Hans Henrich Hock

Principles of Historical Linguistics

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Preface

Since its pre-nineteenth-century beginnings, historical linguistics has undergone many changes that time and again have led to major revisions and modifications in theory and practice.

Early work focused mainly on comparative morphology. A slow trend toward the "emancipation" of phonology culminated in the neogrammarians' emphasis on sound change and their claim that this change is absolutely regular. Combined with the claim that analogical processes are at work not only in observable history but also in prehistoric periods, the neogrammarian approach profoundly changed historical linguistics and greatly increased our understanding of linguistic change. Moreover, under scholars like Delbrück, the neogrammarians produced an impressive amount of research in historical syntax, especially regarding word order and the use of cases and other morphological categories. This syntactic interest, however, proved to be relatively short-lived.

Though the neogrammarian approach became immensely popular and productive, dissenting voices arose almost immediately. In hindsight, the most formidable among these was Schuchardt who claimed that the neogrammarian distinction between sound change and analogy was spurious and who saw in pidgins, creoles, and other types of "language mixture" the potential for challenging established views about the development and genetic classification of languages. Until the 1960s, however, Schuchardt's work and claims were generally ignored in mainstream historical linguistics.

Other challenges met a more usual fate. After some initial resistance they were incorporated into mainstream historical linguistics as important modifications or additions to traditional theory and practice. Thus, the findings of dialectologists like Gilliéron at first glance suggested that the neogrammarian regularity hypothesis had to be abandoned. Soon, however, dialectological research turned out to provide an important tool for explaining apparent irregularities. The response was similar as regards the new concepts that were introduced by the structuralists. While following Bloomfield, American structuralism generally remained satisfied with the traditional neogrammarian approach, modified and enriched only by the notions "phoneme" and "phonological contrast", the European variety of structuralism provided further and farther-reaching contributions. These included Trubetzkoy's and Jakobson's concept of contrast neutralization, Martinet's "functionalism" (including the notion of chain shifts), and Trubetzkoy's and Jakobson's ideas on linguistic convergence areas.

Starting in the 1960s generativists reintroduced the notion "synchronic rule" into linguistics, a concept that had much earlier been put to excellent use by the Sanskrit grammarian Pāṇini and had also been implicit in the work of the

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neogrammarian Hermann Paul. Relevant for historical linguistics, generative linguistics extended its rule-oriented approach to historical problems and in so doing provided significant challenges to historical linguistics, as well as the potential for considerable enrichment. An important result consists in a strong revival of research on diachronic syntax; but the areas of phonological and analogical change have also benefited.

At about the same time, Schuchardt's, Trubetzkoy's, and Jakobson's earlier work and ideas on language contact gave rise, directly or indirectly, to a very active branch of historical linguistics that is concerned with the broader results of language contact, going beyond lexical borrowing, and including structural convergence, pidgins and creoles, and the nature of language attrition and "language death".

Schuchardt's early ideas on the relation between sound change and analogy have received partial confirmation in the work of Labov, whose sociolinguistic approach in many important ways has revolutionized our thinking about the nature and motivation of all linguistic change.

These challenges and proposed modifications of the neogrammarian position have clearly changed the field of historical linguistics. At the same time, it is remarkable that in the long run they have not so much led to complete revolutions in historical linguistic thinking and practice, but rather to modifications, incorporating those concepts that proved useful and important enough to be incorporated and rejecting (or ignoring) others.

As a consequence, historical linguistic theory and practice contains a great number of different layers that have been accepted in the course of time and have acquired a permanence of their own. These range from early neogrammarian conceptualizations of sound change and analogy to present-day ideas on rule change and language mixture. To get a full grasp of the principles of historical linguistics it is therefore necessary to understand the nature and justification (or shortcomings) of each of these layers, not just to look for a single overarching theory.

The major purpose of the present book is to provide in up-to-date form such an understanding of the principles of historical linguistics and of the related fields of comparative linguistics and reconstruction.

In addition to this major goal the book attempts to meet a second goal – to provide broad exemplifications and illustrations of the various principles of historical linguistics. Many aspects of linguistic change have been well exemplified in earlier books on general historical linguistics. Note for instance Paul's extensive coverage of analogical and semantic change, or Bloomfield's rich illustrations of dialectological phenomena. But such coverage usually has not been comprehensive, and especially the area of sound change has generally received only cursory exemplification. It was taken for granted that readers had already

studied the linguistic history of at least one language or language family and thus would be familiar with many examples and types of linguistic change. This is especially the case for the various types of sound change, which were featured in great detail in presentations of individual language histories. Books dealing with general historical linguistics, then, would attempt to provide a broader perspective on linguistic change, not limited to a single language or language family.

For reasons too varied to be discussed here, the field of linguistics has changed such that these earlier assumptions about readers' prior background or familiarity can no longer be maintained. It is therefore necessary to provide a much broader exemplification than what was customary in earlier works – for all linguistic changes, including sound change.

To accomplish the goals of this book as effectively as possible I have endeavored to adhere to the following guidelines

a. Examples should be as accurate as possible. That is, as much as possible the data should be genuine, and they should unambiguously exemplify a given process.
b. Examples and their interpretation, as well as general theoretical claims, should not be unnecessarily controversial or excessively tied to a particular, possibly short-lived theory. This concern, of course, is intimately linked with one of the major goals of this book, namely to provide an accurate picture of the various permanent layers of the theory and practice of historical linguistics.
c. Although this book is intended not as an elementary introduction to the field, but as something like a manual and state-of-the-art report for the general linguistic community, I have tried to make it self-explanatory, by defining all concepts and terminology (including methods of transcription and abbreviation). In the absence of any universally accepted terminology and definitions, this practice will, I hope, help to avoid misunderstandings.

The aim of point a. is not always easy to accomplish. Many changes, even those that are often cited as exemplifications of a given process, are in fact analyzable in more than one way. For instance, examples like Proto-Germanic **uns* 'us' changing to Old English *ūs* are commonly explained as involving "loss with compensatory lengthening". But they may also be attributed to other processes, such as "weakening" of *n* to some kind of glide and subsequent contraction of that glide with the preceding vowel. I hope to have succeeded by keeping examples of this type to an absolute minimum or, alternatively, by offering a discussion of the different arguments and their merits.

What is often even more difficult is to find genuine, attested examples in which no changes have taken place other than the one that the example is

intended to illustrate. As far as possible, I have tried to highlight the relevant portions of such examples in boldface. Elsewhere, readers are asked to concentrate on the change under discussion and ignore other developments. In some cases I have used constructed examples that conform to the synchronic grammar of their historical stages.

The goal of point b. likewise is not always easy to accomplish. Even where there is a communis opinio, there will be at least some dissenters. Moreover, there are cases for which no consensus seems to exist (such as the development of "retroflex" consonants), but where an explanation is possible, along lines that are in essential agreement with general theory and practice. In addition, in some areas most of the relevant research has been conducted relatively recently, and no general consensus has been reached; however, it is possible to weigh the various arguments and to present what appear to be the most probable findings. (This is especially the case in two areas – the development of pidgins, creoles, and similar forms of language, and the question of the relevance of typology for reconstruction.)

In several cases I have not shied away from providing interpretations of my own, even though they may not (yet) have come to be generally accepted, in order to show how a particular theoretical claim could be turned into the basis for further fruitful speculation. This is the case, for instance, for sections of Chapter 5 that deal with regular dissimilation, regular metathesis, initial strengthening, and the effect of phrasal prosody on sound change.

In all of these deviations from my objective b., however, I have tried to follow the principle adhered to elsewhere in this book, namely to limit myself to examples and interpretations that I feel comfortable vouching for.

The response to the two earlier editions of this book has been very encouraging. But as time progressed I felt that many parts of these editions were in dire need of updating and that important aspects of historical linguistics had not been sufficiently covered (or not covered at all). Some of these aspects were incorporated, at a more basic level, in *Language history, language change, and language relationship*, coauthored with Brian D. Joseph. Just as many parts of *Principles of historical linguistics* were incorporated in that book, with appropriate changes, so parts of *Language history* have been incorporated in this publication with appropriate changes, including the decision to include dedicated discussions on morphological change and lexical change, as well as a more thorough and detailed discussion of linguistic palaeontology and ideological reactions to the results of comparative linguistics. (Parts of *Language history* that were contributed by Brian D. Joseph are specifically acknowledged.) In addition, the results of recent work on phrasal prosody and its effects on linguistic change have been incorporated in the chapters on sound change and syntactic change.

I hope that these and other changes will make this, the third edition of *Principles of historical linguistics* more useful than the previous editions.

Finally, I have the pleasant task of extending thanks to those who have helped me in shaping this book.

There are first of all the many former students who have taken my courses in historical linguistics at the University of Illinois and from whose responses to my teaching and to earlier, prepublication versions of this book I have derived immeasurable benefit. Among these the following have been especially helpful and stimulating in the formulation of my ideas – Lee Becker, Esther Bentur, Rodolfo Cerrón-Palomino, Abby Cohn, Thomas Cravens, Karen Dudas, Indranil Dutta, Alexander Francis, Naomi Gurevich, Timothy Habick, Cynthia Johnson, Patrick Marlow, Kelly Maynard, Margie O'Bryan, Elizabeth Pearce, Steven Peter, Pilar Prieto, Vesna Radanović-Kocić, Daniel Ross, Stephen Schäufele, Marco Shappeck, Benjamin Slade, Jesse Robert Smith, K. V. Subbarao, Yasuko Suzuki, Sarah Tsiang, Lieve van de Walle, and William Wallace. Lieve van de Walle has also been helpful in coding the References for the second edition, and Yasuko Suzuki has provided invaluable service by updating and reformatting the old Word documents and incorporating corrections to the first edition, which for technical reasons had been confined to the chapter notes of the second edition.

I am also grateful for feedback that I received when offering intensive short courses on historical linguistics and language contact at Delhi University, the Central Institute of Indian Languages (Mysore), the Deccan Postgraduate College and Research Institute (Pune), the University of Hyderabad, Jawaharlal Nehru University (Delhi), and the Centre for Advanced Study in Sanskrit at Pune University.

I further owe gratitude to many of my colleagues in the field, for general encouragement and for keeping me supplied with their advice and offprints, especially my former and present departmental colleagues and friends, Eyamba Bokamba, Braj and Yamuna Kachru, C.-W. Kim, D. Gary Miller, Rajeshwari Pandharipande, Aida Talić, and Dieter Wanner. I have also benefited from advice, feedback, and critique by Robert Austerlitz, Wolfgang Dressler, Murray B. Emeneau, Henry Hoenigswald, Brian D. Joseph, Paul Kiparsky, Bh. Krishnamurti, Sonal Kulkarni-Joshi, William Labov, D. Gary Miller, Rocky Miranda, Edgar Polomé, Oswald Szemerényi, Peter Trudgill, Calvert Watkins, and Werner Winter. In addition I have benefited from the large number of reviews of the first and second edition of this book, even when I do not agree with them. Special thanks are due to Elmer Antonsen and Ladislav Zgusta for their support and friendship.

Ladislav Zgusta read and commented on earlier drafts of this book, Peter Trudgill rendered the same service of support for an early draft of the chapter on

dialectology, and Brian D. Joseph and Benjamin Slade read and commented on the morphology chapter of this edition.

Very special thanks are owed to Brian D. Joseph, who encouraged me to submit a publication proposal for this book to Mouton de Gruyter, and to Marie-Louise Liebe-Harkort, then Editor-in-Chief of Mouton de Gruyter, who accepted the proposal and pushed me to complete the manuscript for the first edition. The Editors-in-Chief who succeeded Marie-Louise Liebe-Harkort – Anke Beck, Uri Tadmor, and Birgit Sievert – continued to provide excellent support. This edition, specifically, has greatly benefited from the editorial guidance of Barbara Karlson, who took the trouble of checking on the numbering of examples, figures, illustrations, and maps and on cross-references. Finally, I am grateful to the production team under Anne Stroka.

I am indebted to Ram Lakhan Sharma (my guru), S. S. Misra, and Vasudev Dvivedi for supporting my work on modern spoken Sanskrit, and to Michael Clyne, Ingeborg Gutfleisch, Inken Keim, and Bernd-Olaf Rieck for helpful consultations concerning developments in "Gastarbeiterdeutsch". The University of Illinois, through its Research Board, its Scholars Travel Fund, and its Center for Advanced Study has contributed to making my work easier, as have the American Institute of Indian Studies, the American Philosophical Society, Fulbright, and the Center for Avanced Study, Jawaharlal Nehru University.

Last, but by no means least, I am deeply indebted to my wife, Zarina, and to my son, Heinrich Sharad, for putting up with me and encouraging me during the all too many years that the first edition of this book was under preparation. Zarina has also been wonderfully forbearing when I undertook the task of revising the book for the current edition. Surya Prakash Vikramaditya, my walking buddy, sadly did not live to see the completion of that task.

Needless to state, the responsibility of all of these persons and institutions is limited to what may be good in this book; the responsibility for the rest lies with me.

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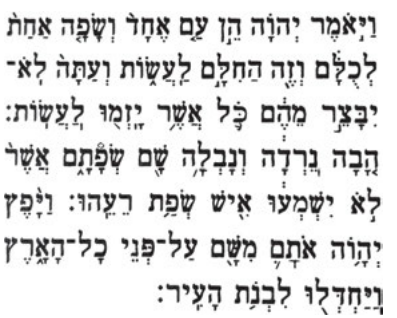
1 Introduction

ते ऽसुरा आत्तवचसो हे लवो
हे लव इति वदन्तः पराबभूवुः ॥
तत्रैनामपि वाचमूदुः । उपजिज्ञास्यां
स म्लेच्छस्तस्मान्न ब्राह्मणो म्लेच्छेद्
असुर्या हैषा वाग्

'The Asuras, deprived of [correct] speech, saying *he lavo he lavaḥ*, were defeated. This is the unintelligible speech which they uttered at that time. Who speaks thus is a barbarian. Therefore a brahmin should not speak like a barbarian, for that is the speech of the Asuras.' (Śatapathabrāhmaṇa 3.2.1.23–24)



וַיֹּאמֶר יְהוָה הֵן עַם אֶחָד וְשָׂפָה אַחַת
לְכֻלָּם וְזֶה הַחִלָּם לַעֲשׂוֹת וְעַתָּה לֹא־
יִבָּצֵר מֵהֶם כֹּל אֲשֶׁר יָזְמוּ לַעֲשׂוֹת:
הָבָה נֵרְדָה וְנָבְלָה שָׁם שְׂפָתָם אֲשֶׁר
לֹא יִשְׁמְעוּ אִישׁ שְׂפַת רֵעֵהוּ: וַיָּפֶץ
יְהוָה אֹתָם מִשָּׁם עַל־פְּנֵי כָל־הָאָרֶץ
וַיַּחְדְּלוּ לִבְנֹת הָעִיר:

'And the Lord said, Behold, the people is one, and they all have one language; and this they begin to do: and nothing will be restrained from them, which they have imagined to do. Go to, let us go down, and there confound their language, that they may not understand one another's speech. So the Lord scattered them abroad from thence upon the face of the earth: and they left off to build the city.' (Genesis 11.6–8)

1.1 Language changes

From time immemorial people have been concerned about the fact that language changes and that languages become different as they change. The cause for such change has traditionally been attributed to divine intervention, as in the story of the Tower of Babel. Or it is has been ascribed to slovenly, barbarous corruption of speech, as in the case of the Asuras (the "Anti-gods"): Instead of uttering the correct Sanskrit *hē rayō hē rayaḥ*, they used the "corrupt" dialectal form *hē lavō hē lavaḥ*. In either case – the ancient Hebrew story of the tower of Babel, or the old Indic tale of the Asuras – change and diversification is considered highly undesirable, a fall from grace, as it were.

However, in spite of admonitions like 'Therefore a brahmin should not speak like a barbarian', all natural languages change inexorably. Thus, Sanskrit, the language of these brahmins, has over the millenia changed so much that in effect it has been replaced by newer and quite distinct forms of speech – the modern languages of North India, including Hindi, Bengali, and Marathi, as well as

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Sinhala on Sri Lanka and the language of the Roma in world-wide diaspora. And the Hebrew now spoken in Israel is not a straight continuation of the ancient tongue in which the story of Babel has come down to us, but represents a deliberate revival of a language that had long died out in its everyday spoken use. Even the English of Britain and the United States has become changed and differentiated over the past three to four hundred years.

What is remarkable is that in spite of these changes, in spite of these "corruptions" and the continued "fall from grace", language has not ceased to be intelligible. If they choose to or try hard enough, its current users can manage to communicate as effectively as those who used language at the time that the stories of the Asuras and the Tower of Babel were composed.

We know now that this is possible because language change is not a random, unprincipled deviation from a state of pristine perfection, but proceeds in large measure in a remarkably regular and systematic fashion, without any profound effects on our ability to communicate. We derive this knowledge from the experience of about two hundred years of research into the question of how languages change and how, through divergent changes, they become diversified.

This book is intended to provide an overview of the most important and best-established (or most challenging) findings of that research, ranging from its earliest beginnings to the present time. Although the book is designed for linguists (students and established scholars alike) and therefore does not shy away from discussing fairly technical issues, it does not take for granted a prior familiarity with its topics. For that reason, all necessary concepts and terms will be defined.

1.2 Illustration of language change

The fact that language changes, and the effect of change can be illustrated by the development of English as it is reflected in the versions of the Lord's Prayer in Figure 1.1. The text has been chosen because of its ready availability in the various stages of English. Moreover, since it encodes the same "message", it is possible to compare how that "same message" is expressed differently at different times.

1.3 Linguistic changes – An overview

As we look at these chronologically different versions of the same text we notice quite a number of differences, especially if we compare the earliest with the most recent text. An examination of some of these changes will make it possible to give a brief introduction to the issues that concern historical linguists.

Old English (ca. 950 A.D. Lindisfarne, Northumbrian)

Fader urer ðu arð [oððe] ðu bist in heofnum [oððe] in heofnas, sie gehalgad noma ðin, to-cymeð ric ðin, sie willo ðin suæ is in heofne ond in eorðo, hlaf userne oferwistlic sel us todæg ond forgef us scylda usra suæ uoe forgefon scyldgum usum, ond ne inlæd usih in costunge, ah gefrig usich from yfle.

Middle English (ca. late 14th c., Wycliffite)

Oure fadir þat art in heuenes, halwid be þi name, þi reume or kyngdom come to be. Be þi wille don in herþe as it is doun in heuene. Geue to vs to-day oure eche dayes bred. And forgeue to vs our dettis, þat is oure synnys, as we forgeuen to oure dettoris, þat is to men þat han synned in vs. And lede vs not in-to temptacion, but delyvere vs from euyl. Amen, so be it.

Early New English (AD 1534, Tyndale)

O oure father which arte in heven, hallowed be thy name. Let thy kingdome come. Thy wyll be fulfilled, as well in erth, as it ys in heven. Geve vs thisdaye oure dayly breede. And forgeve vs oure treaspases, even as we forgeve our trespacers. And leade vs not into temptacion, but delyver vs from evell. For thyne is the kyngedome and the power and the glorye for ever. Amen.

Modern English (ca. l985)

Our father who is in heaven, may your name be sanctified. Let your kingdom come. May your will be fulfilled just as much on earth as it is in heaven. Give us today our daily bread. And forgive us our transgressions, as we forgive those who transgress against us. And do not lead us into temptation, but free us from sin. For yours is the power and the glory, forever.Amen.

Figure 1.1: Language change. (Premodern texts adapted from R. Kaiser 1961.)

1.3.1 Variation and philology

Not all the differences between our sample texts are indicative of language change. In some cases, we are simply dealing with different choices made by different translators in order to convey the same message. Thus, in the Modern English version, it would have been perfectly possible to write *let your name be sanctified*, instead of *may your name be sanctified;* and various other words could have been chosen instead of, say, *transgression* and *transgressor*. In fact, the two oldest texts spell out some of the alternatives. Compare Old Engl. *in heofnum l* [= *oððe*] *in heofnas* 'in the heavens' or Middle Engl. *our dettis, þat is oure synnys* 'our debts, i.e. our sins'. The former indicates a choice in grammatical construction (with *in* construed either with the dative or the accusative); the latter recognizes lexical variation (between *dettis* 'debts', a word borrowed from French, and the native word *synnys* 'sins'). But the listing of alternatives is never complete. Thus, we know from the great majority of other Old English texts that the *Fader urer* of our example exhibts a fairly unusual (but not impossible) construction; ordinarily we would get something like *ure(r) fader* or *ure(r) fæder*, depending on the dialect. In addition to variation of this sort, there may also be differences due to interpolations and other textual corruptions. For instance, the passage *For thyne is the kyngedome...* / *For yours is the kingdom ...* of the (Protestant) Early New English and Modern English versions is the result of interpolation in one of the textual traditions of the New Testament. (As the Gothic example further below shows, this interpolation took place at a fairly early period in one of the manuscript traditions of the Bible.)

In other cases, the written text may suggest changes that did not actually occur in the spoken language. Or conversely, changes of the spoken language may not be properly reflected in writing. An excellent example in our texts is that of Old Engl. *ure* : Middle Engl. *oure* : Mod. Engl. *our*. The spelling suggests a change in the pronunciation of the initial vowel from Old to Middle English. But we know this is misleading; Middle Engl. *ou* is a spelling taken over from the then-dominant French to optionally denote the same long *ū* sound as that of Old Engl. *ure*. The real change, from *ū* to the modern diphthong, took place after the Middle English period. On the other hand, the final *-e* of Old English was getting lost in Middle English, and the *-e* found at that stage more likely than not is an "etymological" spelling, a "silent" letter comparable to the final *-e* which appears in many Modern English words (*give, live, come*, etc.).

Variation of the type Old Engl. *in heofnum* / *in heofnas* is an ever-present phenomenon in natural language. And inaccurate correspondences between spelling and pronunciation are also quite common, especially in languages with an extended written history. Combined with the absence of native speakers who could inform us about issues of grammar and pronunciation, these factors make

the interpretation of the written materials of older languages a difficult task. Fortunately for scholars of historical linguistics, philology, a related branch of inquiry into the history of languages and cultures, has provided such interpretations for many of the relevant older languages; and linguists in many cases need no longer concern themselves with this issue. Still, there remain questions of interpretation that have not so far received a satisfactory solution. The Old English "digraphs" (such as the *eo* of *heofnum*) are a good example. Some scholars consider them diphthongs, others, monophthongs; and both sides support their view with weighty arguments. Within the context of this book we need not worry about such issues of philological interpretation, except that, for obvious reasons, forms whose grammatical and phonetic interpretation is still unsettled will not be drawn on as examples for changes in which this interpretation is directly relevant. (Thus, forms like *heofon* will not be used to illustrate changes from diphthong to monophtong, or vice versa. But they may be used as examples of what happens to final consonants, etc.)

Although philology can be given short shrift in a book like this, which is concerned with the linguistics of language change, it should be noted that practicing historical linguists cannot entirely divorce themselves from philological work. New insights frequently can be gained only from a better interpretation of textual data.

1.3.2 Sound change

In the preceding section we referred to the Modern English diphthongization of Old English *ū* in *ūre* to *our* [aur]. This process represents an example of SOUND CHANGE, i.e. change in pronunciation. Like all technical terms, "sound change" does not refer to just any change in pronunciation, but to changes that are conditioned entirely by phonetic factors (or more accurately, not conditioned by non-phonetic or non-phonological factors).

Sound change thus defined is of considerable importance for historical linguistics.

