Munda family (89). Moreover, contrary to Bhat's claim (122), the typical Australian inclusive dual ŋ*ali* is not obviously related to the first person ŋ*a* (cf. Dixon 2002: 122ff). Yet, such criticism is probably inevitable in the case of books like this, containing so much factual information on so many different languages.

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Juliette Blevins, *Evolutionary phonology: the emergence of sound patterns*. Cambridge: Cambridge University Press, 2004. Pp. xix + 366.

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Evolutionary phonology is a thought-provoking and accessible book that presents cultural evolution as an alternative to innate constraints and features in explaining universals of phonology. It is NOT a book about the biological evolution of speech, as in order to avoid all confusion, the author makes this clear from the beginning. The book contains everything that makes a linguistics book fascinating to read: an overview of the field, a provocative new theory for explaining phonological facts, and numerous contemporary and historical examples from a wide sample of languages to support the new theory. Nevertheless, Juliette Blevins' book can sometimes be a little hard-going, especially if the reader is not used to long quotations in the text and a large number of footnotes.

The central thesis of the book is that synchronic properties of the sound systems of human languages should not be explained by recourse to

phonological processes in the human mind/brain if it is possible to explain them as the result of historical change. By preferring historical explanations that rely on the use of speech over explanations that rely on processes and properties of the brain, Blevins' theory is in accord with other recent data-oriented theories of language. According to the central premise of evolutionary phonology, as stated by the author, 'principled diachronic explanations for sound patterns have priority over competing synchronic explanations unless independent evidence demonstrates, beyond reasonable doubt, that a synchronic account is warranted' (23).

The author compares the process of language transfer from adults to children with biological evolution. Use of speech introduces variation, and the learning process causes selection to take place. Since variation and selection are the two main processes needed for evolution, the author calls her theory 'evolutionary phonology'.

Elaborating this view and introducing evolution and evolutionary theory are the aims of part I, 'Preliminaries'. First, the author gives an overview of the phenomena addressed and provides an outline sketch of the theory itself and of its goal, which is neatly summarised as follows: '[b]y extracting from synchronic phonologies all patterns whose explanation is found in the diachronic domain, we are able to investigate the essence which remains' (19). The author then presents the three basic mechanisms of sound change that she distinguishes. She calls them 'change', 'chance' and 'choice'. Change describes the situation where a sound change results from a language learner mishearing a speaker's utterance. Chance involves a speaker's utterance that is intrinsically phonologically ambiguous and can be analysed in multiple ways by the listener/learner, possibly differing from the speaker's original representation. Finally, choice occurs when a speaker uses different pronunciations of a word from which the learner needs to choose one as the best exemplar. Again, language change occurs when this representation is not the same as that of the speaker. These three mechanisms provide an extremely useful perspective on the interaction between speaker pronunciation and language learning, even if one may not quite agree with the exact three mechanisms proposed.

What is particularly appealing about Blevins' perspective on phonology is that the mechanisms of change, chance and choice, which provide the underpinnings of the evolutionary phonology framework, can be tested in the laboratory. The idea of evolutionary phonology is that many recurring sound patterns in human language can be explained as the historical result of these three mechanisms, and not as the result of innate constraints on representation or on the learning of sound systems. It is therefore important that it can be experimentally tested whether the kinds of misperceptions that are necessary for the proposed historical explanations actually occur in human subjects.

Unfortunately, Blevins' discussion about the parallels between biological evolution and evolutionary phonology is less good. In trying to avoid the

impression of teleology (broadly paraphrasable as 'sound systems are opti-mal, hence there must be a goal-directed factor in their evolution'), the author confuses long-term goals and short-term mechanisms. In biology, mutations are random, but that does not mean that in cultural evolution of speech, optimising mutations cannot occur. The insistence on the random-ness of linguistic 'mutations' is a recurring theme throughout the book, but in my opinion it is totally unnecessary. The important elements of an evol-utionary process are transfer of information, variation and selection. How these are implemented is unimportant. In cultural evolution, where transfer of information takes place through learning and imitation, it is quite possible that variation is biased towards some kind of optimality, most likely ease of pronunciation. The author's position in this matter is possibly explained by her relying mostly on Stephen Jay Gould's books as sources on evolution. Gould, although having written excellent introductions to evolution, is known to have a somewhat extreme position on the role of randomness.

