

Reviews

Daniel Silverman (2006). *A critical introduction to phonology: of sound, mind, and body*. (Continuum Critical Introductions to Linguistics.) London & New York: Continuum. Pp. xii + 260.

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It is difficult to know how to approach a review of Daniel Silverman's unusual book. On the one hand, it is intended as an introductory phonology textbook for students with 'no previous knowledge of either phonology or linguistics'; on the other hand, the approach taken to phonology is so radically different from what is presented in a standard phonology course that Silverman – hoping as he does that his book will give students 'the impetus to ask their professors some challenging questions, or to rethink certain received notions as they embark on writing their dissertations' (p. ix) – clearly also intends to shake up the field. The book is thus really more like two books, and really deserves two separate reviews.

We have chosen to review the book primarily as a fresh approach to phonology rather than as a textbook. This is partly because we feel that a textbook review would inevitably focus on the content of this book anyway, and partly because we feel there is little to say about this volume as a textbook. Each chapter is an introduction to some core issue in phonology – there is a general introduction to phonology, for example, a chapter introducing allophony, a chapter on variation and so on – but the presentation is inevitably more focused on contrasting the author's views with the received wisdom than on giving clear illustrations of the relevant phenomena or of just what the received wisdom is. The introduction to Silverman's chapter on allophony, for example, states that, in what is to follow, he will 'argue ... that *articulatory or acoustic similarity between sounds is neither a prerequisite, nor a diagnostic, for allophonic relatedness*' and will give examples to 'show that the *only* way sounds can be allophonically related is if they *alternate* with each other' (pp. 87–88; emphasis original).

Although these might be interesting challenges for the advanced student or the established scholar to grapple with (and we will return to the second one), it seems to us that it would be very difficult for the target audience even to understand the relevance of the examples, let alone evaluate competing theories, without a firm grounding in the assumptions and mechanics of the standard model. The main failure here is that Silverman defends his claims without clearly articulating what he is defending them against. This presentation is fatally confusing for an introductory textbook.

We will thus address the thought-provoking theoretical claims made by Silverman without evaluating in detail how useful the book's discussion of them

might be to the introductory student. Since this is an age when tables of contents can be instantly accessed online, we believe it is more important to provide a critical summary of the issues raised than it is to summarise, so we have picked out for review what we take to be the three main issues the book raises: the status of ALPHABETISM, the traditional view of lexical storage in which lexical items are stored as strings of segments; the question of whether static phonological generalisations (cases without morphological evidence) should be seen as alternations or as some other kind of knowledge (the latter of which we call the LEXICAL LEARNING hypothesis); and the question of EXEMPLAR STORAGE, a dramatic (though by now familiar) revision to our understanding of phonology, in which each token of a lexical item is stored in memory, rather than a single 'prototype' representation, as is standardly assumed. In each case, Silverman wishes to push the theory in the direction of storage over computation.

1 Alphabetism

The dichotomy between storage and computation emerges somewhat subtly in the case of 'alphabetism', or 'phonemism', Silverman's terms for the assumption that the speech stream is divided into segments. This assumption can be seen in virtually every grammar ever written. Rules going back to Pāṇini manipulate discrete alphabetic symbols, and this formulation was left unchanged when generative grammar gave the primitives of the theory a new, cognitive interpretation. Being responsible for an account of cognition, however, forces us to be extra careful about our assumptions, and this one is no exception. Silverman claims that the alphabetic view of storage is motivated wholly by the illusion of segmentation induced by having an alphabetic writing system. Only in cases where there is some active process in the language do segmental units 'emerge from the phonetic background as elements of combination and recombination' (p. 112).

For the rest of the speech stream, Silverman seems to be taking an extreme position, but does not make clear exactly what 'Gestalt' alternative to alphabetism he has in mind that would not simply be positing finer-grained segments (the stream must ultimately be quantised somehow). The idea seems to be that some such theory of fine-grained storage should be preferred to the standard approach to storage. We would add to this the important qualification that this is true *if* the computational cost of unpacking segments in the phonetic stream can be shown to be much greater than the cost incurred by allowing arbitrary combinations of fine subphonemic detail in storage.

Although the details are not clear, Silverman has a number of arguments for his position. Notably absent is any reference to one of the clearest sources of evidence for segmented representations, speech-error data. This vast literature has demonstrated that substitutions and transpositions (spoonerisms) operate on entire segments far more often than on subsegmental elements (Fromkin 1973, Dell 1986, Frisch & Wright 2002). Suppose each segment of *brake fluid* [brejkfluɪd] was represented by some complicated (but sufficiently consistent) set of correlated subsymbolic features. Why should it be *precisely* the features corresponding to [l] and [r] that are transposed in errors like [blejkfruɪd], or that are anticipated in errors like [friʃgato] (< *fish grotto* [fɪʃgrato]) if these chunks of the stream have no privileged status?

