

The Handbook of Language Emergence. B. MacWhinney & W. O'Grady (Eds.)
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The current volume details a new view of language as an emergent property of a complex system. The editors bring together multidisciplinary research and valuable reviews of a broad range of linguistic phenomena, from the moment-by-moment beginnings of statistical learning and speech segmentation (Ch. 18, Ch. 19) to the emergence over generations of complex language from the protolanguage of our human ancestors (Ch. 28). In doing so, this volume offers a fundamental insight into the nature of human communication: viewed from whatever angle, at whatever level of granularity, language can be seen as emerging from multiple, interdependent components interacting across multiple, nested timescales.

Brian McWhinney's introduction to the volume sets the emergentist scene: language can be thought of in evolutionary terms, subject to the same proliferative, selectional and competitive processes as nonlinguistic systems. On this view, language is fundamentally hierarchical; for example, auditory phonology subserves articulatory phonology, which feeds into the lexicon giving rise to abstracted syntax, which in turn is used to generate interactional and communicative structure. As subsequent chapters demonstrate, examining any level of this hierarchy reveals the components of the complex system from which the particular linguistic phenomenon emerges.

The book distils the emergentist program into five main themes: *Basic Language Structures*, *Language Change and Typology*, *Interactional Structures*, *Language Learning*, and *Language and the Brain*. Part I demonstrates how the structure seen in the building blocks of language can emerge from the interaction of multiple, recurrent timescales. For example, Donovan (Ch. 1) argues that infants' own babble also serves as their language input, reinforcing their phonological representations and influencing subsequent production. Similarly, McDonald (Ch. 3)

illustrates how produced language, constrained by the production system, can serve as input to the comprehension system, in turn shaping comprehension and, via statistical learning, representation; in Chapter 7 Ellis provides empirical evidence for the richness of this input to learning. McClelland (Ch. 2) and Racz (Ch. 4) emphasize the messiness of language. When the behaviour of a system results in categories with fuzzy, porous boundaries (for example, regular/irregular verbs), conceptualizing this behaviour in terms of multiple, parallel interactions between low-level components can account for complex phenomena that top-down rules cannot easily capture.

Part II explores how the structures discussed in the first section change over time. Again, the emphasis is on structure emerging from the interaction of multiple components. Bybee and Beckner argue convincingly in Chapter 8 that language change can be viewed as the change in behaviour of a non-linear dynamic system. Givón (Ch. 9), Hawkins (Ch. 10) and Regier et al. (Ch. 11) further suggest that the need for communicative efficiency and efficacy can act as a constraint on this complex system, driving change and the emergence of syntactic and representational structure.

Part III moves up the levels of analysis from the individual speaker to explore the emergence of structure at conversation and group levels. Poplack and Cacouillos' timely call in Chapter 12 for a data-driven approach highlights the importance of seeking real-world evidence for emergentist theories. The strong emphasis on empirical, variationist methods in this chapter offers an important counterpoint to the theoretical contributions made elsewhere in the volume, emphasising the values of taking bottom-up as well as top-down perspectives in understanding complex behaviours. Timescales are again a focus: the individual embedded in the longer, developmental, communicative and cultural timescales is a central theme of chapters

by Foulkes and Hay (Ch. 13), Hopper (Ch. 14), E. Clark (Ch. 15) and Everett (Ch. 16).

The developmental timescale is examined in more detail in Part IV. Here, A. Clark (Ch. 17), McCauley et al. (Ch. 19), and Ambridge and Lieven (Ch. 22) directly tackle the vexed question of whether linguistic structure has to be innately specified, providing theoretical, computational and empirical arguments in favour of usage-based approaches. Feedback loops make a reappearance here: Vihman's Chapter 20 echoes Chapter 1 by demonstrating how an apparently universal tendency (the crosslinguistic phonological similarity in early-learned words) can in fact emerge from early motor and perceptual constraints, which shape babies' babble and consequently their self-generated input. This idea of multiple constraints on language development (e. g., motor, perceptual, pragmatic) is picked up in both Zlatev's study of gesture (Ch. 21) and Li's computational model of bilingualism (Ch. 23).

The final three chapters examine the relationship between language and the brain. Here, atypical language is viewed as emergent from the same system as typical language, but with small differences in the components that make the system up. Thus, Dell and Anderson (Ch. 25) demonstrate that aphasic language emerges in a connectionist model when the strength of the connections between processing units is modified. Van Lancker Sidtis in Chapter 26 reviews the relationship between processing of formulaic language and language experience, familiarity, emotional representation and brain mechanisms, arguing that while formulaic language is processed separately to novel language both continue to interact throughout development. In a neat example of the hierarchical timescales that permeate emergentist approaches, Arbib (Ch. 27) argues that gesture, which itself is emergent in-the-moment (Ch. 21), is a fundamental component in the emergence of language

over evolutionary time. The final chapter of the volume therefore situates our everyday language, and by extension the subsystems discussed in previous chapters, in this longest of human timescales.

The broad range of topics covered in this volume demonstrates that taking an interdisciplinary view of a traditionally compartmentalised field of study can uncover mechanistic commonalities between systems which appear, on the surface at least, to depend on very different processes. To existing proponents of emergentism this will not be surprising: its core principles of complexity, interactivity, and nested timescales apply at multiple levels of analysis. As such, readers will enjoy new insights into existing topics as well gaining an understanding of the inextricably interrelated nature of apparently unrelated aspects of language. Undeniably, these chapters highlight the immense complexity of the linguistic problem space, but also offer elegant solutions; in particular Chapters 8 and 24 suggest that complex behaviour can be broken down into simpler components without losing sight of the larger system.

However, Van Geert and Verspoor crystallise in Chapter 24 what the other chapters in the book illustrate: “all linguistic sub-levels (phonemic, morphemic, lexica, phrasal, syntactic and so on) can be regarded as complex systems on their own” (p. 539). Emergentism’s structure is an attractor state or stability in a complex system, and variation, so often treated as uninformative noise in generativist approaches to linguistics, marks the system leaving one behavioural state and entering another. While each chapter is informative in its own right, when reading the volume in its entirety a new insight emerges: language from the emergentist perspective is a fractal and fundamentally dynamic phenomenon which can only be fully understood

as dependent on and influencing the behaviour of its intricately interconnected subprocesses.