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*Edited by
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Contributors

Stephen R. Anderson is the Dorothy R. Diebold Professor of Linguistics at Yale University. His interests include most areas of general and historical linguistics, as well as the study of the place of human language in the biological world.

Jóhanna Barðdal is a Research Associate Professor at Ghent University, Belgium. She is the author of two monographs: *Case in Icelandic: A Synchronic, Diachronic and Comparative Approach* (2001) and *Productivity: Evidence from Case and Argument Structure in Icelandic* (2008). She is a founding co-editor of the *Journal of Historical Linguistics* and a founding series co-editor of Brill's *Studies in Historical Linguistics*. She is currently running a research project on the Emergence of Non-Canonical Case Marking in Indo-European, funded by the Norwegian Research Council (2011–2015) and an ERC-funded research project on the Evolution of Case, Alignment and Argument Structure in Indo-European (2013–2018).

Clay Beckner received his Ph.D. from the University of New Mexico and is now a Postdoctoral Research Fellow at the New Zealand Institute of Language, Brain and Behaviour at the University of Canterbury. His research focuses on the processing of complex linguistic units, including multimorphemic words and 'prefabricated' multiword sequences, and the cognitive and social mechanisms of language change.

Claire Bower is Associate Professor of Linguistics at Yale University. Her research focuses on the Indigenous languages of Australia, and is particularly concerned with language documentation and prehistory. Her work particularly concerns the way in which Australian languages can cast light on general processes of language change. Her most recent book is *A grammar of Bardi* (2012) and she is an associate editor at *Language* and *Diachronica*.

Joan Bybee is Distinguished Professor Emerita of Linguistics at the University of New Mexico. Her books and articles focus on theoretical issues in phonology, morphology, grammaticalisation, typology and language change. Her most recent book is *Language, Usage and Cognition* (2010).

Alexandra D'Arcy is Associate Professor of Linguistics and Director of the *Sociolinguistics Research Lab* at the University of Victoria. Her area of specialisation is variation and change in English dialects, both synchronic and diachronic.

Ashwini Deo is Associate Professor of Linguistics, Yale University. Her research examines cross-linguistically observed systematic patterns of variation and change in linguistic

meanings with the goal of understanding their linguistic and cognitive underpinnings. Her work brings together insights from empirical description, formal semantic/pragmatic modelling, and experimental evidence. Her empirical focus is on the languages of the Indo-Aryan family – both ancient and modern.

Michael Dunn is a linguist studying the evolutionary dynamics of language change from a background in linguistic typology and language description. He is based at the Max Planck Institute for Psycholinguistics, Nijmegen where he leads the Max Planck Research Group 'Evolutionary Processes in Language and Culture'.

Patience Epps is Associate Professor in the Department of Linguistics at the University of Texas at Austin. Her research includes descriptive and documentary work on indigenous Amazonian languages, linguistic typology, language contact and language change, and the implications of the latter for understanding South American prehistory.

Bethwyn Evans is Research Fellow in Linguistics in the College of Asia and the Pacific at The Australian National University. Her current research focuses on the languages of Melanesia, exploring language histories, language change and language contact.

Susan D. Fischer is Adjunct Professor at CUNY Graduate Center. She has studied many aspects of sign language structure, processing, and history, and specialises in sign language typology, specifically comparisons between Western and Asian sign languages.

Benjamin W. Fortson IV is Associate Professor of Greek and Latin Language, Literature, and Historical Linguistics at the University of Michigan. He specialises in the comparative linguistic study of the Indo-European language family, focusing primarily on the Italic, Greek, Indo-Iranian, Anatolian, and Germanic branches, with side interests in comparative Indo-European metrics and poetics. He also does research in the methodology of historical linguistics and the mechanisms of phonological and morphological change.

Zygmunt Frajzyngier is Professor of Linguistics at the University of Colorado in Boulder. His main interests and areas in which he has published include: foundations of syntax and semantics in cross-linguistic perspective; typological explanations in grammar; grammaticalisation; Chadic and Afroasiatic linguistics; descriptive grammars and dictionaries of Chadic languages.

