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The Phonological Mind

Humans instinctively form words by weaving patterns of meaningless speech elements. Moreover, we do so in specific, regular ways. We contrast *dogs* and *gods*, favor *blogs* over *lbogs*. We begin forming sound-patterns at birth and, like songbirds, we do so spontaneously, even in the absence of an adult model. We even impose these phonological patterns on invented cultural technologies such as reading and writing. But why are humans compelled to generate phonological patterns? And why do different phonological systems – signed and spoken – share aspects of their design? Drawing on findings from a broad range of disciplines including linguistics, experimental psychology, neuroscience, and comparative animal studies, Iris Berent explores these questions and proposes a new hypothesis about the architecture of the phonological mind.

IRIS BERENT is a Professor of Psychology at Northeastern University, Boston. Her research concerns phonology, morphology, and reading. She has published extensively in psychological and linguistic journals.

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Preface

This book concerns a linguistic human compulsion – our tendency to assemble words that comprise internal patterns. All natural languages manifest such patterns – no known human tongue uses only single atomic sounds as words (e.g., “*a o u*” for ‘I love you’). Rather, words are intricately woven from smaller meaningless elements that form systematic patterns – we contrast *god* with *dog* and *blog* with *globe*. We begin spinning these webs in the womb, and we do so prodigiously, not only for familiar words but also for ones that we have never heard before. Our instinct to form those meaningless patterns is so robust that children have been shown to generate them spontaneously, even if they have witnessed no such patterns in their own linguistic community. In fact, people impose these patterns not only on their natural linguistic communication but also on their invented cultural technologies – reading and writing. This book seeks to unveil the basis of this human compulsion.

The human capacity to weave linguistic messages from patterns of meaningless elements (typically, speech sound) is *phonology*. Phonology has been the subject of much previous research, mostly in linguistics and psychology. For the most part, however, these efforts have proceeded in parallel lines across different disciplines, and as a result our understanding of the phonological mind remains fragmentary. Linguists (specifically, those in the field of formal phonology) have mostly concerned themselves with the structure of the phonological grammar, but the cognitive mechanisms underlying phonological patterns are rarely considered. Psychologists, for their part, have assumed without question that phonological patterns can be adequately handled by rather simple, non-specialized computational systems, but these investigations remain largely divorced from the progress made in formal phonological theory in recent decades. This book seeks to bridge the interdisciplinary divide and reconsider phonology in a new light.

At the center of this book is a novel hypothesis regarding the architecture of the phonological mind. The discussion evaluates this hypothesis against recent advances in formal linguistics, cognitive science, neuroscience, and genetics and reviews these literatures in a manner that is accessible to readers across various disciplines. In so doing, I hope to spark renewed interest in the design of

phonological patterns and to demonstrate the benefits of an interdisciplinary approach to the study of this intricate human capacity. To facilitate dialog across disciplines, I have tried to present the material in a manner that is accessible to professionals and advanced students in either field – psychology or linguistics – who lack expertise in the neighboring discipline. This approach necessarily requires some measure of simplification. I have thus attempted to minimize the use of technical jargon; in as much as possible, I have deliberately attempted to avoid the use of phonetic transcription, and, when background information is absolutely necessary, I provide it in “Box” inserts.

Readers can choose to selectively focus on distinct portions of this book, depending on their interests. The Introduction (Part I, Chapters 1–3) provides an accessible overview of the main thesis of the book. The subsequent three parts provide more technical discussion of the different aspects of the thesis, and these sections can be read independently. Part II (Algebraic phonology, Chapters 4–5) examines the basis of the human capacity to generalize phonological knowledge by investigating the computational properties of the phonological mind. Part III (Chapters 6–8, Phonological universals) considers the design of phonological systems and the extent that they are constrained to putatively universal principles. Chapter 6 reviews linguistic evidence for phonological universals. Although the discussion targets readers with minimal linguistic expertise, this chapter is probably the heaviest on linguistic theory. Readers can therefore pick and choose, as subsequent chapters do not require detailed understanding of this one. Chapters 7–8 consider the role of grammatical phonological universals in light of experimental evidence; Chapter 7 evaluates numerous case studies, whereas Chapter 8 focuses in depth on a single case. The final part of the book, Chapters 9–12, examines phonological ontogeny (the development of phonological competence with special emphasis on the first year of life), phylogeny (a comparative analysis of “phonological” abilities across species and their evolution), hardware (brain areas mediating phonological computation and their genetic regulation) and technology (i.e., reading and writing – both typical and impaired, in dyslexia). Conclusions and caveats are presented in Chapter 13.

This book is the product of many years of research. The ideas have grown out of my interactions with several close collaborators. Steven Pinker and Gary Marcus have shaped my understanding of how the mind works, Paul Smolensky has sparked my interest in the problem of language universals, and Donca Steriade has challenged my thinking about phonology and its interactions with phonetics. These ideas, however, probably would not have materialized in a book if it weren’t for Andrew Winnard, my editor at Cambridge, who saw this volume coming well before I did. Evan Balaban, Lisa Barrett, Bronwyn Bjorkman, Judit Gervain, Bruce Hayes, Ray Jackendoff, Paul de Lacy, Joanne Miller, Steven Pinker, Wendy Sandler, and Paul Smolensky offered valuable

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