Phonology **29** (2012) 337–341. © Cambridge University Press 2012
doi:10.1017/S0952675712000152

Phillip Backley (2011). *An introduction to Element Theory*. Edinburgh: Edinburgh University Press. Pp. xiv + 210.

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An introduction to Element Theory provides an impressive and fully elaborated approach to segmental representation using elements, and is as such essential reading for anyone interested in segmental structure, specifically in the development of monovalent approaches to the internal structure of segments. This book is a long-awaited elaboration on the viability of Element Theory, particularly under the assumption of a reduced set of elements utilising just six primes for the representation of all segmental contrasts. While Element Theory practitioners generally agree with this reduction in the number of elements, which is key to reducing potential overgeneration of possible sounds, to date there has been no articulated model of how such a reduced set would capture all of the required contrasts. Rather, the discussion has focused mainly on the interaction and representation of particular elements, as manifested in specific phenomena under investigation. The proposal for elemental representation made in this book distinguishes itself from previous work in that it is explicitly stated that Element Theory is to be understood as a stand-alone theory, with no inherent connection to any framework. The obvious association with Government or Dependency Phonology is as such not part of the package here. Backley must be commended for filling a gap in what appear to have been disjointed elaborations on a theory of elements. The book is an outstanding piece of work, which manages to provide a very clear introduction for beginners, as well as detailed motivations for the proposed representations and how they fit into an overall theory of segmental representation for the more advanced scholar and researcher.

There are five chapters in the book; I will discuss the focus of each in turn. Chapter 1 is a short introduction to elements, providing motivation for a monovalent approach and arguments against allowing features to have negative values, which are argued to find little support in natural class behaviour.

Chapter 2 introduces the primary elements for vowels (|I U A|), treated as resonance elements occurring in all segment types and defined as acoustic signatures in the speech signal, thereby supporting an acoustic basis for elements. This approach (following Harris & Lindsey 1995), which differs from other element-based approaches such as that of standard Government Phonology (Kaye *et al*. 1985), finds quite convincing support in the discussion of complex expressions that acoustically show combinations of the relevant signatures. Motivation for the treatment of |I U A| as the basic elements for vowels is derived from the cross-linguistic distribution of vowel systems and from dispersion-theoretic arguments that corner vowels within the vowel triangle are the most unmarked. In addition, and significantly for the phonologist, the proposed acoustic basis of elements is in each case also coupled

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with phonological evidence offered through the discussion of phonological phenomena that support, in this case, the existence of complex vowels. Indeed, phonological motivation for representations resonates throughout the book, so that in essence all representations are primarily based on phonological patterns/distribution rather than on phonetics, acoustic or otherwise. This perspective is adopted on the view that the phonological enterprise is a pursuit of solutions to fundamentally phonological questions.

In the representation of vowels, and indeed throughout, headedness is associated with the strength of the relevant signature in the speech signal, and by this token simplex expressions are treated as headed by default. The tense–lax distinction for [i ~ ɪ] and [u ~ ʊ] in English is treated simply as a matter of length, with the members of each pair having the same element representation. Moreover, the vowels in the pair [ʌ ~ ɑː] have the same representation, so that the difference in vowel quality is assigned no phonological importance in this case either, presumably due to the lack of supporting phonological patterning.

Chapter 3 deals with elements for place in consonants, with |I U A| used to define the main places of articulation, thereby demonstrating that elements are not restricted to just vowel or consonantal positions. This 'consonant–vowel unity' gains support from attested interactions between vowels and consonants. Palatals and coronals are treated as having the same place element |I|, but there is a proviso for coronals that may have place represented by |A|, as motivated by their patterning in the relevant phonological system. Thus, for example, tapping *vs.* non-tapping dialects of English are distinguished on the basis of having |A| *vs.* |I| coronals respectively (p. 133). This leeway in which element may be used further highlights the crucial role of phonology in determining segmental representations, contrary to an approach aimed at defining universal representations. Velars, which often receive varying representations in elemental analyses, are represented by |U|, along with labials, with only a contrast in headedness between the two places of articulation. The symmetrical treatment of velars and labials echoes Jakobson *et al.*'s (1952) use of the acoustic feature [grave]. This representation is supported by the unity seen between velars and labials in different phonological processes attested in a number of the languages discussed. Gutturals, retroflexes and some coronals are treated as having the same place element |A|, owing to their general lowering effect on surrounding vowels attested in a number of languages. As with complex vowels, |I U A| can also combine in consonants to yield complex places of articulation in labiodentals, uvulars and what are termed palato-velars, which include front velars but not palato-alveolars, which are represented with |I| place, like the palatals.

Chapter 4 deals with the elements used to express manner, *viz.* |ʔ H L|. The glottal element, associated with sounds that involve occlusion resulting in a sustained drop in acoustic energy, is used in stops, ejectives and implosives. The |H| element is present in articulations that involve frication or noise, while |L| is used to characterise voicing and nasality, following Nasukawa (2005), among others. In line with consonant–vowel symmetry, |ʔ| can also be used for laryngealised vowels and |H| and |L| for tone in vowels, though one might take issue with whether tone should be represented at the same level as other elements within a segment. A number of cross-linguistic weakening processes are used to motivate which elements constitute a given segment, under the view that weakening involves a reduction in complexity, so that, for example, the fact that stops can weaken to [h] in debuccalisation (p. 129) finds explanation in an

