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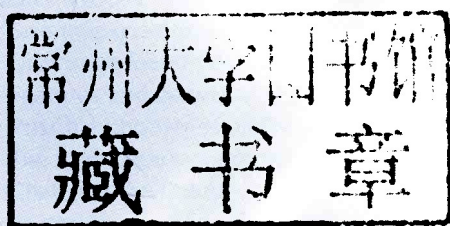
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Introducing Phonology

Second Edition

DAVID ODDEN



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Designed for students with only a basic knowledge of linguistics, this leading textbook provides a clear and practical introduction to phonology, the study of sound patterns in language. It teaches in a step-by-step fashion the logical techniques of phonological analysis and the fundamental theories that underpin it. This thoroughly revised and updated edition teaches students how to analyze phonological data, how to think critically about data, how to formulate rules and hypotheses, and how to test them.

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DAVID ODDEN is Professor Emeritus in Linguistics at Ohio State University.

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About this book

This is an introductory textbook on phonological analysis, and does not assume any prior exposure to phonological concepts. The core of the book is intended to be used in a first course in phonology, and the chapters which focus specifically on analysis can easily be covered during a ten-week quarter. Insofar as it is a textbook in phonology, it is not a textbook in phonetics, and it presupposes an elementary knowledge of transcriptional symbols.

The main emphasis of this book is developing the foundational skills needed to analyze phonological data, especially systems of phonological alternations. For this reason, there is significantly less emphasis on presenting the various theoretical positions which phonolo-

gists have taken over the years. Theory cannot be entirely avoided, indeed it is impossible to state generalizations about a particular language without a theory which gives you a basis for postulating general rules. The very question of what the raw data are must be interpreted in the context of a theory, thus analysis needs theory. Equally, theories are formal models which impose structure on data – theories are theories *about* data – so theories need data, hence analysis. The theoretical issues that are discussed herein are chosen because they represent issues which have come up many times in phonology, because they are fundamental issues, and especially because they allow exploration of the deeper philosophical issues involved in theory construction and testing.

Acknowledgments

A number of colleagues have read and commented on versions of this book. I would like to thank Lee Bickmore, Patrik Bye, Chet Creider, Lisa Dobrin, Kathleen Currie Hall, Sharon Hargus, Tsan Huang, Beth Hume, Keith Johnson, Ellen Kaisse, Susannah Levi, Marcelino Liphola, Mary Paster, Charles Reiss, Richard Wright, and especially Mary Bradshaw for their valuable comments on earlier drafts. I would also like to thank students at the University of Western Ontario, University of Washington, University of Tromsø, Ohio State University, Kyungpook National University, Concordia University, and the 2003 LSA Summer Institute at MSU, for serving as a practical sounding board for this book. Numerous colleagues have provided valuable input leading to the revised version of this book, and I regret being unable to thank them all personally.

Data from my own field notes provide the basis for a number of the examples, and I would like to thank my many language consultants for the data which they have provided me, including Tamwakat Gofwen (Angas), Bassey Irele (Efik), Edward Amo (Gã), Jean-Paul Lamah (Guerze), John Mtenge and the late Margaret Fivawo (Hehe), Beatrice Mulala (Kamba), Oben Ako (Kenyang), Deo Tungaraza (Kerewe), Matthew Kirui (Kipsigis), Habi (Kotoko),

Rose Kamwesa (Llogoori), Emmanuel Manday (Matuumbi), Patrick Bamwine (Nkore), David Mndolwa (Shambaa), Kokerai Rugara (Shona), Udin Saud (Sundanese), Nawang Nornang (Tibetan), and Christopher Oruma (Urhobo).

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Finally, I would like to acknowledge my debt to authors of various source books, in particular Whitley 1978, Halle and Clements 1983, Pickett 2002, and especially Kenstowicz and Kisseberth 1979.

A note on languages

The languages which provided data for this book are listed below. The name of the language is given, followed by the genetic affiliation and location of the language, finally the source of the data ("FN" indicates that the data come from my own field notes). Genetic affiliation typically gives the lowest level of the language tree which is likely to be widely known, so Bantu languages will be cited as "Bantu," and Tiv will be cited as "Benue-Congo," even though "Bantu" is a part of Benue-Congo and "Tiv" is a specific language in the Tivoid group of the Southern languages in Bantoid. Locations will generally list one country but sometimes more; since language boundaries rarely respect national boundaries, it is to be understood that the listed country (or countries) is the primary location where the language is spoken, especially the particular dialect used; or this may be the country the language historically originates from (the Yiddish-speaking population of the US appears to be larger than that of any one country in Eastern Europe, due to recent population movements).

