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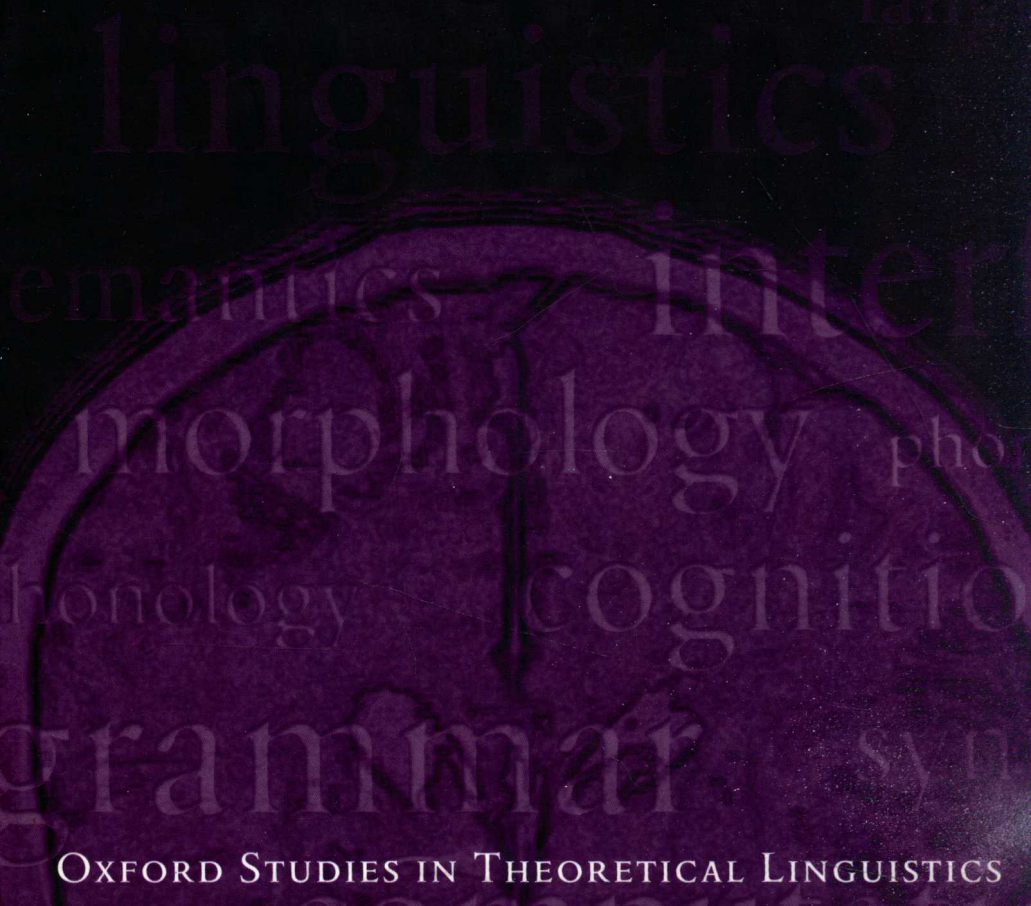
Phonetics, Phonology, and Cognition

edited by

JACQUES DURAND AND BERNARD LAKS



OXFORD STUDIES IN THEORETICAL LINGUISTICS

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JACQUES DURAND

BERNARD LAKS

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Phonetics, Phonology, and Cognition

Oxford Studies in Theoretical Linguistics

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General Preface

The theoretical focus of this series is on the interfaces between subcomponents of the human grammatical system and the closely related area of the interfaces between the different subdisciplines of linguistics. The notion of 'interface' has become central in grammatical theory (for instance, in Chomsky's recent Minimalist Program) and in linguistic practice: work on the interfaces between syntax and semantics, syntax and morphology, phonology and phonetics etc. has led to a deeper understanding of particular linguistic phenomena and of the architecture of the linguistic component of the mind/brain.

The series will cover interfaces between core components of grammar, including syntax/morphology, syntax/semantics, syntax/phonology, syntax/pragmatics, morphology/phonology, phonology/phonetics, phonetics/speech processing, semantics/pragmatics, intonation/discourse structure as well as issues in the way that the systems of grammar involving these interface areas are acquired and deployed in use (including language acquisition, language dysfunction, and language processing). It will demonstrate, we hope, that a proper understanding of particular linguistic phenomena, languages, language groups, or inter-language variation all require reference to interfaces. The series is open to work by linguists of all theoretical persuasions and schools of thought. A main requirement is that authors should write so as to understood by colleagues in related subfields of linguistics and by scholars in cognate disciplines.

Jacques Durand and Bernard Laks and the authors they have assembled here address the question of what kinds of cognitive status should be imputed to phonological representations and how these representations are implemented phonetically. The chapters consider these questions from a variety of perspectives, bringing to bear arguments from classical universal-grammar

based analyses, statistical and inferential approaches, and neurobiology. The initial chapter by the editors sets the scene for the debate which is developed in the rest of the book.