Alexandre François has conducted fieldwork on several Oceanic languages from Vanuatu and the Solomon Islands, which he analyses in their typological and historical dimensions. A permanent member of the Paris-based research centre *Langues et Civilisations à Tradition Orale* of CNRS, he also documents the cultural knowledge, poetry and music of these Melanesian communities.

Andrew Garrett is the Nadine M. Tang and Bruce L. Smith Professor of Cross-Cultural Social Sciences at the University of California, Berkeley, where he directs the Survey of California and Other Indian Languages and the California Language Archive. His research falls into three main areas: the typology of language change, including patterns of grammatical change and linguistic diversification; Indo-European linguistics; and the Native languages of California, especially Karuk and Yurok.

Elly van Gelderen is Regents' Professor at Arizona State University. Her current work shows how regular syntactic change (grammaticalisation and the linguistic cycle) can be accounted for by (Minimalist) Economy Principles that help a child acquire a language and analyse it in a different way from previous generations. Her 2011 book, *The Linguistic Cycle: Language Change and the Language Faculty* (Oxford University Press) shows how cyclical change is relevant for theories on the faculty of language. Her *Clause Structure* (Cambridge University Press, 2013) examines a number of current debates in theoretical syntax. Related interests are the evolution of language, biolinguistics, prescriptivism, authorship debates, and code switching. She has taught at Arizona State University since 1995.

Simon J. Greenhill is a Discovery Fellow in the School of Culture, History, and Language at the Australian National University. His current research focuses on understanding the settlement of the Pacific and New Guinea, and investigating the broad patterns in language and cultural evolution.

Mark Hale is the current Chair of and a Professor in the Department of Classics, Modern Languages and Linguistics at Concordia University, Montréal. He has written books on diachronic methodology, phonological theory, and Indo-European historical syntax, as well as articles on various aspects of Indo-European and Oceanic historical grammar.

Silke Hamann is a research-oriented Lecturer at the English and General Linguistics department of the University of Amsterdam, where she teaches courses in phonetics, phonology, historical linguistics and computational linguistics. Her research focuses on the phonetics-phonology interface, especially on the role of phonological knowledge in the process of speech perception and on the acquisition and learnability of perceptual cues and phonological categories and its change across generations.

Paul Heggarty is a Senior Scientist in the Linguistics Department of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. He focuses on the intersection of linguistics with archaeology and genetics, cooperating across those disciplines to converge their different perspectives into a more coherent understanding of the human past.

Ritsuko Kikusawa is Associate Professor of the National Museum of Ethnology (Osaka) and The Graduate University for Advanced Studies (Hayama), Japan. She specialises in historical (comparative) morpho-syntax and the prehistory of Oceania, among others.

Paul Kiparsky, a native of Finland, is Professor of Linguistics at Stanford University. His research focuses on word structure and the lexicon. He has contributed to developing Lexical Phonology and Stratal OT, a case-licensing approach to morphosyntax, and aspects of the theory of language change. He also works on metrics and on the Sanskrit grammatical tradition.

Harold Koch is a Visiting Fellow in Linguistics in the School of Literature, Languages and Linguistics, The Australian National University. His background includes both Indo-European and Australian comparative linguistics. He has published on morphological change and reconstruction and historical studies on the Arandic languages.

Roger Lass received a Ph.D. from Yale in 1964. He is Emeritus Distinguished Professor of Historical and Comparative Linguistics, University of Cape Town (ret. 2002), and Honorary

Professorial Fellow in English Language and Linguistics, University of Edinburgh. He is the author of numerous books and articles on historical and general linguistics, with a special concentration in English and Germanic, and editor of and contributor to *The Cambridge History of the English Language*, III, 1476–1776 (1999). He is the creator and Principal Investigator of *A Corpus of Narrative Etymologies* (electronic – 2013). His main fields of interest are historical linguistics, philosophy and methodology of linguistics, linguistic filiation, and the history of English.

Christopher Lucas is Lecturer in Arabic Linguistics in the Departments of Linguistics and the Languages and Cultures of the Near and Middle East at SOAS, University of London. He was previously a British Academy Postdoctoral Fellow at the same institution, and prior to that a Research Associate in the Department of Linguistics at the University of Cambridge, where he obtained his Ph.D. on the development of negation in Arabic and Afroasiatic in 2010.