- Akan [Volta-Congo; Ghana]: Dolphyne 1988; Charles Marfo p.c.
Amharic [Semitic; Ethiopia]: Whitley 1978; Grover Hudson p.c.
Angas [Chadic; Nigeria]: FN.
Arabela [Zaparoan; Peru]: Rich 1963.
Aramaic (Azerbaijani) [Semitic; Azerbaijan]: Hoberman 1988.
Araucanian [Araucanian; Argentina, Chile]: Echeverría and Contreras 1965; Hayes 1995.
Armenian [Indo-European; Armenia, Iran, Turkey]: Vaux 1998 and p.c.
Axininca Campa [Arawakan; Peru]: Payne 1981 and p.c.
Bedouin Hijazi Arabic [Semitic; Saudi Arabia]: Al-Mozainy 1981 and p.c.
Bukusu [Bantu; Kenya]: Nasiombe Mutonyi p.c.
Cairene Arabic [Semitic; Egypt]: Broselow 1979.
Catalan [Romance; Spain]: Lleo 1970; Kenstowicz and Kisseberth 1979; Wheeler 1979; Hualde 1992.
Chamorro [Austronesian; Guam]: Topping 1968; Topping and Dungca 1973; Kenstowicz and Kisseberth 1979; Chung 1983.
Chukchi [Chukotko-Kamchatkan; Russia]: Krauss 1981.
Digo [Bantu; Kenya and Tanzania]: Kisseberth 1984.
Efik [Benue-Congo; Nigeria]: FN.
Estonian [Uralic; Estonia]: Ilse Lehist p.c.; Saagpak 1992.
Evenki [Tungusic; Russia]: Konstantinova 1964; Nedjalkov 1997; Bulatova and Grenoble 1999.
Ewe (Anlo) [Volta-Congo; Benin]: Clements 1978.
Farsi [Indo-European; Iran]: Obolensky, Panah, and Nouri 1963.
Finnish [Uralic; Finland, Russia]: Whitney 1956; Lehtinen 1963; Anders Holmberg p.c.
Fore [Papuan; Papua New Guinea]: Pickett 2002.
Fula [West Atlantic; West Africa]: Paradis 1992.
Gã [Volta-Congo; Ghana]: FN in collaboration with Mary Paster.
Gen [Kwa; Togo]: FN.
Greek [Indo-European; Greece]: Georgios Tserdanelis p.c.
Guerze (Kpelle) [Mande; Guinea]: FN.
Hebrew [Semitic; Israel]: Kenstowicz and Kisseberth 1979.
Hehe [Bantu; Tanzania]: FN in collaboration with Mary Odden.
Holoholo [Bantu; Congo]: Coupe 1955.
Hungarian [Uralic; Hungary]: Vago 1980; Kenesei, Vago, and Fenyvesi 1998.
Isthmus Zapotec [Oto-Manguean; Mexico]: Pickett 2002.
Japanese [Japanese; Japan]: Martin 1975.

