to claim that the ‘phonotactic’ and ‘stress’ parts of PE are intertwined, asserting that ‘stress is clearly a partial function of syllable structure’ and that ‘syllable structure is also a function of stress’ (332), all of which seems like a paradox for rule-based analyses. However, it is unfortunate that Hammond does not clearly spell out exactly how the two parts fit together in his OT-based analysis.

One way in which the two interact is through the family of ‘WSP’ constraints which formalize the ‘weight-to-stress’ principle. When ranked high enough, these determine that a syllable which has more than one mora must be stressed. Hammond writes that ‘the WSP must be cast in terms of input vowel quantities...[and]...must thus be conceived as a correspondence-theoretic constraint’ (270). This is necessary to ensure that words like *minnow* do not have final stress: they are stored underlyingly with a final lax (monomoraic) vowel, but are forced to surface with final tense (polymoraic) vowels because of high-ranking BIMORAICITY ‘all syllables are at least bimoraic’ (207). However, this analysis seems unavoidably to conflict with a proposal developed in chapter 4 which assigns different numbers of moras to different types of segment. As we saw above, this is enforced by ranked violable constraints (a ‘mora assignment schema’, which is ‘a constraint family assigning moras to peaks and codas’ (206)).

This seems to result in a derivational paradox. Moras have to be underlying to determine stress correctly (through the ‘WSP’) but they have to be assigned by GEN during the input-output mapping to account for phonotactics (through the ‘mora assignment schema’). Hammond does not show how this can be reconciled with his monostratal OT.

The above discussion will have shown that PE is tightly focused on certain aspects of English phonology and of OT. It is worth briefly considering what it thus does not discuss. These omissions fall into two categories: English-specific and OT-specific. I deal with these in turn below.

Any book with the title ‘*the phonology of English*’ cannot entirely avoid the long shadow of Chomsky & Halle (1968). It is noticeable that Hammond does not provide analyses for such well-known phenomena as Vowel Shift or Velar Softening, and his frank explanation for this is interesting. There has long been debate as to whether such alternations should be treated as part of

synchronic phonology at all and Hammond writes that such things are ‘not so readily or so obviously best treated in terms of’ OT (vii). It is not quite clear how we should understand this, however: if such aspects of morphophonology are not readily treatable in OT, then is Hammond claiming (i) that OT can only be used to explain certain aspects of phonology, or (ii) that morphophonological generalizations are not part of phonology at all? Hammond does not engage with this question.

With very few exceptions, PE only deals with Hammond’s own accent, basically General American. It is a shame that no attempt is made to deal with anything else, especially given that English has several well described ‘standard’ accents. This exclusively American bias will limit PE’s usefulness as an introductory text outside of America, and, coupled with the fact that PE hardly touches on segmental phonology, it means that the book misses out on a lot of important empirical and theoretical issues. If it were not so restricted, a volume on the phonology of English could have included discussion of, for example, flapping and glottaling, various types of assimilation, the allophony of clear and dark ‘l’, the ‘Scottish Vowel-Length Rule’, or æ-tensing. Some important recent discussion has emerged from the consideration of these aspects of English phonology (see, for example, Giegerich 1992 and Harris 1994), and it is difficult not to feel that an opportunity has been missed here for further discussion.

PE’s restrictions cause it to miss some important debate in OT. Because there is no mention of final ‘r’ deletion, intrusion and linking (which is common in many accents of English, including Eastern Massachusetts and many British accents) Hammond cannot address the considerable discussion that this has provoked in the OT literature, thanks largely to the treatment in McCarthy (1993). Also, PE hardly touches on such interesting and contentious notions as the ‘richness of the base’ and ‘lexicon optimisation’, ‘the emergence of the unmarked’ or ‘prosodic morphology’. A book like PE cannot be expected to include all of these, but, given that one of PE’s stated aims is to introduce OT to students, we might reasonably query whether it will prepare students to read other OT literature. These ideas are all well discussed in Kager (1999), as are the notions of constraint conjunction and output-output constraints, which Hammond fleetingly introduces in chapter 8.

PE explicitly rejects the common OT notion that constraints are an innate and universal part of UG. This seems justifiable for many reasons, given evolutionary plausibility, the non-general nature of many of the constraints used in PE and most of the OT literature, as well as the ‘phonetic grounding’ approach to constraint justification (which is widely adopted in the literature and which defends individual constraints on the grounds that they reflect physiological or acoustic universality – but if these can be abstracted from physics, they do not require a source in a mentalistic and modular Universal Grammar). Hammond proposes that general constraint schemata might

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replace UG-innateness as a restriction on the theory, but it does not seem obvious that all the constraints used in PE can be interpreted along these lines.

There are not many misprints or formal infelicities which would distract the reader, although at times technical notions are used as if they should be understood but are only later explained in an introductory way. One further niggling point is that Hammond ignores other accounts for phenomena, some of which are well known and much discussed. For example, non-initial restrictions on the occurrence of [ŋ] are accounted for in PE by stipulating that [ŋ] receives two moras, ignoring the proposal that this and various other observations could be accounted for if surface [ŋ] derives from underlying /ng/. The problem is not that this alternative is necessarily the right analysis, but rather that we might expect Hammond to discuss it (various such alternatives, for example concerning sC clusters and aspiration, are aired in Wiese (1996) and Honeybone (to appear)).

In conclusion, PE is a handy source of reference for the phonotactics and stress patterns of General American. It will be of interest to phonologists who work with such data, particularly those who deal with OT. However, the empirical and theoretical problems noted above are not all trivial and may well restrict the volume's impact. PE could only be used as a text for a course on English phonology or OT if distinctly supplemented by other texts.

It would probably be impossible to cover every aspect of English phonology to the satisfaction of all. Probably quite reasonably, Hammond hasn't tried.

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