Robert Mailhammer is Lecturer in Linguistics in the School of Humanities and Communication Arts at the University of Western Sydney. His research focuses on historical reconstruction, language contact and etymology, especially in Germanic and Australian languages.

Luisa Miceli is Lecturer at the University of Western Australia. Her research interests lie in Australian historical linguistics, methodology in historical linguistics, and in the incorporation of language contact and bilingualism into a general theory of language change.

Lev Michael is Assistant Professor of Linguistics at the University of California, Berkeley. He has carried out fieldwork with speakers of Arawak, Tukanoan, Tupí-Guaraní, and Zaparoan languages, as well as with speakers of several linguistic isolates in the Amazon Basin. With a methodological grounding in language documentation, his research focuses on the socio-cultural dimensions of grammar and language use, typology, language contact, and the historical linguistics of Arawak, Tupí-Guaraní, and Zaparoan languages. Through his engagement with Amazonian indigenous communities, he is also involved in language revitalisation, and in training and collaborating with community linguists.

Brigitte Pakendorf, who holds Ph.D. degrees in both Molecular Anthropology and Linguistics, is a Senior Scientist at the CNRS laboratory *Dynamique du Langage* in Lyon, France. Her research focuses on the interdisciplinary investigation of prehistoric population and language contact.

Paul Sidwell is an Australian Research Council Future Fellow in the Department of Linguistics at the Australian National University. His research focuses on the history and classification of Austroasiatic languages and what this can tell us about the broader social history of Southeast Asia. Paul has also held appointments with the Max Planck Institute for Evolutionary Anthropology (Leipzig) and the Center for Research in Computational Linguistics (Bangkok).

Jane Simpson is Chair of Indigenous Linguistics at the Australian National University. She works on Australian Aboriginal languages (syntax, semantics, dictionaries, kinship systems,

reconstructing languages from old written sources, and a longitudinal study of children learning their first language).

James N. Stanford is Assistant Professor of Linguistics and Cognitive Science at Dartmouth College in Hanover, New Hampshire. His research focuses on language variation and change in indigenous minority communities, including sociolinguistic studies of the indigenous Sui people of China. He also studies regional dialect variation in New England English.

Sarah G. Thomason is the William J. Gedney Collegiate Professor of Linguistics at the University of Michigan. She has two major research interests: first, she is a historical linguist focusing on contact-induced language change; and second, she has worked for more than 30 years with the Salish & Pend d'Oreille Culture Committee in St. Ignatius, Montana, compiling a dictionary and other materials for the tribes' Salish-Pend d'Oreille language programme. Among her publications are *Language Contact, Creolization, and Genetic Linguistics* (with Terrence Kaufman, 1988, 1991), *Language Contact: an Introduction* (2001), 'Chinook Jargon in areal and historical context' (1983), 'Truncation in Montana Salish' (with Lucy Thomason, 2004), and 'At a loss for words', an essay on endangered languages (in *Natural History* magazine, December 2007/January 2008).

Matthias Urban wrote his dissertation on a topic in lexical typology at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and defended it at Leiden University in 2012. Having held a position at Philipps-Universität Marburg in Germany, he presently is postdoctoral researcher at Leiden University, where he works on the historical linguistics of Meso- and South America.

Nigel Vincent is Professor Emeritus of General and Romance Linguistics at the University of Manchester, following his retirement from the Mont Follick Chair in Comparative Philology in October 2011. His theoretical interests lie in exploring feature-based systems, in particular Lexical-Functional Grammar, as models of language change, with a special focus on the interface between morphology and syntax. His specialist languages are Latin, Italian and the dialects of Italy, and he has published on a variety of topics in the historical morphosyntax of Italo-Romance. He is a Fellow of the British Academy and a Member of the Academia Europaea.

Michael Weiss is Professor of Linguistics at Cornell University. He is the author of *Language and Ritual in Sabellic Italy* (Brill 2010) and *Outline of the Historical and Comparative Grammar of Latin* (Beech Stave 2011) as well as articles on various aspects of the historical phonology and morphology of Proto-Indo-European, Greek, Latin, Sabellic, Hittite, and Old Irish.