The anti-alphabetic position is particularly difficult to maintain in the face of the speech-error data from Taiwan Mandarin presented by Wan & Jaeger (1998). Generally speaking, Mandarin speakers in Taiwan have little exposure to alphabetic writing systems (phonetic instruction in school is done using the syllabic Bopomofo system, not pinyin). Furthermore, there are no alternations in Chinese which would pass the rigorous standards imposed by lexical learning (see below) and thus, following the theory presented here, no reason for speakers to develop any alphabetic segmental representations. Nevertheless, their speech errors include a fair number of whole-segment deletions and metatheses, in addition to simple substitutions.

Ultimately, of course, the question, to the degree that it is well posed, is empirical. Even if the existing data from speech errors are not convincing, we have no reason to think that any open questions could not be resolved experimentally fairly straightforwardly. At one level, therefore, we agree with the spirit of Silverman's enterprise: current phonology education does not usually address the fundamental assumptions of the theory in a satisfying way. Linguistics is an empirical science, and while there is a sizeable body of careful experimental research addressing the fundamental question of segmental storage, we know of no introductory phonology textbook that addresses it.

2 Lexical learning

The second crucial element of the theory espoused in this book is what we have referred to above as LEXICAL LEARNING. Although Silverman generally seeks to minimise the role of computation in phonology in favour of storage, the existence of productive alternations demands that at least some computation ('sound substitution') be tolerated. Limiting such computation to a minimum, Silverman proposes that learners do not construct any such substitution rules without being exposed to alternate phonological forms of a single morpheme: 'learning allophonic relations is dependent upon learning allomorphic relations' (p. 26).

The main evidence for this comes from two linguistic examples. We give only one here, from Akan, to give a flavour of the reasoning. In Akan, dorsals and [h] appear to undergo palatalisation before non-low front vowels, as shown in (1) (Marantz 1982, McCarthy & Prince 1995, Raimy 2000).

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|-----|------|------------|------|-----------|
| (1) | tɛɛ | 'divide' | kɔɔ | 'go' |
| | tɛim | 'umbrella' | kun | 'kill' |
| | ɛɪ | 'border' | hawɔ | 'trouble' |

Akan also has a process reduplicating the initial consonant, plus a vowel derived by shifting the following vowel to [+high], as given in (2).

- | | | |
|-----|--------|---------|
| (2) | si+siɔ | 'stand' |
| | su+soɔ | 'seize' |

Crucially, palatalisation underapplies in reduplicated forms, as shown in (3).

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|-----|--------|----------|-----------|
| (3) | kɪ+kaɔ | *tɛɪ+kaɔ | 'bite' |
| | hɪ+haɔ | *ɛɪ+haɔ | 'trouble' |

Reduplicated [k], surprisingly, does not palatalise unless the base form palatalises. This is an important point for Silverman. His explanation for the underapplication (echoing that of Marantz 1982) is that the syllable structure of Akan morphemes is such that [k] + [i] is impossible. Thus the palatalisation rule is not a rule at all, because there is no lexical evidence for it.

Counterexamples to Silverman's generalisation exist, however. In Mandarin, [k] never appears before [i]/[j], and [tɕ] only before [i]/[j]. Given that the syllable structure of Mandarin is such that [k] + [i] is impossible, Silverman would predict that speakers do not internalise any [k] ~ [tɕ] alternation. Chao (1931), however, reports on a set of word games that appear to show just this; insertion of a vocalic sequence + /k/ within a syllable gives rise to palatalisation of /k/ precisely before coronal vowels/glides, as shown in (4).¹

- (4) t^ha → t^hai ka
 k^huŋ → k^hwai k^huŋ
 ɕjuŋ → ɕɥɛ tɕjuŋ
 liŋ → lje tɕiŋ

This type of evidence clearly weakens Silverman's claim. Nevertheless, as with alphabetism, we agree with Silverman that the issue of whether lexical learning is correct is unexpectedly complex and important, and has not been given the attention it deserves in phonology education. In this case, unlike in the case of segments, it would seem that the body of relevant evidence is much smaller. Indeed, the particular dataset given here could easily be improved. It comes from a traditional word game which is taught and which involves orthography (*fanqie*, which is used to illustrate the pronunciation of unfamiliar characters in terms of known ones). Since the relevant experimental evidence would be easy to obtain, we find it alarming that, as far as we know, no one has collected it in the intervening eighty years, and unfortunate that phonologists continue to hold strong opinions on the issue in the absence of relevant empirical evidence. While we think it is inappropriate for a textbook to make strong conclusions about controversial questions on the basis of conflicting evidence (Silverman states unequivocally in his conclusion to the chapter on allophony that 'what matters in the determination of allophonic relatedness is merely that sounds alternate with each other in a non-neutralizing way'; p. 111), we are glad to see it finally treated as a fundamental empirical question in phonology, and we hold out hope for future textbooks that take it seriously.