- Jita [Bantu; Tanzania]: Downing 1996.
- Kamba [Bantu; Kenya]: FN in collaboration with Ruth Roberts-Kohn.
- Karok [Hokan; USA]: Bright 1957; Kenstowicz and Kisseberth 1979.
- Keley-i [Austronesian; Philippines]: Kenstowicz and Kisseberth 1979; Lou Hohulin p.c.
- Kenyang [Bantu; Cameroon]: FN.
- Kera [Chadic; Chad]: Ebert 1975; Kenstowicz and Kisseberth 1979.
- Kerewe [Bantu; Tanzania]: FN.
- Kikuyu [Bantu; Kenya]: Clements 1984.
- Kipsigis [Nilotic; Kenya]: FN.
- Klamath [Penutian; USA]: Barker 1963, 1964.
- Koasati [Muskogean; Louisiana]: Kimball 1991.
- Kolami [Dravidian; India]: Emeneau 1961.
- Korean [Korean; Korea]: Martin 1992; Younghee Chung, Noju Kim, Mira Oh and Misun Seo p.c.
- Koromfe [Gur; Bourkina Fasso]: Rennison 1997.
- Kotoko [Chadic; Cameroon]: FN.
- Kuria [Bantu; Kenya]: FN.
- Lamba [Bantu; Zambia]: Doke 1938; Kenstowicz and Kisseberth 1979.
- Lardil [Pama-Nyungan; Australia]: Klokeid 1976.
- Latin [Indo-European; Italy]: Allen and Greenough 1983; Hale and Buck 1966.
- Lezgian [Northeast Caucasian; Dagestan and Azerbaijan]: Haspelmath 1993 and p.c.
- Lithuanian [Indo-European; Lithuania]: Dambriunas, Klimas, and Schmalstieg 1966; Ambrazas 1997; Kenstowicz 1972a; Mathiassen 1996.
- Llogoori [Bantu; Kenya]: FN in collaboration with Michael Marlo.
- Luganda [Bantu; Uganda]: Cole 1967; Snoxall 1967.
- Lulubo [Nilo-Saharan; Sudan]: Andersen 1987.
- Makonde [Bantu; Mozambique]: Marcelino Liphola p.c.
- Maltese [Semitic; Malta]: Aquilina 1965; Borg and Azzopardi-Alexandre 1997; Brame 1972; Hume 1996.
- Manipuri [Sino-Tibetan; India, Myanmar, Bangladesh]: Bhat and Ningomba 1997.
- Maranungku [Australian; Australia]: Tryon 1970; Hayes 1995.
- Margyi [Chadic; Nigeria]: Hoffmann 1963.
- Matuumbi [Bantu; Tanzania]: FN.
- Mbunga [Bantu; Tanzania]: FN.
- Mende [Mande; Liberia, Sierra Leone]: Leben 1978.
- Mixtec [Mixtecan; Mexico]: Pike 1948; Goldsmith 1990a.
- Mixteco [Oto-Manguean; Mexico]: Pickett 2002.
- Mohawk [Hokan; USA]: Postal 1968; Beatty 1974; Michelson 1988 and p.c.
- Mongo [Bantu; Congo]: Hulstaert 1961.
- Mongolian [Altaic; Mongolia]: Hangin 1968.
- Nkore [Bantu; Uganda]: FN in collaboration with Robert Poletto.
- Norwegian [Germanic; Norway]: Ove Lorentz p.c.
- Osage [Siouan; Oklahoma]: Gleason 1955.
- Ossetic [Indo-European; Georgia, Russia]: Abaev 1964; Whitley 1978. —
- Palauan [Austronesian; Palau]: Josephs 1975; Flora 1974.
- Polish [Slavic; Poland]: Kenstowicz and Kisseberth 1979.
- Quechua (Cuzco) [Quechua; Peru]: Bills, Vallejo, and Troike 1969; Cusihamán 1976.
- Saami [Uralic; Sápmi (Norway, Sweden, Finland, Russia)]: FN in collaboration with Curt Rice and Berit Anne Bals Baal.
- Sakha (Yakhut) [Altaic; Russia]: Krueger 1962; Nadezhda Vinokurova p.c.
- Samoa [Austronesian; Samoa]: Milner 1966.
- Serbo-Croatian [Slavic; Yugoslavia]: Kenstowicz and Kisseberth 1979; Wayles Browne, Svetlana Godjevac, and Andrea Sims p.c.
- Shambaa [Bantu; Tanzania]: FN.
- Shona [Bantu; Zimbabwe]: FN.
- Slave [Athapaskan; Canada]: Rice 1989.
- Slovak [Slavic; Slovakia]: Kenstowicz 1972b; Rubach 1993.
- Somali [Cushitic; Somalia]: Andrzejewski 1964; Kenstowicz 1994; Saeed 1993, 1999.
- Sundanese [Austronesian; Indonesia]: FN.
- Swati [Bantu; Swaziland]: FN.
- Syrian Arabic [Semitic; Syria]: Cowell 1964.
- Tera [Chadic; Nigeria]: Newman 1968.
- Thai [Daic; Thailand]: Halle and Clements 1983.
- Tibetan [Sino-Tibetan; Tibet]: FN.
- Tiv [Benue-Congo; Nigeria]: Arnott 1964; Goldsmith 1976.