First of all, it is only by knowing how sounds change that we can state with confidence that the similarity between Old Engl. *ūre* and Mod. Engl. *our* is not just fortuitous, but that the two are different historical representations of the "same word". This, in turn, permits us to determine what other changes, if any, may have affected our word and its use. For instance, knowing that *ūre* and *our* are chronologically different forms of the same word, we can state that the syntax of this and similar words has changed from Old to Modern English. While Old English tolerated the order *fader urer* beside the more usual *ure(r) fader*, Modern English usage permits only the order *our father*.

Second, sound change, as defined above, is remarkably systematic, so much so that it has been claimed that sound change is regular, without exceptions. This claim may have to be modified to some extent, but the fact remains that sound change does operate with a much higher degree of regularity than most other changes. This fact is, of course, a great boon to historical linguists, since it makes the job of tracing linguistic forms through history much easier. (See also **3.5**.)

1.3.3 Analogical change

Many changes affecting the pronunciation of words are not conditioned entirely by phonetic factors and therefore do not qualify as sound changes. Among these, ANALOGY plays an important role.

Analogy can most easily be seen at work in the early stages of children's language acquisition. If for instance a child says *goed* instead of *went*, the form *goed* is made to follow the analogy of the many other past tense forms of English in which *-ed* is added to the verb stem; compare *walk-ed, smell-ed,* etc. In historical linguistics the term analogy is also used to refer to a number of other developments in which the structure and semantic association of words plays a role. These, too, can be found in early child language, as in the case of my son when he was very young and said *highscraper* for *skyscraper* and, playing with his mother's razor, exclaimed *'Mama, I'm razing myself.'*

In our texts, analogy has played a role in the development of the word for 'heaven'. Ordinarily, Old English final *-n* later was lost after unstressed vowel, as in OEngl. *ðin* vs. MEngl. *þi*, archaic Mod. Engl. *thy,* or OEngl. *uœ forgefon* vs. Mod. Engl. *we forgive*. (The *-n* of MEngl. *we forgeuen* may be an etymological spelling.) In Old Engl. *heofon,* Mod. Engl. *heaven*, however, final *-n* seems to be retained. The explanation for this retention lies in the fact that the word 'heaven' has, beside the uninflected form OEngl. *heofon*, a number of other, inflected forms, such as OEngl. *heofnum, heofnas*. In these forms the *n* was not final and thus was not subject to loss. It is on the anology of these forms with retained *n* that Mod. Engl. *heaven* has reacquired its *n*.

1.3.4 Lexical borrowing and other contact changes

Our Middle English text comes from a period after the conquest of England by the French-speaking Normans. The resulting linguistic contact is reflected in the fact that English adopted from French a large amount of vocabulary, such as *reume* (Mod.Engl. *realm)* beside inherited Anglo-Saxon *kyngdom*, or *dettis* (Mod.

Engl. *debts*) beside *synnys*. Note also *temptacion* which has replaced old *costung*. This adoption of linguistic items from another language is traditionally referred to as BORROWING. Considering that such borrowed items are rarely returned, the terms theft or embezzlement would be more appropriate, but they sound less nice. (Besides, the donor language does not lose the words in the process of borrowing.)

The effects of language contact may go far beyond vocabulary borrowing. Through prolonged contact, languages may CONVERGE, i.e., become similar in their overall structure. Other results of contact include LANGUAGE DEATH (a slow but steady atrophy in the use and structure of a language that is being replaced by another, dominant form of speech) and the development of PIDGINS and similar forms of language that are severely reduced in function, structure, and vocabulary.

Social factors play a major role in determing the specific effects of a particular language contact situation.

1.3.5 Semantic change

Not only the forms of words and sentences, but also their meanings may undergo change. In fact, semantics, the meaning of words, is perhaps the most unstable, changeable aspect of language. Even among contemporary speakers, meanings may vary considerably – for individuals and across different speakers. Thus, speakers of Modern English may refer to the sun as a *star* in contexts where they are on their astronomically best behavior; but the same speakers would find it very strange if in bright, sunny daylight someone were to say *Look at that beautiful starlight*.

It is therefore not surprising that our texts exhibit a number of SEMANTIC CHANGES. Where Old English *heofon* could freely refer to both the spiritual 'heaven' and the visible 'sky', Modern English prefers to use different terms for the two concepts. And of these, *sky* cannot ordinarily be used for the usual meaning of *heaven*. The reason for this differentiation probably lies in the fact that English (or rather, speakers of English) borrowed the word *sky* from Scandinavian, and having done so, "decided" that if there are two phonetically distinct words, then there must also be some difference in meaning. Other words which underwent semantic change from Old to Modern English are *hlaf* and *sel*. The former survives in the word *loaf*, but the usual word corresponding to OEngl. *hlaf* is *bread* whose Old English ancestor meant 'morsel'; and the word *sell* can no longer refer to all transfers of property (including giving), but is restricted to commercial transactions.

1.3.6 Syntactic change

As noted earlier, Old English permitted both the order *fader ure(r)* and *urer(r) fader*, although the latter was the preferred construction. (The choice of *fader urer* in our text is probably conditioned by the Latin original, which had *pater noster*. That is, the motivation lies in a form of language contact.) Modern English, on the other hand, ordinarily only has the order *our father*. SYNTACTIC CHANGES of this sort abound in the languages of the world.

In much of the past history of historical linguistics, linguists paid much more attention to sound change, analogy, borrowing and other contact-induced changes, and semantic change. As a consequence, we know a good deal more about how these changes operate than about the nature of syntactic change. Since the latter part of the 20th century, interest in syntactic change has increased greatly, mainly because of the prominent role that syntax plays in Generative Linguistics and more recently in fields such as Construction Grammar. While much more work needs to be done, at least some of the most basic mechanisms of syntactic change have come to be understood.

1.4 Linguistic change and language relationship

The changes briefly outlined in the preceding sections are not unidirectional but can operate in various, sometimes completely opposite directions. Thus in the history of the Scandinavian languages, ancestral **emno-* at an early stage became *javn* 'even, like' with phonetic differentiation ("dissimilation") of the two nasal consonants *m* and *n*. In many of the modern dialects, however, the dissimilated *vn* has been re-assimilated to a sequence of nasal *m* plus nasal *n*, yielding *jamn*. That is, the development has come full cycle, back to the original *mn*.

Moreover, while all natural languages change, they do not necessarily change the same things at the same time. As a consequence, as communication between different groups of speakers becomes more tenuous or stops altogether, linguistic change may increasingly operate in different directions, in different speech communities. Given sufficient time, then, the dialects spoken by the different communities may cease to be mutually intelligible and become different languages.

At the same time, this divergent development in many cases does not go so far as to completely obscure the fact that these languages are descended from a common source. In such cases we speak of RELATED LANGUAGES.

As an example compare the Old English translation of the Lord's Prayer (repeated below) with Old High German and Gothic versions. Note for instance the similarities between Old English *noma ðin*, Old High German *namo thīn*, and Gothic *namo þein*, all meaning 'your name'.

Old English (ca. 950 A.D. Lindisfarne, Northumbrian)

Fader urer ðu arð [oððe] ðu bist in heofnum [oððe] in heofnas, sie gehalgad noma ðin, to-cymeð ric ðin, sie willo ðin suæ is in heofne ond in eorðo, hlaf userne oferwistlic sel us todæg ond forgef us scylda usra suæ uoe forgefon scyldgum usum, ond ne inlæd usih in costunge, ah gefrig usich from yfle.

Old High German (9th c. A.D., Weissenburg, Rhine Frankish)

Fater unsēr, thu in himilom bist, giuuīhit sī namo thīn. quaeme rīchi thīn. uuerdhe uuilleo thīn, sama sō in himili endi in erthu. brooth unseraz emezzīgaz gib uns hiutu. endi farlāz uns sculdhi unsero, sama sō uuir farlāzzēm scolōm unserēm. endi ni gileidi unsih in costunga. auh arlōsi unsih fona ubile.

Gothic (4th c. A.D., Ulfila)

Atta unsar þu in himinam, weihnai namo þein, qimai þiudinassus þeins, wairþai wilja þeins, swe in himina jah ana airþai; hlaif unsarana þana sinteinan gif uns himma daga, jah aflet uns þatei skulans sijaima, swaswe jah weis afletam þaim skulam unsaraim; jah ni briggais uns in fraistubnjai, ak lausei uns af þamma ubilin; unte þeina ist þiudangardi jah mahts jah wulþus in aiwins, amen.

Figure 1.2: Language relationship (Old English, Old High German, Gothic). (Texts from R. Kaiser 1961, Braune-Helm 1956, Braune-Ebbinghaus 1961.)

How long such linguistic relationships may remain discernible can be seen by looking at the set of vocabulary correspondences from the major languages of Europe given in Figure 1.3 below. In fact, not only is it possible to recognize the major linguistic groups; within the first and largest group, that of the Indo-European languages of Europe, further subgroups can be established without great difficulties.

One of these is Romance. In the case of these languages we are lucky, in that their (near-)ancestral language, Latin, is attested. We are therefore able to confirm our suspicion that these languages are related, by descent from a common ancestor through independent, divergent developments.

For the other groups, no such ancestral language is attested. And this is also true for the whole Indo-European language family to which Latin and the Romance

languages belong and which outside Europe includes Sanskrit, Persian, Armenian, and others. However, by applying what we know about how languages change we can in many cases "reverse" the linguistic developments and through COMPARATIVE RECONSTRUCTION establish what the ancestral language must have looked like.

	'one'	'two'	'three'	'head'	'ear'	'mouth'	'nose'
Breton	*ünan*	*dau*	*tri*	*penn*	*skuarn*	*genu*	*fri*
Welsh	*ɨn*	*dai*	*tri*	*pen*	*klɨst*	*keg*	*truɨn*
Irish	*õn*	*dɔ*	*tri*	*kyan*	*kluəs*	*byal*	*srōn*
Icelandic	*eidn*	*tveir*	*þrīr*	*hõfüð*	*eira*	*münnür*	*nēf*
Danish	*en*	*tōʔ*	*trēʔ*	*hōðə*	*ōrə*	*monʔ*	*nɑ̄sə*
Norwegian I	*ēn*	*tō*	*trē*	*hōvəd*	*õrə*	*mund*	*nɑ̄sə*
Norwegian II	*ein*	*tvō*	*trī*	*hōvud*	*öyra*	*munn*	*nos*
Swedish	*ēn*	*tvō*	*trē*	*hṻvud*	*õra*	*mun*	*nɑ̄sa*
Dutch	*ēn*	*tvē*	*drī*	*hōft*	*ōr*	*mont*	*nõs*
English	*wʌn*	*tʊw*	*θrɪy*	*hed*	*ɪyr*	*mawθ*	*nowz*
German	*ʔains*	*tsvai*	*drai*	*kɔpf*	*ʔōr*	*munt*	*nāzə*
French	*œ̃/ün*	*dö*	*trwa*	*tɛ̄t*	*orɛ̄y*	*buš*	*nē*
Spanish	*uno*	*dos*	*tres*	*kaβeθa*	*orexa*	*boka*	*nariθ*
Portuguese	*ũ*	*doš*	*treš*	*kəbesə*	*orela*	*bokə*	*nariz*
Italian	*un(o)*	*due*	*tre*	*testa*	*orekkyo*	*bokka*	*naso*
Romanian	*un*	*doy*	*trey*	*kap*	*ureke*	*gurə*	*nas*
Albanian	*nʸe*	*du*	*tre*	*kokə*	*veš*	*goya*	*hundə*
Greek	*énas*	*ðyo*	*tris*	*kefáli*	*aftí*	*stóma*	*míti*
Bulgarian	*yedan*	*dva*	*tri*	*glava*	*uxo*	*usta*	*nos*
Serbo-Croatian	*yedan*	*dva*	*tri*	*glava*	*uho*	*usta*	*nos*
Czech	*yeden*	*dva*	*tři*	*hlava*	*uxo*	*usta*	*nos*
Polish	*yeden*	*dva*	*tši*	*gwova*	*uxo*	*usta*	*nos*
Russian	*adʲin*	*dva*	*trʸi*	*galavá*	*úxo*	*rot*	*nos*
Lithuanian	*vʸienas*	*du*	*trʸis*	*galvá*	*ausʸís*	*burná*	*nõsʸis*
Latvian	*viens*	*divi*	*trīs*	*galva*	*auss*	*mute*	*deguns*
Finnish	*üksi*	*kaksi*	*kolme*	*pɑ̃*	*korva*	*sū*	*nenä*
Estonian	*üks*	*kaks*	*kolm*	*pea*	*kïrva*	*sū*	*nina*
Hungarian	*eǰ*	*kēt*	*hārom*	*fő/fey*	*fül*	*sāy*	*orr*
Turkish	*bir*	*iki*	*üč*	*baš*	*kulak*	*ağïz*	*burun*
Basque	*bat*	*bi*	*hirür*	*bürü*	*belari*	*aho*	*südür*

(Notes: (a) Norwegian I and II are the two officially recognized languages of Norway, called Bokmål and Nynorsk respectively. (b) Except for French 'one', the numerals are cited without gender variation.)

Figure 1.3: Language relationship (major European languages). (adapted from Greenberg 1957)

1.5 A note on “language”, “dialect”, and speakers

When talking about linguistic change it is customary to say that a particular change takes place in a particular “language” or that certain changes are common in the languages of the world (“cross-linguistically”) or in Language (writ large). It is also customary to talk about different stages of “a language”, such as “Old English” or “Middle English”. In reality, of course, change takes place in the speech of individual speakers and communities of speakers, and with the exception of the use of standard languages, speakers and their communities are locally defined. Moreover, there never was a time when speakers of Old English woke up one fine morning to find that (much to their surprise) they were speaking Middle English. Notions such as “the English language” or “Old English”, thus, are idealizations capturing interlocking systems of speech communities or stages of linguistic development that are sufficiently different (in aggregate) to distinguish them from other stages. As long as we understand that they are idealizations, no harm is done. Further, in many cases we do not have enough information on small-scale speech communities or fine-grade chronological differences to meaningfully talk about them. In discussing types of possible linguistic changes, moreover, it is in most cases irrelevant whether they are found in large speech communities or small ones; what is relevant is that such changes have occurred and are therefore possible changes in human language.

At the same time, we should never forget that change originates in individual speakers or groups of speakers and that, since most speakers are not linguists, they may produce changes that from the linguist’s perspective look uninformed. For instance, speakers of English, confronted with a *t* in the word *often* may decide to pronounce that *t*, even though (as shown by forms like *soften*) the sound *t* was lost between *f* and *-en* (pronounced [n̲]). As linguists we have to – and in principle do – accept such changes (in this case referring to it as “spelling pronunciation”), just as much as other changes that make “linguistic sense”, such as the “assimilation” of *d* to the following *s* in Lat. **adsimilāre* to become *s*, hence *assimilāre*.

As a consequence, we also have to find a way of dealing with the common use of “language” and “dialect” as (near-)equivalents of “correct, standard” language and “incorrect, substandard” speech, even though as linguists we are convinced that every variety of speech has its own grammar and therefore is as grammatical as any other. Speakers’ attitudes underlying such classifications can have profound effects on language change.

As linguists we feel more comfortable with definitions of “dialect” vs. “language” in purely linguistic terms, without value judgments, such that “dialects” are speech varieties that are mutually intelligible, while “languages” are not. However, as shown in Chapter 12, these definitions have their own problems.

1.6 A brief methodological note

Much of current synchronic linguistics prefers "declarative" approaches of presentation (and interpretation) to "process" ones. So, to simplify things, where a process approach might say that the *d* of Lat. **ad-similāre* "assimilates" to the following *s*, a declarative approach might invoke a "constraint" against *d* before *s* and a preference for *s* before *s*.

The present volume adopts a process approach. This is partly motivated by the fact that linguistic change itself is a process, but partly also by the fact that traditional accounts of historical-comparative linguistics have employed the process approach and that not doing so in this volume would make it more difficult to relate its coverage to what is found in traditional publications on historical-comparative linguistics or on the linguistic history of particular languages or language families. (On this matter, see also Chapter 15, section **15.14**.)

2 Phonetics, transcription, terminology, abbreviations, glosses

Throughout this book, important new terminology and concepts are introduced in small caps, such as the term SEGMENT below. References to sections are in boldface, as in **2.1**.

2.1 Phonetics

In order to understand how sound change operates, it is important to understand something of the nature of speech sounds, because sound change by definition is controlled by the phonetic characteristics of speech. Moreover, in many cases sound change does not just affect a single sound, but whole classes of phonetically similar sounds at the same time. An elementary familiarity with phonetics is necessary to define such classes of similar sounds.

The following presentation of speech sounds or SEGMENTS does not purport to be exhaustive. It is intended to be sufficiently detailed for the purposes of this book. Some details will be introduced later, in appropriate contexts.

The easiest way to define and classify segments is in terms of their production or ARTICULATION; and this is the way that will be adopted here, with only a few exceptions. However, segments can also be classified in terms of their ACOUSTIC or auditory effects. In fact, it has been argued that sound change is much more sensitive to acoustic than to articulatory properties. But note that while certain changes are explainable only acoustically, for the majority of changes an articulatory account is at least as feasible as an acoustic one and, in many cases, provides a better explanation. Thus, assimilation and weakening, two of the most common types of sound change (see **5.1.1** and **5.1.2**), find a ready articulatory explanation as motivated by, respectively, coarticulation (the tendency of articulators to anticipate following segments) and a reduction of articulatory gestures. Moreover, even in cases where acoustic reinterpretation drives sound change (e.g. **5.1.3.4**), the acoustic impression has to be converted into a corresponding articulation to produce speech.

It seems useful, therefore, to define the majority of segments articulatorily, and to reserve acoustic definitions for those cases in which purely articulatory terminology would be insufficient.

Segments are articulated mainly by modifications of the air passing from the lungs, through the GLOTTIS (the "Adam's or Eve's Apple") and the pharyngeal area above it, and then through the oral cavity and through the lips. Depending

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on where and how they are made, these modifications create different resonances and other modulations in the acoustic transmission of segments. See Figure 2.1.

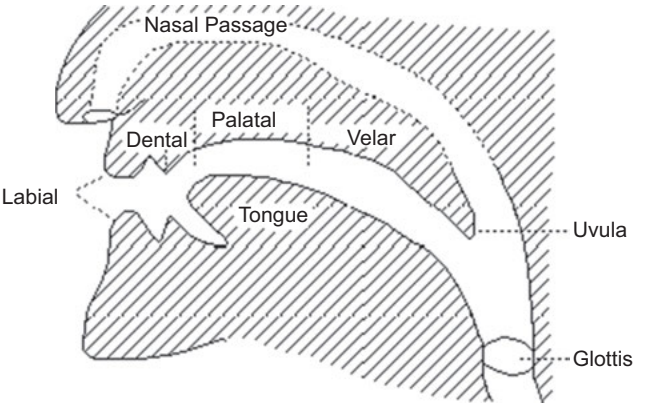

Figure 2.1: Places of articulation and articulators.

Segments can be distinguished in terms of several features, in addition to the PLACE OF ARTIULATION. The two most basic and common features of this type are MANNER OF ARTICULATION (as in the degree of contact) and VOICING (the feature that distinguishes pairs such as *p* and *b*). These are discussed in greater detail in **2.1.1–2.1.3**.

2.1.1 Stops and place of articulation

The most radical modification consists of a complete blockage of the airflow at one of the points through which it passes. Segments of this sort are called STOPS. Though the direct effect of such a blockage naturally results in the absence of an audible sound, it leaves an indirect acoustic effect on neighboring segments. This effect permits the acoustic and auditory identification of different stops, depending on where they are articulated.

Stops can be articulated at various points, or PLACES (OF ARTICULATION). A closure of the lips produces LABIAL stops; in the area of the teeth, DENTALS; further back in the oral cavity, at the "hard palate", PALATALS; and in the area of the "soft palate" or "velum", VELARS.

All of these stops are found in English, as in the initial segments of *pan, ban* (labial); *tan, Dan* (dental); *church, judge* (palatal); *came/king, game/ghetto* (velar).

Note that the "palatals" of English are not just simple stops, but palatal or post-dental stops followed by a distinct sibilant element. (For "sibilants" see further

below.) Even in languages like Spanish, which have more purely stop-articulated palatals in words like *mu**ch**a**ch**o* 'boy', a certain sibilant-like offglide can be discerned. This SIBILANT OFFGLIDE is an important, crosslinguistic feature of palatal stops and tends to have considerable effects in sound change.

Further, the "dentals" of most English dialects are actually post-dental or ALVEOLAR and thus different from the "pure" dentals of languages like Spanish and Italian. Some languages have an additional class of RETROFLEX segments, whose primary articulation is in the alveolar or post-alveolar area, but which also involve a curling back of the tip of tongue. (See **5.1.1.6** below for more details.)

Fine phonetic differences between more or less pure palatals or between dentals and alveolars can for the most part be ignored. They will be noted only where they are crucial for understanding a particular development.

In addition to these segments which occur as regular English speech sounds, other stops can be found in the world's languages. Only one of these will be important for our purposes, and that is the GLOTTAL stop, produced by closure of the VOCAL CORDS or FOLDS (two membranes in the glottis). Although the glottal stop does not function as a distinctive speech sound in English, or most of the other European languages, it can occasionally be heard before English initial vowels, especially in emphatic speech as in *[ʔ]off with his head*; and many dialects of English have the segment for standard *t* in words like *bo[ʔ]le* 'bottle'. German regularly has the stop before (orthographically) initial vowels.

2.1.2 Fricatives and sibilants

A less radical modification than complete blockage of the airflow is that made for FRICATIVES. The obstruction is incomplete, but narrows the air passage sufficiently to produce a friction noise, with specific resonances according to the place of articulation. English has dental and LABIODENTAL fricatives in *think*, *this* and *fat*, *vat*. The latter differ from labial stops in that they are not BILABIAL, but are produced by an articulation of the upper teeth toward the lower lip. Bilabial fricatives are cross-linguistically less common, especially *Φ*. Spanish has a bilabial fricative for written *v* or *b* (except after nasal or pause), as in *haber* 'have', *Habana*. (Speakers of English tend to hear this sound variously as *v* or *w*.) Palatal fricatives occur in German *i**ch*** 'I' and North. Germ. ***j**a* 'yes'; and velars in German *Lo**ch*** 'hole' (also Scots Engl. *lo**ch***) and in the Spanish pronunciation of medial *g* as in *ruego* 'I ask'.

Fricatives can also be articulated in the glottal area, such as the initial segment of Engl. *hound*. But note that *h* can also be classified as a semivowel (see below).

A special subset of the fricatives consists of the SIBILANTS, as in Engl. ***s**ip, **z**ip* (alveolar), ***sh**ip, mea**s**ure* (palatal or post-alveolar). These differ from ordinary fricatives in terms of some ancillary modification of the air stream which creates a special acoustic effect.

Significantly, this effect can be brought about in more than one way; and different speakers of the same language may choose different manners of production, without being aware of any differences between their own sibilants and those of other speakers. Thus, in the case of the sibilant of *ship*, at least two different basic articulatory gestures are found in English. In one of these, the tongue tip is the major articulator and points up to somewhere behind the dental area. In the other, the tongue back is the major articulator, arching against the palatal area, with the tip of the tongue directed down, behind the lower teeth. In both types, secondary articulatory gestures bring about the sibilant effect. These gestures may consist in curling the tongue back, or in the tongue's approximating another area of articulation (such as the lower teeth or the velum), with or without lip protrusion. Yet other sibilant-producing gestures are found in other languages. In languages with only one set of sibilants (*s, z*) or a contrasting pair of sibilant sets (*s, z : š, ž*) these different gestures are perceived as bringing about the "same" acoustic or auditory effect, that of sibilant noise which distinguishes sibilants from fricatives – variations in the exact production are perceived as simply regional or idiolectal features. Sibilants, therefore, are generally best defined in acoustic, not in purely articulatory terms.