3 Exemplar theory

EXEMPLAR STORAGE is surely the most salient of Silverman's revisions to the theory, if only because it has already become familiar through a number of recent publications (Johnson 1997, Pierrehumbert 2001, Bybee 2007). This theory contends that phonological memory, rather than containing a single phonological string (or the non-alphabetic equivalent thereof) for each lexical entry, contains *all of the instances (exemplars)* of that lexical entry (up to decay and so on). The discussion of how the standard array of facts about phonology

¹ The conditions determining the realisation of the inserted vocalic sequence are discussed in Chao (1931).

can be handled on an exemplar perspective is often somewhat unclear. The important question is why, if speakers faithfully record the entire corpus of their experience, they produce unattested forms; that is, why do we see language change (in exemplarist terms, DYNAMICS) or internalised patterns whereby speakers generalise to novel forms or utterances (in exemplarist terms, GRAMMATICALISATION)?

As with many other sources, Silverman's book has much to say about dynamics (and mentions grammaticalisation scarcely at all). The idea is that new pronunciations of (say) *pin* will be generated according to the distribution of *pin* tokens in the mental corpus (the EXEMPLAR CLOUD); the presence of tokens in the exemplar cloud representing outlying pronunciations of *pin* (say, with the vowel lowered slightly) will shift the probability of a speaker producing *pin* with a slightly lowered vowel. This causes pronunciations of *pin* to shift over time, and (at least on Silverman's version of the theory) will ultimately force pronunciations of *pen* to shift as well, by a homophony-avoidance principle. It is important to note that Silverman's version of the theory diverges from others, in that most standard examples are about segments, the existence of which Silverman denies; see Wedel (2006) for an introduction to standard exemplar dynamics (the details of which also apply to Silverman's theory), although we still know of no treatment of exemplar dynamics that has enough technical detail and careful coverage of linguistic examples to make for a satisfying introduction.

This theory raises the obvious question of how changes diffuse through the lexicon if they are tied to individual words; that is, why does the shifting pronunciation of *pin* extend to *bin*? Here we are given little: 'there is an overwhelmingly strong tendency for phonological patterns to generalize' (p. 166). Handling the facts is problematic, because many of the arguments in favour of exemplar storage crucially rely on the existence of item-specific variation (e.g. Bybee 2000), leaving a tension which has not been satisfactorily resolved.

As in other exemplar publications, a larger issue is the absence of a clear explanation of how patterns are extracted from data – that is, how grammaticalisation happens. In discussions addressing grammaticalisation (e.g. Bybee 2006), one often gets the impression that exemplar storage is supposed to make obsolete a theory of grammar, with grammar coming for free ('emerging') from low-level mechanics of storage or retrieval; but having a theory about which alternations are psychologically real (as in this book) implies a belief in alternations, and thus really amounts to having (part of) a theory of possible grammatical rules. If exemplar theory must be accompanied by a theory of mental grammar in order to be complete, then it is a complement to, not a radical revision of, standard linguistic theory. The issue, however, is a live one, and, again, one that should be addressed carefully both in introductions to phonology and in the field at large.

4 Conclusion

A long discussion of alternate answers to the questions raised in the discussion of exemplar theory and throughout the book would be a digression here, but above we have attempted to provide a few useful counterpoints and hints as to how some of the important empirical issues might be resolved. There is one issue, however, on which we can provide a slightly more substantial reply – what is phonology? The first chapter of this book maintains that phonology is

about 'sound substitutions', but asserts that, wherever possible, we should avoid ascribing substitutions to mental processes or states, and openly states an opposition to 'embracing the theoretical construct "phoneme"', where 'phoneme' here could be replaced by any abstract mental representation (p. 19).

Although this book intends to challenge views within the status quo that may be seen as hold-overs from Structuralism, this particular statement is incompatible with the thoroughly modern consensus that phonology is a cognitive science. From a cognitive perspective, phonology is about how auditory and articulatory information is converted and consequently stored in and retrieved from long-term memory. Speech science generally searches for (or should be searching for) the principles governing each of these three computations (audition, articulation and memorisation). There is *some* system for coding information in storage, and 'phoneme' here stands in for the unit of storage. A unit of storage is not a 'theoretical construct' – it is logically necessary. This is true even with exemplar storage: we do not pronounce clouds. Though Silverman is right to question the standard view, the description of phonemes as 'theoretical' is a hold-over from the instrumentalist days. Unfortunately, this confusion can still be found in virtually every phonology textbook (Schane 1973, Hawkins 1984, Kenstowicz 1994, Davenport & Hannahs 1998, Gussenhoven & Jacobs 1998, Roca & Johnson 1999, Odden 2005, Hayes 2009). Addressing this fundamental point in future work should go a long way toward focusing the field on some of the issues raised by Silverman.

We feel the current intellectual environment in phonology is a confusing landscape for the student. While this textbook does little to remedy that, it is nevertheless clear that, under such circumstances, framing the issues in a more coherent way is an essential responsibility of textbook authors, and Silverman should be commended for attempting to do so, and for his judicious selection of fundamental topics. It is not effective for a textbook to consist mostly of speculation, or to present new interpretations of the facts without attempting to first explain standard accounts, but it is absolutely essential to survey the evidence for the fundamental assumptions of the theory in some depth, even if this involves presenting material that is not usually treated in introductory textbooks, or performing some novel exegesis and synthesis of established theories. Of course, Silverman is also quite correct to question pedagogical orthodoxy: better approaches to teaching will surely bring new direction to the field.

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