- Tohono O'odham (Papago) [Uto-Aztecan; USA]: Saxton 1963; Saxton and Saxton 1969; Whitley 1978.
- Tonkawa [Coahuiltecan; USA]: Hoijer 1933.
- Tswana [Bantu; Botswana]: Cole 1955; Snyman, Shole, and Le Roux 1990.
- Turkish [Altaic; Turkey]: Lees 1961; Foster 1969; Halle and Clements 1983.
- Ukrainian (Sadžava, Standard) [Slavic; Ukraine]: Carlton 1971; Kenstowicz and Kisseberth 1979; Press and Pugh 1994 (Standard); Popova 1972 (Sadžava).
- Urhobo [Edoid; Nigeria]: Aziza 2008 and p.c.; FN.
- Vata [Kru; Côte d'Ivoire]: Kaye 1982.
- Votic [Uralic; Russia]: Ariste 1968.
- Warao [Warao; Venezuela]: Osborn 1966; Hayes 1995.
- Weri [Goilalan; New Guinea]: Boxwell and Boxwell 1966; Hayes 1995.
- Wintu [Penutian; USA]: Pitkin 1984.
- Woleaian [Austronesia; Micronesia]: Sohn 1975.
- Xavante [Jé; Brazil]: Pickett 2002.
- Yawelmani [Penutian; USA]: Newman 1944; Kenstowicz and Kisseberth 1979.
- Yekhee (Etsako) [Edoid; Nigeria]: Elimelech 1978.
- Yiddish [Germanic; Eastern Europe]: Neil Jacobs p.c.
- Yoruba [Kwa; Nigeria]: Akinlabi 1984.
- Zoque [Mixe-Zoquean; Mexico]: Pickett 2002.

Abbreviations

abl	ablative	masc	masculine
acc	accusative	ms(c)	millisecond
ant	anterior	nas	nasal
ATR	advanced tongue root	neut	neuter
bk	back	nom	nominative
c.g.	constricted glottis	obj	object
cl	class	pl	plural
cons	consonantal	poss	possessive
cont	continuant	pres	present
cor	coronal	rd	round
dat	dative	sg, sing	singular
dB	decibel	s.g.	spread glottis
del.rel	delayed release	son	sonorant
dim	diminutive	sp	species
distr	distributed	strid	strident
e.o.	each other	syl	syllabic
fem	feminine	tns	tense
gen	genitive	tr	transitive
hi	high	vcd	voiced
Hz	Hertz	vcls	voiceless
imp	imperative	voi	voice
intr	intransitive	1	first person
lat	lateral	2	second person
lo	low	3	third person
loc	locative		

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1 What is phonology?

PREVIEW

KEY TERMS

sound
symbol
transcription
grammar
continuous
nature of
speech

This chapter introduces phonology, the study of the sound systems of language. Its key objective is to:

- ◆ explain the difference between physical sound and “a sound” as a discrete element of language
- ◆ highlight the tradeoff between accuracy and usefulness in representing sound
- ◆ introduce the notion of “sound as cognitive symbol”
- ◆ present the phonetic underpinnings of phonology
- ◆ introduce the notion of phonological rule

Phonology is one of the core fields that compose the discipline of linguistics, which is the scientific study of language structure. One way to understand the subject matter of phonology is to contrast it with other fields within linguistics. A very brief explanation is that phonology is the study of sound structure in language, which is different from the study of sentence structure (syntax), word structure (morphology), or how languages change over time (historical linguistics). But this is insufficient. An important feature of the structure of a sentence is how it is pronounced – its sound structure. The pronunciation of a given word is also a fundamental part of the structure of the word. And certainly the principles of pronunciation in a language are subject to change over time. So phonology has a relationship to numerous domains of linguistics.

An important question is how phonology differs from the closely related discipline of phonetics. Making a principled separation between phonetics and phonology is difficult – just as it is difficult to make a principled separation between physics and chemistry, or sociology and anthropology. While phonetics and phonology both deal with language sound, they address different aspects of sound. Phonetics deals with “actual” physical sounds as they are manifested in human speech, and concentrates on acoustic waveforms, formant values, measurements of duration measured in milliseconds, of amplitude and frequency. Phonetics also deals with the physical principles underlying the production of sounds, namely vocal tract resonances, and the muscles and other articulatory structures used to produce those resonances. Phonology, on the other hand, is an abstract cognitive system dealing with rules in a mental grammar: principles of subconscious “thought” as they relate to language sound.

Yet once we look into the central questions of phonology in greater depth, we will find that the boundaries between the disciplines of phonetics and phonology are not entirely clear-cut. As research in both of these fields has progressed, it has become apparent that a better understanding of many issues in phonology requires that you bring phonetics into consideration, just as a phonological analysis is a prerequisite for phonetic study of language.