It is probably because of their articulatory complexity (and variability) that distinctions between sibilants are among the last to be controlled in child language acquisition.

In languages with richer systems of sibilants, differences in articulatory gestures tend to be exploited to more clearly differentiate the different sets of sibilants. This is the case, for instance, in many Slavic languages. (See also **5.1.1.6**.)

2.1.3 Voicing and aspiration

Except for the glottals, all the segments so far discussed come in acoustically/auditorily distinguishable pairs, such as *sip : zip*. Articulatorily, they differ in terms of the presence or absence of VOICING or VOICE, a feature produced by the "vocal cords". For VOICED segments, as in *zip*, these membranes come close enough together to be set in vibration by the airflow. VOICELESS segments, as in *sip*, lack this vibration, since the vocal cords are in an open position that produces only the same kind of glottal friction as in a weakly articulated *h*. (This gesture is similar to the rest position of the glottis, but the aperture of the latter is wider.) In

addition to voicing and voicelessness, the glottal area can produce several other features that characterize different consonants of the same place and manner of articulation. For the purposes of this book, the most important feature of this type is that of BREATHY VOICE (or "murmur"), produced by the vocal cords taking a position that combines the openness of voicelessness (at one end of the cords) with the vibration of voicing (in the remainder). Breathy voice tends to lower the fundamental frequency (F_0) of speech and thus can lead to changes in tone and related phenomena.

The glottal stop comes only in one variety – voiceless. The likely reason is that the vocal cords cannot simultaneously produce a stop and the vibration of voicing.

For similar reasons, a voiced counterpart of *h* should likewise not be articulatable. Even so, some languages, including many South Asian languages and also some Slavic ones, have a "voiced" [ɦ]. A common device to produce a voiced [ɦ] is breathy voice. Note further that voiceless *h* often is not simply characterized by the absence of voicing, but may involve secondary gestures that produce turbulence.

Since the airflow is interrupted in all stops, voicing should in principle not be articulatable for "oral" stops either. But as *ban* (vs. *pan*) etc. show, stops can be voiced. Here again, some compensatory articulation makes it possible to produce the auditory effect of voicing in these segments, at least close to their release phase.

In English and a number of other languages, voiceless stops generally differ from their voiced counterparts not only by an absence of voicing, but also by being ASPIRATED, i.e. followed by a brief *h*-like offglide. In American English, aspiration tends to be limited to the initial voiceless stops of stressed syllables. Other languages, however, have a contrast between aspirated and unaspirated stops, with a function similar to the English contrast between voiced and voiceless. Frequently such "distinctive" aspiration is found only in voiceless stops, as in Classical Greek *teínō* 'stretch' : *theínō* 'kill'. But some languages have a distinction of aspirated vs. unaspirated in both voiceless and voiced stops, such as Skt. *pala-* (a unit of weight), *phala-* 'fruit', *bala-* 'strength', *bhala* 'indeed'.

In languages that distinguish plain and aspirated stops, aspiration tends to be more turbulent than in English; and unaspirated voiceless stops have such a rapid transition from voiceless-stop articulation to the voicing of a following segment that speakers of languages like English tend to hear them as voiced. Further, the aspiration of "voiced aspirates" such as *bh* differs from that of "voiceless aspirates" such a *ph*. While the release feature of the latter is voiceless, that of the former is breathy voiced. (Aspiration will generally be marked only for those language in which it is distinctive.)

The contrast voiceless : voiced is often characterized as also involving a contrast between TENSE and LAX – concepts that have been controversial in phonetics but may be useful in phonology. What is not controversial is the fact that where there is a contrast voiced : voiceless, voiceless consonants tend to have longer duration and more precise articulation than their voiced counterparts. It may be this durational difference that underlies the distinction tense : lax.

2.1.4 Obstruents vs. sonorants; syllabic vs. nonsyllabic

With the exception of the glottal stop, the segments discussed so far in many languages have a contrast between voiced and voiceless. Moreover, languages without such a contrast tend to have only voiceless stops or fricatives. Further, stops and fricatives are articulated with a relatively great obstruction of the airflow. In all of these respects they differ from the class of segments that includes the initial sounds of Engl. *mow, no, lo, row*. Segments of the latter type do not as commonly show a voiced/voiceless contrast, and if there is no contrast, only the voiced variants occur. Further, impressionistically, the airflow seems to be less obstructed; the segments appear to be more sonorous. Given these differences, it is not surprising that the two classes of segments may behave differently in linguistic change. To capture these similarities and differences, it is useful to distinguish the two classes as OBSTRUENTS vs. SONORANTS.

The two segment classes differ further in their behavior within syllables. Obstruents are much more rarely SYLLABIC, i.e. the center of a syllable, than are sonorants. In fact, with some marginal exceptions like the [s] of Engl. *psst*, many languages do not permit syllabic obstruents. Sonorants, on the other hand, quite commonly may be nonsyllabic or syllabic, even though standard orthography may not acknowledge this. Thus, the normal pronunciation of English words like *bottle, button, bottom* has syllabic [l̩, n̩, m̩], without any phonetic counterpart of the orthographic vowel that precedes the sonorant. (It is only in hypercareful speech that a sequence of vowel plus (nonsyllabic) sonorant is heard.)

Some languages, moreover, show systematic alternations between syllabic and nonsyllabic sonorants. Thus in Sanskrit, *r* is nonsyllabic next to vowel, but (generally) syllabic elsewhere; cf. e.g. *kr̥-ta-* 'what has been done' vs. *kr-iyamāṇa-* 'what is being done'.

The subclasses of the sonorants, the liquids, nasals, and semivowels, are discussed in the following sections.

2.1.5 Liquids

Various *r*- and *l*- sounds are commonly classed together as LIQUIDS. These include the "dental" (actually, alveolar) [r] of languages like Italian and Spanish, the palatal [λ] of conservative varieties of the same languages (cf. It. ***figl****io* 'son', Span. ***ell****a* 'she'), and the dental or alveolar [l] of most of the European languages. Moreover, in careful speech, standard French and many varieties of German and other European languages have a UVULAR [ʀ]; see Figure 2.1 for the location of the uvula. (English, especially in its American varieties, tends to have rather different *r*- and *l*- sounds which involve retroflexion.) Liquids of the type [l, λ] are distinguished from the [r, ʀ] type as LATERALS VS. RHOTICS.

It is difficult to find any positive articulatory basis for classifying these segments together. However, their behavior in language acquisition and linguistic change suggests that they do form a common class. Thus, a number of languages have lost the distinction between *r* and *l* as the result of sound change; e.g. early Iranian. Others, such as Japanese, simply lack the contrast, with some dialects preferring the pronunciation [l], others (including the standard dialect), [r]. Finally, the difference between [l] and [r] generally is one of the last distinctions learned by children acquiring their first language.

2.1.6 Nasals and nasalization, stops vs. continuants

The segments discussed so far are all ORAL, in the sense that the airflow passes through the oral cavity only. However, lowering the uvula and the adjacent area of the velum permits the air to flow through the nasal passage, creating segments with special nasal resonances.

The most common speech sounds of this type are the so-called NASALS, segments like the final sounds of Engl. *clam* (labial), *clan* (dental), *clang* (velar [ŋ]; the orthographic *g* is "silent"). Note also the palatal [ñ] of Span. *señor* 'sir'. Articulatorily, these segments are nasalized stops, differing from oral stops like [b, d, g] only in terms of their NASALIZATION, as can be verified by the fact that colds or allergies that block the nasal passages attenuate the difference between voiced stops and their nasal counterparts. In many other respects nasals differ from oral stops by acting like sonorants.

Moreover, unlike stops, but like fricatives (including sibilants) and liquids, they are directly identifiable, and their articulation may be audibly extended over a considerable length of time. Accordingly, together with fricatives and liquids they are, in this book, distinguished from stops by being called CONTINUANTS. (Focusing on the basic stop articulation of nasals, synchronic phonological approaches

classify nasals as non-continuants; but this ignores important articulatory-acoustic and phonological characteristics of those segments. The articulatory similarity of oral and nasal stops can be accounted for by the feature combination [+ stop, ± nasal].)

Other segments may also be nasalized, especially the vowels; e.g. Fr. *bon* [bõ] 'good' vs. *beau* [bo] 'beautiful'. Nasalized fricatives and liquids are not as common, but are found in various languages around the world. (Like the nasal stops, they are of course continuants.)

2.1.7 Semivowels/glides; consonantal vs. vocalic

Beside nasals and liquids, the class of sonorants also includes the SEMIVOWELS or GLIDES, i.e. segments like the initial sounds of Engl. *wield* and *yield*, transcribed as [w] and [y]. In addition, there is also a front rounded semivowel [ɥ], found e.g. in French *lui* [lɥi] '(to) him'.

As the name suggests, semivowels are the most vowel-like among the nonsyllabic segments. In fact, evidence from many languages and from linguistic change shows that they are the nonsyllabic counterparts of vowels like the [i] of Engl. *pit* and the [u] of *put*. For instance, just as Sanskrit nonsyllabic [r] phonologically alternates with syllabic [r̥] in *kr-iyamāṇa-* 'what is being done' vs. *kr̥-ta-* 'what has been done', so nonsyllabic [y] alternates with syllabic [i] as in *ny-avēdayat* 'reported' vs. *ni-vēdayati* 'reports'.

At the same time, because of their close relationship to the vowels, the semivowels may behave in a manner quite different from the liquids and nasals. Thus, for vowel/semivowel alternations like [i/y] the syllabic value seems to be more basic cross-linguistically; but for liquids and nasals, it is the nonsyllabic variant which tends to be more basic. Moreover, liquids and nasals in many changes behave just like the other consonants, while semivowels may act like vowels. To capture this distinction, the terms VOCALIC and CONSONANTAL have been introduced. The former designates vowels and semivowels. Liquids and nasals, together with fricatives and stops, are covered by the term "consonantal".

Beside *y*, *w*, and *ɥ*, *h* may also behave like a semivowel in certain changes. But note that in others it acts more like a fricative. That is, it appears to have the option of belonging to either of the two segment classes. The reason for its semivowel behavior is that in words like *heat, hit, hate, hat, hot, hoot, hut*, [h] is phonetically identical to the following vowel, except for the fact that it is voiceless and nonsyllabic. And in intervocalic position, [h] similarly is a voiceless (or breathy-voiced) and nonsyllabic transition from the preceding to the following vowel. Just like [y], [w], and [ɥ], then, it is vocalic and nonsyllabic.

In many languages, the pronunciation of semivowels tends to be attenuated, with an articulation that only approximates that of their fully articulated counterparts. Many languages have other, similar segments which, however, do not involve a vocalic articulation. A very common APPROXIMANT of this type is the weakly articulated [$^{\beta}$] found for instance as the initial segment of words like Hindi *vah* [$^{\beta}$ō] 'that one; he, she, it'. Acoustically, the latter segment is similar to [w] and may be misidentified as (equivalent to) [w] by speakers that do not have a [w].

2.1.8 Vowels – high/low, front/back

Unlike the other classes of segments, the VOWELS (and the related semivowels) are articulatorily confined to just one area, that of the velum. Some scholars use the term "palatal vowels" for front vowels; but in articulatory terms, that designation is not accurate. (Acoustically, however, there is an affinity between front vowels and palatal obstruents.)

Within the highly confined velar area, a large number of vowel distinctions can be made. In the following, only those distinctions are discussed that are important for the purposes of this book.

The most basic parameters defining vowel differences are captured by the terms HEIGHT and FRONTNESS/BACKNESS. Of these, height refers to the relative approximation of the tongue-back toward the velum. For the vowels of Engl. *peat, pit; boot, put*, the tongue is relatively close to the velum, and, accordingly, these vowels are referred to as HIGH. On the other hand, the LOW vowels of Engl. *pat* and *father*, are articulated with the tongue in its lowest position. Vowels like those of *pet, pate; boat; but*, articulated with the tongue in an intermediate position, have traditionally been referred to as MID vowels. In order to make the generalization that for certain processes they behave more like ("non-high") low vowels, for others like ("non-low") high vowels, they are now commonly labeled NON-HIGH/NON-LOW. ("Mid" will be retained as an alternative designation.)

The terms frontness and backness indicate whether the vowel articulation is made relatively forward or back in the velar area. FRONT vowels are the vowels in Engl. *peat, pit; pate, pet; pat*; BACK vowels are found in Engl. *boot, boat,* (Brit.) *bought*. In the intermediate position we find the vowels of *just* (adverb; American pronunciation), *but,* and *father*. The traditional term for these is CENTRAL; now they are commonly referred to as NON-FRONT/NON-BACK. ("Central" will be retained as an alternative.) In generative linguistics, the [a] of *father* is usually labeled a back vowel, but phonetically, this is not accurate. True, in linguistic change, [a] often behaves like a back vowel; but this can be accounted for in terms of its being non-front. On the other hand, there are changes in which its behavior

is most accurately described as different from both the front and back vowels. (In some varieties of English, the vowel of *father* is pronounced as a back vowel. Others make no distinction between this vowel and that of *bought*. In fact, the whole area of the low-central and mid- and low-back vowels is characterized by a great amount of fluctuation across different dialects of English. Note, however, that in phonetic transcriptions [a] will always refer to a low-central vowel, as it is found in Germ. *ja*; and [o] to a mid-back vowel as in Germ. *Boot*.)

2.1.9 Vowels – long/short, diphthong/monophthong, etc.

English sets of the type *peat : pit, pate : pet, kook : cook* exhibit yet another difference that is often referred to as LENGTH, i.e. a difference in vowel duration. The vowels of these sets are then differentiated as [i:] : [i], [e:] : [e], [u:] : [u]. An alternative transcriptional convention, which makes it possible to optionally mark short vowels as not being long, is the following: [ī] : [ĭ] or [i], [ē] : [ĕ] or [e], etc. A third convention, which is useful in dealing with vowel contraction and diphthongization as well as changes involving the timing of articulatory gestures, is in terms of MORAS (roughly, timing units). In this notation, long vowels are represented as double vowels such as [ee] and short vowels as singletons such as [e], each vowel having one mora.

For most varieties of English, more than just length is involved, and the vocalic nuclei of *peat, pate, kook* are articulated as DIPHTHONGS, sequences of a steady-state vowel plus a semivowel or glide. That is, if we transcribe the vowels of *pit, pet, cook* as [ɪ], [ɛ], [ʊ], the transcription of the vowels in *peat, pate, kook* would be [ɪy], [ɛy], [ʊw]. It is also possible to focus on the fact that the steady-state vowel of these diphthongs tends to be higher than the vowels in the corrresponding short or MONOPHTHONGAL nuclei. Accordingly, we might use the transcription [iy], [ey], [uw]. (Some linguists, ignoring the post-vocalic glide, instead use the transcriptions [i], [e], [u].)

Such QUALITATIVE differences also frequently accompany the QUANTITATIVE distinction of length, such as in German, where long vowels are steady-state, not diphthongal; for instance, the long [ī] of *biete* 'offer' differs from its short counterpart [ɪ] in *bitte* 'please' not only in length bus also in relative height (and frontness). The terms TENSE and LAX may be used to refer to the combination of qualitative and quantitative differences between long and short vowels. (Some linguists use these terms instead of "long" and "short", or in reference to the qualitative differences in such vowels.) The relation between vowel height, length, "tenseness", and relative position within the vowel system is examined in greater detail in **5.1.4.5.2**.

Except where relevant, such fine distinctions are ignored in this book, and transcriptions focus on the length distinctions. Moreover, following the practice of traditional historical linguistics, long and short vowels will usually be distinguished as [ī] : [i] (or [ĭ]).

While the diphthongal nature of the English non-low "long" vowels, such as [ɪy], [ɛy], may be conveniently ignored, this is not the case for diphthongs such as the [ay] of Engl. *ice* or its German counterpart *Eis*. Diphthongs of this sort have a clear division between a syllabic "center" (the [a]) and a nonsyllabic glide (the [y]). The relative duration (and "tenseness") of the component parts may vary across languages, and this will become an issue in **5.1.4.3.1**. In English, for instance the syllabic part is relatively long and the "glide" is more like an approximant tending to rise to just about the position of [e], whereas in German the syllabic part is relatively short and the glide relatively long, rising to the position of the high vowel [i].

2.1.10 Secondary articulations

Up to this point, vowels have been treated as oral segments. But as noted in **2.1.6**, they may also be nasalized; that is, nasal resonances may be superimposed on the vowel resonances produced in the oral cavity.

Superimposed articulations like nasalization typically are produced outside the area of "primary articulation" and accordingly are called SECONDARY ARTICULATIONS. Cross-linguistically, secondary articulations are "marked". Languages tend to have segments with secondary articulation only if they also have the corresponding primary segments; but many languages only have the primary segments. Thus, English only has oral vowels; French has oral and nasal vowels; but languages with only nasal vowels are exceedingly rare (if they exist at all). (Some varieties of English, to be sure, have pervasive nasalization, such as Midlands British and White Southern American English.)

Another secondary articulation of vowels is ROUNDING. In English, back vowels are pronounced with a certain amount of lip rounding, while front vowels lack this rounding. This difference between back, rounded and front, unrounded vowels appears to be crosslinguistically the most unmarked situation. (Rounding, then, differs from other secondary articulations by being crosslinguistically unmarked for a subset of the vowels. But like other secondary articulations, it is produced outside the area of primary articulation.)

Unlike English, many languages (including German and French) have rounded front vowels, beside the unrounded front vowels familiar from English. In this book, the rounded front vowels are designated as [ü], [ö] etc. (Some languages also have a series of unrounded back vowels, such as the high back unrounded vowel [ï]).

Secondary articulations can also be found in consonants. Beside ASPIRATION, the most important for this book are PALATALIZATION and LABIOVELARIZATION, which involve, respectively, front-unrounded and back-rounded offglides or onglides. A palatalized consonant such as k^y in a sequence such as *ak^{y}a* differs from a cluster such as *ky* in *akya* by being a single consonant that occurs in the onset of the second syllable, while *ky* is a consonant cluster, distributed over the two syllables with *k* in the first syllable and *y* in the second. See **2.1.12** below on the issue of syllabication.

2.1.11 Suprasegmentals

Vowels, syllables, and even whole words may be further modified by SUPRASEGMENTAL articulations, such as STRESS, ACCENT, and TONE. In transcriptions, stress, accent, and tone are commonly marked over the vowels. But phonetically, they extend over larger stretches. Stress and accent tend to be properties of syllables; tone may range over smaller and larger domains.

The distinction between stress, accent, and tone is not always easy to make. Stress and accent usually involve relative prominence of a particular syllable compared to other syllables in the same word. Tone, on the other hand, tends to function as a means of differentiating lexical items. But note that different stress or accent placement may also distinguish words, as in Engl. *pervért* vs. *pérvert*. Tone usually involves differences in pitch, but some languages have "pitch" accents; and even stress (or "stress accent") commonly involves pitch beside loudness and other factors. Moreover, historically, it seems to be possible for pitch accent systems to become tonal (or nearly so). As a consequence, there is a fair amount of terminological uncertainty and fluctuation in the literature. This book does not purport to resolve this uncertainty and fluctuation.

What further complicates matters is that stress, accent, and tone interact in a variety of ways with INTONATION, the modulation of fundamental-frequency (or F_0) in utterances, such as the falling intonation characteristic of statements in most languages, and the rising intonation of yes-no questions. Some of these interactions are discussed in **5.6**.

2.1.12 Syllables, moras, and boundaries

The notion SYLLABLE has been invoked at various points in this chapter. Phoneticians find it difficult to agree on what it is, articulatorily or acoustically, that constitutes or defines a syllable. However, linguistic change and the phonological organization of many languages offer abundant justification for the concept.

The basis for syllable structure is the so-called SONORITY HIERARCHY, see Figure 2.2, but note the further discussion below.

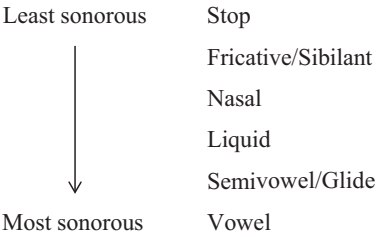

Figure 2.2: The sonority hierarchy.

Syllables are built around a syllabic NUCLEUS, the most sonorous element in the syllable. This may be a vowel, but syllabic sonorants (and even obstruents) can fill that position. The preceding ONSET tends to be characterized by an increase in sonority toward that nucleus, the following CODA by a decrease, as in *priest* [prīst], with stop + liquid in the onset and sibilant + stop in the coda.

Complications arise from the fact that various exceptions to these general principles can be found. Some are specific to particular languages. Others tend to be crosslinguistic. For instance, onsets with stop + fricative (TF) are rarer and more "marked" than fricative + stop (FT) onsets, even though the latter violate the principle of increasing sonority. In generative accounts, this is often accounted for by assuming that the "offending" initial fricative is "extrametrical", i.e. outside the syllabic structure. An alternative, phonetic account may be more insightful: The fricative in the TF combination masks the release features that identify the place of articulation of the preceding stop; the FT combination avoids this problem by bringing T into prevocalic (or presonorant) position and thus provides more robust release features indicating its place of articulation.

In addition to the triple division of the syllable into onset, nucleus, and coda, a two-fold division into onset and RHIME (= nucleus plus coda) is useful. It is the domain of the rhime that defines important distinctions of TIMING. In many languages, the timing of the rhime is characterizable in terms of the concept MORA. Short vowels are associated with one mora, long vowels with two, and (in many languages) so is the combination vowel + coda consonant. Languages may have restrictions on the number of moras in a syllable, and mora count may be an imortant criterion for accent placement. For instance, in Latin the accent falls on the penult (the next to last syllable) if it has two moras (as in *divī́nus* 'divine') but on the antepenult if the penult has one mora (as in *últĭma* 'last').

Further complications arise in regard to SYLLABLE BOUNDARIES. Given structures of the type *ata*, *apta*, or *apra*, with two syllabic nuclei, where will one syllable end

and the other begin? Here again, only some general tendencies can be stated. If there is only one intervocalic consonant, it is usually syllabified with the following nucleus (hence the syllabification *a$ta)*. In the case of a CLUSTER of two consonants, the most general principle is to put the syllable boundary into the middle (hence *apta, apra*). Other tendencies, however, may partially or wholly override this principle. Thus, if the cluster has increasing sonority, it may be syllabified with the following nucleus (hence *a$pra*), especially if the second element of the cluster has a high degree of sonority. Clusters of three or more consonants exhibit even greater cross-linguistic variation. However, within a given language such variation is fairly limited. A further complication is the fact that single intervocalic consonants often are AMBISYLLABIC, with the closure phase in the first syllable and the release in the second.

Ambisyllabic consonants are not always clearly distinct from GEMINATES, which are often written as double consonants (such as *atta*). These, too, have their closure in the first syllable and their release in the second. However, they differ from ambisyllabic consonants in terms of "timing" – the closure phase of the geminate is associated with a mora.

In many sound changes, WORD BOUNDARIES seem to play a role. Note however that in most languages there is no constant and clearly identifiable phonetic correlate of the boundaries between words. This creates difficulties for an approach that defines sound change as conditioned only by phonetic factors. (Section **5.6.8** shows how word boundaries come to play a role in these changes. Prior to that point, the issue is generally ignored, and word boundaries are given as conditions for sound changes.) Pre- and post-pausal UTTERANCE BOUNDARIES, on the other hand, are phonetic phenomena and may thus be properly invoked as conditions for sound change.