Søren Wichmann is a Senior Scientist at Max Planck Institute for Evolutionary Anthropology. His areas of research are historical linguistics, language description, and typology. Aspects of historical linguistics on which he has published include quantitative methods, computational modelling, diachronic typology, grammaticalisation, borrowing patterns, and ancient scripts. Wichmann is General Editor of the journal *Language Dynamics and Change*.

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Demographic correlates of language diversity

Simon J. Greenhill

Why do some languages change at a different rate to others?¹ What causes one language to change faster than another? Why do some language families have many languages and why do some families only have a few? According to the latest version of the *Ethnologue* (Lewis 2013), there are 7,547 languages in the world divided into at least 289 language families (including isolates).² However, there is substantial variation in the number of languages – what I will call *diversity*³ – in each family. The Niger-Congo and Austronesian language families contain 1,543 and 1,255 languages respectively – about 37 per cent of the total alone. At the other end of the scale, 160 language families have only one surviving language.

Plotting the number of languages in each family gives a *language abundance distribution* (Figure 26.1) that follows a common distribution called the ‘hollow curve’ first identified in biology (Willis and Yule 1922). The hollow curve distribution shows that there are only a few large language families (e.g. Niger-Congo, Austronesian), and a handful of moderately sized families (e.g. Indo-European, Pama-Nyungan, Trans-New Guinea). The vast majority of language families, however, are very small.

What could be causing the substantial variation in the number of languages, i.e. language diversity? Diversity is the outcome of differences in the *birth-rate* and the *death-rate* of languages. For example, there are 31 Mayan languages and 1,235 Malayo-Polynesian languages (Lewis 2013). Both groups have only diverged in the last 4,500 years (Gray *et al.* 2009; Gray *et al.* 2013). Therefore, in those 4,500 years, the ancestral Proto-Malayo-Polynesian language was almost 40 times more prolific than Mayan: there was one Mayan language born every 145 years on average while Malayo-Polynesian spawned one language every 44 months.

The pattern of diversity tells us much about the important processes in human prehistory and the factors that have shaped our current global pattern of languages and cultures. Understanding this diversity is so important that it has generated many prominent hypotheses. Some of these hypotheses are more helpful than others for explaining the global pattern of diversity. The fall of Rome, for example, might explain why there are now 42 Romance languages, but does not explain why New Guinea has 477 Trans-New Guinea languages and only four Eastern Trans-Fly languages. What general explanations can we draw about the global causes of language diversity? In this chapter I will review just some of the proposed hypotheses, focusing on those that are large scale and applicable to many languages. Some of these proposed explanations link language diversity to the age of the language family, or

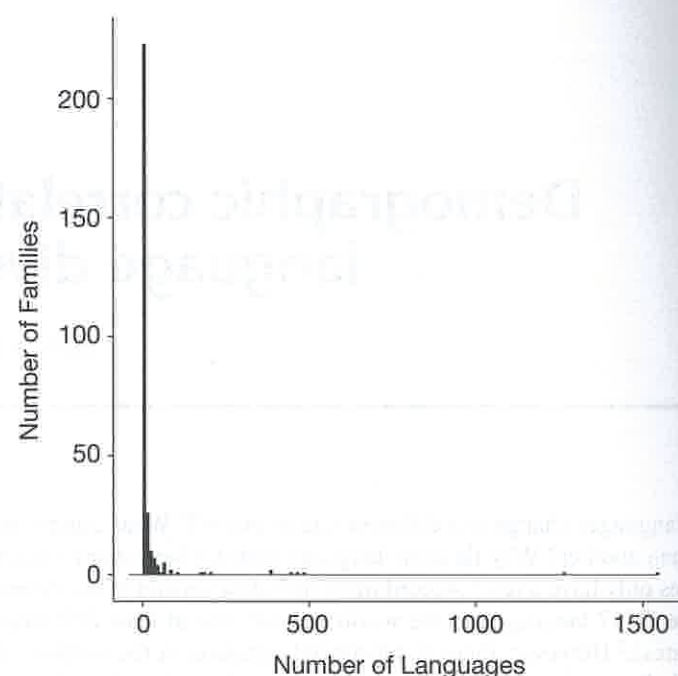


Figure 26.1 'Hollow-curve' graph showing relative language abundance in each language family. The vast majority of language families have one or two languages, with only a few families having many languages. The two outliers are Niger-Congo and Austronesian.

the niche a language is spoken in – whether geographical, environmental or social. Other hypotheses link language diversity to the nature of the speaker population itself – how many speakers a language has, how close-knit the social relationships are, or perhaps even the niche a language occupies. Yet other hypotheses argue that language diversity is driven by certain technological advances.