1.1 Phonetics – the manifestation of language sound

Ashby and Maidment (2005) provide a detailed introduction to the subject area of phonetics, which you should read for greater detail on the acoustic and articulatory properties of language sounds, and transcription using the International Phonetic Alphabet (IPA). This section provides a basic overview of phonetics, to clarify what phonology is about.

From the phonetic perspective, “sound” refers to mechanical pressure waves and the sensations arising when such a pressure wave strikes your ear. In a physical sound, the wave changes continuously, and can be

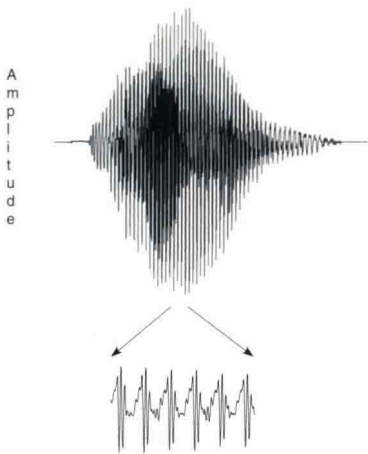


FIGURE 1

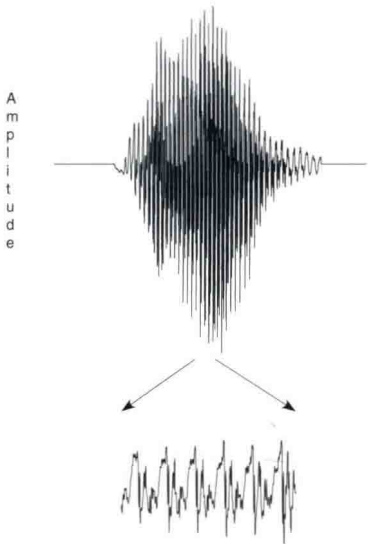


FIGURE 2

graphed as a waveform showing the amplitude on the vertical axis and time on the horizontal axis. Figure 1 displays the waveform of a pronunciation of the word *wall*, with an expanded view of the details of the waveform at the center of the vowel between *w* and *ll*.

Figure 2 provides an analogous waveform of a pronunciation of the word *'will'*, which differs from *wall* just in the choice of the vowel.

Inspection of the expanded view of the vowel part of these waveforms shows differences in the overall shape of the time-varying waveforms, which is what makes these words sound different.

It is difficult to characterize those physical differences from the waveform, but an analytical tool of phonetics, the **spectrogram**, provides a

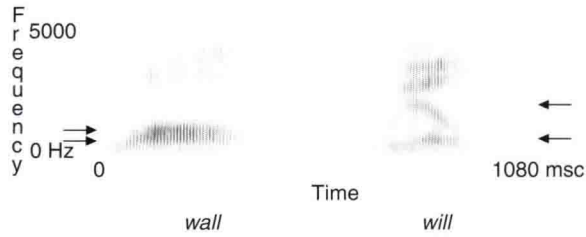


FIGURE 3



FIGURE 4

useful way to describe the differences, by reducing the absolute amplitude properties of a wave at an exact time to a set of (less precise) amplitude characteristics in different frequency and time areas. In a spectrogram, the vertical axis represents frequency in Hertz (Hz) and darkness represents amplitude. Comparing the spectrograms of *wall* and *will* in figure 3, you can see that there are especially dark bands in the lower part of the spectrogram, and the frequency at which these bands occur – known as **formants** – is essential to physically distinguishing the vowels of these two words. Formants are numbered from the bottom up, so the first formant is at the very bottom.

In *wall* the first two formants are very close together and occur at 634 Hz and 895 Hz, whereas in *will* they are far apart, occurring at 464 Hz and 1766 Hz. The underlying reason for the difference in these sound qualities is that the tongue is in a different position during the articulation of these two vowels. In the case of the vowel of *wall*, the tongue is relatively low and retracted, and in the case of *will*, the tongue is relatively fronted and raised. These differences in the shape of the vocal tract result in different physical sounds coming out of the mouth.

The physical sound of a word's pronunciation is highly variable, as we see when we compare the spectrograms of three pronunciations of *wall* in figure 4: the three spectrograms are obviously different.

The first two pronunciations are produced at different times by the same speaker, differing slightly in where the first two formants occur (634 Hz and 895 Hz for the first token versus 647 Hz and 873 Hz for the second), and in numerous other ways such as the greater amplitude of the lower formants in the first token. In the third token, produced by a second (male) speaker of the same dialect, the first two formants are noticeably lower and closer together, occurring at 541 Hz and 617 Hz.