2.2 Transcription

The transcriptional system used in this book is one that has been widely used in publications on historical and comparative linguistics. Its advantage is that it is relatively close to the traditional writing systems or transcription systems employed for older languages, especially the Indo-European ones from which most of the data in this book are drawn. Current phoneticians and phonologists prefer to use the IPA system of transcription, but employing that system in this book would require most examples, whether of individual forms or of longer passages, to be transcribed and would thus make the presentation more unwieldy. Ultimately, of course, it does not matter whether we transcribe the initial sound of Engl. *shoe* as [š] or as [ʃ]; what is more important is the accuracy of the phonetic observations that underlie the transcription (e.g., whether the segment that we transcribe is really palatal, as the symbols suggest, or pre-palatal, or retroflex).

(a) Consonants (nonsyllabic):

		Labial	Labio-dental	Dental / alveolar	Palatal	Velar / (uvular)	Glottal
Stop	vl.	p		t	č	k	ʔ
	vd.	b		d	ǰ	g	
Fricative	vl.	Φ	f	θ, þ	ç	x	h
	vd.	β	v	ð	j̵	ɣ	ɦ
Sibilant	vl.			s	š		
	vd.			z	ž		
Nasal		m		n	ñ	ŋ	
Lateral				l	ʎ		
Rhotic				r		ʀ	
Approximant			ꞵ				
Semivowel	vd.					y ɥ w	
	vl.					h	

Consonantal, Obstruent, Continuant, Sonorant, Vocalic

(b) Vowels (syllabic):

	Front		Central	Back	
	Unround	Round		Round	Unround
High	i (ɪ)	ü (ʏ)	ɨ	u (ʊ)	ï
Mid	e (ɛ)	ö (œ)	ə (ʌ)	o (ɔ)	
Low	æ		a		ɑ

Notes: (i) [þ] is the symbol of the voiceless dental fricative employed for Germanic; [θ] is used elsewhere. (ii) [ə] is the final vowel of Engl. *sofa*, [ʌ] is the vowel of *but*. (iii) Except for [ʌ], the parenthesized symbols designate "lax" vowels such as the [ɪ] in *bit*. (iv) Parenthesized symbols will only be used for fine phonetic transcriptions.

Figure 2.3: Phonetic symbols and segment classes.

2.2.1 Phonetic transcription

For segmental phonetic transcription see Figure 2.3 above, which also gives a summary of most of the terminology introduced in **2.1**. Phonetic transcriptions are given in square brackets, as in the diacritic examples below.

In addition, note the following diacritics (with *a* standing for any vowel):

ã = vowel nasalization

ā = vowel length

a: = vowel length (alternative transcription)
ă = explicit indication that a vowel is short
ǎ = vowel, whether short or long
á = accent

Other diacritics:
◌̩ = syllabicity, as in [mít**n̩**]
◌̯ = nonsyllabicity, as in [haį̯] = [hay] 'high'
◌̣ = retroflex consonant, as in [ṭ, ḍ, ṛ]
h (after a consonant) = aspiration; raised ʰ may be used where aspirates need to be distinguished from clusters of consonant + h
ʸ, ʷ (after or before a consonant) = palatalization, labiovelarization
◌̥ = voiceless sonorant, as in Welsh [l̥an] *llan* 'church; town'

2.2.2 Transcription of specific languages

Examples from most of the older Indo-European languages are generally quoted in their standard (or standardized) orthography. In the case of languages not using the Roman alphabet (such as Greek and Sanskrit) standard romanization is employed. Some modifications are made so as to bring transcription more in line with the phonetic symbols used in this book. (Thus, Sanskrit palatal stops will be rendered as *č(h), ǰ(h),* rather than the *c, j* of internationally established romanization.)

Examples in standard orthography or romanization will normally be cited in italics, but where necessary, crucial parts of the examples will also be indicated in phonetic transcription. For instance, in citing Latin forms such as *caesar* a partial transcription [k-] may be added to remind readers that Lat. *c* designates a voiceless velar stop, rather than a palatal [č] as in Ital. *cesare* [č-].

The symbols used will have (roughly) the same phonetic values as those in Chart 2.1 above, except for the special conventions noted below.

(a) Proto-Indo-European: *ḱ, ǵ,* etc. = pre-velar/palatal stops contrasting with "plain velar" *k, g*, etc. and "labiovelar" k^w, g^w, etc.
(b) Latin: *c*, *q* = [k]; initial *i* before vowel = [y]; *v* = [w]; *ae, au* = [ay, aw].
(c) (Ancient) Greek: ˜ and ´ indicate different accentuations, as in *oĩkoi* 'houses' : *oíkoi* 'at home'.
(d) Sanskrit: *ṁ* = a nasalized segment of somewhat controversial interpretation, probably a nasal transition between neighboring segments; *ṭ, ṭh, ḍ, ḍh, ṣ, ṇ* = "retroflex" (post-dental) segments contrasting with the pure dentals *t, th, d, dh, s, n*; *ś* = palatal sibilant; *ɦ* = "voiced" [ɦ], *ḥ* = voiceless [h] (a segment generally found word-finally); *v* = [w] early, later [β] or [v].

(e) Other Indo-Aryan languages: Similar to Sanskrit, except that Middle and Modern Indo-Aryan *ṁ* may indicate nasalization of a preceding vowel. Modern Indo-Aryan languages may also have additional retroflex segments, such as the retroflex flap *ṛ* in Hindi [gāṛī] 'car'.
(f) Slavic and Baltic: *j* = [y]. Early Slav. *ě*, *a* = (originally) long [ɛ̄, ā]. Slav. *y* = [ɨ]; *ĭ*, *ŭ* = "super-short" [ə]-like high vowels (called "jers"); *ę*, *ǫ* = nasal [ɛ̃, õ].
(g) Germanic: *j* = [y]. *y* = [ü] in Old English and Old Norse. *þ* = [θ] (see Chart 2.1).

2.3 Notation of changes, generalizations

Examples (1)–(8) below illustrate the standard notation of sound change. (Some additional conventions are introduced later, in the appropriate contexts.)

(1) and (2) are examples of the notation of "unconditioned change"; (3)–(7) of changes "conditioned" by a given phonetic environment; (8) illustrates the notation employed to indicate that more than one sound undergoes the same change. Finally, (9) illustrates the convention of FEATURE NOTATION, employing the articulatory (etc.) phonetic features introduced in **2.1** and summarized in Figure 2.2. (For abbreviations of these features and other conventional symbols employed in change formulations, see **2.7.1** below.)

Specifying the significant presence or absence of particular features (indicated by + or – before that feature, as in [+ voice]) in many cases enables us to make GENERALIZATIONS that a simple enumeration of segments can only adumbrate. Thus, in "segment notation", (9) would come out as something like (10), with the idea that voiceless labials change into voiced labials, etc., but not into, say, dentals. But in addition to its clumsiness, this formulation does not explicitly state that all voiceless stops become voiced between voiced segments. Moreover, implicit in formulation (9) is the notion that the change from [- voice] to [+ voice] is not just accidental, but is "conditioned" by the voicing of the ENVIRONMENT. (In many cases, the same generalization can be made by means of an informal, verbal statement, of the type 'all voiceless stops become voiced between voiced segments'. This alternative procedure is found in most traditional literature on historical linguistics and is also frequently employed in this book.)

(1) a > b = '<u>a</u> changes into <u>b</u> by sound change'
(2) b < a = '<u>a</u> develops out of <u>b</u> by sound change'
(3) a > b / c ___ d = '<u>a</u> changes into <u>b</u> in the environment between <u>c</u> and <u>d</u>' (Variants: a > b / c ___ 'after <u>c</u>'; a > b / ___ d = 'before <u>d</u>')
(4) a > b // c = '<u>a</u> changes into <u>b</u> if preceded and/or followed by <u>c</u>, i.e. if it "neighbors" <u>c</u>'

(5) a > b / ___ X d = '<u>a</u> changes into <u>b</u> if <u>d</u> follows, with some unspecified segment or segments <u>X</u> intervening, i.e. not in direct contact'

(6) a > b / ___ (X) d = '<u>a</u> changes into <u>b</u> if <u>d</u> follows, with an optional intervening <u>X</u>'

(7) a > b / ___ C_0 c = '<u>a</u> changes into <u>b</u> if <u>c</u> follows, with any number of intervening consonants, including none'

(8) $\left\{\begin{matrix} a \\ \\ z \end{matrix}\right\}$ > b / c __ d = 'Either <u>a</u> or <u>z</u> changes to <u>b</u> between <u>c</u> and <u>d</u>'

(9) $\left[\begin{matrix} +\,\text{stop} \\ \\ -\,\text{voice} \end{matrix}\right]$ > [+ voice] / [+ voice] ___ [+ voice]

(10) $\left\{\begin{matrix} p \\ t \\ ṭ \\ č \\ k \end{matrix}\right\}$ > $\left\{\begin{matrix} b \\ d \\ ḍ \\ ǰ \\ g \end{matrix}\right\}$ / $\left\{\begin{matrix} \text{vowels} \\ \text{sonorants} \\ \text{voiced fric.} \\ \\ \text{...} \end{matrix}\right\}$ ____ $\left\{\begin{matrix} \text{vowels} \\ \text{sonorants} \\ \text{voiced fric.} \\ \\ \text{...} \end{matrix}\right\}$

Note that in sound change formulations like (1) to (9), the direction of change is indicated by an unshafted arrow (> or <). For analogical change, a shafted arrow (→) is used; and for borrowing, a double-shafted arrow (⇒). (For a different use of → see **6.3.3**.)

2.4 Phonology – Contrast, phoneme, allophone/alternant

In addition to the phonetic features of segments, the environments in which they occur, and the classes to which they belong, their structural relationship to one another may also play a role in linguistic change. The branch of linguistics concerned with such structural relationships between segments and classes of segments is PHONOLOGY.

Perhaps the most important relationship of this sort is the one covered by the term CONTRAST. Simplifying matters, we can define contrast as the relation between segments whose occurrence is phonetically UNPREDICTABLY and which thus can differentiate lexically distinct linguistic items. For instance, the occurrence of [p], [t], and [k] in Engl. *pool, tool, cool* is not phonetically predictable, since all three segments are found in the same phonetic environment, before [ūl]. And obviously, it is the presence of one segment vs. the others that differentiates

the three lexical items. In many cases, contrast can be succinctly demonstrated by means of MINIMAL PAIRS like [pūl] : [kūl].

Significantly, not all segments have such unpredictable occurrences. Recall that in **2.1.7**, when arguing for considering *h* a semivowel, it was observed that its pronunciation varies, depending on the environment. Before high front vowels it has a high-front articulation, before low vowels, a low articulation, etc. What remains constant is the fact that it is voiceless and nonsyllabic. Moreover, speakers are not normally aware of the fact that its pronunciation varies; they feel that there is a single, unitary *h*.

The situation is similar for the velars. Close inspection reveals that the [k] of Engl. *keep* is different from that of *cool*. The former ALTERNANT has a front-velar articulation, just like the front vowel [i] that follows it; the latter has the back-velar and rounded articulation of the following back-rounded [u]. At this point we can symbolize this difference as [k^{i}] vs. [k^{u}]. Again, some features of pronunciation are constant, such as the fact that all the alternants are stops, voiceless, and articulated in the velar area. And again, speakers are not aware of there being any "different" *k*-sounds.

What makes it possible for speakers to feel this way is first, the presence of features that remain constant and thus guarantee a certain degree of similarity between the alternants. Second, and equally important, the alternants do not contrast; their selection is predictable. They are in what is called "complementary distribution", such that one occurs where the other(s) cannot occur. (Beside complementary distribution, other criteria may determine absence of contrast; but such fine details need not concern us.)

Classes of such phonetically similar segments whose selection for a particular environment is predictable have been called PHONEMES, and the alternants that constitute such a class are referred to as ALLOPHONES. Where necessary, phonemic transcriptions can be differentiated from allophonic and purely phonetic ones by the use of slashes, as in /k/ (phoneme) vs. [k^{i}] and [k^{u}] (allophones).

Recent developments in linguistics have tended to reject the theory behind these definitions, but the terminology still is commonly employed. Moreover, the theoretical foundation for these terms, the notion "contrast", has been resurrected as an important determinant of linguistic change.

For further discussion of the terms phoneme and contrast, including the "neutralization" of contrast see Chapter 4.

2.5 Morphology

The notions MORPHEME, ROOT, STEM, AFFIX, PREFIX, SUFFIX, and ENDING are important in the discussion of MORPHOLOGY, the analysis of word structure. Morphemes are the smallest meaningful elements of given words, such as the elements *word* and *s* in *word-s*. Boundaries between morphemes are indicated by a hyphen.

Roots are the morphemes that have the core lexical meaning in a given word, such as *word* in *word-s*, or the *morph-* of *morpheme, morphology.*

Other morphemes are affixes. Depending on their position before or after the root, they are distinguished as prefixes or suffixes, respectively. Thus, the *-eme* of *morph-eme* is a suffix; the *pre-* of *pre-fix*, a prefix. (A third type of affix is the infix, as in Lat. *iu-n-g-ō* 'I yoke', made from the root *iug-* found in *iugum* 'yoke'.)

If the main carrier of lexical meaning in a given word is morphologically complex, containing a root plus an affix, it is called a stem, such as *word-y* in *word-i-er, word-i-ness*.

Many affixes serve the purpose of lexical or stem DERIVATION. Thus the *-eme* of *morpheme* establishes a stem or lexical item which is different from the word *morphology*. In the Indo-European languages, one set of suffixes has a different, non-lexical function. These suffixes serve the purpose of INFLECTION, to express such non-lexical notions as the relationship between words to each other within a given sentence. Since these usually are the last suffix in the word, they have been called ENDINGS.

The non-lexical notions most commonly expressed by Indo-European endings are NUMBER, PERSON, and CASE. Early Indo-European distinguished three numbers – singular, dual, and plural; three persons (first, second, third) are differentiated in verbs and pronouns; and the cases relevant for early Indo-European are nominative, vocative, accusative, instrumental, dative, ablative, genitive, and locative. (The major functions of these cases are as follows. Nominative – subject case; vocative – case of address; accusative – direct object; instrumental – case of accompaniment, instrument, or agent (in the passive); dative – indirect object, beneficiary; ablative – source, cause; locative – location (in space or time). But most of the cases have many other, "minor" functions.)

2.6 Other terminology and concepts

Language can be viewed either as historically developing or as a more or less static, SYNCHRONIC object of investigation. Throughout this book, references are

made to this difference between history (or DIACHRONY) and synchrony and to the relationship between these two aspects of language.

The prefixes PRE- and PROTO- refer to earlier stages of linguistic history. Proto- designates a language as being reconstructed, rather than actually attested, as in Proto-Indo-European. Pre- indicates an (often inferred) earlier stage of a language, as in pre-Modern English, pre-Old English, or even pre-Proto-Indo-European (an inferred stage preceding reconstructed Proto-Indo-European).

2.7 Abbreviations and symbols

The following abbreviations and special symbols are used in addition to the phonetic symbols listed in Chart 2.1. Other abbreviations may be introduced where needed and will be defined in context.

Some abbreviatory symbols are used in more than one reference. Thus, N may refer to nasals, to the "new" or modern stage of a language, to Norse, to nouns, or to nominative. However, the context should make the exact reference clear.

2.7.1 Abbreviations and symbols for sound change and phonological formulations

Note that C and V are commonly used in two overlapping, but distinct meanings. In formulations like (11) they often refer to the features [- syllabic] and [+ syllabic], respectively. On the other hand, in combination with other features, as in (12), they indicate [+ consonantal, (- syllabic)] and [+ vocalic, (+ syllabic)]. (See also section **2.2** on transcription, **2.3** on the notation of changes, and **2.4** on the use of slashes in phonemic transcription.)

(11) C > [+ voice] / V ___ V

(12) $\begin{bmatrix} V \\ -\text{hi} \\ -\text{lo} \end{bmatrix} > [+\text{hi}] / \_\_\_ \begin{bmatrix} V \\ \\ +\text{hi} \end{bmatrix}$

Symbols

C = [+ cons.] or [- syll.]
L = liquid
R = sonorant
Ø = zero
= word boundary
- = morpheme boundary

C_0 = any number of C, incl. none
N = nasal (stop)
V = vowel or [+syll.]
$ = syllable boundary
= utterance boundary
~ = varies with

> = changes to (sound change)
→ = changes to (analogy)
⇒ = is borrowed to

< = develops from (sound change)
← = develops from (analogy)
⇐ = is borrowed from

* preceding a linguistic form indicates a reconstructed form
* following a form indicates that the form is not attested or ungrammatical

Feature abbreviations (including nonabbreviated features)

acct. = accent
back
cont. = continuant
fric. = fricative
glott. = glottal
lab. = labial
liqu. = liquid
long
obstr. = obstruent
pltzd. = palatalized
sib. = sibilant
syll. = syllabic
voc. = vocalic

asp. = aspirated
cons. = consonantal
dent. = dental
front
hi = high
lat. = lateral
lo = low
nas. = nasalized
pal. = palatal
round
son. = sonorant
vel. = velar
voice

2.7.2 Morphological and syntactic abbreviations

A	agent of transitive verb	M	masculine
ABL	ablative	MV	main verb
ABS	absolutive (case)	N	neuter
ACC	accusative	N	noun
ACT	active	N-	non- (e.g. NPST nonpast)
ADJ	adjective	NEG	negation, negative
ADV	adverb(ial)	NMLZ	nominalizer/nominalization
AFFIRM	affirmative	NOM	nominative
AG	agent, agentive	NP	noun phrase
AGR	agreement	OBJ	object
ALL	allative	OBL	oblique

AOR	aorist
AUX	auxiliary
BEN	benefactive
CAUS	causative
CC	correlative clause
CLIT	clitic
COM	comitative
COMP	complementizer
COND	conditional
COP	copula
CP	correlative pronoun
CVB	converb
DAT	dative
DECL	declarative
DEF	definite
DEM	demonstrative
DESID	desiderative
DET	determiner
DIM	diminutive
DO	direct object
DU	dual
DUR	durative
EMPH	emphatic
ERG	ergative
F	feminine
FIN	finite
FOC	focus
FUT	future
GEN	genitive
HAB	habitual
IMP	imperative
IND	indicative
INDF	indefinite
INF	infinitive
INS	instrumental
IO	indirect object
IPFV	imperfective
IMPF	imperfect
IMPV	imperative
ITR	intransitive
LOC	locative
LV	light verb
P	patient of transitive verb
PASS	passive
PCL	particle
PERF	perfect
PFV	perfective
PL	plural
POP	postposition
POSS	possessive
POT	potential
PP	prepositional phrase
PPL	participle
PRED	predicative
PREP	preposition
PRF	perfect
PRS	present
PROG	progressive
PROH	prohibitive
PST	past
PTCP	participle
PURP	purposive
Q	question particle/marker
QUOT	quotative
RC	relative clause
RECIP	reciprocal
REFL	reflexive
REL	relative
RES	resultative
RM	relative marker
RP	relative pronoun
S	subject, as opposed to object
Ŝ	subject of intransitive verb
SBJV	subjunctive
SG	singular
SUBJ	subject
TOP	topic
TPPL	perfective participle in **-to*
TR	transitive
V	verb
VN	verbal noun
VOC	vocative
VP	verb phrase

2.7.3 Language abbreviations

General prefixes

Class.	Classical	N	New
M	Middle	O	Old
Mod.	Modern	P	Proto-

(The most usual designations of the old, middle, and modern stages of a given language are O, M, and N, as in OE = Old English, ME = Middle English, NE or Mod. Engl. = New or Modern English.)

Other abbreviations

BS	Balto-Slavic	IE	Indo-European
CS	Church Slavic	N	Norse
E	English	RV	Rig-Vedic (Sanskrit)
G	German	W	Welsh
HG	High German		

Alb.	Albanian	It(al).	Italian
Algonqu.	Algonquian	Jap.	Japanese
Am.	American	Ka.	Kannada (Dravidian)
Arm.	Armenian	Kor.	Korean
Att.	Attic (Greek)	Lat.	Latin
Av(est).	Avestan	Latv.	Latvian
Brit.	British	Leon.	Leonese (Spanish)
Catal.	Catalan	Li(th).	Lithuanian
Celt.	Celtic	Ma.	Marathi
Cz.	Czech	Norw.	Norwegian
Dan.	Danish	Pers.	Persian
dial.	dialect(s), dialectal	Pol.	Polish
Engl.	English	Port.	Portuguese
Finn.	Finnish	Rom.	Romance
Fr.	French	Rum.	Rumanian/Romanian
Gaul.	Gaulish (Celtic)	Ru(ss).	Russian
Germ.	German	SCr.	Serbo-Croatian
Gk.	(ancient) Greek	Serb.	Serbian
Gmc.	Germanic	Sic.	Sicilian
Go(th).	Gothic	Skt.	Sanskrit
Hom.	Homeric (Greek)	Slav.	Slavic
Hung.	Hungarian	Sp(an).	Spanish
IAr.	Indo-Aryan	Swah.	Swahili
Icel.	Icelandic	Swed.	Swedish
IIr.	Indo-Iranian	Toch.	Tocharian

Ion.	Ionic (Greek)	Ukrain.	Ukrainian
Ir.	Irish	Ur.	Urdu
Iran.	Iranian		

(Notes: Serbo-Croatian is now commonly called Bosnian-Croatian-Montenegrin-Serbian; Tocharian comes in two distinct varieties, called A and B.)

3 Sound change: The regularity hypothesis

The major focus of early 19th-century Indo-European comparative-historical linguistics, as represented in the highly influential work of Franz Bopp, was on morphological comparison and an attempt to "etymologize" affixes as derived from earlier full words. Thus, the future tense marker *-s-* in forms like Gk. *lū́-s-ō* 'I will loosen' was derived from the root *es-* 'to be', and the Gothic past tense suffix *-dēdun*, as in *nasidēdun* 'they saved', was derived from a root whose reflex is found in Mod. Engl. *do*. While the latter derivation may have some merit (see **7.1.2.3** and **7.2.3.2.2**), the former is highly questionable. The problem with these speculations is that they were made without a full understanding of the nature of linguistic change and of the limitations of comparative-historical linguistics. What was particularly missing was an understanding of sound change. In this regard, historical linguistics was still largely characterizable by the (probably apocryphal) statement attributed to Voltaire that 'Etymology is a science in which vowels signify nothing at all, and consonants very little.'

At roughly the same time, however, the more specific linguistic study of the Germanic languages and of the phonetic changes by which they differed from the other Indo-European languages initiated a line of work that culminated in the "phoneticization" of historical-comparative linguistics, which in turn led to a better understanding of the nature of sound change and culminated in the 1870s with the hypothesis that sound change, properly defined, is absolutely regular. While the latter claim may be overargued, subsequent research has affirmed that sound change is overwhelmingly regular. The REGULARITY HYPOTHESIS has proved tremendously productive as a heuristic and, moreover, it can be argued that if sound change were inherently unsystematic or "sporadic", comparative linguistics would be impossible.

This chapter outlines some of the developments that led to the regularity hypothesis, starting with Grimm's Law, Verner's Law, and Grassmann's Law in Section 3.1. The regularity hypothesis is discussed in 3.2. Apparent exceptions are the focus of 3.3. Section 3.4 addresses attacks on the regularity hypothesis. Conclusions and outlook are presented in 3.5.