Another criticism of the book concerns the fact that a number of the references on biological topics are incomplete or incorrect. For example, the text has a reference to Gould (1991) – most likely a reprint of *Ever since Darwin* – which is missing from the bibliography. Thedosius Dobzhansky is referred to as Dobshansky in the book. Material used in the section on frog calls is claimed to be taken from *Nature London* and the *Philological Transactions of the Royal Society of London*, when the correct citations should list the journal titles *Nature* and *Philosophical Transactions: Biological Sciences*. Problems with references occur also in other parts of the book. Although this is a matter of editing rather than content, it is never-theless regrettable.

Part I closes with a very useful comparison between evolutionary pho-nology and the approaches of other phonological theories, such as the Neogrammarians, the Prague school, functional phonology, theories of hypo- and hyperarticulation, and Optimality Theory. Blevins' discussion nicely clarifies the differences between those theories and evolutionary pho-nology, and provides a good overview of the different trends in phonology, especially for those readers who (like myself) come to this book from dis-ciplines other then phonology.

Part II of the book, entitled 'Sound patterns', applies the theory developed in part I to a number of phenomena. The sound patterns discussed include (i) laryngeal features (where Blevins addresses the questions of why there appear to be symmetries in the systems of, for example, voiced/voiceless or laryngealised/breathy consonants, and how universals of voicing and devoic-ing can be explained); (ii) place features (where Blevins considers, among other things, how sequences of sounds influence each other's place of articulation, and why certain places of articulation tend to occur in certain positions); (iii) sound patterns that are spread over different segments (vowel and nasal harmony, lenition and the sonority hierarchy); and (iv) gemination.

The final chapter of part II is devoted to an explanation why certain sound patterns are rare, which demonstrates how evolutionary phonology can also account for rare sound patterns rather than only the frequent ones.

I consider the examples discussed by Blevins to provide a compelling argument that many universals of sound systems can be explained as the result of historical processes. One possible weakness in some of the explanations is that the author avoids all explanations that would require optimising variation in speech. As pointed out above, this is unnecessary and at times only complicates the explanations. Another potential weakness of Blevins' explanations is that most of them appear to be rather ad hoc, and that there is no strong formalism in which to generate them. However, I do not necessarily consider this to be a bad thing: language is a complicated phenomenon, and the brain processes information in much more complex ways than can be modelled in simple formalisms. It may thus be essential to use a flexible theory when explaining language universals.

Part III of the book, 'Implications', investigates the implications of evolutionary phonology for the study of sound systems and, more generally, the implications of the evolutionary perspective for the study of other aspects of language. If most complex phenomena involving human sound systems can be explained as the result of historical processes, what is left of phonology, according to the evolutionary perspective, is a number of simple learning and generalisation rules, in addition to distinctive features and prosodic categories. The author proposes an investigation of these aspects as a new way of studying language, which she calls 'pure phonology'.

In this part of the book, the evolutionary phonology model is also used to explain processes of diachronic linguistics. Although I judge these explanations to be generally successful, they are sometimes needlessly complicated because the author is set on avoiding any trace of a functional bias on the variability of speech.

Finally, Blevins applies the ideas that form the basis of the evolutionary perspective to a different modality (sign language) and to two other aspects of language (morphology and syntax). I particularly liked the discussion of sign language, in which it is argued that the kind of sign language that one would find if it followed the same constraints and markedness properties as spoken language would be quite different from the sign languages that are actually found. The properties of sign language can, however, be convincingly explained from a functional and (cultural) evolutionary perspective.