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analysis that considers |H| to be part of their representation. There is an extensive discussion of voicing, and differences in VOT (VOT lag and lead) are used as the basis for representational differences in terms of elements between languages with a true voicing contrast (e.g. French, Spanish, Dutch, Russian and Japanese) in comparison to aspiration languages like English, German, Swedish and Korean. In this instance there is rather more reliance on phonetic evidence and the characterisation of universal patterns, although there is some discussion of phonological voicing distribution in the different language types to support the phonetic facts. Sonorants are treated as lacking a voicing element, because they do not trigger voicing assimilation, and any voicing alternations involving sonorants are treated like the voicing lead in intervocalic stops in English, i.e. as a mere phonetic effect that does not merit phonological representation. There is an interesting outcome in the discussion of voiceless fricatives like [s], which in principle should contain both headed |H| to indicate the noise component and non-headed |H| to indicate voicelessness. It is argued that it is undesirable to have the same element occurring twice within the same representation, as is the case in standard Government Phonology, but this is an issue that will need further clarification within the Element Theory proposed by Backley; this is discussed below.

Chapter 5 considers the representation of liquids, and draws parallels between rhotics and laterals, which are argued to involve the same element |A|. There is some discussion of other factors that may play a role in the elemental representation that a language eventually converges on, including prosodic structure and whether a language recognises strong positions that may then attract particular elements, in contrast to weak positions displaying fewer contrasts. Finally, some antagonistic relations between elements that fail to co-occur are identified, and an acoustic account is given of their logical incompatibility within this perspective. Thus |A|–|ʔ|, |L|–|H| and |U|–|I| are recognised as pairs that repel each other on the basis of their conflicting acoustic properties, i.e. high *vs.* low resonance, lowering *vs.* raising of fundamental frequency and dark *vs.* light quality respectively. These pairs find support in the cross-linguistic rarity of pharyngeal stops, breathy voiced stops and front rounded vowels respectively, which only occur in systems where their less marked counterparts are present.

The core chapters, 2, 3 and 4, are identically structured, ending with summaries of the proposed elemental representations of the discussed variation that offer a quick reference point for the proposals made. There is an impressive coverage of languages, which offers rich discussions of a wide range of oppositions for any feature. For example, there are treatments of a range of different empty vowel qualities (p. 31), five-place oppositions in Ngiyambaa (Australia) (p. 90), four-way coronal oppositions in Yanyuwa (Australia) (p. 102) and voiceless, creaky voice, breathy voice and laryngealised nasals (p. 150ff), to highlight but a few. I found the organisation of the book very accessible, and appreciated the fact that references are provided at the end of each chapter. This makes the chapters fairly free-standing, which can be quite useful in teaching environments.

There are a number of interesting issues that the book raises with respect to the development of Element Theory, and I highlight the central ones here. Throughout the discussion it is clear that elemental tiers (assumed in standard Government Phonology; e.g. Kaye *et al.* 1985, Scheer 1999) are dispensed with,

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and the summary of particular elements' mutual incompatibility as resulting from opposing acoustic information attests to this position. Thus the position adopted departs from regarding incompatible elements as represented on the same autosegmental tier – indeed it seems that tiers play no role in representation at all, although higher prosodic structure above the segment is assumed. It would seem that tones, which are independent of their host, would still require some kind of autosegmental representation, which would have to be factored in within the current approach.

Another issue is to do with headedness, which we must assume to have taken on a new interpretation (*contra* standard Government Phonology), in that it is used to oppose different characteristics, as in the case of headed |U̲| for labials and non-headed |U| for velars. Despite this representation, headedness is nonetheless treated as related to strength or markedness, in that headed representations present a stronger opposition, which is less likely to be subject to assimilation. Still to be reconciled with this is the idea that the same element may not appear twice within the same segmental representation. This to me seems to be at odds with the idea that headedness is used to represent different characteristics, and may just be a hangover from previous Element Theory discussions for which this position is more convincing, given the static contribution that a particular element makes to a representation: headed and non-headed |ʔ|, for example, both contribute 'stopness' in standard Government Phonology. In this respect, the discussion of the representation of voiceless fricatives, referred to above, does not seem to offer a very satisfactory explanation. I would assume that it is exactly under the new view of headedness that two heads within a representation are deemed acceptable; they paint different patterns in the acoustic signal. There is certainly an intrinsic relation assumed between the headed and non-headed counterparts of an element attested in post-nasal voicing, for example, where the non-head element |L| denoting nasality changes to headed |L̲| in the following stop denoting voicing, so perhaps head relations may be gleaned and decided upon from phonological interaction. If 'identical' elements are accepted, then some mechanism to curtail overgeneration must be sought. In terms of acoustic structure, it is argued that differences in headedness reflect differences in strength of acoustic cues, but one wonders whether this is an abstraction, rather than something actually visible in the acoustic signal as depicted in the spectra for vowel combinations.

A final point has to do with evidence that is adduced for elemental representations. Although it is argued that phonetic evidence is sought only to support phonological alternations, there were a few occasions when perhaps this was not so clear. For example, in the discussion of the representation of breathy voiced sounds, which combine the acoustic characteristics of both voiced stops and aspirated stops, namely headed |L̲| and headed |H̲| – producing a doubly headed expression – the motivation given to avoid this structure and thereby demote |H| to non-head is an articulatory phonetic one, namely that voiced aspirates are produced with a moderately open glottis, rather than the fully open glottis used in aspiration. This avoidance, although attesting to the fact that doubly headed expressions are only sparingly allowed in the system, also follows from the antagonistic relationship between |L| and |H|, as already pointed out. In closing, perhaps the bigger picture to take away from these considerations is that while phonological factors may be primary, a number of other phonetic

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and perceptual factors are also brought into play in deciding elemental representations, which is overall a good outcome.

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