3.1 Grimm's Law, Verner's Law, Grassmann's Law, and the Regularity Hypothesis

An amazingly regular correspondence between the obstruent systems of Germanic and the other Indo-European languages caught the imagination of linguists in the early part of the nineteenth century. It inspired a great amount of research that

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slowly removed apparent exceptions to the changes that were responsible for this correspondence. The findings of that research, in turn, eventually provided some of the most important empirical support for the regularity hypothesis.

A full set of the correspondences that gave rise to this important development in the history of linguistics was first assembled by the Danish linguist Rasmus Rask. Examples are found in (1) below. (Only one example is given for each initial segment. The actual number of correspondences runs in the hundreds.) Example (2) provides a simplified summary.

(1)

PIE	Gothic	Old English	
**pətḗr*	*fadar*	*fæder/fader*	'father'
**tréyes*	*þreis*	*þrī*	'three'
**ḱm̥tóm*	*hund*	*hund*	'hundred'
**déḱm̥(t)*	*taihun*	*tēon*	'ten'
**ǵews-*	*kiusan*	*cēosan*	'choose'
**bher-*	*bairan*	*beran*	'bear'
**dhē-*	*(ga-)dēþs*	*dǣd*	'deed'
**ǵhew(d)-*	*giutan*	*gēotan*	'pour'

(Examples with initial PIE **b* are virtually nonexistent.)

(2)

PIE				PGmc.	
p	*t*	*k*	*f*	*þ*	*x/h*
(b)	*d*	*g*	*(p)*	*t*	*k*
bh	*dh*	*gh*	*b* ~ *β*	*d* ~ *ð*	*g* ~ *γ*

Based on Rask's work, the German scholar Jacob Grimm formulated phonetic changes that account for the correspondences, under the assumption that it was Germanic that changes, rather than the other Indo-European languages (although some correspondences show that these languages, too, underwent changes of their own). In English (and similarly in French) the set of changes now is known as Grimm's Law.

In modern notation these changes can be formulated as in (3), assuming that what is distinctive about the PIE aspirates *bh, dh, gh* etc. is their aspiration, rather than the presence or absence of the feature [voice].

(3) a. $\begin{bmatrix} \text{+ stop} \\ \text{- voice} \end{bmatrix} > \text{[+ fric.]}$

b. $\begin{bmatrix} + \text{stop} \\ + \text{voice} \end{bmatrix}$ > [- voice]

c. $\begin{bmatrix} + \text{stop} \\ + \text{asp.} \end{bmatrix}$ > $\begin{bmatrix} + \text{voice} \\ - \text{asp} \\ (\pm \text{fric.}) \end{bmatrix}$

(The notation (± fric) indicates that the outcome allophonically appears also as a fricative.)

While Grimm and his contemporaries did not fail to be impressed with the great systematicity and regularity of these changes, they did not expect absolute regularity. People, being human beings, were not expected to behave in a completely regular, "mechanical" manner.

In fact, it was easy to find cases where the above changes did not seem to apply or other changes appeared to have taken place instead. Thus, each of the Germanic examples in (4) contains an unshifted voiceless stop, contrary to what change (3a) would suggest, or "PREDICT". Worse than that, in addition to the unshifted stops, the first two examples also exhibit instances of PIE voiceless stops that were shifted to fricatives in accordance with (3a), and only the last voiceless stop remained unchanged. These words, then, cannot even be considered systematic exceptions to Grimm's Law. (In this example, Latin forms are used for comparison instead of reconstructed PIE forms.)

(4)	Latin	Gothic	Old English	
	captus [k-]	*haf**t**s*	*hæf**t***	'captured, prisoner'
	piscis [-k-]	*fis**k**s*	*fisc **[-k]***	'fish'
	spuō	*s**p**eiwan*	*s**p**īwan*	'spit, spew'
	stō	*s**t**andan*	*s**t**andan*	'stand'

Another set of apparent exceptions consists of forms in which the PIE voiceless stops are changed, but where the outcome of the change does not agree with the predictions made by (3a). Instead of a voiceless fricative we find a voiced segment; see (5a). (In the cited examples, that segment is written as a stop; but just as in the outcomes of the PIE aspirates, there was an alternation between stop and fricative pronunciation.) Again we find that beside this aberrant development, the regular change may be found in the same word, as in the initial stop of the first item in (5a). Moreover, phonetically and above all semantically closely related words show the regular Grimm's-Law treatment according to (3a); see (5b). Even

within a single paradigm, different forms of the same word may appear with the regular voiceless development according to Grimm's-Law, or with the aberrant voicing of (5a); see the examples in (6).

(5)

	PIE	Gothic/OHG	Old English	
a.	**pətḗr*	*fa**d**ar* (Go.)	*fæ**d**er*	'father'
	**swekrṓ*	*swi**g**ar* (OHG)	*swe**g**er*	'mother-in-law'
b.	**bhrā́tēr*	*brō**þ**ar* (Go.)	*brō**þ**or*	'brother'
	**swékuros*	*swe**h**ur* (OHG)	*swēor*	'father-in-law'

(By a subsequent change, the intervocalic outcome [h] of PIE [ḱ] was lost in Old English. Even so, the outcome in (5b) is different from that in (5a).)

(6)

	Old English	Old High German	Sanskrit
PRS.1SG	*weor**þ**u*	*wir**d**u*	*vártē*
PST.1/3SG	*wear**þ***	*war**d***	*vavárta*
PST.3PL	*wur**d**on*	*wur**t**un*	*vāv̱rtúḥ*
PST.PPL	*ge-wor**d**en*	*gi-wor**t**an*	*vav̱rtānáˊ*

(PIE root: **wert-* 'turn'; OE, OHG meaning: 'become'. Old High German has changed PGmc. **þ* to *d*, and **d* to *t* (see **12.1.1.2** for more details on these changes); but the distinction remains.)

More evidence for apparent irregular phonetic correspondences is seen in (7), where neither the Sanskrit initial *b-* nor the Greek initial *p-* can be related to the initial *b-* of Gothic by Grimm's Law. Skt. *b* would have to correspond to *p*, and Greek *p* to *f*. Moreover, in this case even the correspondence between Skt. *b-* and Gk. *p-* appears to be irregular.

(7)

Sanskrit	***b**udh-ya-tē*	'wakes up, notices'
Greek	***p**eúth-o-mai*	'find out'
Gothic	*(ana-)**b**iud-an*	'order, i.e. make known'

The evidence thus seemed to be overwhelming that in spite of a great amount of systematicity, Grimm's Law was far from completely regular.

Later researchers showed that this impression is incorrect. First, as the German linguist Carl Lottner pointed out, in (4) and many other examples that follow this pattern, all instances of unshifted voiceless stop occur in the same environment – after PIE obstruent; and conversely, no shifted voiceless-fricative outcomes are found in this environment. If we REFORMULATE the (a) part of Grimm's Law as in (8), then the pattern of (4) ceases to be exceptional and

becomes completely regular. Incorporating this reformulation, we accordingly rewrite Grimm's Law as in (3').

(8) $\begin{bmatrix} + \text{stop} \\ \\ - \text{voice} \end{bmatrix}$ > [+ fric.] / [-obstr.] ___

(This notation is intended to block the change after obstruent.)

(3') Grimm's Law reformulated

a. $\begin{bmatrix} + \text{stop} \\ \\ - \text{voice} \end{bmatrix}$ > [+ fric.] / [-obstr.] ___

b. $\begin{bmatrix} + \text{stop} \\ \\ + \text{voice} \end{bmatrix}$ > [- voice]

c. $\begin{bmatrix} + \text{stop} \\ \\ + \text{asp.} \end{bmatrix}$ > $\begin{bmatrix} + \text{voice} \\ - \text{asp.} \\ (\pm \text{fric.}) \end{bmatrix}$

The second set of counterexamples likewise turns out to be highly patterned and regular, even if more subtle than the first in terms of its special conditioning. In the data of (5a) and (6), voiced obstruents appear if and only if the PIE voiceless stop occurs in medial voiced environment and if the immediately preceding syllable is unaccented. Elsewhere, the voiceless outcome is found. Compare the difference between the words for 'father' and 'brother' in (5a) vs. (5b) and the correlation between Sanskrit accent placement and Germanic voiced vs. voiceless obstruent in (6). (The placement of the PIE accent is most faithfully preserved in Sanskrit. That is the reason for citing Sanskrit data in (6).)

Note that PIE **s* underwent voicing in the same environment as the PIE voiceless stops; see (9). This suggests that all Proto-Germanic voiceless fricatives became voiced in this environment, whether they were inherited from PIE (**s*) or developed out of earlier voiceless stops by Grimm's Law (PIE **p, t, k* > *f, þ, x*). Evidence of the type (10) indicates that the same development took place in the context [+ voice] ___ #. In addition, it shows that the condition for the change is lack of accent on the immediately preceding syllable. (Without such evidence, the

data in (5), (6), and (9) could just as well have been interpreted as indicating that the accent had to follow the relevant obstruent.)

(9)

	Old English	Old High German	Sanskrit
PRS.1SG	*cēo**s**u*	*kiu**s**u*	*ǰṓṣē*
PST.1/3SG	*cēa**s***	*kō**s***	*ǰuǰṓṣa*
PST.3PL	*cu**r**on*	*ku**r**un*	*ǰuǰuṣúḥ*
PST.PPL	*ge-co**r**en*	*gi-ko**r**an*	*ǰuǰuṣāṇá-*

(PIE root: **ǵews-* 'taste, enjoy'; OE, OHG meaning: 'choose'. The expected voiced *z* has further changed into OE, OHG *r*. Traces of the earlier *z* can be found in Gothic and in the early Runic inscriptions.)

(10) PIE ***áyos*** > PGmc. ***áyas*** > ***áyaz*** > ***aiz*** > OE ***ār***, NE *ore*, OHG ***ēr*** 'brass, etc.'

Unlike the data in (3), the apparent counterexamples in (5) and (6) and the data in (9) and (10) cannot be accounted for by a simple reformulation of Grimm's Law. Rather, an ADDITIONAL CHANGE must be invoked. This change, formulated in (13) is named VERNER'S LAW, in honor of the Danish linguist Carl Verner, who was the first to propose the correct solution.

(11) $\begin{bmatrix} \text{+ fric.} \\ \text{- voice} \end{bmatrix} > \begin{bmatrix} \text{+ voice} \\ (\pm \text{ stop}) \end{bmatrix} / \begin{bmatrix} \text{+ voice} \\ \text{- acct.} \end{bmatrix} \_\_ \begin{Bmatrix} \text{[+ voice]} \\ \# \end{Bmatrix}$

(The notation [± stop] accounts for the fact that in the case of non-sibilants, the outcome of Verner's Law shows the same stop/fricative variation as the Grimm's-Law outcomes of the PIE aspirates.)

For maximum and most natural generalization, the change is formulated to apply to the fricatives that are the outcome of Grimm's Law (as well as to PIE **s*). The change also must precede a change by which Proto-Germanic replaced the accentual system of PIE (in which the accent was not restricted to a particular syllable) with a fixed accent on the first syllable of the word; see (12) for an informal notation. Any other ordering of the changes would lead to incorrect results; see the derivations in (13), where the left column has the correct order and the middle and right columns illustrate how the wrong order fails to produce the correct outcome.

(12) $C_0\ V\ C_0$ > [+ acct.] / # ___

(13)

PIE	**pətḗr*	PIE	**pətḗr*	PIE	**pətḗr*
GL	**faþár*	VL	-----	AS	**pátēr*
VL	**fadár*	GL	**faþár*	GL	**fáþar*
AS	*fádar*	AS	*fáþar*	VL	-----
Outcome:	*fádar*		*fáþar**		*fáþar**

(GL = Grimm's Law, VL = Verner's Law, AS = Accent Shift. Relevant vowel changes from PIE to Gothic have been tacitly applied.)

A situation of this sort, where only one order of historical changes yields the correct results, is commonly referred to as RELATIVE CHRONOLOGY. It is worth pointing out that when linguists establish a relative chronology with the argument that no other ordering will predict the correct outcomes, they are not just playing around with changes and imposing their own view on history. Rather, it is the history of the language and its development that imposes the solution on the linguist. (But see **6.3.5** for factors that may interfere with our ability to uncover the correct relative chronology of some sound changes.)

In relative chronologies of this type, changes that must be ordered to precede other changes are commonly referred to as FEEDING changes. Orders such as in the middle and right columns of (13) that fail to provide inputs to subsequent changes are in this book referred to as BLEEDING – they "bleed" other changes of a chance to apply. (The latter terminology is different from common practice that makes a distinction between "bleeding" and "counterfeeding" orders.)

Just like the "Verner's-Law exceptions", the apparent exceptions in (7) were shown to be explainable as not just random exceptions but as the result of linguistic change beyond Grimm's Law, a change that is called GRASSMANN'S LAW after the linguist (and mathematician) Hermann Grassmann who proposed it. In this case it is actually Germanic that preserves the PIE state of affairs more faithfully (except for the operation of Grimm's Law, of course), and Sanskrit and Greek have innovated. If we accept the evidence of the Germanic voiced initial stops, Grimm's Law predicts that they must go back to PIE voiced aspirates, and we can reconstruct a root **bhewdh-* alternating with **bhudh-*. The Sanskrit pattern can then be explained in terms of a DISSIMILATION of aspiration (specifically, dissimilatory loss; see **5.2.1** and **5.2.4**), as in (14), and the Greek one can be similarly explained, if we assume that the devoicing of PIE voiced aspirates (as in **dh > th*) preceded aspirate dissimilation, see the left side of (15). Since devoicing only affects the aspirates and not unaspirated voiced stops, an opposite order would predict the wrong outcome, see the right side of (15) – another case of relative chronology. (The history of the personal endings in (14) and (15) has been simplified.)

(14) Grassmann's Law in Sanskrit

PIE	**bhudh-ye-toy*
pre-Skt.	**bhudh-ya-tai*
Grassm.	*budh-ya-tē*

(15) Grassmann's Law in Greek

PIE	**bhewdh-o-mai*	PIE	**bhewdh-o-mai*
Devoicing	**pheuth-o-mai*	Grassm.	**beudh-o-mai*
Grassm.	*peuth-o-mai*	devoicing	*beuth-o-mai**

3.2 The Regularity Hypothesis

In this way, apparent exceptions to Grimm's Law were whittled away during the course of the 19th century, by showing that they can be explained either by special restrictions on Grimm's Law (as in the case of PIE voiceless stops preceded by obstruents) or by other linguistic changes (such as Verner's Law and Grassmann's Law, and in fact several others). Grimm's Law, thus, no longer came to be seen as a change that was fairly systematic but also had numerous, idiosyncratic and sporadic exceptions. Rather, by the 1870s the time was ripe for a bold extrapolation, namely that sound change is REGULAR, and that apparent exceptions simply present challenges that call for further investigation.

So in 1878, Hermann Osthoff and Karl Brugmann, members of a group of young linguists, later referred to as neogrammarians, published the so-called neogrammarian manifesto, which propounded the REGULARITY HYPOTHESIS that

> Sound change, in so far as it takes place mechanically, takes place according to laws that admit no exceptions

This hypothesis led to a great deal of valuable and interesting research. However, as can be expected, such a strong claim did not remain without a good deal of often quite vociferous opposition. Some of that opposition remains valid even today, especially as it extends to some related but ultimately less important claims of the neogrammarians. (See **15.9**.) However, much of the criticism was misdirected, by attacking the above, bold formulation of the neogrammarian hypothesis, rather than its "fine-print" version which contains many important modifications.

These modifications concern first of all the definition of SOUND CHANGE, not as just any change affecting the pronunciation of words, but as only those changes that take place 'mechanically'. Here, the term "mechanical" must be understood in opposition to the "mental" or "psychological" motivation of other linguistic changes. More prosaically, we can therefore restate the definition of sound

change as change of pronunciation that is not conditioned by non-phonetic linguistic factors.

Secondly, sound change thus defined is said to take place regularly only at a particular time, in a particular speech community. No claims are made about cross-linguistic regularity. For instance, the change in (16) took place only in English, at some stage prior to the modern period, changing OE *cnafa* 'boy, servant' and *cniht* 'servant' to Mod. Engl. *knave* [nēv] and *knight* [nayt]. It did not occur in Old English, which retained initial *k* before *n;* see the data in (16). Nor did it affect other (Germanic) languages; compare NHG *Knabe* [knābə] 'boy', *Knecht* [kneçt] 'servant'. Further, it did not affect initial *k* before vowel, as in OE *cyning* > Mod. Engl. *king*.

(16) k > Ø / # ___ n

Example (16) illustrates something else that is important. Sound change may be confined to a particular environment, in which it is perfectly regular. Outside that environment, it just as regularly does not take place. Changes of this type are said to be CONDITIONED (by the environment in which they occur). Other changes, that are not confined in this way, are termed UNCONDITIONED. For examples of this type, see parts (3'b) and (3'c) of Grimm's Law (which are unconditioned) vs. part (3'a) (which is conditioned in so far as it does not take place after obstruent).

Finally, certain changes are quite commonly, often notoriously, irregular or SPORADIC, even though they do not seem to be conditioned by non-phonetic factors. These changes include DISSIMILATION and METATHESIS; see (17) for examples. These changes are discussed in greater detail in **5.2.1** and **5.2.2**. What is important is that sporadicity is limited to certain specifiable subtypes of sound change, which therefore can be systematically exempted from the regularity hypothesis. (But see **5.2.4** for conditions under which dissimilation and metathesis can be regular.)

(17) Lat. *peregrinus* > Fr. *pèlerin* (dissimilation of *r* ... *r* > *l* ... *r*)
Lat. *miraculum* > Sp. *milagro* (metathesis of *r* ... *l* > *l* ... *r*)

With these modifications, it is possible to rephrase the neogrammarian hypothesis as follows.

Neogrammarian regularity hypothesis restated
Change in pronunciation that is not conditioned by non-phonetic factors is regular and operates without exceptions at a particular time and in a particular speech community, with possible environmental restrictions. Certain changes (including dissimilation and metathesis) are exempt from this hypothesis.

Clearly, this statement is much more cumbersome and much less exciting than the slogan 'Sound change is regular and operates without exceptions'. But something like this must always be understood as a "footnote" to the slogan.

3.3 Apparent exceptions

Real language is far from regular, and the regularities predicted by the neogrammarian hypothesis more often than not seem to be contradicted by numerous exceptions.

The neogrammarians were keenly aware of this fact. But they claimed that such exceptions are merely apparent contradictions of the regularity hypothesis. In reality, they argued, they are attributable to several other factors.

As we have seen earlier, one of these factors might simply be a wrong formulation of the sound change; a more accurate reformulation would show the change to be regular. A related notion is that the change in question may have been correctly formulated, but that a later sound change in some way undid the effects of the earlier change, thereby creating apparent exceptions.

An even more important source of irregularity is the fact that beside regular sound change, various other changes, such as ANALOGY and BORROWING, can apply to any given linguistic form. These other changes are by definition irregular and will superimpose their own irregularity on the regularity of sound change. In fact, the neogrammarian regularity hypothesis for sound change owes a great deal to the realization that other change is not regular and can therefore be invoked to explain apparent exceptions to sound change.

Examples of these various possibilities of explaining apparent exceptions to sound change are given in the sections below.

3.3.1 Other sound changes

At several points in the above discussion, we had to gloss over the fact that changes subsequent to Grimm's and Verner's Laws obscured the outcomes of these sound changes. In principle, this is no different from what Verner's Law did to Grimm's Law. However, in the case of Grimm's and Verner's Laws the relationship between the changes was fairly simple – the output of one change served as the input of the other. The historical development of the post-Verner's Law obstruent system of Germanic into Old English shows that the relationship between changes may be more complex.

A change shared by all the Old Germanic dialects, except Gothic and the early Runic inscriptions, is the one in (18), often referred to as RHOTACISM, which applies to the outcome of Verner's Law. Note that this is an unconditioned change.

(18) z > r (Compare OE *curon, ge-coren* in (9) and *ār* in (10))

The change in (19) is of more restricted application, being limited to the group of West Germanic dialects that includes Old English and pre-Old High German. As noted earlier, the outcome of PIE **dh* was PGmc. **d* ~ *ð*, and this was also the Verner's-Law result of (PIE **t* >) PGmc. **þ*. In West Germanic, the alternation between stop and fricative was eliminated in favor of the stop. This change likewise was unconditional. (Old High German subsequently changed *d* into *t*.)

(19) ð > d (Compare OE *fæder)*

Subsequent to both of these developments, Old English underwent a set of changes by which fricatives were voiced between vowels and other sonorants, and devoiced word-finally. Interestingly, PGmc. [h], rather than getting voiced, was lost intervocalically; but this can be explained by the phonetic nature of [h]. In this position, [h] is simply a voiceless, nonsyllabic transition between the preceding and following vowels. Voicing therefore will make it indistinguishable from its surroundings and effectively bring about its loss.

These developments are illustrated in (20), and a (consolidated) formulation is given in (21). (The transcription in (20) is quasi-phonetic.)

(20)

PGmc.	Old English	
**wulf-*	*wulf*	'wolf'
**wulfōs/z*	*wulvas*	'wolves'
**hlaiß-*	*hlāf*	'bread'
**hlaiβōs/z*	*hlāvas*	'loaves of bread'
**brōþar-*	*brōðor*	'brother'
**kaus*	*cēas*	'chose'
**keusan*	*cēozan*	'to choose'
**sehan*	*sēon*	'to see'
**sax*	*seah* [x]	'he, she saw'
**sēɣun*	*sǣɣon* (dial.)	'they saw'
**burɣ-*	*burh* [x]	'fort'

(21)
$$[+\text{ fric}] > \begin{cases} [+\text{ voice}] \;/\; \begin{bmatrix}\text{- obst.}\\ \text{+ voice}\end{bmatrix} \text{ —— } \begin{bmatrix}\text{- obst.}\\ \text{+ voice}\end{bmatrix} \\ [\text{- voice}] \;/\; \text{\_\_\_\#} \end{cases}$$

Several considerations suggest that (21) is chronologically later than either (18) or (19). Relevant facts for the present discussion are the following. (i) Changes (18) and (19) do not apply to the outcome of (21); (ii) PGmc. **z* and **ð* 'escape' change (21) by going to *r* and *d*. That is, only the relative chronology in (22a) gives correct results for all forms.

(22)	a.	PGmc.	*keusan*	*kaus*	*kuzun*	*aiz*
		(18) and (19)	-----	-----	*kurun*	*air*
		(21)	*keuzan*	-----	-----	-----
		Outcome:	*cēozan*	*cēas*	*curon*	*ār*
	b.	PGmc.	*keusan*	*kaus*	*kuzun*	*aiz*
		(21)	*keuzan*	-----	-----	*ais*
		(18) and (19)	*keuran*	-----	*kurun*	-----
		Outcome:	*cēoran**	*cēas*	*curon*	*ās**

3.3.2 Analogy and the uniformitarian hypothesis

With the above modifications, Grimm's and Verner's Laws quite accurately predict the forms found in Old English and Old High German. But in the corresponding modern languages, this is no longer the case, at least in verbal paradigms of the type (23). Thus, instead of the *s* ~ *r* alternation of Old High German, Modern German has only *r*. The English situation is even more noteworthy, for as a result of the medial voicing of (21), Old English had a triple alternation between *z, s,* and *r*; by contrast, Modern English has [z] throughout. Similar changes have taken place, in both German and English, in almost all cases where Verner's Law introduced alternations within verbal paradigms. In some cases, however, vestiges of the old alternation are retained, sometimes in verbal paradigms (the paradigm of the verb 'to be', which is so "irregular" in general that regularizing the past tense might not seem worth it) and slightly more often in historically related forms that no longer are part of the verbal paradigm (such as *for-lorn*).