The discussion of morphology, on the other hand, is less persuasive. Of course morphology is not the main topic of the book, and it is quite conceivable that, with more study, the morphological phenomena that are presented can be explained from an evolutionary perspective, but as it stands, the author succeeds only in pointing out the problems of traditional morphological 'universals' rather than in providing a convincing evolutionary

alternative. Fortunately, Blevins fares rather better with her discussion of syntax and word order universals.

As a whole, I think the book makes an interesting contribution to the field of phonology. The theory presented proposes that much of the complexity of human sound systems is due to historical processes that are fuelled by different kinds of misperception, while the actual learning and representations in the mind/brain are relatively simple and general. In this respect, the book fits in with an emerging trend in linguistics to move away from what I would call algorithm-driven theories (i.e. theories that propose that most of the complexity of language is due to the way we process it) towards data-driven theories (i.e. theories that propose that much of the complexity of language is in the linguistic data itself and that a lot of this is learned and stored by comparatively simple and general mechanisms). This trend is exemplified also by the work of Jackendoff (2002) and Tomasello (2003).

Blevins' theory does not propose strict formal rules and algorithms to process and learn sound system, but rather a number of mechanisms, heuristics and ways of looking at linguistic phenomena that can be adapted to particular instances, which, rather than a weakness, I consider to be a practical perspective. Perhaps evolutionary phonology should be regarded more as a methodology for studying phonology than as an all-explaining theory of phonology.

It may be the case that this methodology has wider application. In the book, a number of instances are presented where phonetics and phonology become closely intertwined, as well as a number of instances where phonology and morphology influence each other. One cannot help but wonder if the final outcome of the evolutionary (and the data-driven) perspective will be that the separation between these different aspects of language will become less important.

There are a few problems with the book that fortunately do not detract from the main argument. I have already mentioned Blevins' insistence on randomness when it comes to variation in speech, which, to repeat my point, is unnecessarily complicating her explanations. I have similarly referred to the problems with respect to missing and incomplete references. Another problem is that, although the book is presented as intended for an interdisciplinary readership (neurology, psychology, computer science, philosophy and anthropology are mentioned in the preface), it contains a lot of technical terms. A glossary of technical terms would make reading easier for a more general audience. Moreover, some of the more technical descriptions in the book could be made more accessible by providing simple examples of the phenomena that are described. However, all in all, I found this book easier to read and less formal than most books on phonological theory. To conclude, I think this book is well worth reading for a new perspective on phonology that conforms to the trend towards more data-driven models of language.

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Anne Breitbarth & Henk van Riemsdijk (eds.), *Triggers* (Studies in Generative Grammar **75**). Berlin: Mouton de Gruyter, 2004. Pp. vi + 496.

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Reflection on 'triggers', that is, on the factors that yield syntactic operations such as movement, has always been central in generative research. To mention just two of the most influential proposals, the Case Filter (Chomsky 1981) was one of the first explanations advocated for displacement, while more recently the Criteria approach (Rizzi 1996) tried to reduce instances of movement to the necessity of realizing specifier–head agreement relations.

The Minimalist program represents an important milestone in this research for syntactic motivations. More precisely, besides simply pursuing the line of inquiry of the 1980s, Chomsky's program (1995, 2000, 2001) radically imposes severe restrictions both on the format and on the locus of triggers. Given the Principle of Full Interpretation (Chomsky 1986), according to which 'there can be no superfluous symbols in representations' (Chomsky 1995: 151), movement is triggered by the necessity of deleting/valuing all morphosyntactic features that are redundant and hence not interpretable by the interfaces.

Positioning the definition of triggers at the core of syntactic investigation has profound consequences for most major issues of the theory. First, given the Minimalist assumption that variation is limited to morphosyntactic features, the issue of triggers interacts very closely with that of parametric VARIATION. Moreover, if an operation is triggered, i.e. automatically forced by some factor, the issue of OPTIONALITY arises as a potential problem. If triggers for movement always involve feature checking, the standard TYPOLOGY of movements (A- vs. A′-, head vs. phrase, overt vs. covert) requires a radical revision. Finally, if features triggering movement are said to be uninterpretable, the exact nature of the INTERFACES and their interaction with the computational system needs to be further investigated. For all the