

The Sounds of the World's Languages

*Peter Ladefoged and
Ian Maddieson*

Copyright © Peter Ladefoged and Ian Maddieson, 1996

The right of Peter Ladefoged and Ian Maddieson to be identified as authors
of this work has been asserted in accordance with the Copyright, Designs
and Patents Act 1988.

First published 1996
Reprinted 1996

Blackwell Publishers Ltd
108 Cowley Road
Oxford OX4 1JF, UK

Blackwell Publishers Inc.
238 Main Street
Cambridge, Massachusetts 02142, USA

All rights reserved. Except for the quotation of short passages for the purposes
of criticism and review, no part of this publication may be reproduced, stored
in a retrieval system, or transmitted, in any form or by any means, electronic,
mechanical, photocopying, recording or otherwise, without the prior permission
of the publisher.

Except in the United States of America, this book is sold subject to the condition
that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or
otherwise circulated without the publisher's prior consent in any form of binding
or cover other than that in which it is published and without a similar condition
including this condition being imposed on the subsequent purchaser.

British Library Cataloguing in Publication Data

A CD? catalogue record for this book is available from the British Library

Library of Congress Cataloging in Publication Data

Ladefoged, Peter.

Contents

List of figures	viii
List of tables	xv
Acknowledgments	xix
1 The Sounds of the World's Languages	1
2 Places of Articulation	9
2.1 Places of Articulation by Target Region	15
2.2 Contrasting Places of Articulation	39
3 Stops	47
3.1 Laryngeal Setting	47
3.2 Airstream Mechanisms	77
3.3 Affricates	90
3.4 Length	91
3.5 Strength, Emphasis, and Stress	95

5	Fricatives	137
5.1	Non-sibilant Anterior Fricatives	139
5.2	Sibilants	145
5.3	Posterior Non-sibilant Fricatives	164
5.4	Acoustic Differences among Fricatives	173
5.5	Laryngeal Settings and other Modifications of Fricatives	176
5.6	Phonological Features for Fricatives	179
6	Laterals	182
6.1	Voiced Lateral Approximants	183
6.2	Acoustic Characteristics of Voiced Lateral Approximants	193
6.3	Other Types of Laterals	197
6.4	The Feature Description of Laterals	212
7	Rhotics	215
7.1	Rhotics	215
7.2	Trills	217
7.3	Taps and Flaps	230
7.4	Fricative and Approximant /r/"s	232
7.5	Voicing and other Laryngeal Contrasts	236
7.6	Contrasts between Rhotic Types in the Same Language	237
7.7	Relationship to Laterals	243
7.8	Factors Underlying the Unity of Rhotics as a Class	244
8	Clicks	246
8.1	Articulatory Properties of Click Types	247
8.2	Acoustic Properties of Click Types	257
8.3	Clicks in the context of other consonants	266

10.3 Secondary Articulations	354
11 Coda	369
Appendix: List of Languages Cited	374
References	383
Index	408

The Sounds of the World's Languages

The title of this book. *The Sounds of the World's Languages*, implies two very significant claims. One is that it makes sense to talk about entities that can be labeled 'sounds'. The other is that we know enough about the languages of the world to be able to write a book that covers them all. We would like to explain our thinking in selecting this title.

Most of the phonetic literature of the last two centuries assumes that a meaningful analysis can be made by dividing speech into small chunks that can be called speech sounds. These may be described in formalized terms as phonemes, root nodes, or some other theoretical entity, or discussed in more gen-

affairs which has never existed at any time prior to the latter part of this century. The 'global village' effect means that few societies remain outside the scope of scholarly scrutiny. In all probability there will be a sharp decrease in the rate at which previously unknown sounds are drawn to the attention of phoneticians. We are, of course, aware that there are phonetic phenomena in every language that have yet to be described. Speech varies in response to many different circumstances, and we do not have a complete knowledge of the phonetic structure of any language. In addition, languages are always evolving. Thus there can never be a final description of the sounds of any one language. The next generation of speakers will always speak a little differently from their predecessors, and may even create sounds that have never been used in a human language before. We think it probable, however, that any new sounds will be similar to those that now have a linguistic function and will be formed by re-arrangements of properties of sounds that have been previously observed in linguistic usage. In other words, we feel that a basis exists for discriminating between linguistic and non-linguistic sounds.

Using this basis and our intuitions we have sometimes posited the existence of sounds that have not yet been reported in the linguistic literature. These are sounds which we feel reflect accidental gaps in the currently available data, or are absent only by chance from any currently spoken language. Other possibilities are not mentioned at all since we believe they will never have a role in linguistic structure. There are, of course, many sounds that can be made with the vocal organs that are not known to be used in any language. People can whistle, click their teeth, wag their tongues from side to side, and perform a variety of other maneuvers to produce sounds that have never been reported to have a linguistic function. But linguistic phonetics does not have to account for all the sounds that humans are capable of making, or even all of those which can be made just in the vocal tract.

The primary data we will try to describe are all the segments that are known to distinguish lexical items within a language. We have in this way determined the level of description at which we will operate. We are concerned with the lexical segments that account for minimal pairs. (We must admit that

can be said to be absent from the underlying inventory of English, although it serves to establish minimal contrasts. The different status of *rj* is not of concern to phonetics. We want to account for all the contrasts that occur between distinct segments, and in English that includes *r*).

There are, of course, other situations which are harder to resolve in this way. In particular it is often difficult to decide how to divide a particular phonetic string into segments. There are well-known cases such as the affricates *tf* and *d3* in English, which some linguists regard as one segment and others as a sequence of two segments. From our point of view it does not really matter which of these solutions is chosen. The phonetic facts to be described remain the same in either case. English also provides a useful illustration of another form of this problem in words such as *mew* and *beauty*. Obviously these words differ from *moo* and *booty*, but the difference could be interpreted as a contrast between the presence and absence of the semivowel *j*, or as a contrast between the different vowel nuclei *iu* and *u* (where *iu* represents a diphthong with a rising amplitude contour). However, again the phonetic facts would not differ according to which view is taken. Our approach in similar situations is to adopt the phonetic description which yields the simplest segment types. Thus, in this case, we would prefer the interpretation with the simpler segment *j* to the complex one *iu*.

Although our primary data are the contrasts within languages, we also take note of differences between languages. We hope that the phonetic events observed will be sufficient to form the basis for an overall phonetic theory. This needs to be rich enough to describe those segmental events which distinguish one language or accent from another and which are also sufficiently distinct to serve as potential conveyers of lexical contrasts for speakers of other languages. We will, however, mainly restrict the discussion to those segments that distinguish words in some language.

As we will be discussing only segments, prosodic features such as tone, stress and accent fall outside the scope of the book, even though they distinguish words. So also do most of the variations in segments that result from differences in their prosodic context. Furthermore, variations due to stylistic