(23) a. OHG *frio**s**an, frō**s**, fru**r**un, gifro**r**an* : NHG *frie**r**en, fro**r**, gefro**r**en*
OE *frio**z**an, frō**s**, fru**r**on, gefro**r**en* : NE *free**z**e, fro**z**e, fro**z**en*
b. OE *wæ**s**, wā**r**on* : NE *wa**s**, we**r**e*
OE *-lēo**z**an, -lēa**s**, -lu**r**on, -lo**r**en* : NE *lo**s**e* … beside *for-lo**r**n*

What has happened is that ANALOGY has eliminated the alternations that were created by Verner's Law. (The specific analogy at work here is called leveling.) To be completely accurate, it needs to be noted that the first applications of this process can be observed as early as Old English and Old High German. But the earliest texts frequently preserve traces of the original form. Note for instance early OHG original PST.3SG *sluo**h*** beside innovated, analogical *sluo**g***, PST.3PL *sluo**g**un* → later exclusively *sluo**g*** : *sluo**g**un* '(s)he slew' : 'they slew'.)

That we are dealing with analogy, and not with some (irregular) sound change can be seen from the fact that the German replacement of *s* by *r* and the English extension of [z] throughout the paradigm are processes limited to lexical items that earlier had a paradigmatic *s* ~ *r* alternation. That is, the notion PARADIGM, a morphological, nonphonetic factor plays a prominent role in these changes. Other words, such as OE *beran* : NE *bear*, OHG *arlōsen* : NHG *erlösen* 'save, deliver', do not exhibit such changes.

These developments show that analogy can interfere with the outcome of sound change. But because analogy is not a regular process, its interference usually is not regular either. (Contrast the data in (23a) and (23b).) Moreover, by being sensitive to nonphonetic criteria, it affects only those linguistic forms that are characterized by these criteria. Thus, one of the reasons that Engl. *forlorn* has retained its *r* is that it no longer is part of the paradigm of *lose* and therefore is exempt from the analogical processes which affected that paradigm.

Here as elsewhere we can extrapolate from such known cases to prehistoric situations. If a language whose earlier history is not known to us shows irregularities similar to those of modern English and German, and if these irregularities can be similarly linked to nonphonetic, morphological (etc.) factors, then we may infer that the lack of regularity is attributable to analogy. We have here, then, a very important tool for accounting for apparent irregularities in sound change.

A case in point is Gothic. Like the other Germanic languages, Gothic shows the effect of Verner's Law in words like *fadar*; see (5) above. In verbal paradigms, however, Verner's-Law alternations of the type (6) and (9) are virtually nonexistent. Instead, Gothic usually shows the voiceless alternant throughout; see (24a). However, just as Modern English preserves a few traces of the old alternation, so does Gothic; see (24b). In English, one of these traces was in the past

tense of the verb 'to be', i.e. a verb that also in other respects is highly "irregular". Similarly, Gothic has an (optional) trace of the old *x* ~ *g* alternation (written *h* ~ *g*) in the otherwise highly irregular verb 'to have, to own'. In addition, recall that English preserves certain relics of the alternation in lexical items that no longer are in the same paradigm (compare *lose* : *forlorn*). And again, Gothic has a similar relic in the words *fra-wairþan* 'become corrupt' vs. *fra-wardjan* 'make corrupt', which likewise belong to different paradigms.

(24) a. *wairþan, warþ, waurþun, waurþans* 'become'
kiusan, kaus, kusun, kusans 'choose'
b. *aih* 'he owns' : *aigun* 'they own'
fra-wairþan 'become corrupt' : *frawardjan* 'make corrupt, destroy'

Given these data and the fact that the absence of Verner's-Law alternations is tied up with the nonphonetic notion paradigm, the traditional, "orthodox" neogrammarian explanation would be as follows. Verner's Law applied with the same regularity in the prehistory of Gothic as it did in the other Germanic languages. The apparent exceptions in (24a) and similar paradigms are attributable to the workings of analogy.

Beside this "orthodox" approach, however, there continues to be a "heterodox" countercurrent which would claim that there was no separate analogical development – the Gothic application of Verner's Law was morphologically restricted from the start. In this view, then, there can be such a thing as MORPHOLOGICALLY CONDITIONED SOUND CHANGE. An alternative, but in effect very similar claim would be that a PREVENTIVE ANALOGY interfered directly with Verner's Law (not with its outcome), so as to forestall the development of paradigmatic alternations.

The trouble with arguments of this sort is that they are usually advanced for situations like the Gothic one, where the absence of earlier attested history makes it impossible to show how the irregularities came about. They patently do not work for languages like English and German whose earliest stages show (virtually) complete regularity in the outcomes of Verner's Law, and in which it is possible to trace how analogy slowly obscures that regularity. Moreover, in all too many cases it is possible to point to forms like Go. *aih : aigun* which the "orthodox" approach can elegantly explain as relics of an originally regular sound change. The "heterodox" view, on the other hand, would have to account for them as "exceptions" to a sound change which itself is in some sense "exceptional", in that its application (or lack of application) in one morphological category is different from what it is elsewhere. Finally, note that languages like English and German require a distinction between regular sound change and

(irregular) analogy. And the interaction between these two types of change not only is perfectly able to account for relics like Engl. *was : were, lose : forlorn*; it is the only acceptable historical explanation of these forms. As we have seen, the same approach is perfectly able to account for the Gothic facts. Proponents of "morphologically conditioned sound change" or "preventive analogy" cannot explain why languages like Gothic should be treated as fundamentally different, by having a third type of change – morphologically conditioned (or restricted) sound change.

Here as elsewhere the best approach is to extrapolate from observable linguistic changes in attempts to account for prehistoric developments. It is one of the great contributions of the neogrammarians, in addition to their regularity hypothesis, that they have argued for this position, which has subsequently come to be referred to as the UNIFORMATARIAN PRINCIPLE. In fact, it was the neogrammarians' claim that analogical changes could apply at all language stages, even in such ancient and "pristine" languages as Greek, Latin, and Sanskrit, that attracted more heated opposition than their hypothesis that sound change is regular.

3.3.3 Borrowing

Doublets like those in (25a) illustrate another source for apparent irregularity of sound change. The forms in the middle column have undergone Grimm's and Verner's Laws; the ones on the right have not. The latter might therefore be taken as exceptions to these changes. But note the existence of similar doublets as in (25b) which cannot be explained in this fashion; for here the form on the right side differs from PIE in its initial consonant. One might try to account for forms of this type by some additional (irregular) sound changes.

Linguists realized early on that this is not the correct explanation, but that the forms on the right side are based on BORROWINGS from Latin. And in Latin, PIE initial **bh* regularly changes into *f*; see (26). This fact provides further support for the view that sound change is regular and that apparent irregularity is to be attributed to other processes.

(25)

	PIE	Modern English	Modern English
a.	**pətḗr*	*father*	*paternal*
	**mātḗr*	*mother*	*maternal*
b.	**bhrā́tēr*	*brother*	*fraternal*

(26)

	PIE	Latin	Latin derived adjective
	**pətḗr*	*pater*	*paternālis*
	**mātḗr*	*māter*	*māternālis*
	**bhrā́tēr*	*frāter*	*frāternālis*
compare	**bhérō*	*ferō*	
	**bheydh-*	*fīdō*	
	…	…	

(The Classical Latin forms actually are *paternus, māternus, frāternus*. The forms in *-ālis* are later extensions.)

In cases like Engl. *father : paternal*, it is relatively easy to determine that the apparent irregularity in Grimm's and Verner's Laws is attributable to borrowing; for the differences between Latin and English are great enough to show which word goes back to which source. The situation is a little more complex if a borrowing has been made between more closely related languages, or between dialects of the same language. In many cases, however, even these can be detected.

An example is the following. In Old English, fricatives were voiceless in initial position. And this voiceless articulation is generally retained in Modern English; see (27a). In a small set of words, however, we find an apparently irregular voicing of OE *f* to *v*; see (27b). What is especially striking is that *fox* shows the regular treatment, but *vixen*, its original feminine form, has the voiced outcome. (Glosses in (27) are limited to cases where there has been significant semantic change.)

(27)

	Old English	Modern English
a.	*fǣtt*	*fat*
	feoh 'cattle, property'	*fee* 'payment for services'
	for	*for*
	fox [-ks]	*fox*
	seon	*see*
	... ...	
b.	*fæt* 'vessel, cup'	*vat* 'tub'
	fana 'flag'	*vane* 'device indicating wind direction'
	fyxin 'female fox'	*vixen* 'quarrelsome woman'
	seax [-ks] 'knife'	*zax* 'roofer's tool for cutting shingles'

The explanation for the divergent development in (27b) is that these forms are early borowings from Southwestern English dialects into the London-area dialect that was to become the basis for Modern Standard English. In the Southwestern dialects, which include the Somerset [zʌmərzet] dialect, fricatives

(including sibilants) were regularly voiced by the change formulated in (28). In this dialect area, then, we get not only *vixen,* but also *vox*, etc. (See also **10.2.1.**)

(28) [+ fric.] > [+ voice] / $ ___ V

There are, of course, other instance of initial voiced fricatives in Modern English, such as *vain* and *zeal*. Most of these are obvious borrowings. Thus, *vain* is from French and *zeal* from Greek via Latin and French. (An exception is the initial voiced fricative of *this, that, the,* etc. The fact that these forms quite commonly are unaccented or "clitic" gave rise to a special sound change that voiced consonants in unstressed environment; see **5.1.3.1**. The appearance of voiced fricatives in the stressed variants of these forms, then, is due to analogy.)

3.3.4 Fast speech, onomatopoeia, taboo

Analogy and borrowing are the most common nonphonetic sources for apparent irregularity. However, some more isolated cases of irregularity can result from other factors.

One of these is FAST SPEECH, a term that covers the phenomenon of less clearly articulated, "slurred" articulation found in accelerated forms of speech. (Note for instance the fast-speech pronunciation of Engl. *can I go?* as something like [ŋaygow], with velar nasal in initial position, something not permissible in ordinary English.) The term may also be used in reference to similar articulary reductions in "careless" or "tired" speech and the like.

By and large, fast-speech phenomena do not seem to have any lasting effect on linguistic change, which rather seems to take more careful, "normal" speech as its starting point. However, in certain expressions, especially in "politeness" terms such as those in (29), reductions highly reminiscent of fast speech are encountered quite frequently. One suspects that these forms are borrowings from fast speech into normal speech, and that the motivation for the borrowing may be something like the following. Although people want or need to be polite and therefore may use longer, more high-flown forms of address, they do not necessarily want to lose too much time in the process. Reduced, fast-speech versions of these longish polite forms, then, provide the ideal compromise.

(29) Engl. *madam(e)* (from Fr. *madame* 'my lady') > *ma'am*
It. *madonna* 'my lady' > *mon(n)a* (compare *Mona Lisa*)
Sp. *vuestra merced* 'your mercy' > *usted* 'you (honorific)'
Skt. *bhagavat-* 'gracious' > *bhavat-* 'you (honorific)'

In addition to "ordinary" vocabulary, most (perhaps all) languages have words which through their phonetic structure imitate sounds that we hear around us. Compare Engl. *bow wow, cockadoodledoo* : Germ. *wauwau, kikeriki*, etc. ONOMATOPOETIC vocabulary of this sort is often said to be impervious to sound change. Thus, ME *pīpen* (sound made by bird chicks) should by regular sound change have become NE *pipe* [payp]; instead, it is said, we find *peep* [pīp], with the onomatopoetic high vowel [ī] retained.

An alternative explanation would see in NE *peep* a replacement for expected *pipe*, made in order to reestablish the imitative fit between speech and animal sound. The motivation for the development, then, is imitative, not purely phonetic.

In many cases actual evidence shows this alternative analysis to be superior. For instance, in the case of ME *pīpen*, dictionaries do list its regular outcome *pipe* as a form of Modern English (now mostly limited to the expression *pipe up* 'suddenly speak up or make a noise'). True, *peep* is the more common variant, but that is to be expected if it is in fact an onomatopoetic replacement of inherited *pipe*. But even more common forms are *chirp* and *cheep*. These suggest that onomatopoetic forms can be created time and again, independent of what forms may have been used earlier.

Irregularities may also arise as the result of TABOO. Though languages may differ in what they consider to be too sacred – or too profane – to be uttered in polite company, all languages seem to have expressions that are considered taboo by their speakers. Nevertheless, speakers often feel an urge or a need to use these words anyway. A common solution to this dilemma lies in TABOO DISTORTION, a deliberate alteration of the segmental structure of a tabooed word. Examples from English are *doggone, (gosh) darn,* or *shoot*, as substitutes for well-known tabooed expressions.

The phonetic developments discussed in this section are substantially different from sound change, in its strict linguistic definition as not conditioned by non-phonetic factors. These developments are limited to particular forms that have particular meanings and functions. For instance, the changes leading to *ma'am* and *shoot* do not occur in similar linguistic forms that do not have these meanings and functions; so there is no change of *Adam* to *A'am* or of *bit* to *boot*.

3.4 Attacks on the regularity hypothesis

As noted in **3.2**, the regularity hypothesis of the neogrammarians was met by various attacks. Many of these were directed at the neogrammarian's "uniformitarian" assumption that analogy can operate at all stages of linguistic history, even in the "Classical" languages. But there were also objections that their doc-

trine disallows "obvious" linguistic relationships such as the one in (30), since the correspondences of Lat. *h* : Germ. *h* and Lat. *b* : Germ. *b* violate the predictions made by Grimm's Law – Lat. *h*, reflecting PIE **gh*, would have to correspond to Germ. *g*, and Lat. *b*, which can reflect both **bh* and **b* would have to correspond to either PGmc. **p* or **b*, which would come out as Germ. *f* or *b*; see (30').

(30) Lat. *habēre* : Germ. *haben* 'to have'

(30') PIE **ghab-* > Lat. *hab-ēre* : PGmc. **gap-* > Germ. *gaf(f)en**
ghabh-* > *hab-ēre* : **gab-* > Germ. *gaben

Significantly, objections like these keep cropping up in attacks on the neogrammarian position. It is therefore worth the effort to demonstrate that they are without proper foundation and moreover, in many cases, obscure important aspects of comparative linguistics and reconstruction.

As it turns out, for Lat. *habere* and Germ. *haben* there are perfectly good explanations that do not violate the regularity hypothesis. Moreover, there are parallels in other Indo-European languages for the semantic changes involved, plus evidence that Proto-Indo-European lacked a verb 'to have' but used alternative constructions to indicate possessorship.

Lat. *habere* can be phonetically related to Old Irish counterpart *gaba(i)m* by regular sound changes from a PIE source **ghabh-* or **ghab-*; but interestingly, the meaning of the Old Irish word, 'take, seize', differs from that of Latin, 'have'. Similarly, Goth. *haban*, if derived from earlier **hafán* by Verner's Law, can be phonetically related to Lat. *capere* 'take, seize'; and again, we have a semantic relationship 'have' vs. 'take, seize'. See (31).

(31) a. PIE **ghabh-* > Lat. *habēre* : OIr. *gaba(i)m* 'take, seize'
b. PIE **kap-V́-*) > PGms. **hafV́n*
> Germ. *haben* : Lat. *capere* 'seize'

Further parallels of phonetically regular correspondences between verbs meaning 'have' and verbs meaning 'take, seize' are found in Old Church Slavic and Lithuanian; and the Ancient Greek verb 'to have' corresponds by regular changes to words meaning 'hold (power over)'. See (32).

(32) a. OCS *iměti* 'have' : OCS *jęti* (root *em-*) 'take'
b. Lith. *turéti* 'have' : Latv. *turēt* 'hold', *tvert* 'take'
c. Gk. *ékhō* 'have' : PIE **seǵh-* 'hold (power over)' (Skt. *sah-*)

In fact, in all the early Indo-European languages that have a verb 'have', this meaning is secondary, and no common root can be reconstructed. Further, the Indo-European languages on the eastern and western periphery have no such verb, down to the present, but instead use constructions such as (33a). Even the earliest stages of Latin only use a construction of this sort, as in (33b); the use of *habere* is an innovation.

(33) a. Skt. ***mama*** *pustakam (asti)* 'the book is **of me**' = 'I have a book'
Hindi ***mere pās*** *kitāb hai* 'a book is **with me**' = 'I have a book'
Gaelic *tá leabhar* ***ag-am*** 'a book is **at me**' = 'I have a book'
b. Lat. ***mihi*** *liber est* 'a book is **to/for me**' = 'I have a book'

Equating Lat. *habere* and Germ. *haben*, thus, not only violates Grimm's Law and thereby the regularity hypothesis; it also obscures an important aspect of Indo-European comparative syntax, namely the use of structures like (33) to indicate possessorship.

A more sophisticated attack on the regularity hypothesis argues that an otherwise regular sound change may be blocked if it leads to the loss of important distinctions or may be sensitive to certain grammatical conditions that either block or favor it.

The first of these claims runs into a large amount of empirical counterevidence. For instance, the important distinction between *can* and *can't* is commonly lost in American English connected speech, both being pronounced as [kæ̃n], and listeners will ask *Do you mean you can – or you can't?*, resorting to a hyper-articulated pronunciation. Another, famous, counterexample is found in southwestern Gallo-Romance varieties, where Lat. *gallus* 'rooster' and *cattus* 'cat' have, as the result of sound changes, come to be pronounced identically, as *gat*. In a rural setting, it is clearly important to know whether it is the rooster or the cat that has entered the hen house; and yet the changes took place. It was only after they had run their course that speakers began to resolve the problem by using different words for 'rooster', such as *vicaire* 'vicar'. See also **8.4.3**.

The notion of "grammatical conditioning" of sound change is similarly problematic. True, there are many apparent examples, such as the fact that the loss of final *-i* in Latin (and other Indo-European languages) took place in verbs with fewer restrictions than in nouns. While in nouns, *i*-loss was restricted to words with at least two syllables preceding the final *-i*, in verbs there was no such restriction; see (34). However, it is difficult, if not impossible, to find a plausible reason for why verbs, as a morphological category, should behave differently from nouns in as mundane a change as final *i*-loss. Moreover, a perfectly good explanation in terms of regular sound change is possible, if we consider that Latin (and

early Indo-European in general) was a verb-final language, that in well-formed utterances verbs therefore are not only sentence-final but also utterance-final, that utterance-finality is notoriously the weakest position in the utterance, and that changes such as weakening and loss are therefore especially likely to affect utterance-final verbs. See **5.6.8** for further discussion.

(34) a. Nouns

	**animali*	>	*animal*	'animated'
vs.	**mari*	>	*mare*	'sea'
	**pedi*	>	*pede*	'by foot'

b. Verbs

	**esti*	>	*est*	'is'
	**eyti*	>	*it*	'goes'
	**weniti*	>	*uenit*	'comes'

3.5 Conclusions and outlook

This chapter has demonstrated that many apparent counterexamples to the neogrammarian regularity hypothesis can be shown not to be real counterexamples, but to be explainable either through reformulation of sound changes and/or additional sound changes, or through processes not conditioned by purely phonetic factors that are inherently irregular, such as fast-speech phenomena in "politeness" terms, onomatopoeia, taboo, analogy, and borrowing.

Here as elsewhere, then, we may extrapolate from the known to the unknown and conclude with the neogrammarians that all apparent irregularities can be explained in this fashion.

As the discussion in Chapter 15 shows, the latter conclusion needs to be modified to some degree. Even with such modification, however, sound change turns out to be overwhelmingly regular.

Moreover, the neogrammarian regularity hypothesis has proved to be enormously fruitful, however accurate it may be. It forces linguists to look for explanations of apparent irregularities, by trying to establish non-phonetic explanations or better sound change formulations. Either way we learn more about the history of a given language and about the nature of linguistic change in general than if we accept a perspective that does not expect regularity in sound change.

More than that, the overwelming regularity of sound change is fundamental for historical and comparative linguistics. It is only because of this regularity that we can establish linguistic relationships such as that between the different Indo-European languages or between different stages of the same language. Con-

sider the easily recognizable similarities in the actual Indo-European correspondences of Figure 3.1. If sound change did apply in random fashion, differently for each different word and for each segment, in each different language, we might expect correspondences such as those in Figure 3.2. Given such data, a claim that the languages are related would be preposterous.

Sanskrit	Greek	Latin	Old English		PIE
trayaḥ	*treîs*	*trēs*	*þrīe*	'three'	**treyes*
tad	*tó*	*(is-)tud*	*þæt*	'that'	**tod*
takṣati	*téktōn*	*teksō*	*þeoks*	'cut, build(er)'	**tetḱ-*
tanoti	*teínō*	*ten-d-ō*	*þennan*	'stretch out'	**ten-*
tr̥ṣyati	*térsomai*	*torreō*	*þyrrian*	'dry, thirst'	**ters-/tr̥s-*

Figure 3.1: Actual early Indo-European correspondences.

Sanskrit	Greek	Latin	Old English	
thīr	*derye*	*sire*	*trīr*	'three'
thad	*thod*	*har*	*dar*	'that'
haskiti	*tetkān*	*satkō*	*þahs*	'cut, build(er)'
thinithi	*sarā*	*sardū*	*darar*	'stretch out'
hriyadi	*tlaroai*	*tulseū*	*surrior*	'dry, thirst'

Figure 3.2: Counterpart of Figure 3.1, with random application of possible sound changes. (The data in this Figure were created by taking the PIE reconstructions in Figure 3.1 as input and applying up to six different outcomes for each segment in each language (including no change), with the choice determined by casting a die.)

The regularity of sound change, thus, proves to be not only the best hypothesis about linguistic change but also foundational for historical and comparative linguistics.

4 Sound change and its phonological implications

Sound change, as defined by the neogrammarians, is conditioned entirely by phonetic factors (or more accurately, not conditioned by nonphonetic linguistic factors). However, as structural linguists on both sides of the Atlantic realized around the middle of the 20th century, sound change may have important repercussions in the PHONOLOGICAL STRUCTURE of languages. Conversely, aspects of phonological structure may affect sound change; see e.g. **5.2.4** and especially **5.5**. Most important in this respect is the notion of CONTRAST, for which see **2.4** above.

4.1 Subphonemic change; merger and split

The most straightforward type of change is one that merely changes the features of a given segment, without impinging on its contrastive identity. For instance, parts (1b) and (1c) of the reformulated version of Grimm's Law (repeated below) have been argued to be "mere changes in pronunciation" that do not affect phonological structure. Where previously, say, *d* and *dh* contrasted with each other, Proto-Germanic still has a contrast – between *t* and *d* ~ *ð*. See (2) below for a minimal pair, and see Illustration 4.1 for a diagrammatic representation of the developments. (Here as elsewhere in this chapter, ≠ indicates a phonological contrast and ~ allophonic variation; solid lines refer to developments that change contrast; broken lines represent developments or synchronic variation at the "subphonemic" or "allophonic" level.)

(1) (Reformulated) Grimm's Law

a. [+ stop, - voice] > [+ fric.] / [-obstr.] ___

b. [+ stop, + voice] > [- voice]

c. [+ stop, + asp.] > [+ voice, - asp., (± fric.)]

(2)

a.	PIE	**dō*	≠	**dhō-*
b.	PGmc.	**tō*	≠	**dō-*
hence	OE	*tō* 'to'	≠	*dōn* 'to do'

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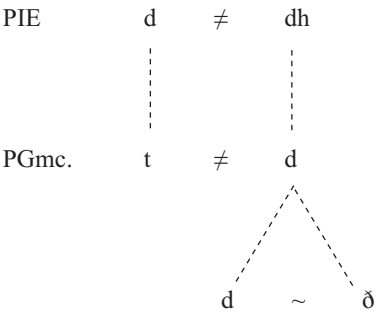

Illustration 4.1: Subphonemic split.