1 Finding the tempo

To understand the causes of language diversity we need to understand both the tempo and the mode of language change. The distinction between tempo and mode was first made by the paleontologist George Gaylord Simpson (Simpson 1944). According to Simpson, the *tempo* of evolution concerned the rates of change and how these rates vary over time. In contrast, the *mode* concerned the causes of that variation in tempo. As Simpson (1944: xxx) put it, the mode describes “how populations became ... differentiated, ... how they passed from one way of living to another, or failed to do so.” To study the mode is to “examine the figurative outline of the stream of life and the circumstances surrounding each characteristic element in that pattern.” The tempo describes how the rates vary while the mode explains why they vary, and to understand the mode we need to first characterise the tempo.

How does the tempo of language change affect language diversification? Biologists commonly distinguish two processes of change. The first of these processes is *anagenesis* which details change *within* a lineage. For example, English's ‘Great Vowel Shift’ restructured the way English was spoken, changing English markedly from its Germanic sister languages.

However, this anagenetic change did not cause new languages to be born. The second process is *cladogenesis*, which details lineage splitting events – e.g. the birth of new languages. Linguistics tends to conflate these two different processes. The theories I will discuss below often assume that any increase in anagenesis leads to cladogenesis. These theories assume that increasing the tempo of change, or providing more opportunities for anagenetic changes to occur will increase the rate of language diversification. This assumption makes sense if we think of language as primarily a communication tool, and that ultimately a new language is formed when two groups of people can no longer communicate (cf. Labov 2007). Therefore while the tempo of change may not directly determine the formation of new languages, it is strongly linked to the formation of new languages.

1.1 Lexicostatistics and glottochronology

In linguistics the first major investigation into the tempo of language change occurred primarily through the linked approaches of *lexicostatistics* and *glottochronology*. In a series of articles Swadesh (1950, 1952, 1955) proposed that language relationships could be inferred statistically by the number of cognates each language shared on a short wordlist of ‘basic’ or ‘core’ vocabulary. The more cognates shared by two languages the more closely related they were. This approach became known as lexicostatistics. Swadesh extended this hypothesis into glottochronology, a system for inferring the ages of language divergences which assumed that languages lost their shared cognates at a constant rate. Swadesh (1952: 459) described the logic as such:

A language is a highly complex system of symbols serving a vital communicative function in society. The symbols are subject to change by the influence of many circumstances, yet they cannot change too fast without destroying the intelligibility of language. If the factors leading to change are great enough, they will keep the rate of change up to the maximum permitted by the communicative function of language. We have, as it were, a powerful motor kept in check by a speed regulating mechanism.

Swadesh (1950) first applied his method to the Salishan languages spoken in the Pacific Northwest (see Thomason, this volume). First, he calculated the number of cognates each language shared with each other, then converted these estimates to time using the following equation:

$$t = \frac{\log C}{2 \log r}$$

Where t is time and C is the number of shared cognates. Swadesh's r is the *retention rate* – the rate at which cognates were replaced in the basic vocabulary. In this paper he assumed a retention rate of 0.85 per 1,000 years based on the differences documented between Old and Modern English over a 1,000-year period on a 165 item wordlist. Thus two languages would share 85 per cent of their basic vocabulary after 1,000 years, 72 per cent after 2,000 years, 61 per cent after 3,000 years, and so on.

Support for glottochronology came from a study by Lees (1953) who calculated the retention rates of 13 languages with a documented history of over 1,000 years. For example, Lees found a retention rate of 0.77 in the 1,000 years between Old and Modern English, and 0.85 in the 1,100 years separating Old High German from Modern German. In the 13