David Adger
Hagit Borer

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Introduction

Jacques Durand and Bernard Laks

As the title indicates, *Phonetics, Phonology, and Cognition* addresses the central question of the cognitive status of phonological representations and their relationship with phonetic implementations. We are aware that the term 'cognition' has become fashionable and has been bandied about in an irresponsible way in much linguistic and other theorizing over the last few decades. Our choice of theme, however, implies a real commitment to the view that phonology is a subsystem (not necessarily modular) of the mind/brain. This has become a standard position since the advent of the generative paradigm but the issue of implementation has often been neglected, indeed often relegated to a subordinate position from an epistemological point of view. But current research allows a much more precise and detailed examination of both cognitive and biological systems involved in speech. The fine-grained analysis of articulatory and acoustic events in phonetics has made it possible to sharpen our answers to questions such as the type of control required for the implementation of articulatory events (low-level vs. high-level strategies) and the nature of the loop existing between auditory and articulatory mechanisms. These are questions which have been at the core of work in psycho- and neurolinguistics: learning strategies and devices, the nature of innate knowledge, the possible modularity of language and its relationship with other abilities (e.g. vision), the role of inferential mechanisms, and so on. We are also in the fortunate position of being able to examine some of these ideas through the more or less direct study of the brain, and neuroscience does not have to rely solely on the post-mortem dissection of speech-impaired patients. The whole story told in the eleven chapters of this book is therefore a story of links between approaches to the mental and physical representation of sound systems and an attempt to break

down some of the boundaries which have led to the emergence of various disciplines traditionally seen as sharply separated. Historically, these boundaries were no doubt justified and have often proved useful, but today converging advances in various disciplines are leading to a questioning of these classical divisions (divisions which we, as editors, see as counter-productive, as argued in Chapter 1). If phonology is important for us, it is not in the sense of a necessarily fully autonomous discipline with its own unique methodology, but as a field of enquiry which allows the integration of phonetics and cognition because, Janus-like, it looks both at the realization of representations in physical structures and at the way the sound structure of languages is linked to their internal form (morphological, syntactic, semantic, and pragmatic) and their mental coding.

Like some other recent contributions in the field (such as the work done within Laboratory Phonology), this book stresses the need for cooperation between closely related disciplines. *Phonetics, Phonology, and Cognition* offers a challenging selection of chapters by specialists in areas ranging from phonetics to neurology. To be more specific, the contributors come from the fields of phonology, experimental phonetics, acoustics, psychology, psycholinguistics, neurology, neurolinguistics, and neurophysiology. They have all published extensively in their respective disciplines and have an international reputation. Even more remarkable than their scientific standing is the willingness of the contributors to this book to transcend traditional boundaries and think provocatively about the relationship between disciplines, levels, and modes of analysis. It is the belief of the editors that this collection constitutes a unique cross-disciplinary book in the area of language and cognition.

The book opens with an introductory chapter by Jacques Durand and Bernard Laks, 'Phonology, Phonetics, and Cognition', in which the authors examine some of the historical links between these various domains of enquiry and discuss current debates in the field. Chapter 1, therefore, while putting forward a number of theses, provides a backdrop for many of the later chapters.

In Chapter 2, 'What Are Phonological Syllables Made of? The Voice/Length Symmetry', Joaquim Brandão de Carvalho deals in a detailed way with syllable structure—an issue which is central to most of the articles in this book. In all phonological models of syllable structure, 'sonority', and in particular one of its main correlates—voice(lessness)—are intrinsic properties of segments, as opposed for example to length, which also plays a major role in syllable structure, and was shown to be a prosodic effect by autosegmental phonology, by appealing to the notion of skeletal positions and the Obligatory Contour Principle. This has particular importance today, since

the segmental nature of sonority may naturally be viewed as evidence for 'output-based' and non-representational approaches to the syllable.

The basic claim of Joaquim Brandão de Carvalho's article is that voice, and more generally all features associated with 'voice onset time' (VOT)—voice, voicelessness, and aspiration (henceforth VOT-values)—are not segmental features. Rather, VOT-values and length contrasts are to be assigned similar representations. It is proposed that phonological words are characterized by two parallel curves which follow from the association with the skeleton of two autonomous and opposed tiers: the O-tier, where 'onsets' are the roots of consonants, is assumed to stand for (articulatory) 'tension'; the N-tier, where 'nuclei' are the roots of vowels, represents (perceptual) 'sonority'. VOT-values and length contrasts are, as it were, contextual allophones of such abstract invariants which arise through autosegmental spreading. The representation of VOT-values and length in terms of O/N interactions is shown by Carvalho to provide a simple and straightforward solution to a set of six independent phonological problems. Beyond its explanatory power, the hypothesis of O/N interactions is important on cognitive grounds. By denying any symbolic status to aspiration and voice, one can no doubt reduce the number of segmental primitives. But more importantly, by assuming that both VOT-values and length contrasts are segmental effects of onset and nucleus weight, defined as the number of slots which onsets and nuclei are associated with, the author establishes a representational basis for the syllable: 'syllables' exist wherever VOT and/or length contrasts may emerge. This runs counter to the claims of output-based approaches, where syllables are constructed from smaller units. By contrast, the present theory may be argued to lend phonological support to other approaches such as MacNeilage's distinction between *frame* and *content*, whose neurological implications are examined in Chapter 9 by Abry, Stefanuto, Vilain and Laboissière.

In Chapter 3, 'Tone in Mituku: How a Floating Tone Nailed down an Intermediate Level', John Goldsmith studies the tonal system of Mituku, a tone language of the Bantu family, and considers the relationship between constraints and phonological representations. He argues that a well-known constraint, the restriction of a maximum of one tone per vowel, is operative in Mituku, but that its domain is restricted to a particular level in the grammar, and he further argues that this level is an intermediate phonological level, neither the underlying representation nor the surface representation. This example is argued by Goldsmith to illustrate the fact that constraint-based phonologies must not be committed to including only surface-level constraints, nor be committed entirely to non-derivational accounts. His conclusions lead him to some speculations on the possible neural basis for