Below the level of contrast, things are more complex. Not only has the pronunciation of the segments changed, but the Proto-Germanic outcomes of the PIE aspirates have undergone differentiation into stop and fricative allophones. The term SPLIT has been introduced to refer to such processes of differentiation.

Just the opposite of this allophonic split is brought about by the West Germanic change of **ð* to *d* (see example (19) in Chapter 3). That change eliminates the allophonic variation within the phoneme /d/; see (3) and Illustration 4.2 below. This converse of split has been called MERGER.

(3)

PGmc.	*fadar* [**-ð-**]	*dō-* [**d-**]	*dēdiz* [**dēð**iz]
OE	*fæder* [**-d-**]	*dōn* [**d-**]	*dǣd* [**dǣd**]
	‘father’	‘do’	‘deed’

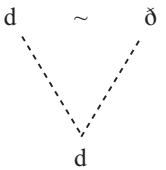

Illustration 4.2: Subphonemic merger.

4.2 Phonological merger and split

All of the changes so far examined in this chapter are SUBPHONEMIC and do not affect phonological structure. No old contrast is lost, and no new contrast is introduced. (Some linguists would accept this interpretation only for the allophonic split and merger, but would consider parts (1b) and (1c) of Grimm’s Law to be pho-

nologically significant since they entail a radical change in the feature system. The problem with this position is that it is not always clear where to draw the line between "radical" and "less radical" feature-system changes.)

Many changes do affect the phonology of a given language by eliminating old contrasts or introducing new ones; that is, there are PHONOLOGICALLY SIGNIFICANT mergers and splits. It is these developments that are usually referred to by the unmodified terms "merger" and "split". (Changes like the ones in Illustrations 4.1 and 4.2, then, are specifically labeled as "allophonic merger" and "allophonic split".)

For instance, the change of PGmc. **z* to *r* (see example (18) in Chapter 3) obliterated the contrast between these two segments, and **z* and **r* "merged" into a single phoneme /r/; see (4) and Illustration 4.3.

(4)

PGmc.	**aiz* -	≠	**air* -	
OE	*ār*	=	*ār*	
	'metal'		'messenger'	

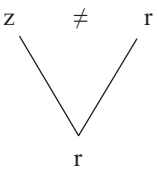

Illustration 4.3: Phonological merger.

Merger can come about by more complex developments. Consider change (5) below (= Chapter 3, example (20)). As a consequence of its application (and of the change of earlier **β* to *v)*, the Proto-Germanic contrast between **f* and **b* was eliminated in noninitial position. Compare the data in (6) and the left side of Illustration 4.4. The right side of Illustration 4.4 maps out the developments from the purely phonetic point of view and shows that phonological and phonetic developments do not necessarily coincide.

(5)

$$[+\text{ fric}] > \begin{cases} [+\text{ voice}] \;/\; \begin{bmatrix}-\text{ obst.}\\ +\text{ voice}\end{bmatrix} \_\_\_ \begin{bmatrix}-\text{ obst.}\\ +\text{ voice}\end{bmatrix} \\ [-\text{ voice}] \;/\; \_\_\_\,\# \end{cases}$$

(6)

PGmc.	Old English	
**wulf-*	*wulf*	'wolf'
**wulfōs/z*	*wulvas*	'wolves'
**hōf-*	*hōf*	'hoof'
**hōfōs/z*	*hōvas*	'hooves'
**grōβō-*	*grōve*	'groove'
**hlaiβ-*	*hlāf*	'bread'
**hlaiβōs/z*	*hlāvas*	'loaves of bread'
**kalβ-*	*cealf*	'calf'
**kalβizō*	*cealvru*	'calves'

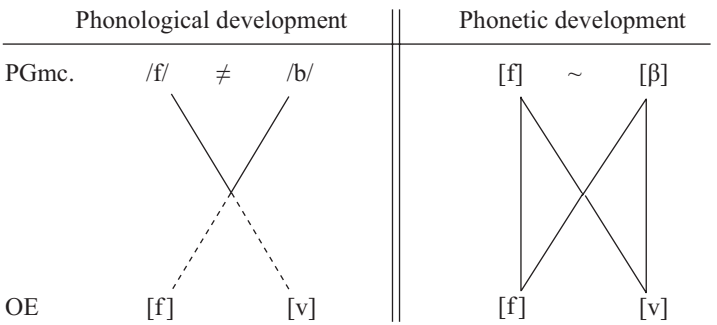

Illustration 4.4: Phonological merger (and subphonemic split).

As Illustration 4.4 shows, although the two segments merge phonologically, the result is not an invariant segment as in (4) and Illustration 4.3, but a phoneme with two allophonic members. Moreover, disregarding the small phonetic adjustment from **β* to *v,* the change does not eliminate any old phonetic segments or result in any new ones; only the distribution of the segments is altered.

The full phonological implications of change (5) are even more complex. Recall that in Proto-Germanic, [β] alternated with [b] as allophones of the same phoneme /b/. And that phoneme clearly was in contrast with /f/; see (7a). Now, since the allophone [β] merged with /f/, but initial [b] did not, the phoneme /b/ underwent a process of (phonological) split, as in Illustration 4.5, since /b/ continued to contrast with /f/ as shown by (7b).

(7)

a.	PGmc.	**banō(n)*	≠	**fanō(n)*
b.	OE	*bana*	≠	*fana*
		'murderer'		'flag, vane'

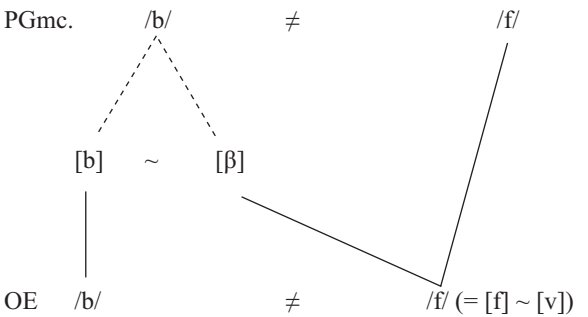

Illustration 4.5: Combined merger and split (1).

Disregarding the low-level, allophonic variation of OE /f/, Illustration 4.5 represents a classical pattern in which (phonological) split comes about. An originally allophonic split becomes contrastive through merger of one of the allophones with another phoneme. A variant of this development is part (1a) of Grimm's Law. As (8) and Illustration 4.6 show, when PIE stops occurred after obstruent and thus did not qualify for (1a), they merged with the outcome of (1b). The pattern in Illustration 4.6 differs from in Illustration 4.5 in that there is no evidence for invoking an intermediate stage with allophonic split. The split and the merger may well have been simultaneous. However, what is shared by both of these scenarios is the fact that split comes to be phonologically significant as the result of a merger, in a pattern of COMBINED MERGER AND SPLIT.

(8)

PIE	*t̲rno-	*stā-	*d̲rno-
PGmc.	*þurna-	*stand-	*turna-
OE	þorn	standan	torn
	'thorn'	'stand'	'anger'

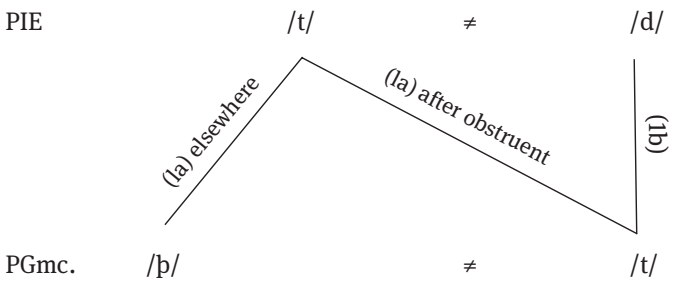

Illustration 4.6: Combined merger and split (2).

A second way in which split can come about is similar to the scenario in Illustration 4.5 in that it starts out with low-level allophonic alternation. However what triggers the split is not merger, but LOSS OF THE CONDITIONING ENVIRONMENT or TRIGGER for the allophonic alternation.

This development can be illustrated by the fate of the Old English [f] ~ [v] alternation along the way toward Modern English. As a result of the changes in (5) and of the merger and split developments in Illustrations 4.4 and 4.5, the allophones of Old English /f/ had (roughly) the distribution in (9); see the examples in (9). Significantly, at this point [v] can occur only if a sonorant or vowel precedes and follows; its occurrence is CONDITIONED by these sonorants or vowels. Subsequently there was a change in the conditioning environment, with many vowels and sonorants lost in final syllables. As a consequence, [f] and [v] come to both occur in word-final environment; their relative distribution ceases to be predictable; they have come to be in contrast. Compare the forms in (10) and the diagram in Illustration 4.7.

(9) OE /f/

[v] / { [+ son.] / V } ___ { [+ son.] / V }

[f] elsewhere, including / [+ son.] ___ #

(10)

a.	OE	[līf]	[līvlič]	[livyan]
b.	NE	[layf]	[layvlī]	[liv]
		‘life’	‘lively’	‘to live’

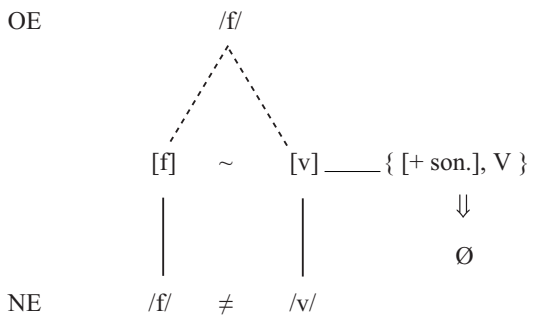

Illustration 4.7: Split through loss of conditioning environment.

Note that for split through loss of conditioning environment to occur, it is sufficient that only a part of the conditioning environments are lost; it is not necessary that all of them are lost. For instance, in the split of Old English /f/, conditioning

environments were lost in forms like *livyan* > *live*, but not in *līflic* > *lively* and other forms like it. Moreover, [v] becomes a different phoneme not only in forms like *live* (where it has ceased to be predictable), but also in forms like *lively* where the conditioning environment for the voicing has remained. For this and other scenarios it is useful to state that they obey the PHONEMIC PRINCIPLE, in the sense that all instances of a given phoneme (in this case /f/) behave the same way for the purposes of a particular change.

Beside loss, a simple CHANGE IN CONDITIONING ENVIRONMENT can also result in split; for an example see the Indo-Aryan palatalization of (labio)velars in **5.1.5**.

4.3 Merger and split vs. contraction and diphthongization

The concepts merger and split are easily confused with contraction and diphthongization, respectively. Some discussion of their differences therefore seems appropriate. While merger and split refer to the phonological effects of sound changes, contraction and diphthongization refer to subtypes of sound change, irrespective of their effects on the phonology.

Once we consider the phonological effects of contraction and diphthongization, things typically become quite complex. Take for instance the diphthongization of OHG *ī* to NHG [ai]. As (11) shows, this change resulted in a merger with old *ei* which likewise became [ai]. However, note that [ai] is bisegmental. The merger therefore was not just with [ai], but at the same time "partly" with [a] and "partly" with [i], either of which can occur by itself, as in [mat] 'worn out' and [mit] 'with'.

(11)	OHG	līb	(h)leib
	NHG	[laip]	[laip]
		'body'	'loaf (of bread)'

Not much seems to be gained by trying to devise diagrams that will take care of the complexities of such changes.

4.4 Neutralization

When Proto-Germanic /z/ and /r/ merged in most of Germanic, the synchronic result was the elimination or NEUTRALIZATION of their contrast. For synchronic phonology, such cases of complete merger or neutralization are less interesting than partial, environmentally restricted mergers. Consider the case of German "final devoicing" in (12) and (13), which leads to the merger of the voiced obstru-

ents with their voiceless counterparts in final position, but leaves the contrast unaffected elsewhere. See the final vs. medial outcomes in (13).

(12) [+ obstr.] > [- voice] / ___ #

(13)	OHG	*rad*	*rades*	*rāt*	*rātes*
	NHG	[rā**t**]	[rā**d**əs]	[rā**t**]	[rā**t**əs]
		'wheel'	'of the wheel'	'advice'	'of the advice'

Neutralizations of this type are interesting, in that they cause difficulties for the "phonemic principle". While the distribution of voiced vs. corresponding voiceless stops clearly is unpredictable and contrastive in (initial and) medial position, it is completely predictable word-finally. Only the voiceless alternant of obstruent pairs like /t/ : /d/ can occur in this environment. Some linguists therefore invoke a special concept, the ARCHIPHONEME, to refer to the segments that occur in the position of neutralization. This permits them to capture the native speakers' feeling that, say, the [t] of [rāt] 'wheel' and the [d] of [rādəs] 'of the wheel' are "the same sound". Other linguists insist on identifying the word-final [t] of [rāt] as an allophone of the phoneme /t/ and to account for its relationship to the [d] of [rādəs] as a MORPHOPHONEMIC ALTERNATION, involving not just phonology but also morphology (in terms of the final word boundary). Whatever the merits of the arguments on either side, historical linguistics offers many changes that are consonant with the second view – the phonemic principle; but there are also some cases where the environmentally restricted neutralization of a given contrast – the ARCHIPHONEMIC PRINCIPLE plays a decisive role. (See e.g. **5.1.1.3** and **5.2.4**.)

Neutralization can take a variety of synchronic shapes. For example, just like German, Sanskrit has word-final neutralization of obstruent voicing. However, instead of a unitary voiceless representation of the archiphoneme, Sanskrit offers an alternation between voiced and voiceless. Word-final obstruents are voiceless before pause or if a voiceless obstruent follows, they are voiced elsewhere; see (14) and (15). Note that voiced and voiceless stops contrast elsewhere, as in (16). Put differently, the realization of the archiphoneme varies, depending on what follows across the word boundary; but the contrast remains neutralized in both sets of environments.

(14)

$$[+\text{ obst.}] \quad > \quad [-\text{ voice}]\ /\ \_\_\_\ \#\ \left\{\begin{matrix}[-\text{ voice}]\\ \#\#\end{matrix}\right\}$$

(15)	Skt.	*vāk ##*	:	[vā**k**]	'speech'
		vāk # tasya	:	[vā**k**tasya]	'that one's speech'
		vāk # asya	:	[vā**g**asya]	'his speech'
		yug ##	:	[yu**k**]	'yoking'
		yug # tasya	:	[yu**k**tasya]	'that one's yoking'
		yug # asya	:	[yu**g**asya]	'his yoking'

(16)	Skt.	*kirati* 'scatters'	:	*girati* 'swallows'
		akra 'banner'	:	*agra* 'front, foreward'

There are also examples of synchronic neutralization that are not due to historical merger. Consider the distribution of English liquids after [s]. While /r/ and /l/ clearly are in contrast in most other contexts (cf. *row* and *low*), only [l] can occur after [s]. Hence *slang, slam, slime* are acceptable English words; *srang*, sram*, srime** are not. (Historically, this situation arises from the fact that PIE **sr* changed to **str* in Proto-Germanic, while **sl* was retained.)

4.5 Contrast and "margin of safety" – Polarization

While neutralization in effect eliminates the phonetic realization of contrast in certain contexts, there is a countervailing tendency to increase the phonetic realization of contrast where it is not neutralized. Important in this context is the insight, reached already by 19th-century phoneticians, that in actual speech the pronunciation and corresponding acoustic realization of phonemes is highly variable, scattered around what may be considered the norm. As a consequence, the actual realization of phonemes may partly overlap. See the simplified presentation in Illustration 4.8.

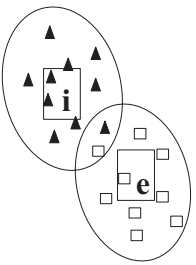

Illustration 4.8: Scattering and (minimal) overlap of phonetic realizations.

As long as the overlap is relatively minor, no harm is done. Major overlap, however, would decrease the acoustic distinctiveness between different phonemes and make more difficult the listener's task of distinguishing between the phonemes and hence between the words they distinguish. A common response to this potential difficulty is to make the MARGIN OF SAFETY between different phonemes more robust by either increasing the articulatory and acoustic space between them (POLARIZATION, also known as DISPERSION) or by eliminating the contrast (through merger).

A well-known case is that of the Spanish sibilants. Through various earlier developments, late Medieval Spanish acquired the sibilant system on the left side of example (17), with a phonetically minimally differentiated triple distinction between dental, alveolar, and palatal. In Castilian Spanish, the distinction was polarized, with dental [s̪] shifting to interdental [θ] and palatal [š] to velar (or even uvular) [x]. Moreover, in the Alto Castellano dialect, alveolar [s] is further differentiated by being retracted to a "cacuminal" or retroflex position. In Andalusian varieties, by contrast, the distinction between [s̪] and [s] was eliminated in favor of either a dental or an alveolar pronunciation, and [š] shifted to [x] or [h]. See the outcomes on the right side of (17). Similar differentiations in highly "crowded" sibilant systems are found in Slavic, especially in northwestern varieties; but the differentiations involve different features, such as "velarization" (produced by the tongue back approaching the velar position during the sibilant phonation).

(17)	*bazo* [-s̪-] 'spleen'	>	Cast. [baθo]	Andal.	[baso̪]/[baso]
	baso [-s-] 'I base'		[baso]/[baṣo]		
	baxo [-š-] 'low'		[baxo]/[baχo]		[baxo]/[baho]

5 Types of sound change

Understanding the nature of sound change is fundamental to doing historical and comparative linguistics. The major focus of much of the traditional literature on historical-comparative linguistics therefore has been working out the sound changes that differentiate related languages or dialects, or different stages of the same language or dialect. The following discussion aims to provide as comprehensive an overview as possible of the different types of sound change. Section 5.1 deals with the bulk of regular conditioned sound changes – assimilation, weakening (or lenition), loss, timing and control, and what may unite these processes. Typically irregular changes (dissimilation, metathesis, and distant assimilation) are covered in 5.2. Sections 5.3 and 5.4 deal with other kinds of segmental sound changes. Section 5.5 examines structural factors that may influence sound change. Finally, 5.6 considers suprasegmental changes, including tonogenesis, accent shifts, and changes conditioned by other aspects of prosody.

5.1 Typically regular sound changes

Most of the processes covered in this section belong to the category of regular sound change. In fact, among conditioned sound changes, these processes make up the bulk of regular change. (Changes that are not normally regular are specially noted.)

5.1.1 Assimilatory changes

The process of assimilation can be illustrated by the history of the word *assimilation*. It is derived from Lat. *assimilāre* 'to assimilate', which in turn is composed of a prefix *ad-*, a root or stem *simil/simul-* 'similar, like', and a verbal suffix *-āre*. In *assimilāre*, then, the final *-d* of the prefix has ASSIMILATED, i.e. become similar in pronunciation, to the initial *s-* of *simil-*; cf. (1).

(1) s > d / ___ s

5.1.1.1 General discussion and Greek-letter variables

In *assimilāre*, the process of assimilation has gone all the way, making the assimilated segment identical in pronunciation to the following *s*. Such a development is referred to as COMPLETE assimilation. Note that the outcome of this process is a double or

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GEMINATE *ss*, with roughly twice the length of a single *s*. (If in languages like English, *assimilation* is pronounced with a single [s], that results from a separate process of degemination, for which see **5.1.2** and **5.1.3.2**.)

Assimilation can also be PARTIAL, affecting only a subset of a given segment's features. Consider the Sanskrit data in (2) and the Latin examples in (4). The respective sound changes are formulated in (3) and (5). As can be seen, in these cases the assimilation of stops to following stops affects only their voicing, and the assimilation of nasals to following stops is limited to their place of articulation. Otherwise, these segments retain their original identity. (The data given here are synchronic, but the corresponding changes did take place at some point in history.)

(2) Skt.
yu-ŋ-g- + *-dhi*	:	*yuŋgdhi*	'yoke (IMPV.2SG)'
yu-ŋ-g- + *-tha*	:	*yuŋktha*	'you yoke (PRS.2PL)'
ri-ŋ-k-+ *-dhi*	:	*riŋgdhi*	'thou (IMPV.2SG)'
ri-ŋ-k- + *-tha*	:	*riŋktha*	'you leave (PRS.2PL)'

(*yu-ŋ-g-* and *ri-ŋ-k-* have "nasal infixes" and are derived from the roots *yug-* and *rik-* respectively.)

(3) [+ stop] > [α voice] / ___ [+ stop, α·voice]

(4) Lat.
in- + *primere*	:	*i**m**primere*	'impress'
+ *tendere*	:	*i**n**tendere*	'intend'
+ *congruere*	:	[i**ŋ**koŋgruere]	'be incongruous'

(5) N > [α place] / ___ [+ stop, α place]

Examples (3) and (5) introduce a new notational convention, the so-called GREEK-LETTER VARIABLE notation. This convention is useful for many assimilatory processes, and is also employed in the notation of other changes. The more straightforward application of the notation is that in (3). Here the symbol α is understood to indicate that the output of the change has the same feature value ('+' or '–') as the conditioning environment. The notation in (5) extends this notation to place of articulation, which is not statable in terms of a simple '+' or '–'. (5) can be read as indicating that the output of the change has the same feature for place of articulations as the conditioning environment.

The changes examined so far are examples of ANTICIPATORY assimilation. The segment that is uttered earlier "anticipates" part or all of the pronunciation of a later segment. The converse development, in which the pronunciation of a segment "perseveres" into the domain of a following segment, is referred to as PERSEVERANT

assimilation. Examples of this type of assimilation are given in (6) and (7). (6) illustrates complete perseverant assimilation, (7) partial perseverant assimilation.

(6) PGmc. **wulnō* > **wullō* > OE *wull* 'wool'
**fulnaz* > **fullaz* > *full* 'full'

(7) Skt. *ātman-* > MIAr. dial. *atpan-* 'self'

Note that though anticipatory and perseverant assimilation are both common processes, anticipation occurs more frequently than perseverance.

Many linguists instead use the terms "progressive" and "regressive" assimilation. But different scholars do not agree on what should be called progressive, and what regressive. Some refer to the changes in (6) and (7) as regressive, since the assimilating segment "goes back" to the pronunciation of an earlier segment; others call it progressive, since the impetus for the assimilation "goes forward" from the earlier to the later segment. The terms anticipatory and perseverant have the advantage of being unambiguous.

In addition to anticipatory and perseverant assimilations, there may also be cases of MUTUAL assimilation, in which both involved segments become similar to each other; see e.g. (8). However, changes of this type can always be conceived of as proceeding in two steps, one involving anticipatory, the other perseverant assimilation. In fact, (7) shows that some Middle-Indo-Aryan dialects only have the perseverant assimilation in the cluster [tm]. It is therefore entirely plausible that (8) came about by the two-step development in (9).

(8) Skt. *ātman-* > MIAr. dial. *appan-* 'self'

(9) a. Perseverant assimilation

$$\begin{bmatrix} +\text{stop} \\ \\ +\text{nas.} \end{bmatrix} > \begin{bmatrix} -\text{nas.} \\ \\ \alpha\text{ voice} \end{bmatrix} / \begin{bmatrix} +\text{stop} \\ -\text{nas.} \\ \alpha\text{ voice} \end{bmatrix} \text{——}$$

Hence: *ātman-* > *atpan-*

b. Anticipatory assimilation

[+ stop] > [α place] /_____ [+ stop, α place]

Hence: *atpan-* > *appan-*

All the examples so far cited have been instances of CONTACT assimilation. The two segments involved were in immediate contact with each other. However, developments like the ones in (10) show that DISTANT assimilation is also a possibility.

(10)	pre-Lat.	*$penk^we$	>	*$kwenk^we$	>	Lat. *quīnque*	'five'
		*$pek^wō$	>	*$kwek^wō$	>	*coquō*	'I cook'
		*$perk^wus$	>	*$kwerk^wus$	>	*quercus*	'oak'

In consonants, such distant assimilation is rarely regular. Example (10), to be sure, might be considered regular, in that all three words that qualified did undergo the change. But one may wonder whether three items are sufficient to establish a pattern of "regularity". At any rate, examples like (11) are much more typical. Here we find distant consonant assimilation in (11a), but no such change in the phonetically very similar words of (11b). Distant assimilation therefore is covered under typically irregular changes in **5.2.3**.

(11)	a.	Lat.	**līrium*	> *līlium* 'lily'
	b.		*dēlīrium*	(unchanged) 'confusion, madness'
			rīdiculāria	(unchanged) 'antics'

The situation is different for vowels, in so far as assimilation between vowels in neighboring syllables is quite common, and regular. (Compare the discussion of umlaut and vowel harmony in **5.1.1.2** and **5.1.1.3**.) That is, it appears as if for vowel assimilations, intervening consonants "do not count", and that vowels in neighboring syllables behave as if they were in contact.

Note however that examples of regular vowel assimilation in neighboring syllables appear to be limited to certain features, especially vowel height, frontness, and rounding. Length assimilation does not seem to be attested as a regular process. Moreover, assimilations between vowels that are not in neighboring syllables seem to be just as irregular as distant consonant assimilation.

Like other sound changes, assimilation often is highly restricted in scope, as in the case of (6) above, a change limited to *n* after *l*. But as (3) and (5) show, the scope of assimilation may be much broader, in terms both of the class of segments affected by the change and of the conditioning environment. For instance, (5) applies to all nasals before all stops. In some languages, assimilation may go even farther and affect the entire phonological system. Consider the development of consonant clusters from Old Indo-Aryan (represented by Sanskrit) to Middle Indo-Aryan (represented by Pali). Where Sanskrit permitted a large variety of HETERORGANIC clusters like *pt, tp, mn*, almost all Pali clusters had to be HOMORGANIC; that is, their members had to share the same place of articulation. In fact, with the exception of nasal + stop clusters, they were not just homorganic, they were geminates. This change in structure was brought about by a number of individual assimilatory processes, only some of which are given in (12) below. (Here the feature [manner] is used to indicate manner of articulation, i.e. [stop] vs. [fric.] vs. [nasal] etc. The changes are given in

strict order, with a. taking precedence over b., b. over c., etc.) For examples see (13), and note that what is transliterated as *v* is most likely a semivowel-like approximant [β] and functions like a glide.

(12) a. r > [α manner, β place] // [- syll., α manner, β place]

b. [+ son, - syll] > [α manner, β place] / [- syll., α manner, β place] ____

c. [+ stop, + nas.] > [- nas., α place] / [+ stop, - nas., α place] ____

d. [+ stop, - nas.] > [α place] / ___ [+ stop, - nas., α place]

(13)

	Sanskrit	Pali	
a.	*bhartum*	*bhattuṁ*	'to carry'
	patra-	*patta-*	'wing, leaf'
	sahasra-	*sahassa-*	'thousand'
	varṣati	*vassati*	'it rains'
	ārya-	*ayya-*	'noble'
b.	*pakva-*	*pakka-*	'cooked'
	aśvēṣu	*assēsu*	'among horses'
	namasyati	*namassati*	'honors'
c.	*svapna-*	*soppa-*	'sleep'
	nagna-	*nagga-*	'naked'
d.	*bhaktum*	*bhattuṁ*	'divide'
	prāptum	*pattuṁ*	'obtain'
	labdha-	*laddha-*	'taken'

Some assimilations are quite common in the languages of the world. These include voicing assimilations in obstruents; place-assimilations of nasals before stops; height, frontness, and rounding assimilations in vowels. Although there are considerable differences in detail and in the scope of application, most of

these differences traditionally have not been considered important enough to be recongized as special subvarieties of assimilation.

A few subtypes of assimilation, however, have received special attention. The most commonly recognized changes of this type are umlaut, vowel harmony, and palatalization. The reason for according special treatment to umlaut and vowel harmony seems to be that they tend to have a broad effect on the vowel system. Umlaut, moreover, frequently leads to new phonological contrasts and thus introduces new phonemes into a given language. And so does palatalization.

These and a number of other special types of assimilation are covered in **5.1.1.2** to **5.1.1.7**.

5.1.1.2 Umlaut

Umlaut, as traditionally defined, involves the assimilation of a class of vowels to a set of [+ vocalic] segments in an immediately neighboring syllable. Because it affects a class of vowels, it tends to have a broad effect on the vowel system. Moreover, umlaut leads to phonological split and frequently introduces new phonemes. (Vowel assimilations not meeting this definition sometimes are also referred to as umlaut. But here as elsewhere, it seems preferable to reserve a special term to designate a special phenomenon.)

Perhaps the most classical examples of umlaut come from the early Germanic languages (except Gothic); see (14). Depending on the nature of the assimilation, we can distinguish between FRONTING, BACKING, RAISING, and LOWERING umlaut. (14a) and (14b) offer examples of the fronting of a [– front] vowel to [+ front], by partial assimilation to a following front vocalic segment. Example (14b) exhibits raising (and fronting) of [+ lo, – hi] to [– lo, – hi] under the influence of the following [– lo, + hi] vowel; (14c) exemplifies lowering of high to mid vowels under the influence of a following low vowel; and (14d) indicates backing (as well as some raising) conditioned by the following back (and high) *u*-vowel.

(14)		PGmc.	Old English	
	a.	**fulljan-*	*fyllan*	‘fill’
		**kūiz*	*cȳ* [kȳ]	‘cows’
	b.	**gastiz*	*giest* [yest]	‘guest’
	c.	**nistã*	*nest*	‘nest’
		**guldã*	*gold*	‘gold’
	d.	pre-ON	ON	
		**sakū*	*sǫk* [sɔk]	‘thing’
		**allum*	*ǫllum* [ɔllum]	‘all (DAT.PL)’

In the majority of cases, the outcome of the change is a new phoneme. And in all cases there has been a phonemic split. Consider e.g. example (15), which shows that these developments result from a classical scenario of split through loss of conditioning environment. (As usual, split does not require the loss of all conditioning environments; it is sufficient that some of the conditioning environments are lost.)

(15)	PGmc.	*kūiz 'cows'		*kūz	'cow'
	Allophonic assimilation	[kūiz]		-----	
	Loss of conditioning environment	[kū]		(-----)	
	OE	*cȳ* [kū]	vs.	*cū* [kū]	

The Old Irish developments in (16) and (17) are similar, except that in this case the umlauted vowels merge with other, preexisting phonemes. At first sight it might appear that there was no split at all, but just a merger of old /e/ and /i/. Consider the complete agreement in vocalism between (17a) and (17a') on one hand, and between (17b) and (17b') on the other. But note that the changes in (16) did not affect /e/ and /i/ before the old mid vowel [e]; see (17c) and (17c'). In this environment, /e/ and /i/ continued to contrast and remained distinct phonemes. The alternation between [i] and [e] in (17a)/(17a') and (17b)/(17b') therefore is morphophonemic, not allophonic. See the summary in (18).

(16) a. $\begin{bmatrix} \text{V.} \\ -\text{lo} \\ -\text{hi} \end{bmatrix} > [+\text{hi}] \;/\; \_\_\_\_ C_0 \begin{bmatrix} \text{V} \\ \\ +\text{hi} \end{bmatrix}$

b. $\begin{bmatrix} \text{V} \\ -\text{lo} \\ +\text{hi} \end{bmatrix} > [-\text{hi}] \;/\; \_\_\_\_ C_0 \begin{bmatrix} \text{V} \\ \\ +\text{hi} \end{bmatrix}$

(17)		pre-OIr.	OIr.	
	a.	**meli-*	*mil* [m^{y}il^{y}]	'honey'
		**berū*	*-biur* [b^{y}ir^{w}]	'I carry'
	b.	**ekwas*	*ech* [ex]	'horse'
	c.	**bereti*	*berid* [b^{y}er^{y}əð^{y}]	'(s)he carries'

(17')	a.	**wirī*	*fir* [f^{y}ir^{y}]	'man (GEN.SG)'
		**wirū*	*fiur* [f^{y}ir^{w}]	'to a man (DAT.SG)'
	b.	**wiras*	*fer* [f^{y}er]	'man (NOMS.SG)'
	c.	**ibeti*	*ibid* [iβ^{y}əð^{y}]	'(s)he drinks'

(18)

	*/ ___ C_0 e	*/ ___ C_0 i/u	*/ ___ C_0 a
*e >	e	i	e
*i >	i	i	e

The whole issue of Old Irish umlaut is complicated by the fact that the conditioning environments for changes (16a) and (16b) were lost. It is therefore not entirely clear whether it was merger or loss of the conditioning vowels that was responsible for the splits.

Note further that crosslinguistically, umlaut most frequently is conditioned by final syllables. The reason seems to be that word-final position is a highly conducive environment for the loss of segments, including vowels – the most common conditioning environments for vowel assimilations. Final vowel loss therefore is a natural trigger for making vowel assimilations unpredictable. This certainly is the explanation for Germanic umlaut. That also Old Irish umlaut is accompanied by final vowel loss therefore is probably not just an accident.

The fact that the outcome of umlaut is synchronically unpredictable has important consequences. Like many other morphophonemic alternations, the interchange between umlauted and unchanged vowels easily gives rise to analogical developments which, given enough time, tend to eliminate these alternations. In English, for instance, synchronically "live" alternations resulting from umlaut are limited to a few irregular noun plurals (cf. *man : men, woman : women, mouse : mice, louse : lice, goose : geese, tooth : teeth*.) See also Chapter 6.

5.1.1.3 Vowel harmony

Vowel harmony, like umlaut, is an assimilatory process affecting classes of vowels and conditioned by vocalic segments in neighboring syllables. As a consequence, some linguists do not distinguish these two processes.

However, if we examine the classical cases of vowel harmony, we find that this phenomenon is sufficiently different from umlaut to merit separate treatment. One of the most striking things about vowel harmony is that in most of the languages that have it, the pattern of vowel alternation goes back to prehistoric times, perhaps even to the proto-language. As a consequence, it is very difficult to find examples in which vowel harmony originates. Linguists therefore are commonly content with giving synchronic data like the Finnish ones in (19), or similar ones from Hungarian or Turkish.

(19) Finn. *suoma-l**a**inen* 'Finnish' : *venä-l**ä**inen* 'Russian'
*tuoli-ll**a*** 'on the chair' : *pöydä-ll**ä*** 'on the table'

A closer examination of the Finnish data illustrates some of the principles of vowel harmony. As a live process, Finnish vowel harmony operates on the boxed-in vowels in Illustration 5.1. It is triggered by the vocalism of roots and affects the vocalism of suffixes in the following fashion. Vowels of the same height alternate with each other, assimilating to the feature [± front] of the root vocalism. Note that while *i* and *e* do not undergo vowel harmony, they serve as triggers for the process; see the data in (20). (But note that when the root has a combination of *i* and *e* with non-front vowels, the root "counts" as having [– front] vocalism throughout; compare the form *tuoli-lla* in (19).)

[+ front]		[- front]	
[- round]	[+ round]	[- round]	[+ round]
i	y [ü]		u
e	ö		o
ä [æ]		a	

Illustration 5.1: Alternations in Finnish vowel harmony.

(20)		Root	Adessive	Allative	Partitive	
	a.	*maa-*	*maa-lla*	*maa-lle*	*maa-ta*	'land'
	b.	*pää-*	*pää-llä*	*pää-lle*	*pää-tä*	'head'
	c.	*tie-*	*tie-llä*	*tie-lle*	*tie-tä*	'road'

In this (slightly idealized) system, the frontness or backness of the alternating suffix vowels is entirely predictable in terms of the root vocalism. That is, although the vowels participating in the alternation are in contrast elsewhere, that contrast is neutralized in suffixes, with the appearance of round or non-front alternants being LOCALLY PREDICTABLE (in terms of the root vocalism).

In this respect, then, vowel harmony differs from umlaut, which is characterized by split, not neutralization. One suspects that it is this difference that is responsible for the very different behavior of these two processes of systematic vowel assimilation.

This suspicion is supported by two reportable cases where the origin of a vowel harmony system can be observed, one being Old Norse, the other Eastern Andalusian dialects of Spanish.

As the result of various historical processes, Old Norse at a certain point had the short-vowel systems in (21). Whereas stressed, initial root syllables had (at least) a five-way contrast (21a), unstressed syllables had a reduced, three-point

system (21b), in which the contrast between high and mid vowels was neutralized. As often happens in such neutralized systems, there was a fair amount of dialectal and chronological variation in the realization of the non-low archiphonemes /i : e/ and /u : o/. The *i* and *u* of the transcriptions of (21) and (22) are found in some of the early Norse dialects; but early Icelandic has *e* and *o*, only to change them to *i* and *u* in later Old Icelandic.

(21) a. Stressed:

i		u
e		o
	a	

b. Unstressed:

i		u
	a	

(22)

Common Old Norse	Old Norwegian dialects	
rīki	*rīki*	‘country’
kvæðði	*kvæðe*	‘poem’
urðu	*urðu*	‘they became’
nāmu	*nāmo*	‘they took’

In a subgroup of the Old Norwegian dialects, high and mid unstressed vowels came to synchronically alternate with each other, with vowel height determined by the vocalism of the preceding root; see (22). We can account for this development by the sound change in (23). But significantly in the present context, this change led to the development of a system of high/mid vowel harmony out of an earlier system in which the contrast between high and mid vowels had been neutralized. Moreover, the result of change (23) was a locally predictable alternation between high and mid vowels. That is, the contrast remained neutralized in this unstressed position. All that changed is the exact realization of the non-low archiphonemes. (See **4.4** for the terminology employed here.)

(23) $\begin{bmatrix} V \\ \\ -lo \end{bmatrix} > [\alpha\ hi] \ / \ \begin{bmatrix} V \\ \\ \alpha\ hi \end{bmatrix}\ C_0 \_\_\_\_$

Like the rest of Spanish, Eastern Andalusian dialects started out with a system in which mid vowels had allophonic variation between upper-mid [e] and [o] in open syllables and lower-mid [ɛ] and [ɔ] in checked syllables. See the left column in (24). Weakening of final *s* to *h* and subsequent loss, as in (25), made the distribution between upper-mid and lower-mid vowels unpredictable, as

shown in the middle column of (24). However, in non-final syllables, the old distribution still prevailed, as in [o$tro] vs. [mɔn$te], and thus was locally predictable. In the Eastern Andalusian dialect, then, essentially the same phenomenon occurred as in Old Norse – the realization of the archiphonemes /e : ɛ/ and /o : ɔ/ was changed so that the distribution of their members was sensitive to the relative height of the following vowel, rather than to syllable structure.

(24)

General Spanish	pre-East.Andal.	East. Andal.	
lo [lo]	[lo]	[lo]	'the (SG)'
los [lɔs]	[lɔØ]	[lɔ]	'the (PL)'
ve [be]	[be]	[be]	'(s)he sees'
ves [bɛs]	[bɛØ]	[bɛ]	'you see'
otro [o$tro]	[o$tro]	[o$tro]	'other'
otros [o$trɔs]	[o$trɔØ]	[ɔ$trɔ]	'others'
monte [mɔn$te]	[mɔn$te]	[mon$te]	'mountain'
montes [mɔn$tɛs]	[mɔn$tɛØ]	[mɔn$tɛ]	'mountains'

(25) s > h > Ø / ___ #

The examples of Old Norse and Eastern Andalusian suggest that neutralization and the notion of archiphoneme may play an important role in the development of vowel harmony. What is less certain is whether they play (or played) the same role in the origination of all vowel harmony systems.

Part of the problem arises from the question of how to define vowel harmony as distinct from umlaut and/or from other cases of vowel assimilations that are not limited to just one particular vowel in one particular context.

The classical definition of umlaut vs. vowel harmony is that the target of umlaut becomes unpredictable because of a change in the conditioning environment while the trigger for vowel harmony is stable and therefore, vowel harmony remains predictable (in the domain in which it applies). Moreover, umlaut is typically triggered by suffix vowels, which tend to be affected by final loss and similar developments; vowel harmony typically is triggered by roots, which are stable.

But even the case of Eastern Andalusian vowel harmony presents a counter-example to these generalizations, since in this case vowel harmony is triggered by the suffixes and affects the root.

Even many classical systems of vowel harmony do not fully live up to the generalizations above. In Finnish, for instance, vowel harmony is synchronically predictable in the majority of cases; but there are exceptions. Recall that the

front vowels *i* and *e*, if they do not cooccur with [- front] vowels, trigger the front-vowel realizations in alternating suffixes; see (20c). In examples (26) and (27), however, we find that some forms derived from the same roots have this regular pattern of vowel harmony, others do not. The system, therefore, is not completely predictable.

(26)	Root	Adessive	Partitive	
	meri-	*mere-ll**ä***	*mer-t**a***	'sea'
	veri-	*vere-ll**ä***	*ver-t**a***	'blood'

(27) *teh-* 'do' *teh-d**ä*** 'to do' *teh-d**a**s-* 'factory'

The terms umlaut and vowel harmony thus refer to two extreme points in the development of systematic vowel assimilations. Intermediate situations can be characterized in terms of how much they deviate from these cardinal points.

See **5.2.4** for consonant harmony.

5.1.1.4 Contraction

Taken by itself, the common process of vowel CONTRACTION, as in (28), can be described as assimilatory. This becomes especially clear if we ignore the issue of syllabicity, as well as differences in transcription and analysis, and follow the transcriptional convention of "mora notation" (**2.1.9**) in (28'). Diphthongs here are written as sequences of non-identical vowels, and long vowels as the equivalent of two identical short vowels. Example (a), then, is a case of anticipatory assimilation; (b), one of perseverance; and (c), one of mutual assimilation.

(28)						
	a.	PIE	**bheyd-*	>	PGmc.	**bīt-* 'bite'
	b.	PGmc.	**bait*	>	OE	*bāt* '(s)he bit'
	c.	PIE	**aydho-*	>	Skt.	*ēdha-* 'fire wood'

(28')					
	a.	PIE	**bheid*	>	**biit-*
	b.	PGmc.	**bait*	>	*baat*
	c.	PIE	**aidho-*	>	*eedha-*

Treating contraction as assimilatory might suggest analyzing its logical opposite, diphthongization, as a dissimilatory process, but as the discussion in **5.2.1.1** shows, there are difficulties with such an analysis. At the same time, it is not clear

whether because of these difficulties an assimilatory explanation of contraction should be rejected.

Some linguists distinguish between "monophthongization" and "contraction". The latter term tends to be reserved for the conversion of heterosyllabic vowels into monosyllabic long monophthongs or diphthongs. The elimination of "hiatus" between heterosyllabic vowels certainly is an interesting phenomenon; but as section **5.3.12** shows, hiatus is eliminated by a variety of different processes. Among these are contraction (as defined in this book) and "gliding". A distinction between monophthongization and contraction therefore does not seem to be required.

5.1.1.5 Palatalization and labiovelarization

The term palatalization crops up in many linguistic discussions, but in an almost bewildering variety of uses. Thus, any of the developments in (29) may be referred to as palatalization.

(29)	a.	pre-BS	**minyō*	>	Lith. *miniù* [m^{y}in^{y}ú] 'I remember'
				>	OCS *mĭn'ǫ* [m^{y}ĭn^{y}õ] 'I remember'
	b.	Lat.	*centum* [k-]	>	It. *cento* [č-] 'hundred'
			faciō [k-] > PRom. *fakyo*	>	It. *faccio* [-čč-] 'I make'
	c.	Lat.	*centum* [k-]	>	Fr. *cent* [s-] 'hundred'
	d.	PIE	**k^{w}e*	>	Gk. *te* 'and'

In some sense, this varied usage is justified; for all of the above examples have undergone the process of palatalization. In (27b)–(27d), however, that process has been followed – and obscured – by other changes that commonly apply to palatalized segments. This section investigates the nature of these changes, and the process of palatalization that gives rise to them, as well as the related process of labiovelarization.

Palatalization consists in the partial assimilation of a consonant to a neighboring front vocalic segment. Phonetically, this assimilation manifests itself in a nonsegmental [y]-like onglide and/or offglide. The usual notation in this book is as in (27a) above, with superscript ^{y} following the palatalized consonant. After vowel, however, palatalized consonants also tend to have a [y]-like onglide. A more accurate transcription of Lith. *miniù* therefore would be something like [(^{y})m^{y}i^{y}n^{y}ú]. However, unless specifically required, the simpler transcription with ^{y} following the palatalized consonant will be used in this book, as in [m^{y}in^{y}ú].

Labiovelarization similarly is brought about by the partial assimilation of a consonant to a neighboring back and rounded vocalic segment, is phonetically

characterized by a non-segmental [w]-like on- or offglide, and is transcribed by means of a superscript ^{w} after the labiovelarized consonant.

Like umlaut, palatalization and labiovelarization become phonologically significant through some other process that makes them unpredictable. Most usually, this process consists in the loss of some of the conditioning environments. But other scenarios are possible. The examples in (30)–(32) represent the most common developments leading to distinctive palatalization. In (30), the loss of postconsonantal [y] makes palatalization unpredictable. In (31), final vowel loss leads to contrastive palatalization and labiovelarization. And in (32), a merger of non-high vowels, formulated in (33), brings about a contrast between palatalized and nonpalatalized velars before *a*-vowels.

(30)

pre-Balto-Slav.		Allophonic stage		Contrastive stage
**minyō*	>	**[m^{y}in^{y}yō]	>	Lith. *miniù* [m^{y}in^{y}ú] ‘remember’
			>	OCS *mĭn’ǫ* [m^{y}ĭn^{y}ō] ‘remember’

(31)

pre-Old Irish		Allophonic stage		Contrastive stage		
**wiras*	>	**w^{y}eras*	>	**w^{y}er*	> *f^{y}er*	‘man’ (NOM.SG)
**wirī*	>	**w^{y}ir^{y}ī*	>	**w^{y}ir^{y}*	> *f^{y}ir^{y}*	‘man’ (GEN.SG)
**wirū*	>	**w^{y}ir^{w}ū*	>	**w^{y}ir^{w}*	> *f^{y}ir^{w}*	‘man’ (DAT.SG)

(32)

pre-Sanskrit		Allophonic stage		Contrastive stage	
**penke*	>	**penk^{y}e*	>	**pank^{y}a*	> *pañča* ‘five’
**gegome*	>	**g^{y}egome*	>	**g^{y}agāma*	> *ǰagāma* ‘went’

(33) $\begin{bmatrix} \text{V} \\ -\text{hi} \\ -\text{lo} \end{bmatrix} > [+\text{lo}]$

Just like other assimilatory processes, palatalization and labiovelarization are more commonly anticipatory than perseverant. In addition, a number of other limitations and tendencies need to be mentioned.

First, of the two processes, labiovelarization seems to be less common. Moreover, once introduced, it seems to be less stable and to be lost more easily than palatalization. Thus, the palatalization of Old Irish has survived to the present day, even if in changed form. Labiovelarization, however, disappeared so early that some linguists have doubted that it ever existed. See also **5.3.5**.

Secondly, palatalization tends to have certain restrictions. It is most frequently found with velars and/or dentals, i.e. with “lingual”, tongue-articulated consonants; for instance, change (32) is limited to velars. It is more rarely introduced